

International Conference on Research in Education and Science

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Antalya/TURKEY

PROCEEDING BOOK

EDITORS

Assoc. Prof. Dr. Ismail SAHIN
Assist. Prof. Dr. S. Ahmet KIRAY
Dr. Selahattin ALAN

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INDEX

REACTIVE POWER OPTIMIZATION FOR REDUCING ACTIVE POWER LOSS IN A DISTRIBUTION NETWORK.....	1
HOW CAN TECHNOLOGY HELP SOCIAL WORK STUDENTS TO LEARN ABOUT WORKING WITH EXPERTS BY EXPERIENCE?.....	8
TELEOPERATION OF AN EDUCATIONAL MOBILE MINI-ROBOT VIA WIRELESS COMMUNICATION	13
ONLINE VIDEO GAMES AND YOUNG PEOPLE.....	22
EFFECT OF LOCATION OF THIN FILMS DEPOSITED BY APCVD INSIDE THE REACTOR ON ITS OPTICAL AND ELECTRICAL PROPERTIES	34
STRATEGY FOR THE ACCELERATION AND EXTENSION ON ECONOMIC DEVELOPMENT OF ENDE DISTRICT THROUGH TEACHING PROGRAM BY GRADUATE IN THE OUTERMOST, THE BORDER AND THE RETARDED REGION (<i>SM3T</i>).....	39
THE SELECTED TEACHERS' COMPETENCE AND A SENSE OF PROFESSIONAL IDENTITY AMONG MEDICAL STUDENTS.....	46
A NEW METHOD FOR DETERMINING LOWER DENSITY LAYER IN PROSPECTION OF HYDROCARBON.....	56
GOLD PROSPECTION USING MAGNETIC, VLF AND SP METHODS IN THE KISLADAG PROVINCE OF WESTERN TURKEY.....	64
CONTRIBUTION TO THE STUDY OF THE EFFECTIVENESS OF <i>TRICHODERMA ATROVIRIDE</i> AND <i>TRICHODERMA LONGIBRACHIATUM</i> AGAINST <i>BOTRYTIS CINEREA</i> PERS. AGENT OF GRAY MOULD ON GRAPES	71
LEARNING COMPUTER HARDWARE BY DOING: ARE TABLETS BETTER THAN DESKTOPS?.....	80
A CFD ANALYSIS REGARDING THE DEVELOPMENT STAGE OF A PIPE FLOW.....	90
REINFORCEMENT OF PROFESSIONAL TEACHER CANDIDATES IN INDONESIA THROUGH PROGRAM OF GRADUATES EDUCATING IN THE FRONTIER, OUTERMOST, AND DISANVANTAGED REGIONS (SM-3T).....	99
EXPLOITATION OF WHEY BY MODIFIED STRACH HYDROPOPHYL E1442 TO OBTAINING HIGH ADDED VALUE TO FRUIT DRINKS.....	106
THE ESTIMATION OF LIVE WEIGHT FROM BODY MEASUREMENTS USING MULTIPLE REGRESSION METHOD (STEPWISE) AND CREVAT METHOD IN OULED DJELLAL BREED IN THE HIGHLANDS OF SETIF (ALGERIA).....	110
ANTIOXIDANT ACTIVITY OF <i>OLEA EUROPAEA L.</i> LEAVES	117
RATIONAL MYTHOS AND IRRATIONAL LOGOS: THE NARRATIVE FORMS OF CHINA'S 'SHE' PEOPLE.....	118
PSYCHOMETRIC PROPERTIES OF THE UNDERGRADUATE CLINICAL EDUCATIONAL ENVIRONMENT MEASURE UCEEM IN IRANIAN NURSING AND MIDWIFERY STUDENTS.....	131
SEASONAL VARIATIONS IN SPERM PRODUCTION, TESTICULAR SIZE, SERUM TESTOSTERONE LEVELS OF OULED-DJELLAL RAMS RAISED IN SOUTHEAST ALGERIA (BISKRA).	136
THE IMPORTANCE OF REASON OF TOURISM EDUCATION IN IRANIAN SCHOOLS.....	144
INTERPRETING TABOO: DEVELOPING AND EVALUATING STRATEGIES IN THE TRANSFER OF TABOO LANGUAGE.....	150
THE STATE OF SCHOOL AND UNIVERSITY TEACHER SELF-DEVELOPMENT IN GEORGIA.....	160
FAMILY QUALITY OF LIFE: CONTENT VALIDITY OF A TOOL FOR FAMILIES OF ADULTS WITH INTELLECTUAL DISABILITIES IN BRAZIL	170

CONTENT VALIDITY OF THE QUESTIONNAIRE ON LEARNING EXPERIENCES ASSOCIATED WITH THE USE OF DIGITAL INFORMATION AND COMMUNICATION TECHNOLOGIES BY UNDERGRADUATES.....	179
ADVANTAGES AND LIMITATIONS OF USAGE OF OPEN EDUCATIONAL RESOURCES IN SMALL COUNTRIES	187
THE IMPACT OF COOPERATIVE LEARNING IN TEACHING COMMUNICATION SKILLS FOR PSYCHIATRIC NURSING STUDENTS	193
HOW CAN CULTURALLY DIVERSE CHILDREN PRESERVE THEIR MOTHER TONGUE AND ENHANCE THEIR SECOND LANGUAGE SKILLS-A STUDY OF FAMILY INVOLVEMENT FOR CHINESE MIGRANTS IN NORTHERN IRELAND.....	197
TRANSLATION OF NIS EXPERIENCE TO THE MAINSTREAM SCHOOLS	207
MIMO CONTROL FOR NONLINEAR SYSTEM.....	216
OPTIMAL INJECTED CURRENT CONTROL FOR SHUNT ACTIVE POWER FILTER USING ARTIFICIAL INTELLIGENCE.....	224
THE INFLUENCE OF SALT AND FREE AMINO ACID CONTENT OF <i>TERASI</i> ON THE SENSORY CHARACTERISTICS OF CHILI SAUCE ADDED WITH <i>Terasi</i>	236
ASK A QUESTION. SAFE A LIFE: SUICIDE PREVENTION EFFORTS ON COLLEGE CAMPUS	244
INNOVATION IN ASSESSMENT AND FEEDBACK: ENHANCING THE STUDENT EXPERIENCE.....	250
A NEW TECHNIQUE FOR SHORT TERM SOLAR RADIATION PREDICTION	256
DETERMINING THE HETEROGENEITY OF STAKEHOLDERS PREFERENCES TOWARDS DESIRABLE KEY COMPETENCES OF JOB APPLICANTS: A CONJOINT ANALYSES APPROACH.....	262
MHD FLOW OVER A PERMEABLE STRETCHING/SHRINKING SHEET OF A NANOFUID IN POROUS MEDIUM WITH SUCTION/INJECTION.....	273
INVESTIGATION OF FRACTURE PROPERTIES OF $\pm 55^\circ$ FILAMENT WINDING CNT REINFORCED CTP COMPOSITE PIPE	286
COMMUNICATIONS MANAGEMENT IN SCHOOL.....	291
THE ROLE OF TEACHERS' ATTITUDES TOWARD TECHNOLOGY INTEGRATION IN SCHOOL	302
COMPARISON OF SOME EXECUTION TIME MEASUREMENT CODES ON UBUNTU	312
ATTITUDES OF BIOENGINEERING AND MECHANICAL ENGINEERING STUDENTS TOWARDS ENGLISH : A CASE OF KAFKAS UNIVERSITY.....	316
A STUDY TO ANALAYSE THE MAIN FACTORS ON THE SUCCESS OF WOMEN ENTREPRENEURS IN NORTH CYPRUS	323
IMPROVED PERMUTATION OPTIMIZATION TECHNIQUE FOR SOLVING QUADRATIC ASSIGNMENT BASED PROBLEM	327
CONCEPTIONS OF PUBLIC SCHOOL TEACHERS ON INDISCIPLINE.....	336
SCIENCE EDUCATION: BEYOND A LIMINAL UNDERSTANDING OF KNOWLEDGE PRODUCTION/DISSEMINATION.....	342
TRANSFORMATION MANAGEMENT IN INFORMATICS AND ITS EDUCATION	348
A RESEARCH ON MOTIVATION DEFICENCY FOR ASSOCIATE DEGREE STUDENTS OF HIGHER EDUCATION.....	358
DETERMINATON OF THE VALUES USED IN THE TURKISH COURSEBOOKS OF 4TH GRADES IN 2014-2015 ACADEMIC YEAR OF	369
AN INVESTIGATION ON PROSPECTIVE PRE-SCHOOL TEACHERS' PERCEPTION OF THEIR ADEQUACY ON TEACHING FOREIGN LANGUAGES TO YOUNG CHILDREN.....	376
THE USE OF DIFFERENT GEOPHONE PLATES ON PAVEMENT AND GRAVELED SURFACES	385

REMOTE CONTROLLED WALKING ROBOT	395
PROBLEMS OF EDUCATION AND PROPOSALS FOR SOLUTIONS IN VOCATIONAL SCHOOLS	406
A CONTENT ANALYSIS OF THE PROBLEMS ENCOUNTERED BY TURKISH SMES IN ACCESSING BANK LOANS	411
EFFECT OF VARIOUS FIBER MIXTURE COMBINATIONS ON THE MECHANICAL PROPERTIES OF POLYAMIDE 6 AND 6.6 MATERIALS	416
PRODUCING NEW MUSICAL COMPOSITIONS USING MARKOV CHAINS AND CLASSIFYING THE COMPOSITIONS	426
ARTIFICIAL NEURAL NETWORK AND FUZZY NEURAL NETWORK METHOD USING ANKARA WEATHER FORECAST	434
GEOMETRY OF FIVE-AXIS MOTION OF TWO-PARAMETER FAMILIES OF SPHERES IN MINKOWSKI SPACE	442
ANALYSIS OF EPISTEMOLOGICAL BELIEFS OF TEACHERS BASED ON SOME VARIABLES	452
DETECTION OF DISORDERED REGIONS IN PROTEINS WITH MACHINE LEARNING METHODS ..	461
PARAECOLOGICAL" PARADIGM IN EDUCATION TO COMBAT ENVIRONMENTAL PROBLEMS ..	465
INVESTIGATING OF TEACHER CANDIDATES' SELF REGULATED LEARNING IN TERMS OF EMOTIONAL INTELLIGENCE AND EPISTEMOLOGICAL BELIEFS	475
OPTIMIZATION OF BRASS CONTENTS FOR BEST COMBINATION OF THERMAL CONDUCTIVITY AND TRIBOLOGIAL BEHAVIOR OF BRAKE LININGS COMPOSITES	485
SMART CITY: DEFINITIONS, COMPONENTS, AND APPLICATION	492

REACTIVE POWER OPTIMIZATION FOR REDUCING ACTIVE POWER LOSS IN A DISTRIBUTION NETWORK

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ABSTRACT: In this paper the reducing of power losses in a real distribution network are subjected by solving reactive power optimization problem. The problem solving has been carried out with real data at Ereğli Distribution Network; it is a section of Turkish electric distribution network managed by *MEDAŞ*. The network includes 9 feeders, 1323 buses (containing 0.4 kV, 15.8 kV and 31.5 kV buses) and 1311 transformers. Genetic algorithm (GA) is proposed for this problem and solution is compared with novel method. The optimization with GA is obtained minimum active power losses and optimal voltage margin by optimal value of reactive power. The formulation contains are detailed constraints including the bus reactive power limits, voltage limits and capacitor boundary.

Key words: genetic algorithm, newton-raphson, reactive power optimization, active power loss, distribution network

INTRODUCTION

The growing electricity demand is increased power losses, which is affected power quality and economic operation of systems. In power systems, reactive power optimization (RPO) can effectively reduce the active power losses which have a substantial effect on secure and economic operation of power system [1-3]. Reactive power optimization means all these reactive adjusting methods, which can be found through optimizing some certain variables when structure parameters and load situation of system are given, and under the premise that when all specified constraint condition is satisfied, which can make one or more performance indexes of system to reach optimization [4]. In the past, many conventional techniques such as dynamic programming [5], linear programming [6] and interior point methods [7] has been used to solve reactive power optimization problem.

In paper [8], author presented optimal reactive power planning based on a genetic algorithm which was applied to practical 51-bus and 224-bus systems. In paper [9], Weiwei *et al.*, proposed an improved genetic algorithm for reactive power optimization of power system and the mixing binary-real coding method and the algorithm's crossover operator were improved. An improved genetic algorithm combining sensitivity analysis was advanced in [10], by this algorithm crossover and mutation operator were improved, which applied to reactive power optimization for Shaoguan power network. In paper [11] assessment of different Genetic Algorithm selection, crossover and mutation techniques in term of convergence to the optimal solution for single objective reactive power optimization problem is presented and investigated. Evolutionary computation techniques such as GA and PSO algorithms proposed for solving the nonlinear reactive power optimization problem and methods implemented to IEEE 30-bus and 118-bus systems.

In order to solve the problem, reactive power optimization method with using GA is presented in this paper, which reduces active power losses of distribution network through adjusting the variables. Three different cases dare discussed in this study; over load, normal load and low load. Results are compared with a classical analytic method. This study has been carried out in Ereğli Distribution Network in Konya, Turkey, which managed by *MEDAŞ*.

In this paper, sections were listed as follows; section 2, a distribution system was clarified, section 3, the problem was formulated and preferred methods were explained, section 4, the simulation and analysis results were reported, In section last section, conclusions are given.

POWER SYSTEM STRUCTURE

Distribution network includes 9 feeders, 1323 buses and 1311 transformers and their capacitor banks. In the distribution system, the voltage level is 36 kV, and in the secondary of transformers is 0.4kV. Each transformer has own capacitor bank connected to secondary. Figure 1 shows one part of the distribution network.

In 2013, the load of network was measured approximately 91.93 MW. Moreover, in the network, annual total electrical energy loss of system is about 12 percent. The active power losses compose a large amount of total power of system.

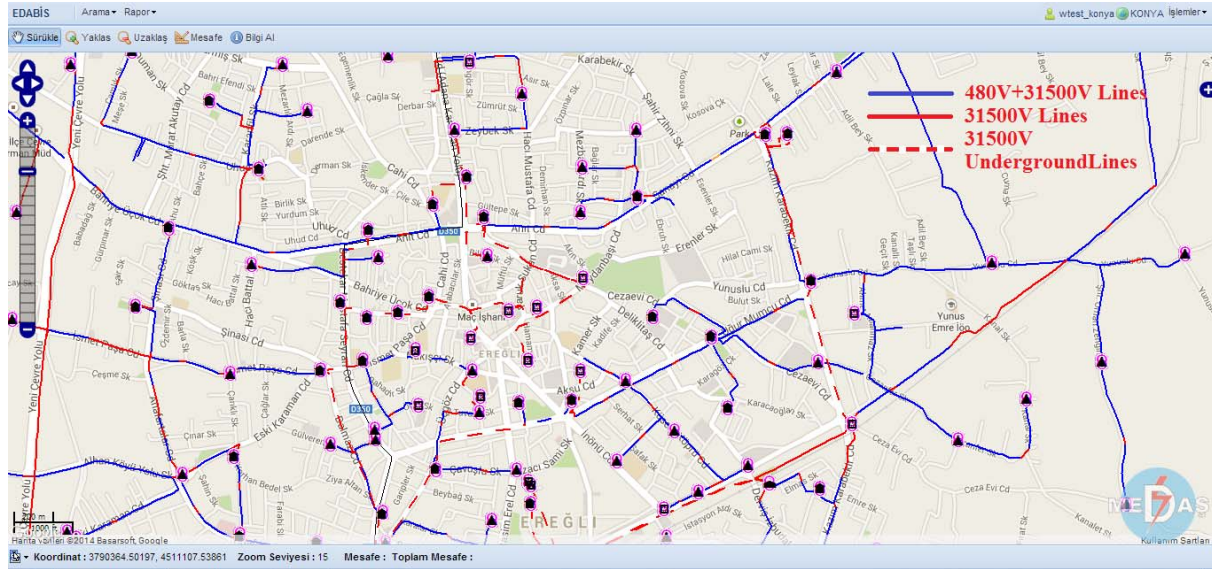


Figure 1. A part of Ereğli Distribution Network.

PROBLEM FORMULATION

The RPO is one of the methods to improve the steady state performance of power systems with regard to one or more objective function while providing several equality and inequality constraints. Objective function is represented by the real power loss of power systems. The balance of active power and reactive power, have to be preserved when computing objective function, obtained with constraint functions [13,14]. The objective function can be expressed as;

$$\min F = P_{loss} + w_1 \cdot \sum (\Delta Q_{Ci})^2 + w_2 \cdot \sum (\Delta Q_i)^2 + w_3 \cdot \sum (\Delta V_i)^2 + \frac{1}{M_i} \quad (1)$$

Where;

$$P_{loss} = \sum_{i=1}^{N_i} [g_{h(i,j)} \cdot (V_i^2 + V_j^2 - 2 \cdot V_i \cdot V_j \cdot \cos(\theta_{i,j}))] \quad (2)$$

Equality and inequality constraints can be formulated as in the following;

$$P_i - P_{loadi} - V_i \cdot \sum_{j=1}^n [V_j \cdot (g_{h(i,j)} \cdot \cos(\theta_{(i,j)}) + b_{h(i,j)} \cdot \sin(\theta_{(i,j)}))] = 0 \quad (3)$$

$$Q_i + Q_{C_i} - Q_{loadi} - V_i \cdot \sum_{j=1}^n [V_j \cdot (g_{h(i,j)} \cdot \sin(\theta_{(i,j)}) - b_{h(i,j)} \cdot \cos(\theta_{(i,j)}))] = 0 \quad (4)$$

$$P_{imin} \leq P_i \leq P_{imax} \quad (5)$$

$$Q_{imin} \leq Q_i \leq Q_{imax} \quad (6)$$

$$Q_{C_{imin}} \leq Q_{C_i} \leq Q_{C_{imax}} \quad (7)$$

$$V_{i,min} \leq V_i \leq V_{i,max} \quad (8)$$

Where;

N_i , number of nodes,

P_i , the active power of node i ,

Q_i , the reactive power of node i ,

P_{loss} , power loss of line,

P_{loadi} , the active power of load node i ,

$Q_{load,i}$, the reactive power of load node i ,

Q_{C_i} , shunt capacitor value of load node i ,

V_i , the voltage magnitude of node i

V_j , the voltage magnitude of node j

$g_{h(i,j)}$, conductance between node i and j ,

$b_{h(i,j)}$, admittance between node i and j ,

$\theta_{(i,j)}$, angle difference between node i and j ,

w_1 , penalty factor of capacitor reactive power limits,

w_2 , penalty factor of node on reactive power output over limits,

w_3 , penalty factor of node on voltage over limits,

M_i , reactive power margin.

Newton Raphson (NR) Method

The Newton-Raphson (NR) method is applied for solving a set of synchronous non-linear equations in an equal number of unknowns based on Taylor's series expansion for a function of two or more variables. The partial derivatives are written in a form of Jacobian matrix, which is a function of $N \times N$. If the functions have continuous first derivate in the neighborhood of the solution, the Jacobian is non-singular, and the initial approaches are close to the actual solution the Newton-Raphson algorithm will converge quadratically [15].

Implementing the NR method to power systems is defined as follows;

$$\begin{bmatrix} J1(i) & J2(i) \\ J3(i) & J4(i) \end{bmatrix} \cdot \begin{bmatrix} \Delta\theta(i) \\ \Delta V(i) \end{bmatrix} = \begin{bmatrix} \Delta P(i) \\ \Delta Q(i) \end{bmatrix} \quad (9)$$

Where

P , the real power,

Q , imaginary power,

V , the line voltage,

δ , the phase angle.

The update of algorithm can be shown in Equations (10,11), as follows;

$$x(i + 1) = \begin{bmatrix} \theta(i + 1) \\ V(i + 1) \end{bmatrix} = \begin{bmatrix} \theta(i) \\ V(i) \end{bmatrix} + \begin{bmatrix} \Delta\theta(i) \\ \Delta V(i) \end{bmatrix} \quad (10)$$

$$\begin{bmatrix} \theta(i + 1) \\ V(i + 1) \end{bmatrix} = \begin{bmatrix} \theta(i) \\ V(i) \end{bmatrix} - [J(i)]^{-1} \times \begin{bmatrix} \Delta P(i) \\ \Delta Q(i) \end{bmatrix} \quad (11)$$

The iteration continues while convergence is obtained, as given below;

$$\begin{bmatrix} \theta(i + 1) \\ V(i + 1) \end{bmatrix} - \begin{bmatrix} \theta(i) \\ V(i) \end{bmatrix} \leq \kappa \quad (12)$$

Genetic Algorithm (GA)

The Newton-Raphson (NR) method is applied for solving a set of synchronous non-linear equations in an equal number of unknowns based on Taylor's series expansion for a function of two or more variables. The partial derivatives are written in a form of Jacobian matrix, which is a function of $N \times N$. If the functions have continuous first derivate

GA is one of the methods to solve the optimization problems, which is started from various initial conditions [14]. GA is solved objective function for each new individual is generated by the individuals of previous population and the procedure is continued iteratively to achieve the optimal solution [16].

In GA, there are many coding ways to solve the problems of optimization, such as binary coding, permutation coding and real coding [16,17]. Binary coding has clear principles and easy operation characteristic. It puts a decimal number with a binary number and takes up bits increase, describing a more digits meticulous, equivalent to increase the search range, which can with the larger probability converge to the global optimal solution.

The number of bits, called gens can be calculated as in following;

$$2^{li} \geq \left\lceil \frac{X_{imax} - X_{imin}}{\varepsilon} \right\rceil + 1 \quad (13)$$

Where,

- X_{imax} and X_{imin} the upper and lower limits of variable i ,
- ε step length,
- 2^{li} decoding coefficient of gen i .

GA has three basic operators; selection, crossover and mutation. Selection operator is used to select best individuals of each population for new generation. It is provided by fitness proportionate selection, ranking and tournament selection. The crossover operator basically combines substructures of two parent chromosomes (gens) to produce new structures [18]. Single crossover and multiple crossovers are the methods of crossover. Single point crossover, two point crossover and other crossover method shown in Fig. 3.

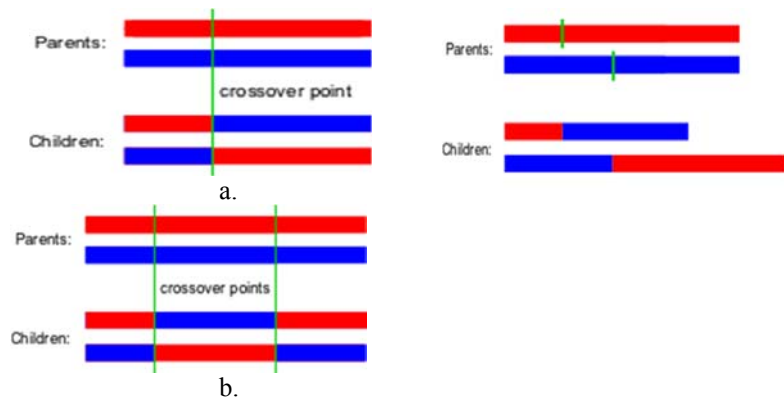


Figure 3. Crossover operation a. single point b. two point c. cut-add

The final operator is mutation. The mutation operator is used to mutate some chromosomes. The chromosomes are changed randomly by determined rate shown in Equation (15). The operation of mutation is shown in Figure 4.

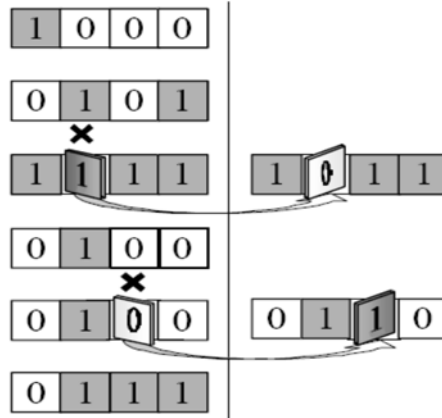


Figure 4. Mutation Operation

$$\frac{1}{Population\ Size} < MRate < \frac{1}{l} \quad (14)$$

After mutation, the new generation is complete and the procedure begins again to achieve the optimal solution while stop criterions have been occurred.

RESULTS OF SIMULATION AND ANALYSIS

In this study; GA is used to solve RPO for decreasing power loss in Ereğli Distribution Network. The computer software program has been developed in MATLAB environment. Variables are coded binary and tournament selection, single point crossover are used. The parameters of GA are given below. The objective function is given in equation 1 and the equality constraints and the inequality constraints are shown in Equations (4-8) for the solution

Generations = 1000,
Population Size = 20,
Crossover probability = 0.4,
Mutation Rate = 0.01,
Turnament size = 4.

The nominal voltages are set to between 0.9 pu and 1.1 pu. The maximum capacitor power of each bus is set to 0.1 MVA_r. The minimum and maximum limits of variables of power system are given in Table 1. ϵ is set to 0.0001 because of the changing of each capacitor's value. The number of gens of each variables calculated by the Equation (13). Thus, the number of gens has been found 11 bits for each variable; Q_i , Q_{ci} and V_i . Number of i is set by the number of transformers and their capacitor banks and here i is equal to 1311. After setting parameters, objective function are computed for initial population and minimum value are assigned to cost value. After this, software began the iterations. Then, by the selection operator, four individuals member of population in k th iteration are selected amount of size of tournament. In the crossover operator, each of these four individuals mated with each other to create the parents. By the crossover probability, first 5 gens of first one, provided by the *round* command of MATLAB, crossed with the last 6 gens of second one to generate first child. The last 6 gens of first parent crossed with the first 5 gens of the second parent to generate the second child. The other children are generated by the same way. In the end, random selected gens of each child are mutated. The number of gens is designated by the mutation rate. The new prepared individuals are added to population instead of their parents. The procedure continues until the stop criterion will provided. The objective function is computed in the each iteration to find minimum cost.

There are buses which have been installed and switched capacitors and the number of buses of 1311 are selected. The minimum and maximum limits of variables of power system are given in Table 1.

In the first case, load power of system is set to 91.93 MW. The minimum power loss is reduced to 2.0525 MW. In the second case, under the condition of overload, load power is set to 130 MW and the minimum power loss is reduced to 3.1030 MW. In the last case, under the condition of low load, load power is set to 70 MW and the minimum power loss is reduced to 1.8545 MW.

Table 1. The Limits Of Inequality Constraints

Variables	Min.	Max.
Q_i MVAR	0.0	0.2
Q_{ci} MVAR	-0.1	0.1
V_i (pu)	0.9	1.1

The results are compared to power system analysis with NR method. The minimum loss obtained by proposed method is less than the value computed in power flow analysis with NR method. The compared results are given in Table 2.

Table 2. Active Power Loss In Distribution Network

Case	Test System		
	Ereğli Network	NR	GA
1.	P_{loss} (MW)	2.6133	2.0525
2.	P_{loss} (MW)	3.8592	3.1030
3.	P_{loss} (MW)	1.9005	1.8545

CONCLUSION

In this paper, GA is preferred to solve RPO problem in Ereğli Distribution Network. Here, three different conditions are perceived for optimal installation and switching capacitor to the secondary of transformers in this distribution system. The network simulated and the problem solved on MATLAB software program. This method minimizes active power loss and so affects to system performance. On comparing, GA found active power losses lower than the values found by NR technique. Our future work will relate to control to set all parameters by the software based on algorithm in dynamic network, in this way the capacitors are switching according to changing of load reactive power.

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HOW CAN TECHNOLOGY HELP SOCIAL WORK STUDENTS TO LEARN ABOUT WORKING WITH EXPERTS BY EXPERIENCE?

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ABSTRACT: Biggs (1999) constructive alignment theory describes total synergy in the teaching and learning activities that we use namely: the curriculum itself, the environment in which students learn, the teaching methods and assessment processes. Within UK social work education the Standards for Education and Training as outlined by the regulatory body the Health and Care Professions Council (2009: 31) state: 3.17 Service users and carers must be involved in the programme

This paper will concentrate upon how the approach to course design and delivery has changed within the BA and MA Social Work programmes at The University of Cumbria (UoC) to become a more collaborative and inclusive process. In particular this paper will focus upon how the use of technology has assisted the effective delivery of the UoC's Working with Experts by Experience module. This module is designed and delivered by service users and carers and co-facilitated by the social work course team. The module provides opportunities for students to work alongside a variety of service users and carers, in a variety of ways, in order to both understand the range of complexities within the relationship between social work professionals and user groups, and to embed the need for service users and carers to be at the centre of all professional activity and decision making. Reference will be made to the use of podcasts, video, digital narratives and the use of online learning environments.

Key words: expert by experience, social work education, technology.

INTRODUCTION

Social work education in the UK has always encouraged the meaningful inclusion of Service Users and Carers i.e. those who currently receive, or have received social care services in the past and those that care for them. The regulatory body, the Health and Care Professions Council (HCPC) state in their Standards for Education and Training (SETs) (3.8 and 3.9) that resources must be appropriate for the teaching and used in an effective manner (2009: 23-24). Within social work education specifically it is vital that people's experiences of services are captured in as diverse way as possible. This maximizes the capacity for people to be involved in a number of creative ways to suits their needs. It is not always appropriate to simply have a person present in a large classroom of students whom they have never met: this can be an intimidating and frightening experience for someone who may still be vulnerable and in need. Technology allows us to capture someone's lived experience in a medium that is meaningful for them, accessible for their needs and appropriate to the message they wish to present.

Aim

The Working with Experts by Experience module ran for the first time in the academic year 2013-14. The module is collaborative in nature with the entire content being populated by Experts by Experience. The module takes place in year one, runs for 12 weeks and draw upon a range of service user and carer experiences and life stories in a range of formats so as to maximize potential involvement according to individual needs and wishes of the individual. Some of the different ways technology assists in the module is by the production and utilization of videos, audio podcasts, written narrative work and our online virtual learning environment (VLE). The idea was to combine the involvement of actual recipients of social care, via the use of different forms of technology, to promote and encourage the reflective development of the students and embed this reflective practice early on in their career. Schon (1983) is widely accepted to be one of the major proponents of reflective practice. He was actively concerned with a practitioner's ability to reflect on their actions both in the moment of the actual interaction but also in their consideration of the event after it had occurred.

In social work reflective practice has become the "signature pedagogy" (Shulman 2005b, p.9 cited in Trowler and Wareham 2013) and for me is the golden thread which links all aspects of a social workers' practice.

METHODS

This study was carried out using an action research approach. Jean McNiff (2002) states:

Action research is open ended. It does not begin with a fixed hypothesis. It begins with an idea that you develop. The research process is the developmental process of following through the idea, seeing how it goes, and continually checking whether it is in line with what you wish to happen. Seen in this way, action research is a form of self-evaluation. It is used widely in professional contexts such as appraisal, mentoring and self-assessment.

Brown and Jones (2001) however are critical of the action based approach asking how can we as participant researchers effectively reflect upon our work when our world view, language and meaning is in constant motion? They call for a post-structuralist approach in which we reflect on how our realities are constructed, asserting that a unidirectional call for 'reflective practitioners' is not, in itself, sufficient.

However I concur with Mayes and Freitas (2005) who describe a 'constructivist pedagogical approach', which concentrates upon what the student is actually doing: and which places the learning and teaching activities (TLAs) at the heart of the process. Biggs' constructive alignment theory has a constructivist approach at its very heart. Gardner (2014, p.7) bridges the perceived gap that Brown and Jones (2001) indicated above, she advocates:

Being critically reflective as an attitude of mind as well as doing critical reflection.
I am not suggesting a dichotomy here of being critically reflective versus doing...the aim is to combine both.

Recruitment for this action research was sought from the BA Social Work 2013-14 students who were the first cohort to participate in the Working with Experts by Experience module at the University of Cumbria. Students were asked to volunteer. From a total number of 45 students, 13 came forward as potential participants with 11 completing the questionnaires, indicating an 84.6% response rate.

Measures

A 14 item Bristol Online Survey (BOS) based questionnaire was used in this study. Respondents were posed a number of questions or statements and asked to rate their response according to a Likert Scale of 5 possible answers: strongly disagree, disagree, undecided, agree, and strongly agree (Social Research Methods, 2014). In addition there were asked to add any further comments on a number of the items.

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Procedural and Ethical Considerations

There are a number of procedural and ethical considerations that must be explored. McDonald (1999), cited in Orme and Shemmings (2010, p.23) ask the researcher to consider potential oppression of 'the researcher or the researched'. McDonald (ibid) calls for clarity in the value base of the research project and 'robustness'. However 'robustness' is a contested concept. Beresford (2000) discusses the complexities of social research as being problematic from an evidence based practice perspective due to the inherent ethical value base of the researcher. Macdonald and Sheldon (1998) cited in Webber (2015), acknowledge that 'evidenced-based approaches to social work can be challenging to achieve'. However Macdonald (2003: 5) also cited in Webber (2015), states:

Different people will make different decisions. This is fine as long as it is clear to the reader what decisions have been made...so that they can make an informed decision about relevance

This brings me to consider my own ethics and values as the author of this research and the 'cognitive biases that might lead me astray' (Gambrill, 2011: 29 as cited in Webber 2015: 81). Having previously been trained as a person-centered counsellor and being a firm believer in personal and professional development I have been aware of making several assumptions at the outset. My hunches included:

- That the EbE module has aided the reflective ability of the students
- That the EbE module has challenged the students' values and ethics

There is an inherent incongruence in researching the effects of the Expert by Experience upon the students and the ethos of the module itself which seeks input and collaboration with EbE at every level as EbE were not included in this piece of action research:

Both the process of social work/ care research, including choice of methodology, and the use to which any findings might be put, should be congruent with the aims and values of social work practice and, where possible, seek to empower service users, promote their welfare and improve their access to economic and social capital on equal terms with other citizens. (Joint University Council, 2015: 1)

RESULTS AND FINDINGS

In total 11 out of 13 students who initially volunteered to take part in the research project completed the online survey. This gives a response rate of 84.6%. Of the 13 who volunteered 3 were male and 10 female. Ages ranged between early twenties to early 50's. The survey was available for students to complete between the 4th and the 12th December 2014.

The first 4 questions asked the students to retrospectively think back to before they started the social work course as to how reflective (Q1), tolerant and accepting a person they thought they were (Q2), if they spend much time considered why they acted a certain way or thought certain things (Q3) and if they felt they had dealt with any personal issues from the past (Q4).

Although 63.6% of students felt they were already reflective people prior to the module, 100% of students felt they were more reflective after their engagement with the module.

Prior to the module 81.8% of students felt they were tolerant and non-discriminatory in their practice, this rose to 90.9% of students post module.

27.3% of students felt they didn't spend much time thinking about why they thought or acted in certain ways prior to the commencement of the module however 100% of students felt they had become more aware of this post module. Prior to the module 45.5% of students felt that they had dealt with any personal issues from the past but as a result of their engagement with the module 90.9% of students became more aware of having personal issues which would still need to be resolved in order to become a more effective social worker (Fig. 1).

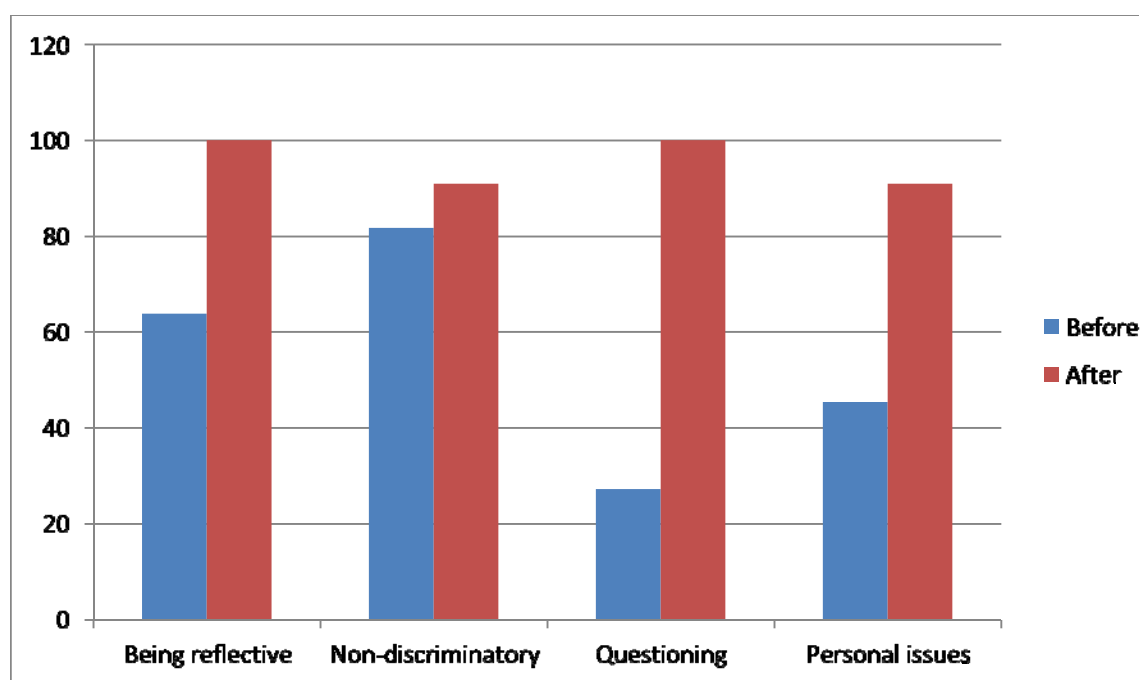


Figure 1. Student Evaluation of Module Impact

Student Comments on Use of Technology

The recordings that X allowed us to listen to; I found to be very engaging and thought provoking. Previous to these recordings I knew very little about Schizophrenia and the way they made me empathise and gain more of an insight into this illness was brilliant. The fact that these were recorded daily allowed me to understand the 'rollercoaster' of emotions X can feel on a daily basis

I found them a complete inspiration, interesting and informative.

I found the videos very exciting, hopeful and inspiring. The video is proof that with the right support and person centred care, someone with severe learning difficulties and challenging behaviour can be helped to achieve a real quality of life.

The videos me gave me an insight into how as workers we could support people with challenging behaviour and learning disabilities to live independently as well as through services, to help enable them to get the best out of life. One of the videos also gave a good insight into how life is like for families and carers of those with challenging behaviour and learning disabilities...I feel that if I was to go out on placement in a learning disabilities team, I would probably watch these videos again to enrich my learning and the support I provide.

CONCLUSION

Notwithstanding the caveats raised above in the ethical and procedural section, these results do indicate that of all the first year modules the Working with Experts by Experience module has been the one which the respondents have indicated as most enabling their self-discovery in terms of being more aware of their values, attitudes and belief systems. Even those students who felt that were quite reflective before the course indicated that they were still more reflective and aware of potential conflicts which might need resolved in order to be most effective as a future social worker. An integral part of this module has been the use of different technological aspects which has aided the participation of a wide range of service users and carers and been very well evaluated by the students in terms of their affects upon their experiential learning journey.

Further Research

The study has been repeated this year with the 2014-15 intake of students which are the second cohort to undertake this new module. The questions have been asked prior to the students' commencement upon the

module and have been answered by all 45 students. The module is currently nearing completion so will generate much more comprehensive data this time around being answered by the whole cohort and not just a minority group. However early responses to the first 4 questions are remarkably similar to the statistics generation in the smaller piece of research represented in Figure 1 above.

RECOMMENDATIONS

Currently we are engaged with widening the use of different forms of technology to assist in our teaching and the Working with Experts by Experience module is shortly going to be available for teaching online via the use of 'Blackboard' the University of Cumbria's Virtual Learning Environment.

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TELEOPERATION OF AN EDUCATIONAL MOBILE MINI-ROBOT VIA WIRELESS COMMUNICATION

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ABSTRACT: This work aims to describe another contemporary manner for interaction between human and mechatronic device (educational mobile robot) by Bluetooth communication with a purpose for implementing wireless remote motion control. Herein the three major topics will be discussed - the educational mobile robot “Audrino”; the consoles for wireless motion control; the communication between robot and consoles.

Key words: teleoperation, wireless communication, arduino educational mobile robot, bluetooth

INTRODUCTION

Teleoperation indicates operation of a machine at a distance. It is similar in meaning to the phrase "remote control" but is usually encountered in research, academic and technical environments. It is most commonly associated with robotics and mobile robots but can be applied to a whole range of devices or machines operated by a person from a distance, [1]. In recent years, there has been a growing interest in mobile robot motion control.

Telerobotics is the area of robotics concerned with the control of semi-autonomous robots from a distance, mainly using interfaces for Wireless network like Wi-Fi, Bluetooth, the Deep Space Network, and similar connections. Mainly to control the movement of a mobile robot we control the speed and direction of rotation of its engines by using one of the above mentioned interfaces to connect with a corresponding control circuits.

While controlling the mobile robot it has to consider that our application will not only control the robot movement but also will do additional tasks for gathering information about the environment, computing the mobile robot's moving direction and therefore the interface connection should not block these tasks. Herein the three major topics will be discussed:

1. The educational mobile robot “Audrino”.
2. The consoles for wireless motion control.
3. The communication between robot and consoles.

1. CONCEPTUAL CONFIGURATION OF A DISTANCE CONTROL

1.1. The educational mobile platform “Audrino”

The Arduino robot is a self-contained platform, based on the popular BOE Shield-Bot, which includes:

- Board of Education Shield PCB
- High-quality aluminum robot chassis, continuous rotation servos and wheels
- Components needed for tactile, light, and infrared distance navigation systems..

Arduino robot is a result of the collective international team effort in collaboration with Complubot - 4-time world champion in robocup junior robotics soccer - who looking at how science can be made fun to be learning and to be developed an interactive machine that allows exploring an environment. [2].

The Arduino hardware and software have many functional similarities to the BASIC Stamp microcontroller and software. Parallax Inc. teamed up with SimplyTronics to design the Board of Education® Shield, which makes the Arduino hardware compatible with the Boe-Bot chassis.

Both the functional similarity and the hardware compatibility made very simple porting of example programs and educational material from Robotics with the Boe-Bot to robotics with the Board of Education Shield.

For our research and experiments was assembled an own “Arduino” mobile robot which is shown on Fig. 1. It is based on classical two wheeled platform with reversible DC-servo driven wheels and spherical fulcrum on the rear side. The Motor control module drives the motors, and the Control Board reads sensors and decides how to operate. Each of the boards is a full programmable using the Arduino IDE.

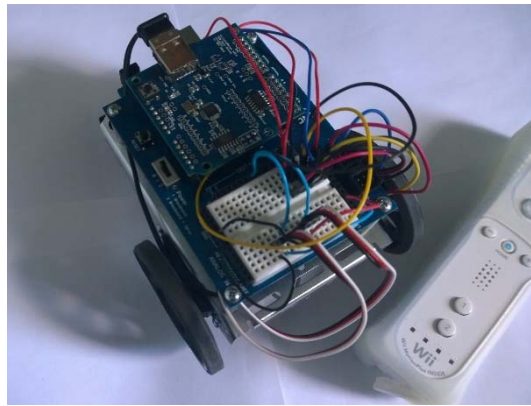


Fig. 1. The Assembled Own “Audrino” Type Mobile Robot

The robot’s completeness includes the following modules: *Arduino Uno Rev3*, *Parallax Robotics Shield Kit*, *USB Host Shield 2.0* and *Bluetooth* communication, which modules are described in detail as follows below.

1.1.1. The Arduino Uno Rev3 module. This is an open source microcontroller board, represented on Fig. 2, based on the Atmel ATmega328 MCU, plus a free software development environment [2]. The module can be used to sense inputs from switches, sensors, and computers, and then to control motors, lights, and other physical outputs.



Fig. 2. The module Arduino Uno Rev3 (front and back)

It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The *Arduino Uno Rev3* differs from other preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. The microcontroller board can be powered via the USB connection or with an external power supply. The power source is selected automatically. The technical specifications of the module *Arduino Uno Rev3* are:

- Microcontroller: ATmega328
- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- Digital I/O Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 40 mA
- DC Current for 3.3V Pin: 50 mA
- Flash Memory: 32 KB (ATmega328) of which 0.5 KB used by boot-loader
- SRAM: 2 KB (ATmega328)
- EEPROM: 1 KB (ATmega328)
- Clock Speed: 16 MHz

1.1.2. The Parallax Robotics Shield Kit module. Parallax Inc. introduced the original Boe-Bot® robot with its BASIC Stamp® 2 brain shown below in 1999, [3]. The module includes a Board of Education Shield (BOE), represented on Fig. 4, which makes it easy to build circuits and connect servo motors to the *Arduino Uno Rev3* module. The BOE Shield mounts on metal chassis with motors and wheels.

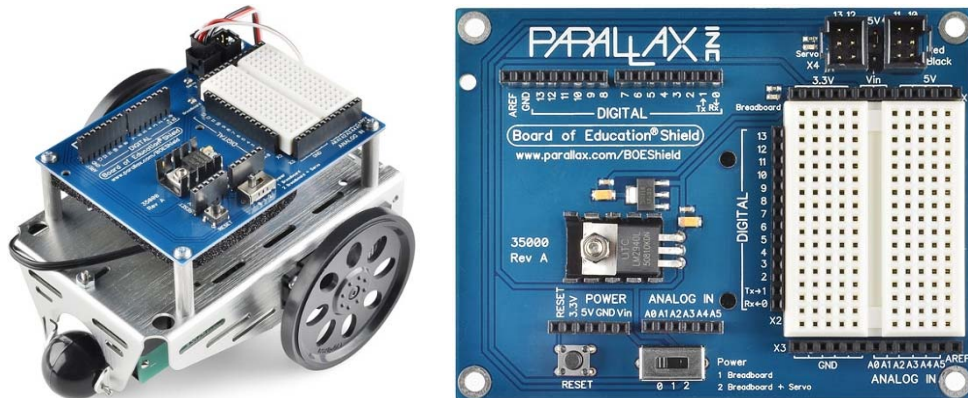


Fig. 4. The Parallax Robotics Shield Kit and BOE

With this kit and Arduino module is able to activate over 40 hands-on activities in robotics, such as:

- Learning to program the robot's Arduino Brain
- Calibrating the robot's continuous rotation servo motors
- Using lights and speakers for status indicators
- Assembling the robot
- Preprogrammed navigation
- Using touch-switches to navigate by contact with objects
- Using phototransistors to navigate by light
- Using non-contact infrared sensors to measure distance and avoid or follow objects
- Remote motion control by wireless communication.

1.1.3. Arduino Software. The Arduino integrated development environment (IDE) is a cross-platform application written in Java, and is derived from the IDE for the Processing programming language and the wiring projects. It is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and is capable of compiling and uploading programs to the board with a single click. A program or code written for Arduino is called a "sketch".

The Arduino free programming software is designed for communication with a computer, another Arduino, or other microcontrollers by UART TTL (5V) serial communication and includes a serial monitor which allows simple textual data to be sent to and from the Arduino board, as it is shown on Fig. 3. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer.

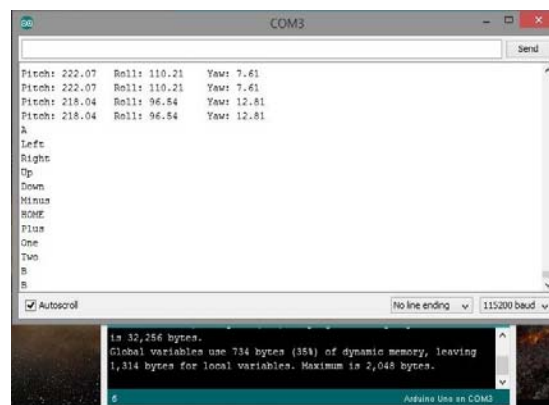


Fig. 3. A Textual Data Sent To And From The Arduino Board

The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the boot-loader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by software running on a connected computer.

Arduino programs are written in C++. The Arduino IDE comes with a software library called "Wiring" from the original Wiring project, which makes many common input/output operations much easier. Users only need define two functions to make a runnable cyclic executive program:

- **setup()**: a function run once at the start of a program that can initialize settings;
- **loop()**: a function called repeatedly until the board powers off.

2.2. The consoles for wireless motion control

The concept of the mobile robot's teleoperation by with "Wii Remote" console has been presented at the „Robotics and Mechatronics Festival 2014" in the Ruse University, Ruse, Bulgaria [4]. The idea evolved in developing two more forms of control. The second was with Xbox controller via Wireless Gaming Receiver and third with mobile application for Windows Phone.

2.2.1. The "Wii Remote" console (handle). In 2006, Nintendo released a console for home entertainment called Wii. It fast became popular thanks to its intuitive motion controllers, Wii Remote and NunChuk. The console Wii Remote, informally known as the Wiimote, is the Wii's main input device. It was not long before enthusiasts started to use them for different applications. The Wiimote handle is a wireless device, using standard Bluetooth technology to communicate with the Wii. This handle is able to communicate wirelessly with the controller via short-range Bluetooth radio, which permits to operate up to 10 meters away from the console with up to four controllers. However, to utilize the pointer functionality, it must be used within 5 meters [6].

It uses the standard Bluetooth Human Interface Device (HID) protocol to communicate with the host, which is directly based upon the USB HID standard. As such, it will appear as a standard input device to any Bluetooth host. The Wiimote actually uses a complex set of operations, transmitted through HID Output reports, and returns a number of different data packets through its Input reports, which contain the data from its peripherals. More over, the controller's symmetrical design allows it to be used in either hand and also to use two Wiimote handles in each hand, [6]. The Wiimote handle, shown on Fig. 5, represents a one-handed, remote-control based design console, instead of the traditional gamepad controllers.

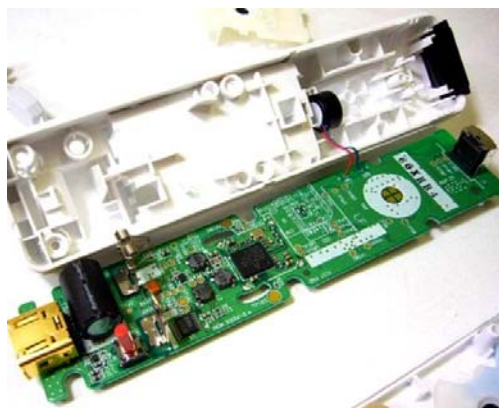


Fig. 5. "Wii Remote" One-Handed Console

The handle has the ability to sense acceleration along three axes through the use of an ADXL330 accelerometer (see Fig. 6). It also features a PixArt optical sensor, allowing it to determine where the console is pointing.

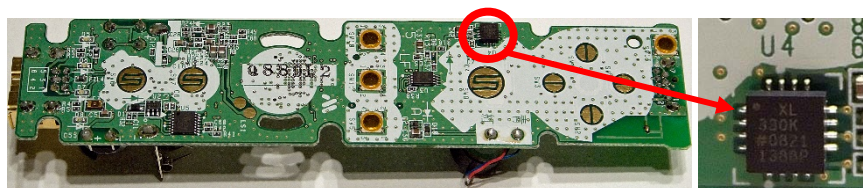


Fig. 6. The ADXL330 Accelerometer In "Wii Remote"

Wiimote has a built into the console Broadcom BCM2042 Bluetooth System-on-a-chip, which contains multiple peripherals that provide data to it, as well as an expansion port for external add-ons. The **BCM2042 microcontroller**, shown on Fig. 7, includes a large 108 Kb on-chip ROM section for storing firmware.



Fig. 7. Wii Remote” With The BCM2042 Microcontroller

The Wiimote contains a 16 KB EEPROM chip with a section of 6 kilobytes to be freely read and written by the host. If the EEPROM chip really contains code for the BCM2042 then this was probably done to make firmware updates possible, so there might be a way of accessing the other parts of the EEPROM via **Bluetooth** as well.

2.2.2. The “Wii MotionPlus”. This is an expansion device for the Wii Remote (see Fig. 8) that allows it to capture complex motion more accurately, as a remote design is fitted perfectly for pointing, and in part to help the console appeal to a broader audience that includes non-gamers.

“Wii Remote Plus” as a Motion controllers are used to achieve some desired benefits which can include:

- increased the accuracy of position and speed;
- higher speeds;
- faster time of reaction;
- increased productivity;
- smoother movements;
- integration with other automation;
- integration with other processes;

It incorporates a *dual-axis tuning fork gyroscope*, and a *single-axis gyroscope* which can determine rotational motion [7]. The information captured by the angular rate sensor can then be used to distinguish true linear motion from the accelerometer readings.



Fig. 8. Wiimote With The Expansion Device “Wii Motionplus”

This allows for the capture of more complex movements than possible with the Wiimote alone. More over, it gives the ability the Wiimote also to be turned horizontally and used like a steering wheel.

2.2.3. X-box controller via Wireless Gaming Receiver. The adapter was first revealed at E3’2006 and released on February 16, 2007 [9]. Xbox 360 wireless accessories communicate over a proprietary 2.4 GHz protocol.

In order to accommodate this, Microsoft released the Wireless Gaming Receiver, which allows wireless Xbox 360 accessories to be used on a Windows-based PC or in this case on an Arduino, [8].

Both wireless devices, the Wireless Gaming Receiver and the Xbox 360 Controller, are represented on Fig. 9. After connecting to a mobile robot left analog stick controls steering, right trigger moving forward, left trigger moving backwards.

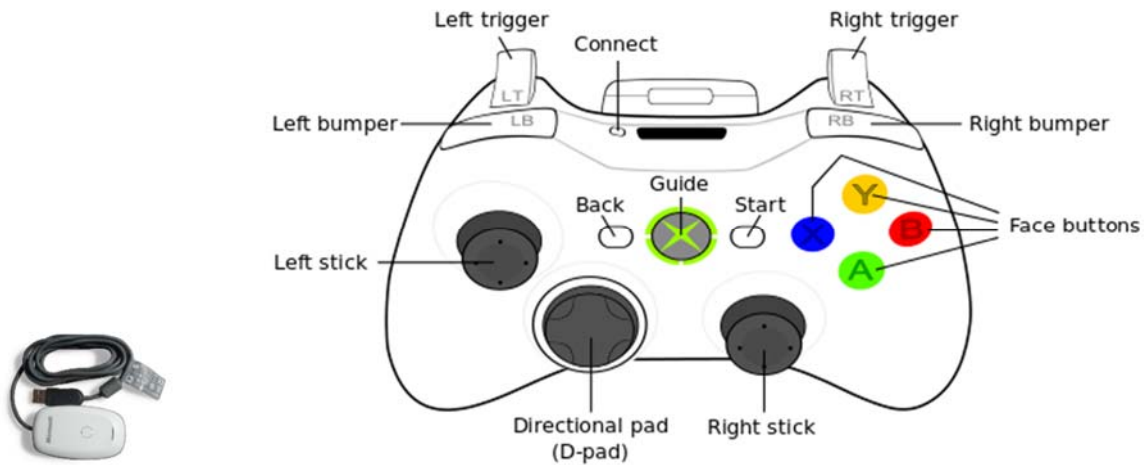


Fig. 9. The Wireless Gaming Receiver and Xbox 360 Controller Layout

2.2.4. Windows phone. Windows Phone is Microsoft’s the operating system for smart phones. It is the successor to Windows Mobile, but there is no backward compatibility. Microsoft created a new flat user interface, featuring a design language named "Modern" and deep integration with social networks and all Microsoft services, first launched with Windows Phone 7.

Windows Phone 8 is a fresh start for the platform: Microsoft has abandoned the old stack of technologies used in Windows Phone 7 (the Windows Mobile kernel, Silverlight, XNA) to embrace the new features introduced in Windows 8, like the new kernel, the Windows Runtime, and the native code (C++) support [10].

The official platform to develop Windows Phone applications is Visual Studio 2012, although support has also been added to the Visual Studio 2013 commercial versions. The major difference is that while Visual Studio 2012 still allows you to open and create Windows Phone 7 projects, Visual Studio 2013 can only be used to develop Windows Phone 8 applications.

To start application development it was necessary to download the Windows Phone 8 SDK. Because the Visual Studio 2012 was not installed the first step was to install the SDK and the emulator and add them to the existing Visual Studio installation [11].

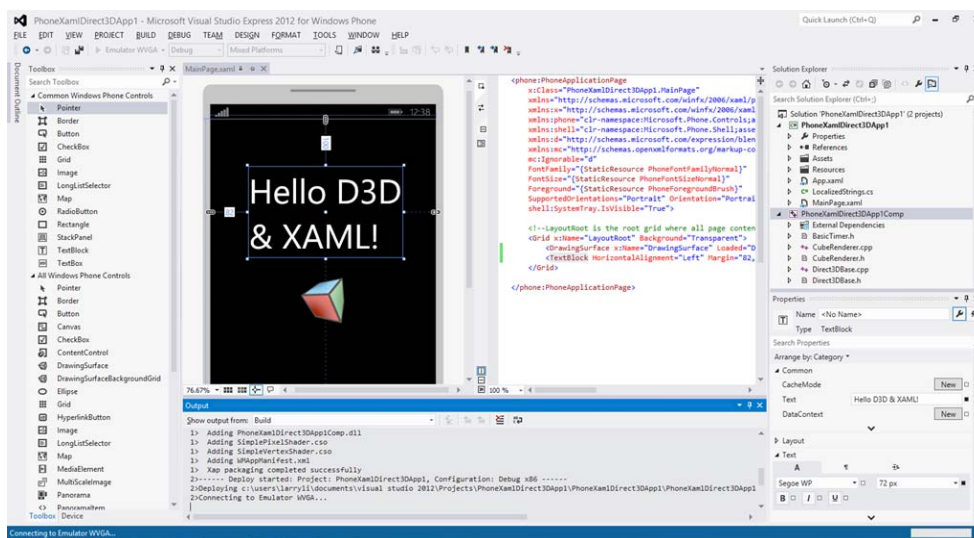


Fig. 10. The New tools for Windows Phone 8.0 SDK

The developed mobile application for Arduino mini-robot control communicates with the robot via Bluetooth. The four directional dpad for sending commands to the robot is shown on Fig. 11.

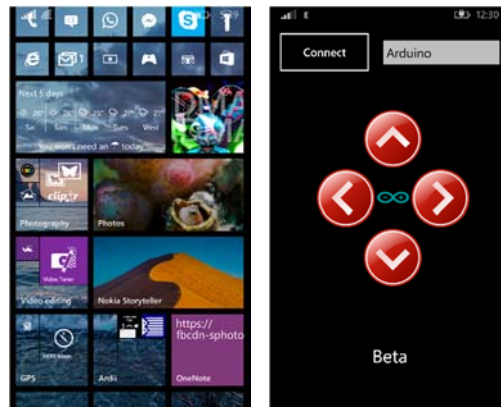


Fig. 11. Customized Start Screen of Windows Phone 8.1 and Mobile Application for sending commands

2.3. The Bluetooth communication between robot and console

2.3.1. Bluetooth. Bluetooth is a packet-based protocol with a master-slave structure, which is based on a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from several fixed and mobile devices and building personal area networks (PANs) to connect devices, overcoming problems of synchronization.

One master may communicate with up to seven slaves in a piconet; all devices share the master's clock. Packet exchange is based on the basic clock, defined by the master, which ticks at 312.5 μ s intervals. Two clock ticks make up a slot of 625 μ s; two slots make up a slot pair of 1250 μ s.

A master Bluetooth device can communicate with a maximum of seven devices in a piconet (an ad-hoc computer network using Bluetooth technology), though not all devices reach this maximum. The devices can switch roles, by agreement, and the slave can become the master.

3.2.2. The USB Host Shield 2.0 module. This is a universal connection tool, shown on Fig. 12, and together with a Bluetooth dongle is used as add-on board in the Arduino developed platform in order to connect the educational mobile robot with a wireless controller and in this way to equip the mobile robot with a wireless communication. There is interference between USB Host Shield and the Board of Education Shield, so Arduino's SPI and Host Shield are connected via wires through the breadboard.

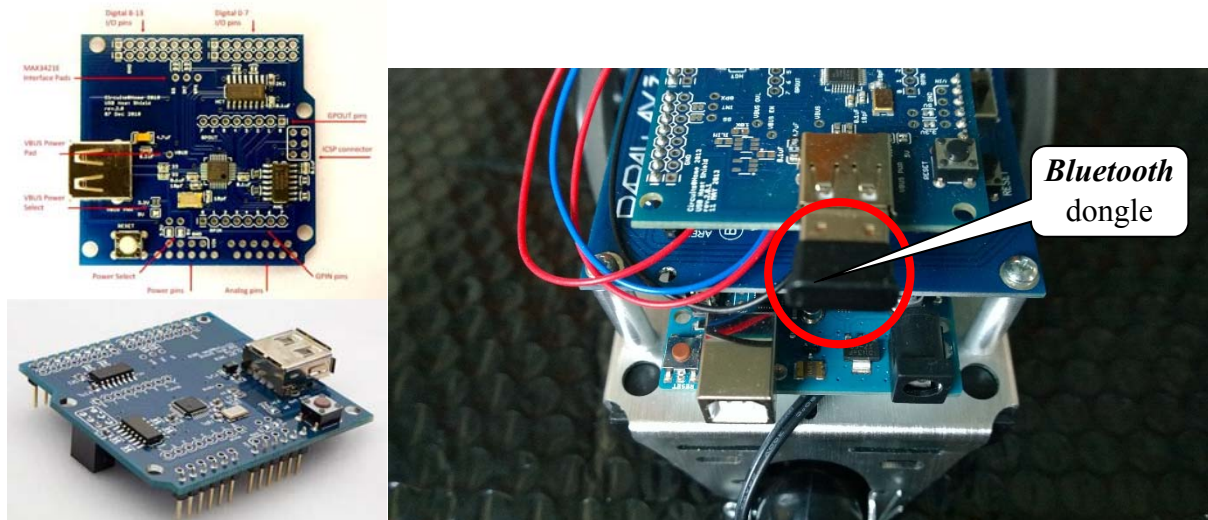


Fig. 12. The USB Host Shield 2.0 Modules And With A Bluetooth Dongle

The shield provides USB Host interface, allowing full and low-speed communication. The USB Host Shield 2.0 currently supports the following device classes [12]:

- HID devices, such as keyboards, mice, joysticks, etc.
- game controllers - Sony PS3, Nintendo Wii, Xbox360

- USB to serial converters - FTDI, PL-2303, ACM, as well as certain cell phones and GPS receivers
- ADK-capable Android phones and tables
- Digital cameras - Canon EOS, Powershot, Nikon DSLRs and P&S, as well as generic PTP
- Mass storage devices, such as USB sticks, memory card readers, external hard drives
- Bluetooth dongles.

The board contains Maxim MAX3421E USB host controller, 12MHz crystal, level shifters, resistors, capacitors, Reset button and USB A-type connector. There are also a number of solder pads and jumpers, which are marked with red arrows. MAX3421E interface pads are used to make shield modifications easier. Pads for SS and INT signals are routed to Arduino pins 10 and 9 via solder jumpers. In case pin is taken by other shield a re-routing is necessary, a trace is cut and corresponding pad is connected with another suitable Arduino I/O pin with a wire. To undo the operation, a wire is removed and jumper is closed. GPX pin is not used and is available on a separate pad to facilitate further expansion. It can be used as a second interrupt pin of MAX3421E.

The board layout is completed with : Power Select, Power pins, Analog pins, GPIN pins, ICSP connector, GPOUT pins, Digital I/O pins 0-7, digital I/O pins 8-13, MAX3421E interface pad, VBUS power pad

For activation of **USB Host Shield 2.0** module with **Bluetooth** has to be written communication software and uploaded part of which it is shown on Fig. 13.

```

}      /* fill in setup packet */
      setup_pkt.ReqType_u.bmRequestType = bmReqType;
      setup_pkt.bRequest = bRequest;
      setup_pkt.wVal_u.wValueLo = wValLo;
      setup_pkt.wVal_u.wValueHi = wValHi;
      setup_pkt.wIndex = wInd;
      setup_pkt.wLength = nbytes; .... {

```

Fig. 13. Part Of Communication Software For Activation Of USB Host Shield 2.0

For activation of Wiimote one-handed console with the expansion device “**Wii MotionPlus**” we need to provide a software initialization procedure where after its fulfillment the Wiimote reached to the return states, represented on Table 1.

Table 1. Software Initialization Of “Wii Remote” (Return States)

For LEDs	For buttons
0x00, // OFF	0x00008, // UP
0x10, // LED1	0x00002, // RIGHT
0x20, // LED2	0x00004, // DOWN
0x40, // LED3	0x00001, // LEFT
0x80, // LED4	0, // Skip
0x90, // LED5	0x00010, // PLUS
0xA0, // LED6	0x00100, // TWO
0xC0, // LED7	0x00200, // ONE
0xD0, // LED8	0x01000, // MINUS
0xE0, // LED9	0x08000, // HOME
0xF0, // LED10	0x00400, // B
	0x00800, // A

For the accelerometer in the expansion device “**Wii MotionPlus**” we need to provide a software initialization procedure as follows:

```

accXwiiM = ((l2capinbuf[12] << 2) | (l2capinbuf[10] & 0x60 >> 5)) - 500;
accYwiiM = ((l2capinbuf[13] << 2) | (l2capinbuf[11] & 0x20 >> 4)) - 500;
accZwiiM = ((l2capinbuf[14] << 2) | (l2capinbuf[11] & 0x40 >> 5)) - 500;

```

and for the gyroscopes :

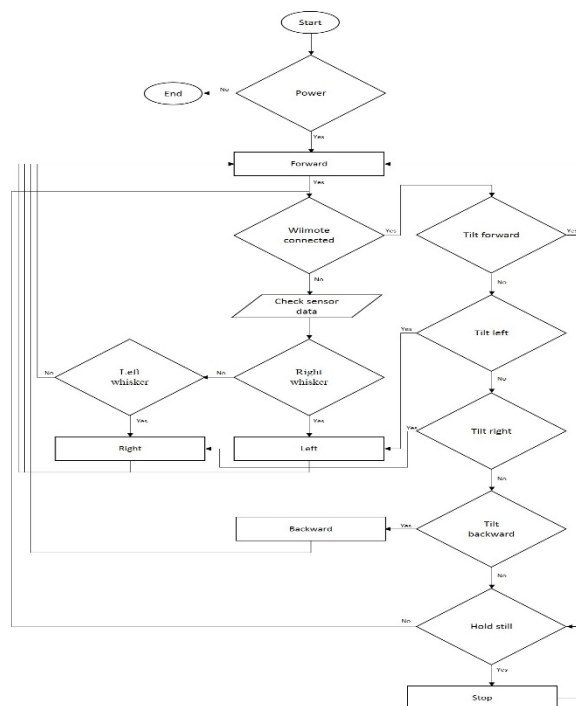
```

gyroYawRaw = ((l2capinbuf[15] | (l2capinbuf[18] & 0xFC) << 6) - gyroYawZero);
gyroRollRaw = ((l2capinbuf[16] | (l2capinbuf[19] & 0xFC) << 6) - gyroRollZero);
gyroPitchRaw = ((l2capinbuf[17] | (l2capinbuf[20] & 0xFC) << 6) - gyroPitchZero); ....

```

2.4. Control mechanism of robot movement

The following flow chart represents the working mechanism of the robot:



CONCLUSION

In this project three alternative engineering decisions are represented for connection between human and the educational mobile robot “Audrino” by using of three innovative devices - the handle-console “Wiimote”, the X-box controller with Wireless Gaming Receiver and the Smartphone with “Windows phone” as via communication based on Bluetooth wireless technology standard, is successfully enable to be realized remote control of movement of mobile robot.

RECOMMENDATIONS

Further activities in the field of mobile robots teleoperation will be directed toward development of mobile applications to support motion sensors and Microsoft’s assistant Cortana so to be added abilities for motion and voice control of mobile robot.

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ONLINE VIDEO GAMES AND YOUNG PEOPLE

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ABSTRACT: The availability of new information and communication technologies to an increasingly younger population, the constant availability of the Internet and the opportunity to search information, to create new types and models of communication, types of acceptance and ways of accepting and coping with the infinite amount of information, the velocity and choice of well-designed marketing products, especially video games, in particular in the last decade, caused a real "gaming boom" among almost all age groups.

Addictions are a well-known problem of the human kind, and they are as well a challenge for professionals and scientists from different fields of interest. Considering the large amount of addictions, one of the new types is the addiction to videogames affecting a younger and younger population.

Smartphones and tablets are available to a growing number of children and youngsters. It is almost incomprehensible and "unacceptable" that a child in the first grade of primary school does not have its own mobile phone, PDA, game console, laptop, desktop or similar. By playing video games for several hours a day, either at school, during school hours or after, they enter a world exit from which sometimes requires seeking the help of experts. Are we facilitating the creation of new types of addictions among the new generation of youngsters?

In the paper we present the results of the research conducted with children of the seventh and eighth grades of the primary schools of Pula on the time they spend playing online videogames during and after the lessons, on playing videogames to get to know new people, for fun, to be part of a clan, not performing daily activities to play online videogames, their sleeping problems and other things.

Key words: ICT, online videogames, addiction to online videogames

INTRODUCTION

The videogame industry growth is accelerating. Videogames are becoming a serious challenge to companies and experts and the videogames market is growing rapidly. Some videogames have become so realistic and can emulate the outer, real life in such a realistic manner as to "urge" users to spend their free time, and often a large part of time in general, in virtual space. Playing videogames on various game consoles, computers, tablets and smartphones has been present in our culture for about twenty years.

Even though video game addiction has not entered the internationally recognized standard diagnostic tool ICD-10, nor can it be found under the diagnostic criteria of the DSM-IV manual, it does nevertheless show symptoms similar to those with other behavioural addictions.

As with the majority of other addictions, video gaming (znano.st, 2013) releases an increased level of dopamine and glutamate in the brain, which brings pleasure and, consequently, gives an impetus for further playing of videogames and video game addiction. Apart from the chemical component, there is also a psychological component of addiction, with video game addicts showing similar behaviours to those of other addicts.

Video game addiction has reached worldwide proportions. Authors Gentile, Choo, Liau, Sim, Fung, Khoo et al. (2011) say that online video gaming, a poor-level social competence and gamers' impulsiveness are some of the possible factors which may lead to a risk of developing pathologic video game addiction. A video gamer addict on average spends 31 hours a week playing video games.

Adolescents addicted to video games (Gaetan, Bonnet, Pedinelli, 2012) are satisfied with their real life to a less extent. When compared with their peers, they seem to be happier in the virtual life, which is, at the same time, one of the indicators of video game addiction.

Video game addiction, particularly Massively Multiplayer Online Role-Playing Games (MMORPG) has become so widespread among Korean teenagers (Pyoung Won Kim, Seo Young Kim, Miseon Shim, Chang-Hwan Im, Young-Min Shon, 2013) that the Government imposed a ban on playing MMORPGs after midnight. This is, in our opinion, a way to try to prevent the addiction, but it is not the best one. The prevention has to be done by the introduction of educational activities aimed at sensibilizing both the parents and the children. Also, the school system there should provide more space for discussing this risk.

Aggressiveness, self-control, narcissistic personality traits (Kim, Namkoong, Ku, Kim, 2008) may predispose some individuals to become addicted to online games. Correlational analyses indicate that low levels of functional impulsivity and agreeableness alongside high levels of verbal aggression and video game dependency are associated with greater amount of time spent playing MMORPGs (Collins, Freeman, Chamaro-Premuzic, 2012).

Video game addiction is still not perceived by the public as something really happening among the young people. Video gaming, which started as occasional entertainment, can soon translate into everyday habit, and habit can soon escalate into addiction (www.novapsihologija.com/ovisnost-o-videoigrama).

When does entertainment become a problem? Video game addiction has been recognized by many experts. There are numerous clinics to treat and prevent video game addiction in China, the Netherlands and Korea.

In a research (Hellström, Nilsson, Leppert, Lslund, 2012) that comprised 7757 Swedish adolescents (aged 13 to 18), aimed at studying the influences of time spent gaming and motives to play on the negative consequences of adolescent online computer gaming, the majority of adolescents who played MMORPGs confirmed to have experienced negative consequences of gaming. These negative consequences comprised: poor sleep quality, lack of time to do school assignments, often quarrelling with parents (especially girls). Boys mentioned lack of time to spend with friends, staying home to play games, lack of time to do school assignments. The girls often forgot to eat and had less sleep.

As a consequence of the "surplus" or "poor organisation" of leisure time, young people spend more and more time playing video games. The roles of parents and teachers in the prevention of video game addiction have become the subjects of studies of numerous scientists.

One of the primary keys can certainly be found in the family. Numerous studies, for various types of addictions, have pointed out family as one of the key sources of both emergence of and solution to the problem of addiction. What is so important in the family environment? First of all, it is the context or the environment where abilities of the child to function in a quality way in the world are developed. Upbringing is, therefore, one of the crucial impacts on the learning of self-control, taking good and responsible life decisions and being able to foresee negative outcomes (Sakoman, 2009).

Apart from the family, pre-school and school teachers and every other person included in the education process should become involved in order to prevent a possible addiction (addiction prevention) and/or to, at least, recognize the first signs of its emergence.

RESEARCH OBJECTIVE AND WORKING METHODS

Considering that playing video games, online gaming in particular, has become widespread among the younger population, the question now is to what extent, i.e. how much time students of the seventh and eighth grades spend playing video games. This research tried to answer the questions about the time spent by the respondents video gaming, point of access to video games, money spent on video gaming, reasons for gaming and impact on their behaviour.

The sample comprised 123 students of the seventh and eighth grades of the primary schools of Pula. Respondents were distributed with regards to their sex (72 M and 51 F). A questionnaire consisting of 21 variables was implemented:

1. How often do you play online video games? (CESTO_IG)
2. How much time a day do you spend playing online video games? (DNEVNO_IG)

3. What time of the day do you play online video games most often? (DOBA_DN)
4. I mostly access online video games from (PRIST_IG)
5. Are you member of a group (clan) of gamers within Croatia? (CLAN_UHR)
6. Are you member of a group (clan) of gamers outside Croatia? (CLAN_IHR)
7. Do you consider yourself to be an important link of your clan? (CLAN_VZN)
8. What do you buy most often? (NAJ_KUP)
9. I play online video games for fun (IGR_ZAB)
10. I play online video games out of boredom (IGR_DOS)
11. I play online video games because all my friends play them (IG_PRI)
12. I play online video games to make new acquaintances (IG_NPOZ)
13. I play online video games because I cannot stand even one day without playing (IG_IDBN)
14. I sometimes play online video games during classes (lectures) (TNAS_IG)
15. Because an online video game has to be played at a definite time I sometimes absent from classes (lecture) (IZ_SNAST)
16. Upon a request of the team to play a video game, I cancel all my appointments (NAP_AKT)
17. Playing online video games is a means of escape from the real world (IG_BRSL)
18. Playing online video games makes me feel part of a team (IG_DIOT)
19. Playing online video games disturbs my sleep (NIG_LSP)
20. Playing is a means of escape from the real world problems (IG_BPUZ)
21. I want to, but I do not know how to stop playing (NEZ_STOP)

RESEARCH RESULTS

Table 1 shows frequency of online video game playing by the respondents. The first group (male students) has 38.9% respondents playing video games every day, while in the second group (female students) 13.7% play video games every day. The calculated value of the χ^2 test (Chi square=27.883 (df=4), p=0.001) is larger than the limit value at degree of freedom 4. The results can therefore be considered statistically significant.

Table 1. Playing Online Video Games

Crosstab

		CESTO_IG					Total
		NEVER	UP TO 5 TIMES PER MONTH	2-3 DAYS PER WEEK	4-6 DAYS PER WEEK	EVERY DAY	
GENDER M	Count	8	10	13	13	28	72
	% within GENDER	11,1%	13,9%	18,1%	18,1%	38,9%	100,0%
F	Count	8	28	4	4	7	51
	% within GENDER	15,7%	54,9%	7,8%	7,8%	13,7%	100,0%
Total	Count	16	38	17	17	35	123
	% within GENDER	13,0%	30,9%	13,8%	13,8%	28,5%	100,0%

Table 2 shows the time spent by the respondents every day playing online video games.

A total of 41.7% male students and 66.7% female students spend up to 1 hour a day playing online video games, while 33.3% male students play video games two to three hours a day. The calculated value of the χ^2 test (Chi square=14.773 (df=4), p=0.001). The results can be considered statistically significant.

Table 2. Time Spent Online Gaming

Crosstab

		DNEVNO IG					Total
		DON'T PLAY	1 HOUR	2-3 HOURS	4-6 HOURS	MORE THAN 6 HOURS	
GENDER M	Count	8	30	24	8	2	72
	% within GENDER	11,1%	41,7%	33,3%	11,1%	2,8%	100,0%
F	Count	9	34	4	4	0	51
	% within GENDER	17,6%	66,7%	7,8%	7,8%	,0%	100,0%
Total	Count	17	64	28	12	2	123
	% within GENDER	13,8%	52,0%	22,8%	9,8%	1,6%	100,0%

Table 3 shows data on time of day when respondents play online video games mostly. Respondents of both groups mostly play video games in the afternoon, 44.4% of male and 47.1% of female students; 37.5% of male students play video games in the evening. The calculated value of the Chi square value =2.046 (df=4), p=0.80. This data can be considered statistically significant.

Table 3. Time Of Day Spent On Online Gaming

Crosstab

		DOBA DN					Total
		0	IN THE MORNING	IN THE AFTERNOON	IN THE EVENING	DURING NIGHT	
GENDER M	Count	8	1	32	27	4	72
	% within GENDER	11,1%	1,4%	44,4%	37,5%	5,6%	100,0%
F	Count	8	2	24	15	2	51
	% within GENDER	15,7%	3,9%	47,1%	29,4%	3,9%	100,0%
Total	Count	16	3	56	42	6	123
	% within GENDER	13,0%	2,4%	45,5%	34,1%	4,9%	100,0%

Table 4 presents points of access to online videogames. Respondents of both groups access video games mostly from home, 83.3% of male and 74.5% of female students. It can be concluded that respondents still follow the classes, at least when it comes to playing video games, since only 1.4% of male and 3.9 of female students access online video games from school. On the other hand, we can also conclude that the majority of children have access to online videogames at home. That opens two scenarios: either parents approve the behaviour of their children or they are not aware of that behaviour. The value of the χ^2 test (Chi-square=1.737 (df3), p= 0.50).

Table 4. Points Of Access To Online Videogames

Crosstab

		PRIST IG				Total
		0	FROM HOME	FROM SCHOOL	OTHER	
GENDER M	Count	8	60	1	3	72
	% within GENDER	11,1%	83,3%	1,4%	4,2%	100,0%
F	Count	8	38	2	3	51
	% within GENDER	15,7%	74,5%	3,9%	5,9%	100,0%
Total	Count	16	98	3	6	123
	% within GENDER	13,0%	79,7%	2,4%	4,9%	100,0%

Table 5 presents percentages of membership of clans (groups) in Croatia. The table clearly shows that the greatest percentage of male students (30.6%) are members of a group within Croatia. The value of the χ^2 test (Chi-square=16.057 (df=1), p=0.001) was larger than the limit value at degree of freedom 1 and this data can, therefore, be considered statistically significant.

Table 5. Membership In A Clan (Group) Within Croatia

Crosstab

			CLAN UHR		Total
			YES	NO	
GENDER	M	Count	22	50	72
		% within GENDER	30,6%	69,4%	100,0%
	F	Count	1	50	51
		% within GENDER	2,0%	98,0%	100,0%
Total		Count	23	100	123
		% within GENDER	18,7%	81,3%	100,0%

Table 6 explains whether respondents are members of certain groups (clans) outside Croatia. In total, 30.6% of male students are part of a clan. The value of the x2 test demonstrates that data contained in the table below is significant (Chi-square=13.484 (df1), p=0.001).

Table 6. Membership In A Clan (Group) Outside Croatia

Crosstab

			CLAN IHR		Total
			YES	NO	
GENDER	M	Count	22	50	72
		% within GENDER	30,6%	69,4%	100,0%
	F	Count	2	49	51
		% within GENDER	3,9%	96,1%	100,0%
Total		Count	24	99	123
		% within GENDER	19,5%	80,5%	100,0%

We can conclude that boys are more attracted by being members of a virtual group. Why there is such a big difference between boys and girls can be a matter for a future analysis.

Table 7 explains whether respondents, members of a group (clan), consider themselves an important link within their group (their clan). 27.8% of the male students consider themselves to be an important link. The value of the x2 test demonstrates that data contained in the table below is significant (Chi-square=14.054 (df=1), p= 0.001).

Table 7. Respondents Consider Themselves Important Links Of A Group (Clan)

Crosstab

			CLAN VZN		Total
			YES	NO	
GENDER	M	Count	20	52	72
		% within GENDER	27,8%	72,2%	100,0%
	F	Count	1	50	51
		% within GENDER	2,0%	98,0%	100,0%
Total		Count	21	102	123
		% within GENDER	17,1%	82,9%	100,0%

Table 8 shows how many respondents use real money to purchase something in video games that enables them to move forward. The results reflect that the largest percentage in both groups of students (65.3% of male and 84.3% of female students) do not purchase anything and do not spend real money to make progress in a game. The result of x² test is (Chi-square= 8.335 (df= 5), p= 0.1).

Table 8. What Respondents Buy Most In Online Video Games

Crosstab

		NAJ_KUP						Total
		NOTHING	LEVELS	GEAR/ITEMS	CHIPS	RESOURCES	OTHER	
GENDER M	Count	47	3	9	3	3	7	72
	% within GENDER	65,3%	4,2%	12,5%	4,2%	4,2%	9,7%	100,0%
F	Count	43	3	3	0	1	1	51
	% within GENDER	84,3%	5,9%	5,9%	,0%	2,0%	2,0%	100,0%
Total	Count	90	6	12	3	4	8	123
	% within GENDER	73,2%	4,9%	9,8%	2,4%	3,3%	6,5%	100,0%

Table 9 reflects the assertions of respondents on playing video games for fun. 47.2% of male and 27.5% of female students stated that this assertion always applies to them. These are, at the same time, also the largest percentages in both groups of respondents. The result of χ^2 test is (Chi-square= 5.937 (df=4), p= 0.2).

Table 9. Online Gaming For Fun

Crosstab

		IGR_ZAB					Total
		NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	ALWAYS REFERS TO ME	
GENDER M	Count	12	3	12	11	34	72
	% within GENDER	16,7%	4,2%	16,7%	15,3%	47,2%	100,0%
F	Count	9	5	11	12	14	51
	% within GENDER	17,6%	9,8%	21,6%	23,5%	27,5%	100,0%
Total	Count	21	8	23	23	48	123
	% within GENDER	17,1%	6,5%	18,7%	18,7%	39,0%	100,0%

Table 10 reflects data indicating whether respondents play video games out of boredom. It can be inferred that this table supplements the results from the previous table and that the respondents mostly play online video games for fun. The greatest percentage in both groups of respondents (48.6% of male and 31.4% of female students) indicates that this assertion does not refer to them. The value of the χ^2 test is (Chi-square=7.423 (df=4), p= 0.01).

Table 10. Online Gaming Out Of Boredom

Crosstab

		IGR_DOS					Total
		NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	ALWAYS REFERS TO ME	
GENDER M	Count	35	14	9	7	7	72
	% within GENDER	48,6%	19,4%	12,5%	9,7%	9,7%	100,0%
F	Count	16	9	16	5	5	51
	% within GENDER	31,4%	17,6%	31,4%	9,8%	9,8%	100,0%
Total	Count	51	23	25	12	12	123
	% within GENDER	41,5%	18,7%	20,3%	9,8%	9,8%	100,0%

Table 11 presents the extent to which the assertion that respondents play online video games because their friends do so applies to the respondents.

Even though the largest percentages given in this table for both groups (30.6% of male and 52.9% of female students) indicate that this assertion does not refer to them, the group of male students is much more easily

influenced by their peers than the female group (need to prove oneself, feeling of equality, belonging, etc.). The value of the χ^2 test is (Chi-square=12.644 (df=4), $p=0.01$).

Table 11. Assertion 3- Online Gaming Because Of Friends

Crosstab

			IG PRI					Total
			NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	ALWAYS REFERS TO ME	
GENDER	M	Count	22	10	18	12	10	72
		% within GENDER	30,6%	13,9%	25,0%	16,7%	13,9%	100,0%
	F	Count	27	12	6	3	3	51
		% within GENDER	52,9%	23,5%	11,8%	5,9%	5,9%	100,0%
Total		Count	49	22	24	15	13	123
		% within GENDER	39,8%	17,9%	19,5%	12,2%	10,6%	100,0%

Table 12 shows data referring to playing online video games and making new acquaintances. The assertion is not of great importance to either male or female students.

The value of the χ^2 test is (Chi-square=18.149 (df=4), $p=0.001$).

Table 12. Online Gaming To Make New Acquaintances

Crosstab

			IG NPOZ					Total
			NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	ALWAYS REFERS TO ME	
GENDER	M	Count	36	11	8	11	6	72
		% within GENDER	50,0%	15,3%	11,1%	15,3%	8,3%	100,0%
	F	Count	42	6	3	0	0	51
		% within GENDER	82,4%	11,8%	5,9%	,0%	,0%	100,0%
Total		Count	78	17	11	11	6	123
		% within GENDER	63,4%	13,8%	8,9%	8,9%	4,9%	100,0%

Table 13 gives the results showing the respondents' answers regarding the assertion that respondents play online video games as they cannot stand even one day without playing. Results are the approximately the same for both groups of respondents (79.2% of male and 84.3% of female students) saying that this assertion never applies to them.

The value of the χ^2 test is (Chi-square= 5,445 (df=4), $p=0.2$).

Table 13. Assertion 5 – I Play Online Video Games Because I Cannot Stand Even One Day Without Playing

Crosstab

			IG 1DBN					Total
			NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	ALWAYS REFERS TO ME	
GENDER	M	Count	57	10	3	0	2	72
		% within GENDER	79,2%	13,9%	4,2%	,0%	2,8%	100,0%
	F	Count	43	3	4	1	0	51
		% within GENDER	84,3%	5,9%	7,8%	2,0%	,0%	100,0%
Total		Count	100	13	7	1	2	123
		% within GENDER	81,3%	10,6%	5,7%	,8%	1,6%	100,0%

Table 14 presents the extent to which the assertion that respondents sometimes play online video games during classes. In both groups the largest percentage of respondents answered that the assertion does not apply to them.

Nevertheless, it is worth noting, that a minor percentage of respondents coming from both groups play online video games during classes.
The value of the x2 test is (Chi-square= 4.585 (df=4), p= 0.2).

Table 14. Online Gaming During Classes

Crosstab

			TNAS IG					Total
			NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	ALWAYS REFERS TO ME	
GENDER	M	Count	57	7	3	3	2	72
		% within GENDER	79,2%	9,7%	4,2%	4,2%	2,8%	100,0%
	F	Count	43	6	0	0	2	51
		% within GENDER	84,3%	11,8%	,0%	,0%	3,9%	100,0%
Total		Count	100	13	3	3	4	123
		% within GENDER	81,3%	10,6%	2,4%	2,4%	3,3%	100,0%

Table 15 gives the values showing the respondents' answers regarding the assertion that video games are played at definite times and that respondents absent from classes because of that demand. The table demonstrates that respondents of both groups consider that gaming is not more important than classes (95.8% of male and 100% of female students). The value of the x2 test is (Chi-square=2.178 (df=3), p=0.5).

Table 15. Respondents Absent From Classes Because Of A Demand To Play An Online Video Game At A Definite Time.

Crosstab

			IZ_SNAST				Total
			NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	
GENDER	M	Count	69	1	1	1	72
		% within GENDER	95,8%	1,4%	1,4%	1,4%	100,0%
	F	Count	51	0	0	0	51
		% within GENDER	100,0%	,0%	,0%	,0%	100,0%
Total		Count	120	1	1	1	123
		% within GENDER	97,6%	,8%	,8%	,8%	100,0%

Table 16 presents the extent to which the assertion that respondents cancel all their agreed appointments because of a request of their teams. Respondents of both groups do not give precedence to online gaming over their obligations. However, more male students will abandon their activities to play online video games than female students. The value of the x2 test is (Chi-square=1.508 (df3), p= 0.5).

Table 16. Upon A Request Of The Team For Online Gaming, I Cancel All My Appointments.

Crosstab

			NAP_AKT				Total
			NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	
GENDER	M	Count	60	6	3	3	72
		% within GENDER	83,3%	8,3%	4,2%	4,2%	100,0%
	F	Count	46	2	2	1	51
		% within GENDER	90,2%	3,9%	3,9%	2,0%	100,0%
Total		Count	106	8	5	4	123
		% within GENDER	86,2%	6,5%	4,1%	3,3%	100,0%

Table 17 presents the extent to which the assertion that respondents escape the real world by online gaming. The majority of the respondents declare that this assertion mostly does not apply to them.

The value of the x2 test is larger than the limit value at degree of freedom 4. The results can therefore be considered statistically significant (Chi-square=1.887 (df=4), p= 0.8).

Table 17. Online Gaming Is A Means Of Escape From The Real World

Crosstab

			IG_BRLS					Total
			NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	ALWAYS REFERS TO ME	
GENDER	M	Count	51	14	2	2	3	72
		% within GENDER	70,8%	19,4%	2,8%	2,8%	4,2%	100,0%
	F	Count	33	11	4	1	2	51
		% within GENDER	64,7%	21,6%	7,8%	2,0%	3,9%	100,0%
Total		Count	84	25	6	3	5	123
		% within GENDER	68,3%	20,3%	4,9%	2,4%	4,1%	100,0%

Table 18 presents the extent to which the assertion that online gaming makes respondents feel part of a team. Despite the fact that the largest percentage of respondents of both groups belongs to the first answer category, it can be inferred that more than a half of the first group (male students) play online video games precisely for the reason to feel part of a team. The value of the x2 test is larger than the limit value at degree of freedom 4. The results can therefore be considered statistically significant. Value of Chi-square test=14. 235 (df=4), p= 0.01).

Table 18. Assertion 10 - Online Gaming Makes Me Feel Part Of A Team

Crosstab

			IG_DIOT					Total
			NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	ALWAYS REFERS TO ME	
GENDER	M	Count	29	10	15	11	7	72
		% within GENDER	40,3%	13,9%	20,8%	15,3%	9,7%	100,0%
	F	Count	34	10	3	2	2	51
		% within GENDER	66,7%	19,6%	5,9%	3,9%	3,9%	100,0%
Total		Count	63	20	18	13	9	123
		% within GENDER	51,2%	16,3%	14,6%	10,6%	7,3%	100,0%

Table 19 presents the extent to which the assertion that online gaming makes often disturbs respondents' sleep. The majority of the respondents declare that this assertion does not apply to them (83.3% of male and 90.2% of female students). The value of the x2 test is = 6.967, df=4, p= 0.1.

Table 19. Online Gaming Often Disturbs Sleep

Crosstab

			NIG_LSP					Total
			NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	ALWAYS REFERS TO ME	
GENDER	M	Count	60	7	1	3	1	72
		% within GENDER	83,3%	9,7%	1,4%	4,2%	1,4%	100,0%
	F	Count	46	1	1	0	3	51
		% within GENDER	90,2%	2,0%	2,0%	,0%	5,9%	100,0%
Total		Count	106	8	2	3	4	123
		% within GENDER	86,2%	6,5%	1,6%	2,4%	3,3%	100,0%

Table 20 presents the extent to which the assertion that online gaming is a means of escape from the real world problems. The data presented in the table demonstrate that the majority of the respondents from both groups declare that this assertion does not apply to them (77.8% of male and 80.4% of female students). The value of the x2 test is = 2.312, df=4, p= 0.5.

Table 20. Online Gaming Is A Means Of Escape From The Real World Problems

Crosstab

			IG_BPUZ					Total
			NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	ALWAYS REFERS TO ME	
GENDER	M	Count	56	5	4	5	2	72
		% within GENDER	77,8%	6,9%	5,6%	6,9%	2,8%	100,0%
	F	Count	41	6	1	2	1	51
		% within GENDER	80,4%	11,8%	2,0%	3,9%	2,0%	100,0%
Total		Count	97	11	5	7	3	123
		% within GENDER	78,9%	8,9%	4,1%	5,7%	2,4%	100,0%

Table 21 presents the extent to which the assertion that respondents want to, but do not know how to stop playing online video games. As with previous assertions, the majority of the respondents declare that this assertion does not apply to them. However, a small percentage (2% of male and 1% of female students) of respondents declared that the assertion does apply to them, which must not be neglected. The calculated value of the x² test = 0.895, df=4, p= 0.9.

Table 21. Willing, But Unable To Stop Online Gaming

Crosstab

			NEZ_STOP					Total
			NEVER REFERS TO ME	RARELY REFERS TO ME	OCCASIONAL LY REFERS TO ME	OFTEN REFERS TO ME	ALWAYS REFERS TO ME	
GENDER	M	Count	59	5	5	1	2	72
		% within GENDER	81,9%	6,9%	6,9%	1,4%	2,8%	100,0%
	F	Count	43	4	3	0	1	51
		% within GENDER	84,3%	7,8%	5,9%	,0%	2,0%	100,0%
Total		Count	102	9	8	1	3	123
		% within GENDER	82,9%	7,3%	6,5%	,8%	2,4%	100,0%

CONCLUSION

Based on the obtained results it can be concluded that the male students are more prone to playing online video games than their female peers. The respondents play video games during the day, however only 5.6% of male

and 3.9% of female student play online video games at night, which may indicate sleep deprivation, inability to attend classes on the following day, irritability, fatigue and similar.

In order to gain membership to an online gaming group, respondents believe that they need to prove themselves since the majority of groups condition access on certain conditions such as spending a minimum of one hour per day online gaming, readiness to respond at a definite time etc. Once a respondent has become a member of a group, he will carry out tasks imposed on him by group leaders to advance in the team (hierarchy). 30.6% of male (m) and 2% of female respondents are members of a clan in Croatia, with 20% of male and 5% of female respondents are members of a clan outside Croatia. The relevant difference in the number of boys and girls included in groups indicates that boys search social interaction in the virtual life more than girls.

In order to advance in a particular video game it is sometimes required to spend money to purchase some equipment. A good indicator is that respondents, none the less, do not spend money on purchasing equipment or anything similar for the video game, despite the fact that 12.5% of the respondents did answer that they purchase equipment. The question remains whether parents know how their children spend their pocket money, how much money they spend on equipment and how often they do that. We cannot offer an answer to this question, but we consider that this should be matter for future research.

Respondents answered the question why they play video games saying that they play video games primarily for fun. Some of them do it even during classes, which can point to a possible indifference to curriculum content, inability to attend classes (due to all-night gaming), boredom, request of the team to play at definite time or it can point to a possible addiction to videogaming. The use of smartphones to play online video games and any other form of class disruption should be precluded.

Even though the usage of smartphones and m-learning has entered teaching and it does have many advantages when used for learning, i.e. when it is implemented for teaching purposes, there is the other side of the coin which shows that the increasing frequency to use it for online gaming, searching information on the Internet, frequent downloading of numerous application and similar, spending more than three hours a day at smartphone and/or tablet/computer, could point to possible signs of addiction. Considering the amount of time young people spend interacting with their new "smart pets", including time during classes and breaks, free time, time before going to bed, in other words most of their time, a part of their time should be directed to activities which balance the activities of the left and the right hemispheres, spend more time in countryside and be included in sport teams.

We cannot change the progress of the world or the fact that the new generations, called digital natives (Prenski, 2001), have a different approach to technologies in general. However, on the other side, we cannot forget that the human being and our body are meant for moving and it is biologically structured for moving. The big change in our habits, introduced by the massive use of technologies has its risks. Risks that have to be understood firstly by the parents and educators of all the school grades. We have to be aware that technology is an instrument that can be used in a vastity of ways and, more important, that the choice is very often imposed. In the same way that we are doing our best as individuals and as society to keep our children away from drugs and gambling, we have to do our best to teach them the proper use of the ICT tools. In the first years this will mean to create the environment in which they can live (physical and virtual).

Precisely for the above-discussed reasons, it is of extreme importance to permanently educate parents, children and all people involved in the upbringing and education process, especially teachers, in order to enable them to prevent or at least recognize the first signs of a possible online gaming addiction. It is recommended that education be commenced as early as possible (when a child's interest for the usage of computers, smartphones and other devices is noted) both at home and at kindergarten. Early prevention and efficient education is one of the preconditions for a healthy growing up alongside new information and communication technology.

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EFFECT OF LOCATION OF THIN FILMS DEPOSITED BY APCVD INSIDE THE REACTOR ON ITS OPTICAL AND ELECTRICAL PROPERTIES

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ABSTRACT: Nano tin oxide films were deposited on glass substrates by atmospheric pressure chemical vapor deposition (APCVD) system. Films were deposited at different locations inside and along the reactor. Optical properties including transmittance(T%) and absorption coefficient (α); Electrical properties including current-voltage (I-V) characteristics and sheet resistance (Rsh) for all SnO₂ thin films (TFs) have been studied. Calculated TFs thickness was in the range (170-200) nm using T% spectrum. Energy gap (Eg) and X-Ray Diffraction (XRD) for the best transparent conductive SnO₂ film were measured. It reveals that Eg=4.1 eV and the film has polycrystalline tetragonal structure with a preferred orientation in the (110) direction. The grain sizes are in the range (17-24) nm. Position for optimum physical properties is at 18.5 cm from the reactor outlet.

Key words: APCVD, thin films, physical properties.

INTRODUCTION

There are several techniques to prepare TFs such as thermal evaporation, spray pyrolysis, dip coating, spin coating, APCVD, etc. (Ikhmayies 2012, Hububi et al. 2011, Serge and Cathy 2013, Guglielmi and Menegazzo 1998, Yates et al., 2011). In thin film manufacturing requirements it is important to choose a fast and cheap deposition process which achieve a significant degree of control of thin film properties. APCVD technique is an ideal method to achieve these requirements by choosing the right value of the main effective deposition factors, such as substrate temperature, rate of flow of gases, sample position and depositing time (Al-Delaimy, 2006).

Transparent conducting thin films are important in applications in various fields such as optoelectronic applications (Fay, et al. 2007), transparent surface electrodes in thin film solar cells (Aranovich et al., 1980), fabrication of heat reflecting (low emissivity) windows (Proscia and Gordon, 1992), liquid crystal displays, heat mirrors and multilayer photothermal conversion systems (Chopra, et al., 1983), and gas sensors (Lim et al., 2006) electronic devices such as laser emitting diode (Karamdel, 2010). Transparent conducting oxides (TCOs) films have been prepared from a wide variety of materials, these include metals (such as silver, gold, and titanium nitride, etc.), and semiconducting oxides (of tin, indium, titanium, zinc and cadmium, etc.). SnO₂ material is one of the most important TCOs (Al-Delaimy and Al-Khaerow, 2012, Gordon, 2000). The combination of conductivity and transparency is usually impossible in intrinsic stoichiometric oxides, but it could be achieved by oxides with a non-stoichiometric composition(Granqvist, 1993, Exarhos and Zhou, 2007).

In this work, the effect of sample position factor on SnO₂ thin films properties have been studied. The studied properties are, Optical properties including transmittance (T%), absorption coefficient (α) and energy gap (Eg); Electrical properties including current-voltage (I-V) characteristics and sheet resistance (R_{sh}); and structural properties using XRD technique.

METHODS

Homemade APCVD system shown in figure (1) was used in depositing SnO₂ thin films at different positions. Four cleaned slides (S1, S2, S3, S4) type Gloim 1003 (Altay) (25.4x76x1) mm were arranged inside and along a reactor (50 cm quartz tube length with 33 mm diameter) touching each other in series. Each slide was marked with line in the middle of its length to get eight numbered positions as shown in figure (2).

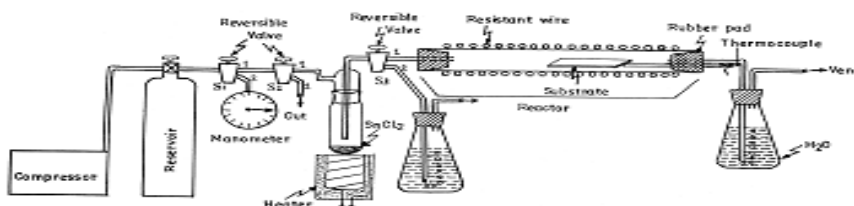


Figure 1. Schematic Diagram of APCVD System

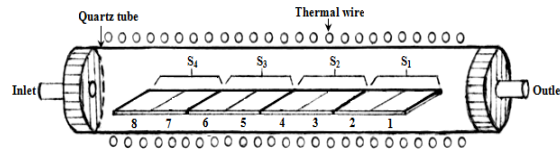


Figure 2. Slides Arrangement Inside the Reactor

Material used was $\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$ (purity 99.99%) supplied by Fluka company, and pure air as carrier and oxidizing gas. Rate of flow of gas was fixed at 2 lt/min. substrate temperature at 450°C and deposition time at 10 min. Transmittance spectra for SnO_2 thin films were recorded using Shimadzu-1800 UV-vis spectrophotometer in the range (400-800) nm. Films thickness (t) was calculated using the relation (Ikhmayies and Bitar,2012):

$$t = (\lambda_{\text{max}} \cdot \lambda_{\text{min}}) / 4n(\lambda_{\text{min}} - \lambda_{\text{max}}) \quad \dots\dots\dots (1)$$

where, λ_{max} and λ_{min} are the wavelength values at a certain T_{max} and next T_{min} respectively in transmittance spectrum and (n) is film refractive index. It was found that films thickness are in the range (170-200) nm. Using film thickness (t) and transmission percent (T%), absorption coefficient (α) was calculated using the relation:

$$\alpha = -\frac{1}{t} \ln T \quad \dots\dots\dots (2)$$

Current-voltage characteristics were measured for all SnO_2 thin films using four point probe unit and R_{sh} was calculated. Structural properties for the best conductive film with the lower R_{sh} and good transparency were studied by XRD technique using Philips X-ray diffractometer model (PW1130). Source of radiation was $\text{CuK}\alpha$ ($\lambda = 1.5405 \text{ \AA}$) and the scanning range was restricted to the range ($10\text{-}60^\circ$). Energy gap for this film was calculated using transmittance spectrum.

RESULTS AND FINDINGS

Transmission percent as a function of wave length, for SnO_2 films deposited at different positions, is shown in figure (3). The figure shows that T% increases with λ within the studied range for all films, and it's values depend on samples positions.

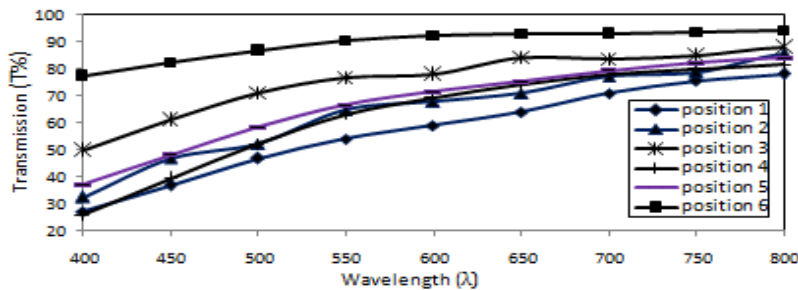


Figure 3. T% Vs. λ For SnO_2 Thin Films At Different Positions

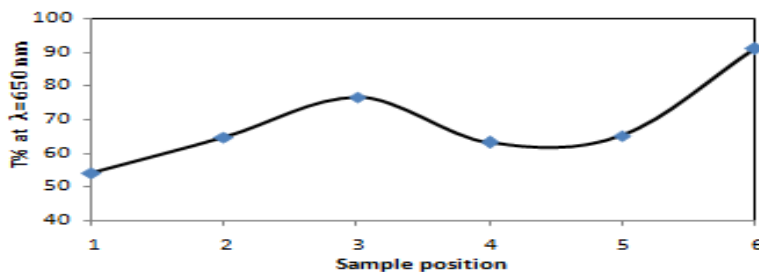


Figure 4. T% For SnO_2 Film At 650 Nm Versus Film Position

Figure (4) shows T% at wave length 650 nm in the best fitted curves of transmission% spectra for samples at different positions. It is clear that sample in position 6 has the highest T% value followed by sample in position 3, and the lowest in position 1. This was attributed to the pattern of gas flow and the temperature gradient through the whole tube which depend on the geometric dimensions of the tube.

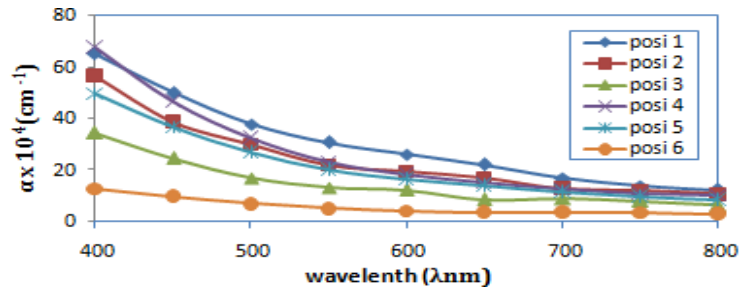


Figure 5. Absorption Coefficient Versus λ For SnO_2 Tfs At Different Positions

T% for samples at positions 7 and 8 is very close to glass transparency and they have a very high resistivity which means either poor or no film deposition. Absorption coefficient (α) was calculated for samples deposited at different positions using equation (2). Figure (5) shows the relation between α and λ for SnO_2 films. The value of (α) increases in the direction of wavelength decrement. The minimum value of α is for sample in position 6 and the maximum for sample in position 1. It's magnitude was $> 10^4 \text{ cm}^{-1}$ which indicated that the film is a semiconductor (Nag 1972).

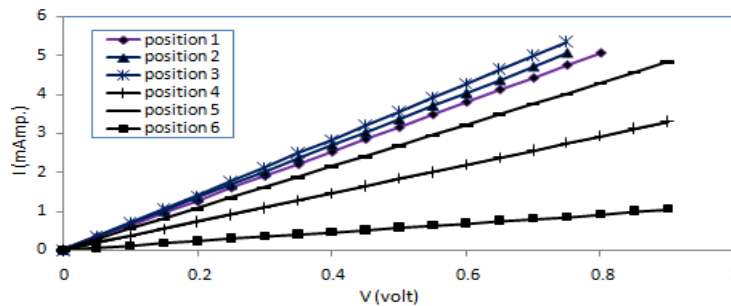


Figure 6. I-V Characteristics For SnO_2 Tfs At Different Positions

Current–Voltage characteristics for all SnO_2 thin films are displayed in figure(6). The figure shows that the current is proportional to the voltage within the applied voltage range for films in different positions except positions 7 and 8 where no current pass through. Also samples at different positions give different currents at the same voltages.

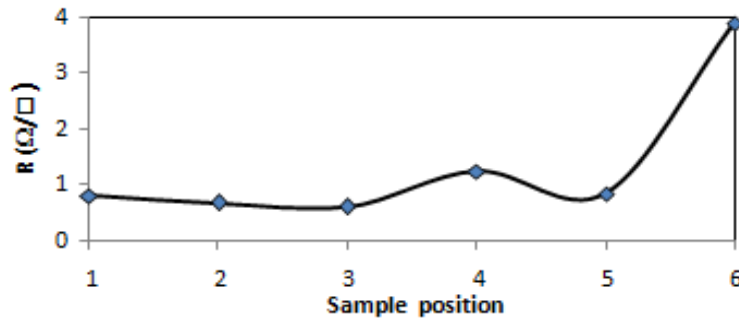


Figure 7. R_{sh} vr. Positions of SnO_2

Calculating sheet resistance for all films and drawing the relation with sample position as in figure (7), one can notice that the lower sheet resistance value belong to sample at position 3. Sample in this position which poses the optimum physical properties (lower R_{sh} and good T%), located at 18.5 cm from the reactor outlet. In our previous study [6] in which different dimension reactor been used, the optimum physical properties were obtained for sample located at 17 cm from the reactor outlet. Figure (8) shows the XRD pattern for SnO_2 film in position(3). It reveals that SnO_2 film has a polycrystalline tetragonal structure with (110), (101), (200), (211) orientations and the preferred orientation is in (110) direction. Grains size were calculated using scherrer equation. They are (17.4, 23, 24, 22) nm for (110), (101), (200), (211) orientations respectively.

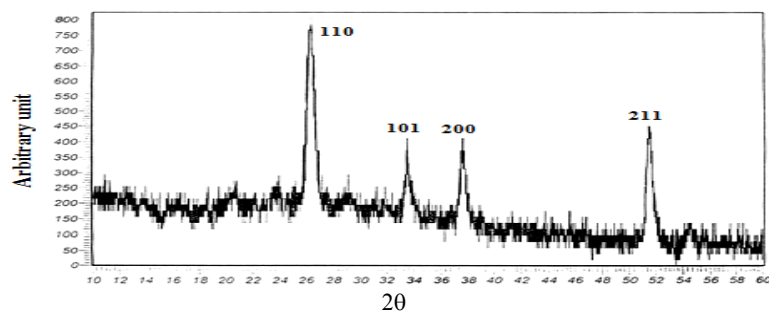


Figure 8. XRD for SnO₂ (TF)

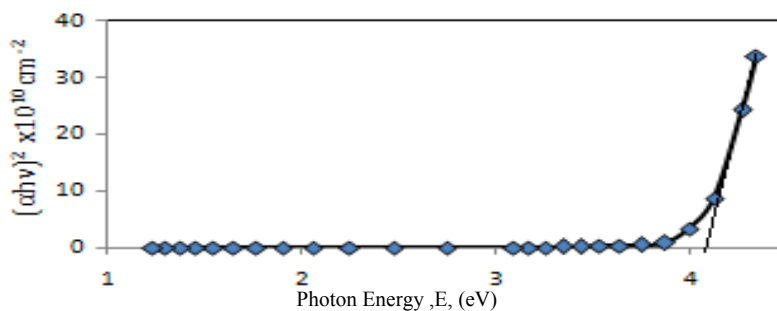


Figure 9. $(\alpha h\nu)^2$ vs. Photon Energy for SnO₂ (TF)

A plot of $(\alpha h\nu)^2$ versus photon energy ($h\nu$) for sample in position (3) is shown in figure (9) which is linear in absorption edge. E_g value equal (4.1) eV is found from the figure by intercept of the straight line in absorption edge region with the energy axis.

CONCLUSION

- 1- Location of thin film deposited in APCVD technique inside the reactor is an effective factor on its physical properties.
- 2- The optimum position for SnO₂ TFs in the system used in this work is located at 18.5 cm from the outlet end of the reactor.
- 3- SnO₂ films have $E_g = 4.1$ eV, max. transmission = 94% with a polycrystalline tetragonal structure.
- 4- Grains size were (17.4, 23, 24, 22) nm for (110), (101), (200), (211) grain orientations respectively.
- 5- The preferred orientation was in (110) direction.

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STRATEGY FOR THE ACCELERATION AND EXTENSION ON ECONOMIC DEVELOPMENT OF ENDE DISTRICT THROUGH TEACHING PROGRAM BY GRADUATE IN THE OUTERMOST, THE BORDER AND THE RETARDED REGION (SM3T)

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ABSTRACT : Research on "Strategy For The Acceleration And Extension On Economic Development Of Ende District Through Teaching Program By Graduate In The Outermost, The Border And The Retarded Region (SM3T)" aims to examine (1) improving the quality of human resources in the face of the Asean Economic Community; (2) mapping the flagship commodity of Ende district; and (3) developing a policy strategy to accelerate and expand the development of leading sector of Ende district. Given the peculiarities of the subject, the object of study as well as the nature of the research, the research used both qualitative and quantitative approaches. The results showed that the efforts of acceleration and expansion of economic development in Ende district done by education graduate for the purpose of enhancing the competence of human resources. These competencies required to process agricultural commodities and tourism became superior commodity. The strategies are the following: **first**, increasing the enrollment of learners; **second**, developing the agricultural sector according to the potential, the characteristics of the land and its people; **third**, developing tourism and the preservation of local culture in accordance with its potential; and **fourth**, increasing the capacity of economic institutions of the society. Suggestions can be recommended as follows: **first**, the universities need to equip candidates of SM3T with the needs of the location that can help to strengthen the local economy; **the second**, Local Governments should facilitate the marketing of technology-based agricultural products and tourism.

Keywords: the acceleration and expansion of Indonesian economic; outermost and retarded region

Preface : In 2015, Indonesia will face AEC (Asean Economics Community). Many professionals assumed that Indonesia is not properly prepared for facing AEC. Actually, however, Indonesia has a potential to become an important player because of the possession of several advantages as compared to other ASEAN countries. One of these advantages is the numerous middle-class populations. As a reflection, in 2004 the number of middle-class populations in Indonesia represented only 17% of total population but it increased to 56.7% in 2013 (Kompas, November 25, 2013)

AEC imparted an opportunity for Indonesia to become a high-income state, which is a state whose societies have achieved a knowledgeable phase. Presently, however, Indonesia is still far away from this phase. AEC necessitates economic capitals, human resources and manufactured products to flow in and out of a country freely without restriction. In this context, suitable policies and strategies done by the government especially for education sector are necessary to fulfil the need of educated and qualified human resources which, in turn, will be able to accelerate the economic growth.

However, to make the above expectation come into reality is not easy because of the wide-scale of the United Republic of Indonesia (NKRI), which is very heterogenic both geographically and socio-culturally in the 3 areas (the outer most, the border and the retarded region). Some of the problems that arise are a shortage of educators, unbalanced distribution, under standard qualification, less competent, as well as the mismatch between educational qualifications with the needs of the field.

In attempt to expand and accelerate economic growth in Indonesia, the Ministry of Education & Cultures had launched the so called Forward Together Program for Educating Indonesia. These program consists of: (1) PPGT (Education Program for Integrated Teachers with Additional Authorities), (2) SM-3T Program (Education in 3T Areas by Strata I Graduates), (3) Real Field Work Program by University Students in 3T (the outer most, the border and the retarded region) areas,(4) Education Program for Collaborative & Integrated Teachers and (5) Strata I-level Education Program with Additional Authorities. The above programs might be used for overcoming various problems relating to education in 3T areas. The SM-3T program was intended for graduates who would be assigned to 3T areas for one year. These graduates had never been a teacher before but they must be graduates from Strata I-level Study Program. The SM-3T program had been implemented in 35 Regencies of 3T areas around Indonesia, in the year of 2011 and 2012 for 5170 graduates and in 2013 for 2652 graduates.

In another context, the Coordinating Minister for Economy had supported the Expansion & Acceleration Program for Economic Developments by integrating the following elements: (1) Developments of local Economic Potentials in 6 economic corridors (Sumatera, Java, Kalimantan, Sulawesi, Bali, East Nusa Tenggara, Papua), (2) Reinforcement of National Connectivity by means of inter-local integrations and global connectivity and (3) reinforcement of human resources and IPTEK (science, knowledge and technologies) capabilities for supporting the development of main program in every economic corridor. In this context, there were 8 nominated sectors namely farming, mining, energies, industries, marine, tourism, telematics and development of strategic areas

Ende Regency is one of 22 regencies in Nusa Tenggara Timur Provinces, has a coverage area of 2,946.60 km² and 40 isolated villages spread in 13 districts. The topography of Ende Regency consists of hilly and coastal areas in which very potentials for tourism, agricultural, horticultural, fishery and mining developments. Besides, there are 15 cultural and 69 natural tourism resorts.

Based on the data of 2010 trends, the population of Ende district in 2019 is projected to reach 298,834 of people (assumed that the average growth per year is 1.48%). In term of education level, human resources in Ende Regency were still left behind. Only 6.07% of the total population graduated or just finished from College, 18.98% from Senior High School, 14.09% from Junior High School and 25.53% from Elementary schools (Marheni, 2014)

The problems that arises then is as follows: (1) How to increase the quality of human resources in Ende associated with the competition among ASEAN countries?, (2) What commodities can be seeded in the trade of Ende?, (3) What strategies and policies should be attempted for expanding and accelerating the developments of primary sectors in Ende?

Therefore, this research was intended to construct a model for improving human resources for expanding and accelerating the developments of the primary sectors of Ende regency.

LITERATURE REVIEWS

AEC intended to integrate economic developments in the region by forming a single market, uniting production bases, reinforcing competitive powers and distributing economic growth among ASEAN countries. Within integrated economy, there would be a tradeoff but also limiting the trades among the countries

Integrating the economy are usually done through the following phases:

1. Provide special convenience to particular products from certain countries, such as lowering tariffs for example (Preferential Trading Areas).
2. Eliminating tariffs and trading quotes among the countries member, but still charge the tariffs for non-member countries (Free Trading Areas).
3. Free Trading Areas, which eliminates all restrictions of the commodities among the countries member and charge the same tariff for non countries member (Custom Union).
4. Custom Union also eliminates all restrictions of the production factors flow. It is hoped that the parity of prices and production factors will result the resources allocation efficiency (Common Market).
5. Common Market is characterized by harmonious and significant economic policies in every country (Economic Union)
6. Total Economic Integration, which is characterized by unification of monetary, fiscal and social policies, reflects the formation of a supra natural body whose decisions bind all member countries (Pelkman 2001)

Economic growth of an area is one of several indicators for the success of economic developments in the area. There are three parameters for measuring economic growth. These are general, per worker and per capita growth of outputs. General growth of outputs is used for measuring the growth of production capacities, which is determined by increases in monetary capitals and number of workers in the area. Per worker growth of outputs is frequently used as an indicator for changes in competitive power of the area, which depend on the growth of productivity. Per capita growth of outputs is used as an indicator for changes in economic welfares (Bhinadi, 2002).

More integrated economy will result in easy movement and broader job opportunities for workers that, in turn, would reduce the number of jobless, eliminate poverty and increase individual incomes. Considering the fact that most of Indonesian workers are still non-skilled ones, however, improved educational and training programs should be provided in order to increase their qualities and to develop their potentials

This research showed the following results: (1) Proportion of populations with productive ages did not significantly affect economic growth. (2) Graduation from Senior High Schools positively and significantly affected economic growth. (3) Healthiness and life expectancies did not significantly affect economic growth. However, the quality of human resources, as measured by three independent variables, significantly affected economic growth. The three variables both individually and collectively affected economic growth very significantly (Lonni and friends, 2002).

SM-3T program constituted a dedication program for Strata I Educational Graduates who should dedicate themselves for one year for accelerating the achievement of educational developments in Indonesia. The targets for SM-3T program were 3-T regencies spread out in 8 provinces (Aceh, Riau, NTT, East Kalimantan, West Kalimantan, North Sulawesi, Papua and West Papua). The criteria for determining whether or not an area is categorized as a 3-T area were issued by the Ministry of Developments for Lag-Behind areas

In fact, any State Policy has a risk to fail. Parson (1995) divided policies into unimplemented and implemented but unsuccessful ones. Unimplemented means that the policy is implemented but in a way that is not in accord with the plan, probably because the involved parties cannot work together or because they are not efficient or because the works are beyond the reach of the parties that however hard the parties had worked the obstacles remain irresolvable. Unsuccessful implementation means that the policy is implemented as planned but external conditions are not supportive.

METHODS

This research, entitled “Policies and Strategies for Expanding and Accelerating Economic Developments in Ende Regency through SM-3T Program”, constituted a specific and holistic study. Specific meant that the subjects of study were the implementers of the policies for the field of education. Holistic means that the analyses conducted were projected not only to human resources and economic but also to political aspects. The researchers and the subjects of study interacted very actively in certain time and contexts. This research employed qualitative (Bogdan & Biklen, 1998) or naturalistic (Lincoln & Guba, 1985) and also quantitative approaches.

The qualitative approach was used for analyzing independent and natural phenomena or pure entities. For describing a phenomenon, the researchers used inductive procedures with human being as the main instruments. The quantitative approach was used for mapping out the economic potentials and the availabilities of related resources. Quantitative analyses were intended not only for short-run (profit maximization) but also for long-run (wealth maximization) goals

In accord with the theme of this research, the aspects studied were human resources, economic and political ones. This research was conducted in 13 districts in Ende Regency, NTT Province. Due to different characteristics of the study sites, the most suitable type of study was multi site one (as stated by Bogdan & Biklen, 1998), This multi site or multi case study took on various format starting with a single case, which was used as a pilot study for studying other similar cases. Two or more case studies were conducted and then compared to produce generalizations.

This research used primary and secondary data, The primary data were collected in the forms of verbal and behavioral information from the informants who were selected using purposive sampling technique. The secondary data were collected from documents, photos, audio & visual records and other objects used for complementing the primary data

In order to obtain holistic and integrated data relevant to the research focus, problems and goals, the needed data were collected by means of (1) deep interviews, (2) observations, (3) Focus Group Discussions, (4) questionnaires and (5) studies on documents

For the qualitative approach, the data were analyzed using an interactive model consisting of reducing and presenting the data followed by conclusion takings. Interpretations were then conducted by describing the arising trends and finding out inter relationships among those trends. The quantitative approach used percentages for describing the potentials which were then used for describing the necessary strategies

The validities of the data were tested using triangulation technique, which used information or data other than the primary data. These other data or information were used for checking out the validities of the primary data (Moleong, 2004).

RESULT AND DISCUSSIONS

Ende Regency is one of regencies in Flores Island, NTT Province. Ende Regency is 204,660 hectare in area. The population of Ende in 2012 totaled 269,629 (141,672 females and 127,957 males). In 2012, an average of 137 individuals occupied every one kilometer square of land. In 2012, the composition of the population in Ende Regency was as follow. Age 0 – 14 consisted of 39.00% males and 31.40% females, age 16 – 49 consisted of 44.00% males and 50.50% females and age 50 and older consisted of 17.00% males and 18.10% females. Most of the populations (78,049) worked in farming sector, 25,304 worked in tertiary sector (trading, transportation, servicing and money lending) and 16,751 worked in secondary sector (mining, digging, processing industries, electrical, drinking water and construction).

SM-3T program provided Graduates from Strata I Educational Study Program with opportunities to participate in accelerating the development programs. Two hundred twenty three (223) graduates participated in the SM-3T program in Ende Regency. They were distributed to villages spread out in 13 districts. The graduates participating in this SM-3T program had good personalities and had achieved pedagogic and social competencies which were indicators for professional teaching activities.

The recruitments for the SM-3T participants was done using Internet as the medium and was based on the following criteria: Indonesian nationality, graduated from Strata I Study Program with Achievement Index of 3 at the minimum, age 27 or less, still single, healthy and having good personality. Before being sent to the locations of studies, these participants were briefed on good learning-teaching strategies.

It is hoped that in 5 years after the completion of the SM-3T program, the qualities of human resources in 3T areas might be increased. The 2013 data by Bapeda (a Regional Governmental Body) of Ende Regency showed that in 2012, the area had shortages of 21.91%, 52.83% and 67.24% of competent Elementary, Junior High and Senior High School teachers, respectively. Ende Regency had several commodities having potentials to be of superior in their trading values (see Table 1).

Ende Regional Income from agriculture sector increased Rp. 77,043,000 per year (Rp. 96,422,500 in 2009 and Rp. 173,465,000 in 2013). The Middle-term Plan for Development in Ende Regency targeted an income of Rp. 175,000,000 in 2013, which meant that the Regency achieved 99,12% of the targeted income.

Development policies and strategies for education, agriculture and tourism in Ende had been composed to become references not only for running the government businesses, implementing development programs and building up the communities in all Work Units in Ende Regency, but also to be used by all related stakeholders. The development policies in Ende for the 5 year period were mapped per year and begun in 2015. In this context, the development policies for 2019 become a transitional base for the next 5 year Middle-term Plan. Inter relationships among goals, objectives, strategies and implementation of policies is show in Table 2.

CONCLUSIONS & RECOMMENDATIONS

Based on analyses that had been conducted, several conclusions can be forwarded as follow:

1. SM – 3T Program had been used for increasing the quality of educations in Ende Regency in order that, in the short-run, the students would achieve pedagogic and social competencies, good personalities and basic professionalism. In the long run, with improvement in the qualities of human resources, it is hoped that Ende Regency will be able to accelerate its economic developments
2. Agriculture and tourism sectors constituted two superior commodities providing the biggest economic contributions to the income of Ende Regency
3. The policies taken by regional government should be the ones that would improve the existing educational means & infrastructures, increase the accesses to and quality of educations and give incentives to local teacher. As for the agricultural sector, the policies should improve the productivities of farming, fishery and other marine products. In the content of tourism sector, the policies should increase the qualities of means & infrastructures and accesses to the existing tourism resorts. Local cultures should also be promoted, local institutions for tourism should be reinforced and creative industries (souvenir) should be developed.

The recommendations that can be forwarded are as follow:

1. Colleges or universities as the main sources for participants of SM-3T program should provide the prospective participant with skills and knowledge in accord with the needs of the 3T locations where the participants will be sent, that the social and economic factors of the target locations can be reinforced
2. The government of Ebde Regency should facilitate the SM-3T participants and the local communities in their attempts to marketing, by means of Internet, the existing agricultural and tourism potentials.

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Table 1: Potential Tourism and Farming Commodities

No	Districts	Target Village for SM-3T	Tourism Potentials	Farming & Plantation Potentials
1	Nangapanda	Ondorea Rajawawo, Orakeri Tendarea	Ring Beach Pu'ukung Beach Ondorea	Coconuts, Coffee, Cocoa, Guava Mete, Vanilla, White pepper, Pala, Candlenut tree, Pinang, Cassava, Corn
2	Maukaro	Kebirangga Kebirangga	Maukaro Beach Kindey Beach	Coconuts, Coffee, Cocoa, Guava Mete, Cassava, Corn, Paddy
3	Ende	Kojanara Mokeasa	Kombandaru Hot/Warm Water	Coconuts, Coffee, Cocoa, Guava Mete, Clove, Vanilla, White pepper, Pala, Candlenut tree, Pinang, Pepper
4	East Ende	Mautapaga	Bitu Beach	Coconut, Coffee, Cocoa, Guava Mete, Clove, Vanilla, White pepper, Pala, Candlenut tree, Pinang, Pepper, Cassava, Corn
5	Middle Ende	Lorong Loper		Corn, Cassava
6	Norther Ende	Kampung Barai Borokanda	Bung Karno Cite Bung Karno Reflection Park Ria Beach	Coconuts, Banana, Corn
7	Ndona	Kekasewa, Dedu Kelikiku, Lokoboko	Mbu'u Beach Saga Custom House	Coconuts, Cocoa, Corn, Cassava
8	Wolowaru	Bokasape, Niramesi Detupau, Likanaka Belanggo	Murundao Warm Water Mbuli Beach Japu Water Fall Mother Maria Cave	Banana, Coffee, Cocoa, Guava Mete, Candlenut tree, Pinang, Cassava, Coconuts, Clove
9	Wolojita	Wolowaru-Nggela	Nggela Beach	Candlenut tree, Vegetables, Corn
10	Maurole	maurole	Warulo'o Beach, Ropa Beach	Coconuts, Banana, Coffee, Cocoa, Guava Mete, Ubi, Corn
11	Detukeli	Watunggere	Marilonga Castle Moke Tuak & Sugar Plant Lesugolo Natural Hot Water	Coffee, Cocoa, Guava Mete, Clove, Candlenut tree, Vegetables,
12	Wewaria	Southern Waterati Ekose	Wewaria Beach Waka Beach	Coffee, Cocoa, Guava mete, Candlenut tree
13	Kelisoke	Pisa	Tiwu Sora Lake	Coconuts, Coffee, Cocoa, Guava Mete

Table 2: Inter Relationships among Goals, Objectives, Strategies and Policy Implementations

Improve Human Resources with High Quality and Competitive Powers							
Goals	Objectives	Strategies	Directions				
			2015	2016	2017	2018	2019
1. Increase the Intelligence of Society Members	1.1. Realization of High Quality All-level Education including for Disables	1.1. Administer education processes capable of producing high quality graduates	1. Provision and distribution of teachers and education processes for all types and levels of educations 2. Improvements in the quality of teachers and education processes for all types and levels of educations 3. Improvements in the quality of graduates from all types and levels of educations				
	1.2. Increases in reading willingness of the society members	1.2. Improve means & infrastructures for libraries and motivate individuals to read more	1. Provision of high quality reading materials 2. Provision of adequate and high quality means & infrastructures for libraries				
2. Increase the accesses to High Quality Education	2.1. Realization of balanced learning-teaching means & infrastructures for all levels of education	2.1. Increase the quality of means & infrastructures for education processes	1. Development and rehabilitation of adequate and high quality means & infrastructures for all types and levels of educations				
	2.2. Improvement in the accesses to high quality education in accord with local needs and potentials	2.2. Increase the accesses of the society to education since the earliest ages	1. Elimination of illiterates 2. Provision of means & infrastructures for Earliest Age Education 3. Wise management on Drop Outs				
	2.3. Realization of means & infrastructure and economic welfare for teachers, suited to local characteristics	2.3. Give necessary incentives, means and Infrastructures to teachers teaching in isolated locations	1. Provision of additional benefits for teachers teaching in isolated locations 2. Development of housing complexes for teachers teaching in isolated locations				
3. Increase participation from local young individuals in the development processes	3.1. Increases in the building up activities for the Youths and Sports	3.1. By means of Youth & Sport Activities, intensify active involvements of young generations in the development processes	1. Building up of youth groups 2. Development of sport activities for the youths				
Acceleration of Development Processes for Competitive and Sustainable Tourism & Economy							
Goals	Objectives	Strategies	Directions				
			2015	2016	2017	2018	2019
1. Develop Economic Sector based local potentials and soil & community characteristics	1.1. Development of planting lots and increases in agricultural, plantation and fishery products	1.1. Conserve the cubic areas of the existing farming lots 1.2. Based on local potentials, maximize production and innovation from farming and plantation	1. Arrangements of new paddy lots for replacing the old ones already used or changed to other functions, in order to actively support the provision of sustainable farming lots 2. Making uses of unused lots 3. Development of non-irrigated paddy lots 4. Increases in cubic areas of agricultural, horticultural and farming lots by optimizing the uses of dry lots 1. Improvements in the performances of institutions for farming and plantation businesses 2. Improvements in means & infrastructures for farming and plantation businesses 3. Developments of processing plants and of marketing activities for farming & plantation products 4. Optimization of counseling on farming businesses 5. Expansion of agricultural developments 6. Improvements in inter-area distribution and trading arrangements in order to facilitate broader accesses to food materials				
	1.2. Intensification of Cattle Farming Production	1.3. Intensify the production and processing of both fishery and sea-catches products	1. Optimization of fishery and sea-catches businesses 2. Optimization of processed products from fishery and sea-catches 3. Increases in fish consumption by local communities 4. Protection and rehabilitation on fishing businesses 5. Management on locations with risks of food shortages and unhealthy consumptions 6. Development of food diversification and construction of ware houses for food raw materials				
		1.4. Increase the availability of and accesses to food materials, variations and safety	1. Increases in cattle populations 2. Developments of natural feeding lots for cattle 3. Increases in the quality and quantities of cattle managers and of processed products from cattle farming 4. Increases in the quality and quantities of controlling pests and				

			in servicing community health
2. Develop local tourism and cultures based the existing potentials	2.1. Conservation of local cultures	2.1. Intensify the understanding on local cultures, traditional arts and artifacts	1. Actualization, development and conservation of local tourism and cultures 2. Facilitation on community participation in managing cultural wealth
	2.2. Increases in the activities of building up local groups for cultural performances	2.2. Intensify the building up local groups or institutions for art cultural performances	1. Building up local groups for art cultural performances
	2.3. Developments of Local Tourism	2.3.1. Intensify the attractiveness and promotion of local tourism	1. Implementation of one-week Kalimutu Lake Fair that became a momentum for developing tourism resorts & products 2. Optimization of tourism promotion through various media
		2.3.2. Improve the management on local tourism	1. Rearrangements on superior tourism resorts 2. Intensification on community participation in supporting tourism
3. Increase the capability of community-level economic institutions	3.1. Increases in the activity of building up farmer & fisherman groups	3.1 Increase the capability of farmer & fisherman groups	1. Intensification of farmer & fisherman production processes and product diversifications 2. Guidance on processing local fish and other food products
	3.2. Development and building up of cooperative and small-scale local businesses	3.2.1. Improve the management on cooperative and small-scale local businesses	1. Increases in the capacities of local cooperative and small-scale local businesses 2. Provision of means & infrastructures for broader accesses to working capitals
		3.2.2. Develop the sizes and coverage of cooperative and small-scale local businesses	1. Provision of locations for business activities and intensification of cooperation and partnerships between cooperatives and small-scale local businesses
		3.2.3. Develop small-scale monetary institutions	1. Increases in the capacities of managers of small-scale monetary institutions 2. Development of capitals for small-scale monetary institutions

THE SELECTED TEACHERS' COMPETENCE AND A SENSE OF PROFESSIONAL IDENTITY AMONG MEDICAL STUDENTS

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ABSTRACT: The didactic competences and interpersonal skills of an academic teacher might have an influence on shaping the vision of a professional role among students. The proper relationship between an academic teacher and a student stimulate academic development. This phenomenon is particularly important in the medical professions and is associated with specific knowledge and skills gained in the learning process.

The aim of the project was to analyze the relationship between selected didactic competences and interpersonal skills of an academic teacher and the degree of students' identification with their future medical profession. 85 students of Warsaw Medical University aged 18-25 took part in the study. The mean age of participants was 21 years. All participants were medical course students. The research was questionnaire-based. The research tools applied enabled the evaluation of the degree of students' identification with their work in a chosen medical profession, as well as academic teachers' qualities that influence forming one's professional identity. Statistical analysis was conducted using SPSS Statistic 17.0 software. Correlation analysis - Spearman's Correlation Coefficients and linear regression were used. The level of identification with a medical profession among students was graded as high or very high. The statistical analysis has shown a significant relationship between the identification with students' future medical profession and the selected methodical and didactic competences as well as the substantive competences of an academic teacher. According to students, among the most important academic teachers' personality traits were being ambitious, demanding and just.

Key words: didactic competences, medical professions, interpersonal skills.

INTRODUCTION

The didactics in higher education is a conscious process in which teachers as well as students are actively involved. This process has specific characteristics (eg. students' age) and depends on multiple teacher's skills, such as capturing students' interest and getting them engaged, appropriate choice of materials and teaching methods, as well being a mentor for them throughout their learning process. (Lugovtsova & Yavuz, 2014).

The teaching process is of particular importance in medical schools. On the one hand it is based on the sharing specific knowledge and skills, on the other it shapes appropriate moral and ethical attitude, as well as awareness of one's own activities. (Joshi, 2012).

The role of the academic teacher in the teaching process

Many scientific studies emphasize the importance of adequate academic teachers' attitudes towards the subject, as well as a group of students they work with. Didactic and substantive competences might have an important role in shaping the proper teacher-student relationship (Beelen, 2006). The adequate relationship between teachers and students determine the proper didactic development (Lugovtsova & Yavuz, 2014).

Among methodical and didactic competences of an academic teacher we can distinguish the following: delivers knowledge in a clear and understandable way, conducts classes in an interesting way, stimulates activity throughout classes, is able to select adequate materials, exercises discipline, takes advantage of various didactic tools, shows communication skills, clearly defines his/her requirements, as well as systematically controls and evaluates the level of gained knowledge (Adamus & Jaworski, 2014a; Adamus & Jaworski, 2014b, Lugovtsova & Yavuz, 2014).

Among substantive competences of an academic teacher we should highlight: proves to be an expert in his/her subject area, shows thorough knowledge in his/her subject matter, possesses thorough knowledge, possesses

practical experience in taught subject, demonstrates experience, expands his/her knowledge by participating in conferences and follows ethical principles (Adamus & Jaworski, 2014a; Adamus & Jaworski, 2014b).

Adequate teaching methods are one of the important factors determining the proper management and transfer of knowledge. Studies emphasize that academic teachers can follow an extensive list of methods, such as lecturing, demonstrating, collaborating, oral reporting and assignments. The higher variety of teaching methods used during lessons, the more efficiently and effectively students will work. The effectiveness of the method applied is determined by the extent to which it provokes the student to be active and autonomous (Adamus & Jaworski, 2014; Lugovtsova & Yavuz, 2014; Vaughn & Baker, 2001).

A sense of professional identity among medical students

A sense of professional identity is defined as the rational and emotional acceptance of a chosen profession, by performing tasks and activities associated with this profession. There are two forms of an identification with a chosen profession in the literature. These are formal and real identification. The first one, a formal identification is characterized by a lack of emotional connection with a profession and a tendency to look for new employment. The latter is known as a real identification and is characterized by a correct perception of one's profession and its acceptance, as well as job satisfaction (Byra & crime, the penalty, 2011).

There are also publications which highlight the importance of didactic and substantive competences, as well as communication skills of academic teachers in shaping the future identification of students' professional role. A sense of medical professional identity is not only associated with the medical knowledge. A person who passes that knowledge forward plays an important role in this process. Student imitates the teacher who impresses her/him and is an authority for her/him. Academic teachers create their authority by not only possessed knowledge, but also owing to their teaching and communication skills (Adamus & Jaworski, 2014b).

The aim of study

The aim of the study was to analyze the relationship between the degree of students' identification with their future medical profession and selected didactic as well as substantive competences of an academic teacher.

The following research questions were formulated based on the aim of the study:

1. What is the level of students' identification with their future medical profession?
2. Which methodical and didactic competences of an academic teacher are important for medical students?
3. Which substantive competences of an academic teacher are important for medical students?
4. Are there differences between male and female students in terms of preferred methodical and didactic competences of an academic teacher?
5. Are there differences between male and female students in terms of preferred substantive competences of an academic teacher?
6. Is there a relationship between the selected methodical and didactic competences of an academic teacher and students' identification with their future medical profession?
7. Is there a relationship between the selected substantive competences of an academic teacher and students' identification with their future medical profession?

METHODS

The study was conducted on 85 students aged from 18 to 25 years. The mean age was 21 years (SD = 1.1). The group of subjects consisted of 50 women (58.8%) and 36 men (41.2%).

The study was voluntary and anonymous. All participants were medical course students.

Selection criteria for the research study included: 1) current course of medicine, 2) informed consent for taking part in the research. Additionally, the following variables were controlled: gender, age and the year of studies.

The research was questionnaire-based. The researched tools applied enabled the evaluation of: the degree of students' identification with their work in a chosen medical profession, as well as academic teachers' qualities which influence forming one's professional identity.

The degree of identifying oneself with work in a chosen medical profession was graded on a five-point scale from 1 to 5 (where 1 - very low, 5 - very high).

The methodical and didactic competences, as well as substantive competences were analyzed. The respondents graded the influence of these academic teacher's qualities on their perception of a chosen profession (where 1 - represents no influence and 6 - a very high influence).

The following methodical and didactic competences of an academic teacher were evaluated:

- 1) delivers knowledge in a clear and understandable way,
- 2) conducts classes in an interesting way,
- 3) stimulates activity throughout classes,
- 4) is able to select adequate materials,
- 5) exercises discipline,
- 6) takes advantage of various didactic tools,
- 7) shows communication skills,
- 8) clearly defines his/her requirements,
- 9) systematically controls and evaluates the level of gained knowledge

The following substantive competences of an academic teacher were evaluated:

- 1) proves to be an expert in his/her subject area
- 2) shows thorough knowledge in his/her subject matter,
- 3) possesses thorough knowledge,
- 4) possesses practical experience in taught subject
- 5) demonstrates experience,
- 6) expands his/her knowledge by participating in conferences,
- 7) follows ethical principles,

Statistical analysis was conducted using SPSS Statistic 17.0 software. Correlation analysis - Spearman's Correlation Coefficients and linear regression were used.

RESULTS AND FINDINGS

The level of identification with a medical profession in students taking part in the research study was graded as high or very high. Male students were characterized by a higher level of identification with the medical profession than female students ($t=-2.18$; $p=0.03$) (Table 1).

Table 1. Characteristic Of The Selected Methodical And Didactic Competences Of An Academic Teacher

Variables	X	SD	Mediana	Min.	Max.
The level of identification with a medical profession	4.37	0.63	4.00	3	5
The level of identification with a medical profession for women	4.28	0.64	4.00	3	5
The level of identification with a medical profession for men	4.57	0.56	5.00	3	5

Characteristic of the selected methodical and didactic competences of an academic teacher

The most important methodical and didactic competences of an academic teacher for medical students were: delivers knowledge in a clear and understandable way, conducts classes in an interesting way, clearly defines his/her requirements and shows communication skills (Table 2).

Competences such as: stimulates activity throughout classes, is able to select adequate materials and systematically controls and evaluates the level of gained knowledge, were also very important. The least important competences of an academic teacher for medical students were: takes advantage of various didactic tools and exercises discipline. The detailed data are presented in Table 2.

Table 2. Characteristic Of The Selected Methodical And Didactic Competences Of An Academic Teacher

Variables	X	SD	Mediana	Min.	Max.
delivers knowledge in a clear and understandable way	5.55	0.86	6.00	1	6
conducts classes in an interesting way	5.36	1.07	6.00	1	6
stimulates activity throughout classes	4.86	1.25	5.00	1	6
is able to select adequate materials	4.84	1.17	5.00	2	6
exercises discipline	4.32	1.19	4.00	1	6
takes advantage of various didactic tools	4.29	1.28	4.00	1	6
shows communication skills	5.07	1.06	5.00	1	6
clearly defines his/her requirements	5.17	0,99	5.00	1	6
systematically controls and evaluates the level of gained knowledge	4.34	1.38	5.00	1	6

Men and women did not differ among themselves in terms of preferred methodical and didactic competences of an academic teacher (Table 3).

Table 3. Characteristic Of The Selected Methodical And Didactic Competences Of An Academic Teacher

Variables	Gender	X	SD	t	p
delivers knowledge in a clear and understandable way	F	5.48	0.99	-1.14	0.26
	M	5.69	0.47		
conducts classes in an interesting way	F	5.38	1.07	0.39	0.70
	M	5.29	1.13		
stimulates activity throughout classes	F	4.90	1.27	0.26	0.80
	M	4.83	1.22		
is able to select adequate materials	F	4.80	1.31	0.00	1.00
	M	4.80	0.93		
exercises discipline	F	4.38	1.19	0.36	0.72
	M	4.29	1.18		
takes advantage of various didactic tools	F	4.26	1.37	-0.69	0.49
	M	4.46	1.17		
shows communication skills	F	5.06	1.11	-0.48	0.63
	M	5.17	0.95		
clearly defines his/her requirements	F	5.04	1.07	-1.10	0.27
	M	5.29	0.93		
systematically controls and	F	4.54	1.33	1.54	0.13

evaluates the level of gained knowledge	M	4.09	1.36		
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Characteristic of the substantive competences of an academic teacher

Medical students rated as the highest such substantive competences of an academic teacher as: shows thorough knowledge in his/her subject matter, possesses practical experience in taught subject, demonstrates experience and proves to be an expert in his/her subject area. Following ethical principles and expanding knowledge by participating in conferences were also very important for medical students (Table 4).

Table 4. Characteristic Of The Substantive Competences Of An Academic Teacher

Variables	X	SD	Mediana	Min.	Max.
proves to be an expert in his/her subject area	5.29	0.92	5.00	1	6
shows thorough knowledge in his/her subject matter	5.61	0.82	6.00	2	6
possesses thorough knowledge	5.08	1.14	5.00	1	6
possesses practical experience in taught subject	5.64	0.89	6.00	1	6
expands his/her knowledge by participating in conferences	4.95	1.23	5.00	1	6
demonstrates experience	5.20	1.03	6.00	2	6
follows ethical principles	5.14	1.23	6.00	1	6

Male and female students did not differ among themselves in terms of preferred substantive competences of an academic teacher (Table 3).

Table 5. Characteristic Of The Substantive Competences Of An Academic Teacher

Variables	Gender	X	SD	t	p
proves to be an expert in his/her subject area	F	5.18	1.04	-1.60	0.12
	M	5.49	0.56		
shows thorough knowledge in his/her subject matter	F	5.56	0.79	-1.23	0.22
	M	5.77	0.77		
possesses thorough knowledge	F	5.02	1.29	-0.98	0.33
	M	5.26	0.74		
possesses practical experience in taught subject	F	5.62	0.83	-0.81	0.42
	M	5.77	0.88		
expands his/her knowledge by participating in conferences	F	4.88	1.27	-1.12	0.27
	M	5.17	1.04		
demonstrates experience	F	5.30	1.10	1.01	0.31
	M	5.06	1.10		
follows ethical principles	F	5.10	1.10	-1.22	0.23
	M	5.37	0.94		

Relationship between the level of identification with a medical profession and the selected methodical and didactic competences of an academic teacher

The level of identification with a medical profession positively correlated with: delivers knowledge in a clear and understandable way, conducts classes in an interesting way, stimulates activity throughout classes, exercises discipline, clearly defines his/her requirements and systematically controls and evaluates the level of gained knowledge.

There were significant differences between male and female students. The level of identification with a medical profession had a positive relationship only with: clearly defines requirements in the case of women on the one hand, and delivers knowledge in a clear and understandable way, conducts classes in an interesting way, stimulates activity throughout classes, exercises discipline and systematically controls and evaluates the level of gained knowledge in the case of men on the other hand (Table 8).

Table 8. Relationship Between The Level Of Identification With A Medical Profession And The Selected Methodical And Didactic Competences Of An Academic Teacher

Variables	The level of identification with a medical profession					
	All students		Women		Men	
	rho	p	rho	p	rho	p
delivers knowledge in a clear and understandable way	0.32	<0.01	0.27	0.06	0.42	<0.01
conducts classes in an interesting way	0.32	<0.01	0.25	0.08	0.46	0.01
stimulates activity throughout classes	0.21	0.05	0.11	0.45	0.44	0.01
is able to select adequate materials	0.14	0.21	0.07	0.65	0.31	0.07
exercises discipline	0.30	<0.01	0.26	0.07	0.41	0.02
takes advantage of various didactic tools	0.16	0.16	0.15	0.30	0.17	0.34
shows communication skills	0.11	0.32	-0.02	0.91	0.31	0.07
clearly defines his/her requirements	0.25	0.02	0.29	0.04	0.11	0.55
systematically controls and evaluates the level of gained knowledge	0.25	0.02	0.23	0.10	0.41	0.02

Relationship between the level of identification with a medical profession and the selected substantive competences of an academic teacher

The level of identification with a medical profession positively correlated with substantive competences of an academic teacher such as: proves to be an expert in his/her subject area, possesses thorough knowledge, possesses practical experience in a taught subject, expands his/her knowledge by participating in conferences, demonstrates experience and follows ethical principles.

There were also significant differences between male and female students. The level of identification with a medical profession in women positively correlated with: possesses thorough knowledge and demonstrates experience. The level of identification with a medical profession in male students had a positive relationship with: proves to be an expert and possesses practical experience in taught subject (Table 9).

Table 9. Relationship Between The Level Of Identification With A Medical Profession And The Selected Substantive Competences Of An Academic Teacher

Variables	The level of identification with a medical profession					
	All students		Women		Men	
	rho	p	rho	p	rho	p
proves to be an expert in his/her subject area	0.36	<0.01	0.25	0.09	0.62	<0.01
shows thorough knowledge in his/her subject matter	0.20	0.09	0.16	0.27	0.15	0.40
possesses thorough knowledge	0.26	0.02	0.40	0.01	-0.09	0.60

possesses practical experience in taught subject	0.35	<0.01	0.24	0.09	0.50	<0.01
expands his/her knowledge by participating in conferences	0.27	0.02	0.16	0.28	0.32	0.07
demonstrates experience	0.28	0.02	0.28	0.05	0.21	0.24
follows ethical principles	0.36	<0.01	0.27	0.06	0.01	0.99

Linear regression for women

A linear regression analysis was used to make in-depth analysis of the observed relationships, where the dependent variable was the level of identification with a medical profession, and predictors were selected methodical and didactic as well as substantive competences of an academic teacher.

Finally created model contained one predictor and explained 41.5% of the variance of the dependent variable (adjusted R-square was 0.172). The model was well matched to data, better than the average enables prediction of the dependent variable: $F(1.49) = 9.97, p < 0.01$. The resulting regression coefficients were given in Table 10.

Table 10. Linear Regression For Women

Variables	B	Std. Error	Beta	t	p
Scale	3.24	0.34		9.58	<0.01
possesses thorough knowledge	0.21	0.10	0.42	3.16	0.01

Linear regression for men

A linear regression analysis was used for male students, where the dependent variable was the level of identification with a medical profession, and predictors were selected methodical and didactic as well as substantive competences of an academic teacher.

Finally created model contained eight predictors and explained 86.4% of the variance of the dependent variable (adjusted R-square was 0.746). The model was well matched to data, better than the average enables prediction of the dependent variable: $F(8.26) = 9.99, p < 0.01$. The resulting regression coefficients were given in Table 11.

Table 11. Linear Regression For Men

Variables	B	Std. Error	Beta	t	p
Scale	0.05	0.73		0.07	0.95
proves to be an expert in his/her subject area	0.40	0.12	0.41	3.36	<0.01
expands his/her knowledge by participating in conferences	0.47	0.09	0.88	5.03	<0.01
stimulates activity throughout classes	0.19	0.07	0.42	2.89	0.01
exercises discipline	-0.25	0.10	-0.52	-2.57	0.02
takes advantage of various didactic tools	-0.18	0.06	-0.39	-2.87	0.01
clearly defines his/her requirements	0.20	0.09	0.33	2.32	0.03
systematically controls and evaluates the level of gained knowledge	0.23	0.05	0.57	4.33	<0.01

demonstrates experience	-0.21	0.07	-0.36	-2.94	0.01
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CONCLUSION

Presented results have shown that the students' identification with their future profession is very important for medical students. This is consistent with other publications that include Adamus & Jaworski (2014); Borges (2007); Gazewood, Owen & Rollins (2002); Stets & Burke (2000). Studies show that professional identity development refers to the gradual process by which students assume the identity of a "physician" over the medical training. The researchers stress that professional identity in doctors refers to three important areas such as: 1) personal identity, comprised of factors such as an individual's history, experience, personality, feelings, goals, and values; 2) role identity, which refers to one's assumed social or professional functions, activities, and responsibilities; and 3) social identity, understood as the commitment to the values and goals of specific groups (Borges, 2007).

The development of a professional identity is an essential element of teaching medicine. It allows students to learn how their professional work will look like in the future on the one hand, and fulfill their responsibilities and obligations as physicians on the other hand (Rabow et al., 2010). Properly formed professional identity may affect the proper motivation to study and future job satisfaction. Satisfaction with the work is a result of balancing one's expectations and needs, and the possibility of their fulfillment in the workplace (Krogstad et al., 2006).

The level of identification with a medical profession and the selected methodical and didactic competences of an academic teacher

Obtained results have shown that the level of identification with a medical profession is associated with such competences as: delivers knowledge in a clear and understandable way, conducts classes in an interesting way, stimulates activity throughout classes, clearly defines his/her requirements.

Proper material selection and way of teaching allows the student to acquire knowledge, skills and improve their performance. The appropriate methods of teaching develop the cognitive abilities of the student on the one hand, and shape appropriate attitudes towards patients and medical staff on the other hand. The literature emphasizes that the value of teaching methods depends on the teacher's activity and the extent to which the student is provoked to be proactive during classes. The selection of teaching methods should be carefully considered, and an objective evaluation will be prepared after its realization (Theall & Franklin, 2001).

It is reported that familiarity with 'learning styles' have definite benefit for both teacher and students. Teachers can adapt new methods if they know the learning styles of the students (Lubawy, 2003). 'Learning style' means as 'an individual's preferred method of gathering, processing, interpreting, organizing and analyzing information' (Kharb et al., 2013).

Presented study have shown that medical students are characterized by a specific style of teaching, which is associated with the following qualities: systematically controls and evaluates the level of gained knowledge and exercises discipline. Qualities such as: delivers knowledge in a clear and understandable way, conducts classes in an interesting way, stimulates activity throughout classes, clearly defines his/her requirements were also very important for students.

Students' expectations regarding the competences of academic teachers should be included in the curriculum of medical courses. This is related to the fact that medical students are adults thus they have already developed their own learning style (Collins, 2004).

Relationship between the level of identification with a medical profession and the selected substantive competences of an academic teacher

The present study have shown that the level of identification with a medical profession correlated positively with such substantive competences of an academic teacher as: proves to be an expert in his/her subject area, possesses thorough knowledge, possesses practical experience in taught subject, expands his/her knowledge by participating in conferences, demonstrates experience and follows ethical principles.

Studies have shown that being an expert was a very important characteristic of academic teacher for medical students. This relationship was observed particularly in male medical students. The linear relationship between the level of identification with a medical profession and being an expert in academic teachers' subject area has been shown in this study. A review shows that the identification with a significant person is an important element of identification with one's future professional role. This is realized by mirroring the identity of an authority. An academic teacher plays the role of an authority and significantly impacts students, shaping their values and beliefs system (Śnieżyński, 2004).

The professional identity development is stimulated by receipt of feedback and mentoring as well as clinical activities. These experiences are integrated with each individual's personality, prior experience, extracurricular activities and aspirations to give rise to notions of professional identity. The more the academic teacher is the expert for the students, the greater the professional identity, which is unique and highly subjective (Monrouxe, 2010; White, Borges & Geiger, 2011).

The practical experience of an academic teacher in clinical work is also very important for students. Students can gain not only theoretical knowledge, but also practical tips of clinical work. It is compatible with other scientists' research, Penar-Zadarko et al. (2008), who have shown that competences, communication, respect for students and practical experience are important characteristics for medical students. An academic teacher who has a clinical practice can highlight how students could use theoretical knowledge in practice, and may refer to cases of patients and their problems during lesson. An academic teacher also teaches medical students how to cope with stress. A number of stressors are associated with the health and helping professions, including time pressures, workload, having multiple roles, and emotional issues (Lambert et al., 2004; Lim, Hepworth, & Bogossian, 2011).

An academic teacher also shapes in students an important skill, namely appropriate doctor-patient communication. The teacher not only teaches students communication skills, but also shapes ethical, moral and professional attitude towards patients and all medical staff (Adamus & Jaworski, 2014; Hussein, 2009). More and more publications highlight the important role of shaping the ethical attitudes among medical students (Alkaabba & Hussein, 2011; Hussein, 2009; Eckles et al., 2005). Our research has shown that students expect ethical and moral behaviours of academic teachers. The ethical behaviour in clinical practice is essential in the correct development of the identification with the future role of the professional in medical students.

The developed curriculum of medical studies should include not only the theoretical aspects of ethics, but also, which are equally important, practical ones. An academic teacher must be a role model of ethical attitudes which students will strive to emulate.

Limitations

There are some limitations to this study. First, our data are drawn from students at one medical school. Broader participation is necessary to determine if these findings are generalizable or if they only reflect a particular institutional culture or cohort of students. Secondly, there was a small sample of respondents.

RECOMMENDATIONS

Current research stress that development of effective 'curriculum and learning environment' is the greatest challenge of modern medicine (Murphy et al., 2004). There is a global trend of medical curriculum reform, changing from a teacher-centered to a student-centered learning (Collins, 2004). This curriculum should include a number of factors influencing the identification with future professional role in students, among others academic teachers' competences and learning styles of students. It should be taken into account that medical students are adults thus they have already developed their own learning style (Collins, 2004). Including these factors will impact the level of job satisfaction, ability to cope with stress and problems at work and behave morally and ethically in the future.

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A NEW METHOD FOR DETERMINING LOWER DENSITY LAYER IN PROSPECTION OF HYDROCARBON

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ABSTRACT: The formations are usually heterogeneous and densities vary depending on heterogeneity. For this reason, densities should be taken into account as variables. Some scientists consider densities as variables in each formation in model calculations. In fact, functional change is regular. However, density is an irregular variable that depends on the change boundaries of seismic velocity. In this study, it is aimed to take density into account as a variable by using detected seismic velocity boundaries at which seismic velocity changes for each formation. The change boundaries of seismic velocity are an indication of the change of density in the formation. In addition to main formations in model geometry in 3D inversion calculations, another formation was defined. This additional formation has been described by using a combination of all of the change boundaries of seismic velocity present in each formation in a specific order. That is, the additional formation consists of nested formations. The density calculated for the additional formation estimated the variation of density between the change boundaries of seismic velocity. This variation is added to the mass densities that are calculated for the description number of each zone. Thus, the change of the densities with depth is described in detail. So, lower-density layer comprising oil may be determined by this method. The reliability of the results of the method depends on the reliability of seismic velocity boundaries. Moreover, the increasing number of seismic velocity boundaries leads to the increasing resolution of density variations.

Key words: gravity, modeling, mass density, inversion, seismic velocity region

INTRODUCTION

The densities are taken to be variables in each formation for 3D model calculations using mathematical functions. In other words, density is defined as a function of the required parameters. The gravity anomaly from the whole mass body is an algebraic sum of the contributions of all vertical rectangular prisms at appropriate depths and distances from the observation point. This procedure is widely used in gravity-anomaly forward modeling and inversion (Barbosa, V. C. F. et al, 1999). For a rectangular prism, a closed-form equation for the gravity anomaly is derived by (Banerjee, B. et al, 1977 when the density contrast is a constant, the density contrast is a quadratic function of depth.

Historically, increase of density and decrease of porosity with depth is of primary interest because of the mechanical compaction arising from the overburden and diagenesis resulting in reduced porosity and vertically layered structure (Zhou, X., 2008, 2009). However, because of complicated geological and geochemical processes in the diagenesis of rocks, metamorphism, intrusives, extrusive volcanics, and facies changes, the density contrast of earth material can also depend arbitrarily on horizontal positions (Zhou, X., 2009). Changes in the density distribution of sediments can be caused by changes in oxidation or reduction by the surface charges that bind the components into a composite aggregate (Becking, L. G. M. B. et al, 1959).

Specifically, mechanisms that cause variability in density contrast include dipping layered intrusions (Ruotoistenmäki, T., 1992), folded sedimentary formations, exhumation, overpressure, salt that can result in off-normal compaction curves in sediments, fan development (Cordell, L., 1979), no uniform stratification, physical and chemical cementation and gradual horizontal change in density between two rock types caused by metamorphism (Ruotoistenmäki, T., 1992). The density contrast of earth material also can depend arbitrarily on horizontal position (Zhou, X., 2009).

Using line integrals is an efficient method to calculate the gravity anomaly for a given density-contrast model (Talwani, M., 1959; Zhou, X., 2008, 2009). Hubbert (1948) obtains a line integral for irregular 2D masses of constant density contrast for calculating the gravity anomaly. This is the basis for the classic Talwani et al. (1959) scheme for rapid computation. Murthy and Rao (1979) extend Hubbert's line integral to cases when the mass-density contrast is a function of depth. Zhou (2008, 2009) studies line integrals systematically for irregular 2D masses by defining a 2D vector gravity potential and obtains line integrals when the density contrast is depth-dependent or varies vertically and horizontally.

In this study, the variable densities are defined by using a new method. All calculations were made using an algorithm in this study (Çavşak, H., 1992, 2010, 2011). As it is mentioned in the summary, an additional formation was also defined in addition to the main formation in the model geometry in 3D inversion calculations. Density is defined as a variable according to the geometry of seismic velocity boundaries.

METHODS

3D model geometry has been triangulated to describe the upper surfaces of the masses. Three points were used to define planes, and the method offered the most convenience for three-dimensional (3D) modeling. Even for very complicated mass shapes, a good description can be obtained by increasing the number of triangles. The gravity effect of the bodies was calculated first for the tetrahedron expanded by an “observation” point P to each triangle and then adding them up in a certain sequence. (Jacoby, W. R. et al, 2005) Figure 1, Eqs. (1), (2) and (3); see for details (Çavşak, H., 2008, 2011; Jacoby, W. R., 2009). The surface of a uniform 3D body can be well approximated as a polyhedron composed of plane triangles to any degree of detail. Moreover, this parameterization is flexible and efficient.

Figure 1 shows the basic uniform tetrahedron, expanded from the “observation” point P at O to an arbitrarily oriented planar triangle, or A-B-C in an earth-oriented Cartesian coordinate system (x, y, z) with origin O and z pointing vertically downward. This does not reduce generality. First, the gravitational potential ΔU of the tetrahedron is derived for its apex P, and then the gravity effect, Δg , is obtained as the vertical component of the potential gradient, by vertical differentiation of ΔU . The effects Δg and ΔU of the polyhedron are the sums of the basic tetrahedral effects. With a consistently defined sequence of computational steps, the partial effects were automatically calculated with the correct sign, i.e., positive for “inside” triangles and negative for “outside” triangles; more specifically, “in” and “out” signify the geometrical relation of the observation point P and the polyhedron. The far-side basic tetrahedral effects were added, while the near-side tetrahedral effects were subtracted such that only the effects of the intervening polyhedron remained. The calculations were also correct if P was enclosed in a polyhedron (Çavşak, H., 2011).

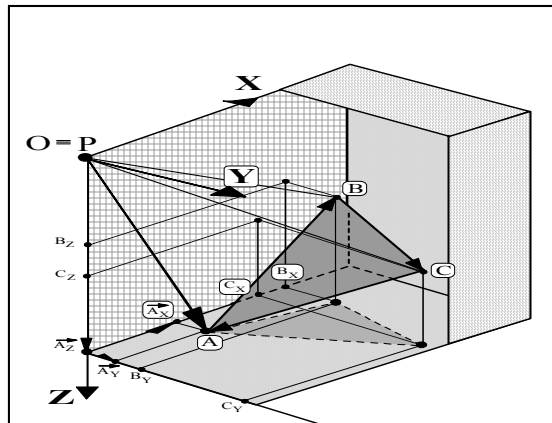


Figure 1. Illustration Of The Parameters Describing The Tetrahedron (0-A-B-C), Arbitrarily Oriented In Earth-Bound X, Y, Z Coordinates; Triangle Or A-B-C Projected Onto Bottom X-Y Plane

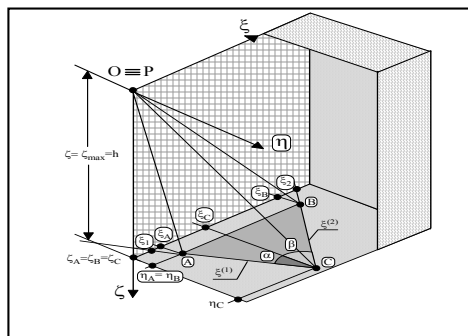


Figure 2. Explanation Of The Nomenclature Used In Describing The Tetrahedron, After Coordinate Transformation From X, Y, Z To The System ξ, η, ζ (See Text) With The Triangle, Lying In The Bottom ξ - η Plane

Integration of the tetrahedral potential effect, ΔU , in arbitrary orientation is awkward, but the orientation is irrelevant for the potential.

Therefore a suitable coordinate transformation is carried out (Figure 2): the ξ, η, ζ system is defined such that the triangle is in the $\xi - \eta$ plane and one edge (A-B) is parallel to ξ . The coordinate transformation is carried out by vector operations (see (Çavşak, H., 2011)).

A FORTRAN code that performs the triangulation and the integration has been developed (Çavşak, H., 1992, 2010, 2011). Evaluating the complicated term is unnecessary, and the simpler expression eases the evaluation of Δg and increases the numerical accuracy. In contrast, when completely written, the expression is fairly complex.

$$\begin{aligned}
 Y = & \left\{ \eta_C \cdot \ln \left[\xi_C + \overline{OC} \right] + \xi_2 \cdot \cos \beta \cdot \right. \\
 & \ln \left[\overline{OC} + \frac{\eta_C}{\cos \beta} + \xi_2 \cdot \sin \beta \right] + h \cdot \arctan \left[\frac{h^2 \cdot \tan \beta - \xi_2 \cdot \eta_C}{h \cdot \overline{OC}} \right] \\
 & - \eta_A \cdot \ln \left[\xi_B + \overline{OB} \right] - \xi_2 \cdot \cos \beta \cdot \\
 & \ln \left[\overline{OB} + \frac{\eta_A}{\cos \beta} + \xi_2 \cdot \sin \beta \right] - h \cdot \arctan \left[\frac{h^2 \cdot \tan \beta - \xi_2 \cdot \eta_A}{h \cdot \overline{OB}} \right] \\
 & - \eta_C \cdot \ln \left[\xi_C + \overline{OC} \right] - \xi_1 \cdot \cos \alpha \cdot \\
 & \ln \left[\overline{OC} + \frac{\eta_C}{\cos \alpha} + \xi_1 \cdot \sin \alpha \right] - h \cdot \arctan \left[\frac{h^2 \cdot \tan \alpha - \xi_1 \cdot \eta_C}{h \cdot \overline{OC}} \right] \\
 & + \eta_A \cdot \ln \left[\xi_A + \overline{OA} \right] + \xi_1 \cdot \cos \alpha \cdot \\
 & \left. \ln \left[\overline{OA} + \frac{\eta_A}{\cos \alpha} + \xi_1 \cdot \sin \alpha \right] + h \cdot \arctan \left[\frac{h^2 \cdot \tan \alpha - \xi_1 \cdot \eta_A}{h \cdot \overline{OA}} \right] \right\} \quad (1)
 \end{aligned}$$

Gravity potential

$$\Delta U = \frac{1}{2} G \cdot \rho \cdot (h \cdot Y) \quad (2)$$

G is gravity constant and h is height of tetrahedron.

The gravity effect of the polyhedron is given by the vertical derivative of the potential effect.

$$\Delta g = \frac{\partial}{\partial z} (\Delta U) \quad (3)$$

Figure 1 Shows The Parameters Of A Tetrahedron In Eq. (1).

3D Model Calculations

3D deep seismic reflection studies that have been done in Adiyaman, Diyarbakir and Gaziantep (Figure 3) by TPC (Turkish Petroleum Corporation) have been benefited. The information is obtained from the velocity Table 1 and well depth information of the working area. The velocity was assumed to increase with depth in the first and second layer from top to bottom. The third layer exhibits low velocity. The fourth layer is also taken as the reference mass in calculations. It is accepted that the velocity decreases downwards in the low-velocity layer in calculations.



Figure 3. The Study Area (Closed Curve Drawn Red Line)

The gravity data of the region did not get because of corporate rules' nature. The velocity information of the 3D layer and the information of the opened wells which are on the profiles were obtained from TPC. On the planned model; 3 wells on the $y = -450$ m profile, 4 wells on the $y = 0$ m profile and 3 wells on the $y = 450$ m profile

were opened during TPC operation in the region. Velocity and depth information of these 10 wells was used in the calculations. Densities of the layers were calculated from the velocity values by using Eq. (4) (Gardner, G. H. F., 1974). Seismic sections and depth information of the wells were evaluated together in creating model. Because of the gravity anomalies cannot be obtained, Bouguer gravity data was generated from the planned model with forward modeling.

$$\rho=(0.31)\times V_p^{0.25}(\text{m/sn}) \quad (4)$$

Density for mass 1; $\rho_1=(0.31)\times 2487^{0.25} = 2.189 \text{ gr/cm}^3$

Density for mass 2; $\rho_2=(0.31)\times 3927^{0.25} = 2.454 \text{ gr/cm}^3$

Density for mass 3; $\rho_3=(0.31)\times 3699^{0.25} = 2.417 \text{ gr/cm}^3$

Density for mass 4; $\rho_4=(0.31)\times 4289^{0.25} = 2.509 \text{ gr/cm}^3$

Table 1. Model Velocities And Densities Of Layers In Model

Mass Nu.	Mass Velocity m/sn	Mass Density gr/cm ³
I	2487	2.189
II	3927	2.454
III	3699	2.417
IV	4289	2.509

3D model calculations were made to explain the method used in this study and to prove the reliability of the results. Three main formations on the reference formation are taken for the 3D model. The model is identified from 0 m to 6700 m in the x-direction, from -450 m to 450 m in the y-direction and from 0 m to -2000 m in depth. Differences in density were found by subtracting the reference density from the mass densities. The densities belonging to the model are shown Table 2. These are reliable density parameters.

Table 2. The Densities And Density Differences Of Masses

Reference Density: 2.509 gr/cm ³		
Mass Nu.	Mass Density gr/cm ³	Density Difference gr/cm ³
I	2.189	-0.320
II	2.454	-0.055
III	2.417	-0.092

Firstly, gravity values were obtained by utilizing forward modeling (Figure 4). In this solution, an underground model is used. According to the algorithm used in this study, model definition was performed by defining the bottom surface first, then the top surface of every mass. The letters K, L, M and N represent the layer boundaries from the surface to the bottom (Figure 5). The numbers I, II, III and IV written in red are the layer numbers from the surface to the bottom (Figure 5).

Table 3. The Density Differences Of Masses Calculated With Inversion Solution

Mass Nu.	Calculated Density Differences gr/cm ³
I	-0.3211
II	-0.0565
III	-0.0902

According to the method used in this study, previously surface L and then surface K of Şelmo formation were defined. Later, surface M and then surface L were defined for the Midyat formation. Then, surface N and then surface M were defined for the Germav formation. Thus, the definition process is completed (Figure 5). Also, Kastel formation is bedrock. Arbitrary noise is added by chance to the calculated gravity values for inversion calculations. Then, density is calculated by inversion calculations for the additional mass constituted by using seismic velocity boundaries. The new differences in density found from the inversion solution results for masses in Figure 5 are given in Table 3.

New densities belonging to the layers were found by using Eq. (5).

$$\Delta\rho = \rho_n - \rho_{ref} \quad (5)$$

1. For first mass; $\rho_1 = \Delta\rho_1 + \rho_{ref} = -0.3211 + 2.509 = 2.1879 \text{ gr/cm}^3$
2. For second mass; $\rho_2 = \Delta\rho_2 + \rho_{ref} = -0.0565 + 2.509 = 2.4525 \text{ gr/cm}^3$
3. For third mass; $\rho_3 = \Delta\rho_3 + \rho_{ref} = -0.0902 + 2.509 = 2.4188 \text{ gr/cm}^3$

The densities found were calculated as a result of the inverse solution Table 6. Thus, an attempt was made to determine real densities by adding the aforementioned change in amount of density, calculated with two different identifications for additional mass, to the main formation densities by the number of definitions of each region between seismic velocity boundaries. Locations of opened wells are shown on the each profile (Figure 6).

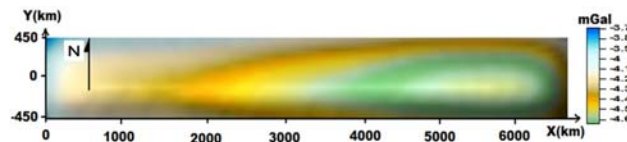


Figure 4. Bouguer anomaly of model

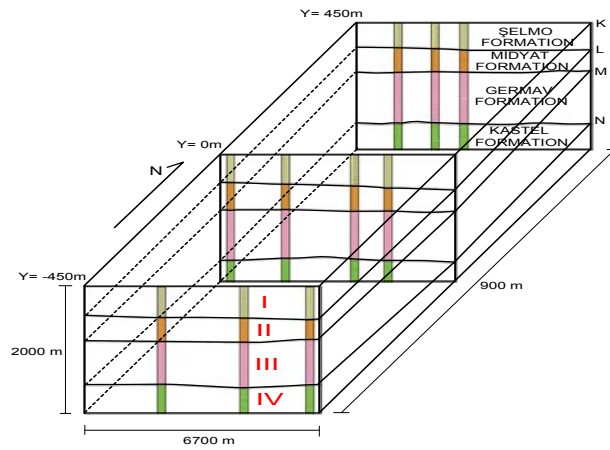


Figure 5. Designed model.

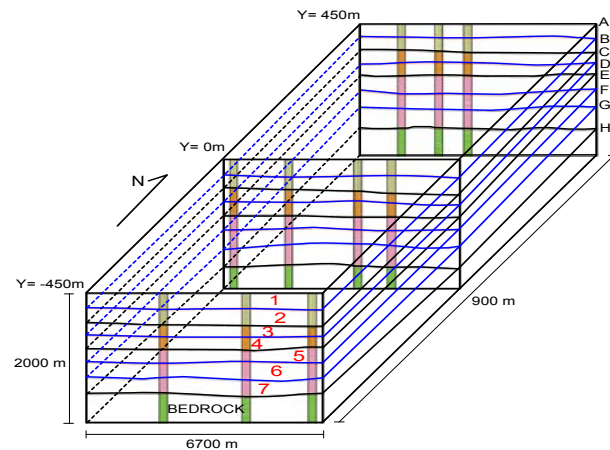


Figure 6. Seismic Velocity Boundaries In The Model Geometry For The Additional Mass Definition

Performed Inversion Studies in the Low velocity layering model

While definition, for layers at which the velocity increases down; first, the sub-surface, then the top surface are defined. For layers at which the velocity decreases down; first, the top surface, then the sub-surface is defined. The letters A, B, C, D, E, F, G and H represent the surfaces of seismic velocity boundary from surface to the

bottom (Figure 6). The numbers 1, 2, 3, 4, 5, 6 and 7 written in red are the layer numbers from surface to the bottom (Figure 6).

In the first identification of the additional mass, it was accepted that the velocity increases down in Germav formation. The definition of the masses between seismic velocity surfaces is made by using B-A-C-A-D-A-E-A-F-A-G-A-H-A surfaces continuously in ascending order. As it can be seen here, the masses are described once more starting in the amount of rotations in such a way that one is within the other. In other words, while the number 1 mass is defined 7 times, the number 2 mass is defined 6 times and the last number 7 mass is defined only once (Figure 6).

The inverse solution technique is applied by giving the defined values of seismic velocity boundaries to the algorithm (Çavşak, H., 1992) as additional mass in addition to the defined values of the model. The differences in density of the masses in the model are calculated Table 4.

Table 4. Density Differences Found From The Inverse Solution Made After The First Definition Of Additional Mass

Mass Nu.	Calculated Density Difference gr/cm ³
I	-0.3043
II	-0.0436
III	-0.0860
Additional Mass	-0.0026

Masses have been turned a few times from the defined surface in the defining process of seismic velocity boundaries. Therefore, differences in real density for the first definition are calculated by using Eq. (6).

$$\Delta\rho_i = \Delta\rho + (n.(\delta\rho)) \quad i=1,7 \quad (6)$$

Here;

$\Delta\rho_i$: Difference in real density calculated for the places between each seismic velocity boundary

$\Delta\rho$: Difference in density obtained for the first and the second mass

n: Number of definitions of zones between each seismic velocity boundary that constitutes additional mass

$\delta\rho$: Difference in density of additional mass defined by seismic velocity change boundaries

If the differences in real density for the first definition are calculated;

$$\Delta\rho_1 = -0.3043 + (7. (-0.0026)) = -0.3226 \text{ gr/cm}^3$$

$$\Delta\rho_2 = -0.3043 + (6. (-0.0026)) = -0.3200 \text{ gr/cm}^3$$

$$\Delta\rho_3 = -0.0436 + (5. (-0.0026)) = -0.0567 \text{ gr/cm}^3$$

$$\Delta\rho_4 = -0.0436 + (4. (-0.0026)) = -0.0541 \text{ gr/cm}^3$$

$$\Delta\rho_5 = -0.0860 + (3. (-0.0026)) = -0.0938 \text{ gr/cm}^3$$

$$\Delta\rho_6 = -0.0860 + (2. (-0.0026)) = -0.0912 \text{ gr/cm}^3$$

$$\Delta\rho_7 = -0.0860 + (1. (-0.0026)) = -0.0886 \text{ gr/cm}^3$$

Then using Eq. (5), real densities;

$$\rho_1 = \Delta\rho_1 + \rho_{\text{ref}} = -0.3226 + 2.509 = 2.1864 \text{ gr/cm}^3$$

$$\rho_2 = \Delta\rho_2 + \rho_{\text{ref}} = -0.3200 + 2.509 = 2.1890 \text{ gr/cm}^3$$

$$\rho_3 = \Delta\rho_3 + \rho_{\text{ref}} = -0.0567 + 2.509 = 2.4523 \text{ gr/cm}^3$$

$$\rho_4 = \Delta\rho_4 + \rho_{\text{ref}} = -0.0541 + 2.509 = 2.4549 \text{ gr/cm}^3$$

$$\rho_5 = \Delta\rho_5 + \rho_{\text{ref}} = -0.0938 + 2.509 = 2.4152 \text{ gr/cm}^3$$

$$\rho_6 = \Delta\rho_6 + \rho_{\text{ref}} = -0.0912 + 2.509 = 2.4178 \text{ gr/cm}^3$$

$$\rho_7 = \Delta\rho_7 + \rho_{\text{ref}} = -0.0886 + 2.509 = 2.4204 \text{ gr/cm}^3$$

calculated Table 6.

Table 5. Density Differences Found From The Inverse Solution Made After The Second Definition Of Additional Mass

Mass Nu.	Calculated Density Difference gr/cm ³
I	-0.3122
II	-0.0515
III	-0.0964
Additional Mass	-0.0026

The definition of the masses between seismic velocity surfaces is made by using B-A-C-A-D-A-E-A-G-H-F-H-E-H surfaces continuously in ascending order. The number 1 mass is defined 4 times, the number 2 mass is defined 3 times and the last number 7 mass is defined 3 times (Figure 6). The differences in density obtained from the inverse solution made after this second identification are shown below Table 5.

$$\begin{aligned} \Delta\rho_1 &= -0.3122 + (4. (-0.0026)) = -0.3226 \text{ gr/cm}^3 \\ \Delta\rho_2 &= -0.3122 + (3. (-0.0026)) = -0.3200 \text{ gr/cm}^3 \\ \Delta\rho_3 &= -0.0515 + (2. (-0.0026)) = -0.0567 \text{ gr/cm}^3 \\ \Delta\rho_4 &= -0.0515 + (1. (-0.0026)) = -0.0541 \text{ gr/cm}^3 \\ \Delta\rho_5 &= -0.0964 + (1. (-0.0026)) = -0.0990 \text{ gr/cm}^3 \\ \Delta\rho_6 &= -0.0964 + (2. (-0.0026)) = -0.1016 \text{ gr/cm}^3 \\ \Delta\rho_7 &= -0.0964 + (3. (-0.0026)) = -0.1042 \text{ gr/cm}^3 \end{aligned}$$

Then using Eq. (5), real densities;

$$\begin{aligned} \rho_1 &= \Delta\rho_1 + \rho_{\text{ref}} = -0.3226 + 2.509 = 2.1864 \text{ gr/cm}^3 \\ \rho_2 &= \Delta\rho_2 + \rho_{\text{ref}} = -0.3200 + 2.509 = 2.1890 \text{ gr/cm}^3 \\ \rho_3 &= \Delta\rho_3 + \rho_{\text{ref}} = -0.0567 + 2.509 = 2.4523 \text{ gr/cm}^3 \\ \rho_4 &= \Delta\rho_4 + \rho_{\text{ref}} = -0.0541 + 2.509 = 2.4549 \text{ gr/cm}^3 \\ \rho_5 &= \Delta\rho_5 + \rho_{\text{ref}} = -0.0990 + 2.509 = 2.4100 \text{ gr/cm}^3 \\ \rho_6 &= \Delta\rho_6 + \rho_{\text{ref}} = -0.1016 + 2.509 = 2.4074 \text{ gr/cm}^3 \\ \rho_7 &= \Delta\rho_7 + \rho_{\text{ref}} = -0.1042 + 2.509 = 2.4048 \text{ gr/cm}^3 \end{aligned}$$

calculated Table 6. It has been neglected that the seismic velocity decreases with depth in the mass III in the first identification. It has been included to account that the seismic velocity decreases with depth in the mass III in the second identification.

Table 6. Densities Calculated From The Three Inverse Solutions; (A): The Layers Separated With Seismic Velocity Boundaries, (B): Density Calculated By Without Using Seismic Velocities, (C): Calculated Density Without Taking Into Account The Velocity Decrease Downwards In The Germav Formation (III) And (D): Calculated Density With Taking Into Account The Velocity Decrease Downwards In The Germav Formation (III)

Nu.	(a)	(b) gr/cm ³	(c) gr/cm ³	(d) gr/cm ³
I	1		2.1864	2.1864
	2	2.1879	2.1890	2.1890
II	3	2.4525	2.4523	2.4523
	4		2.4549	2.4549
	5		2.4152	2.4100
III	6	2.4188	2.4178	2.4074
	7		2.4204	2.4048

Then again using (4), real densities from density differences are calculated Table 6. As it can be seen in Table 6, layers densities are obtained as a result of two different definitions that are made for the additional mass. It has been found that the layer 7 has the lowest density from the result of the inversion calculation in the second identification.

RESULTS AND FINDINGS

In this study, different densities for both main formations and additional mass are calculated as a result of inversion calculations made by using two different methods employed in the definition of additional formation. The layer 7 (Figure 6) in the third layer, since the density is low, the layer is thought as probably oil bearing reservoir rock.

CONCLUSION

Irregularity in the geometry of seismic velocity boundaries refers to the irregularity shown in the density of the variable. This situation varies because of the practice of taking the density as a variable in a mathematical expression. Mathematical definition of the density as a variable is actually an expression of the regular density change in every formation. This requires that seismic velocity boundaries have to be parallel to each other, i.e. parallel to the ground. Mathematical definition of irregular changes of seismic velocity boundaries does not have a practical side as in inversion calculations. This method which takes the density as a variable depending on seismic velocity boundaries represents the density variations in a mass very well.

RECOMMENDATIONS

The cost can be minimized by using this method and opening less exploratory wells in the hydrocarbon exploration areas.

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GOLD PROSPECTION USING MAGNETIC, VLF AND SP METHODS IN THE KISLADAG PROVINCE OF WESTERN TURKEY

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ABSTRACT: The study area is in the Kışladağ province of western Turkey. The site has an approximate dimension of 1.5 to 2 kms north-south length and 3 kms east-west width. Combined earth sciences were applied in the field, including geology, geochemistry and geophysics. There are a few volcanic hills in the center of the Kışladağ caldera, which is actually the field of interest. The Kışladağ caldera is surrounded by andesitic, dacitic, and basaltic young volcanisms.

Magnetics (M), Magnetic Total Field Derivative (Mg), Very Low Frequency (VLF) and Self Potential (SP) methods were used to prospect terrains or boundaries of gold depositions in the area. The observed mineralized zones are characterized with low magnetization, high conductivity and low polarization. Locations of the proposed drill holes were determined with varying depths. After the completion of geophysical and geochemical prospection, exploration has continued with open cut mining with a yearly production rate of about 5 to 6 tons of gold minerals at a depth varying between 50 to 225 meters.

Key words: minerals, magnetic, VLF, SP and gold

INTRODUCTION

On a smaller scale, geophysical data helps elucidate the regional geologic framework, mainly by defining major compositional boundaries or structural zones that may be favorable environs for mineralization (Gunn et al. 1997a, b; Jaques et al. 1997; Leclair et al. 1997; Moore et al. 1998). Detection of places and reserves of gold and silver deposits are found as a result of geological and geophysical exploration (Grauch et al. 1995; Irvine & Smith 1990; John et al. 1999; Locke & De Ronde 1987; Morrell 2004).

Gold minerals commonly occur in a zone of quartz-adularia-sericite-pyrite alteration that is surrounded by zones of propylitic and argillic alteration in the low-sulfidation epithermal systems (Andreeva et al. 2013; Christie & Brathwaite 2003; Yuningsih et al. 2012). The presence of mineralization zones that contain gold and silver deposits are also found in the caldera type of geological structures (Andreeva et al. 2013; Groves et al. 2003; Robert et al. 2005). In the western part of Turkey there are twin calderas in the Ulubey town of Uşak. The one in the south is called the Gedik caldera and the one in the north is called the Kışladağ caldera. We have studied the Kışladağ caldera in the south-western region from Kışladağ Hill. The investigation area has an approximate dimension of 1.5 to 2 km north-south length and 3 km east-west width. There are a few volcanic hills in the center of the caldera that are actually the field of interest (Fig. 1). This study aims to prospect formation discrimination, continuity, subsurface extent of outcrops, elongations of alteration zones, and the underground structure of possible mine sites.

STUDY AREA, GEOLOGICAL AND GEOCHEMICAL STUDIES

The Kışladağ caldera in Uşak city in western Turkey is an area investigated for gold and silver deposits. Geological and geochemistry studies were carried out by private international company personnel. The geochemical survey was run by collecting soil specimens from holes that had an approximate depth of 10 to 15 cms with an arbitrary or orderly interval of 50 meters along the profiles. All rock and soil samples were analyzed in terms of petrographic properties, degree of alteration and chemical content. The average chemical content of the study area are given in Table 1.

Table 1. Average Chemical Content Of Surface Top Soil İn The Kışladağ Caldera Area

Element	Rate (parts per million)
Ag	100 ppm (0.5 - 100 ppm)

As	82 - 450 ppm
Ba	300 - 900 ppm
Cu	14 - 35 ppm
Pb	200 - 1100 ppm
Zn	60 - 270 ppm
Mo	20 - 350 ppm
Fe	%1 - 4
Bi	8 - 27 ppm
K	% 0.0 - 0.55

According to geochemical analyses and geologic observations, geochemical and geologic zonal map along the geophysical profiles was drawn for the sake of correlation. In general, dominant formation in the field is andesitic volcanic, which overlies the Meander metamorphic rocks. There is acidic or silicified volcanic intrusion or cyclic intrusions in alteration zones. Such intrusions are the main cause of mineral dissemination in alteration zones or portions. Therefore, the essential target for gold and silver depositions are picking up discontinuities given as follows: altered zones in volcanic fields and silicified volcanic rocks. Basement rock is the Meander metamorphic, which is dominantly schist. Volcanic rocks, dominated by andesite on the basement have about 150 to 200 meters of thickness. However, Basalt is also observed at the stations (G1000) and (L250 and L750). Moderately silicified argillic andesite was observed to be wide spread on the northern and eastern side of station G1000. However, strongly silicified andesite with mineralization is at stations H1600 and I1450 on the northwestern part of station G1000. This zone could extend to profile G (Fig. 1).

ANALITICAL METHOD

Background of geophysical prospecting

Magnetic methods are applicable to gold exploration because alteration readily destroys magnetite such that, in the absence of post-mineralization cover, gold deposits invariably occur within 'magnetic quiet zones', typically several kilometers across (Allis 1990; Irvine & Smith 1990). The magnetic method is especially effective for mapping gold deposits, as most occur in volcanic rocks with high magnetization, which makes the quiet zones very distinct (Allis 1990). As witnessed in Kışladağ, the magnetic method is based on mapping the subsurface distribution of magnetic minerals, primarily magnetite. Mafic igneous rocks can be very magnetic, whereas felsic igneous, metamorphic, and particularly sedimentary rocks generally have weaker magnetic expressions. Many Mesozoic-Cenozoic plutonic and volcanic rocks are sufficiently magnetic enough to be expressed in magnetic anomaly maps. Magnetic Gradiometry is also an important near surface exploration method in the investigation of gold and silver deposits. First vertical derivative of the residual total magnetic field provides value-added products that may contribute to the geological interpretation of magnetic data. The first vertical derivative (nT/m) is probably the most commonly used derived product. Vertical derivative maps present a filtered picture of the magnetic field, emphasizing near-surface geological features. Vertical derivative maps are useful for mapping geological contacts, since theoretically the zero contour of the derivative coincides with contacts between contrasting magnetizations, provided the contacts are steep and the area is in high magnetic northing (Hood & Teskey 1989). Electromagnetic (EM) techniques are among the most commonly used methods in mineral exploration. They are capable of direct detection of conductive base-metal deposits, where large conductivity contrasts exist between the deposits and resistive host-rocks or thin overburden cover. A specific type of electromagnetic method uses the VLF waves (radio waves) that are generated by powerful, distant man-made electromagnetic sources such as VLF signals from military bases or radio stations. The VLF technique is often used for estimating the locations of subsurface geological conductors (Erkan 2008). The VLF source can be used for determining the electrical properties of the subsurface. In practice, the method is contingent upon a powerful source having a good signal-to-noise ratio. SP surveys were at one time popular in mineral exploration because of their low cost and simplicity. Since 1830 the SP method has been employed in the search for minerals. Anomalous surface potentials are commonly measured in the vicinity of pyrite (marcasite), chalcopyrite, pyrrhotite, sphalerite, and graphite. These potentials are measured in millivolts (mV) relative to a "survey base", where the potential is arbitrarily assigned to be zero volts. The potentials of interest are always negative above a mineralized body relative to a point outside the mineralization. The observed potentials are the result of the oxidation, or valence electron stripping, of sulfides; hence, the negative potential.

Geophysical Prospecting

The investigation site was divided by 13 south-north extending profiles. Each profile has an average length of 1.5 to 2.3 km and the stations are evenly distributed in 50 meter intervals. Coordinates of each station were previously selected (Fig. 1). Total area covered with the geophysical studies is approximately 5 km².

For the sake of simplicity, these profiles have been named A, B, C, D, E, F, G, H, I, J, K, L, and M from east to west. Station A0, at the southeast corner of the study area, was selected as the primary base station, which was later linked to secondary base stations in the site. Profile 61000 extends in an east-west direction and is considered the baseline (Fig. 1). Amplitudes of the total magnetic field, magnetic derivative and VLF were acquired on the profiles. Amplitude of the SP was acquired on the profiles A and B.

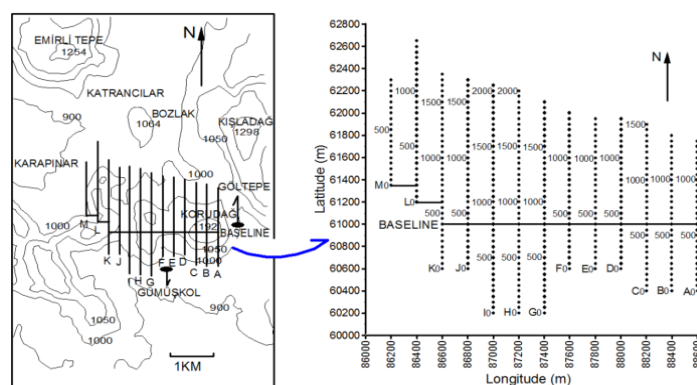


Figure 1. Topography Of Site And Its Surround (In Left), Distribution Of Geophysical Profiles And Stations On The Study Area (In Right)

In this study we are limited to 50 meter sampling intervals, which leads to missing some details in magnetic prospecting and could also shift some peaks on the anomaly. The shape of the anomaly is determined by the geometry of the causative body with respect to the direction of the earth's magnetic field. The amplitude, in contrast, is controlled by a combination of the permanent magnetization and the distance from the body. The magnetic field varies between 45900 to 46600 gammas in the area. The average value is about 46050 gammas and the anomaly is about 550 to 600 gammas. The most intensive anomaly was observed at station A1350, which could represent the existence of a higher magnetizable object (Fig. 2). Observed characteristics of discontinuities in the field are magnetization (Magnetics and Magnetic Gradiometer), conductivity (VLF, Electromagnetic) and Polarization (SP). So, geophysical methods that are sensitive for such changes were selected. These properties do not necessarily depend upon the formation type. Even in the same formation there are significant differences in physical properties. VLF appears to be highly successful in locating highly altered zones that have a substantial increase in conductivity. This method is capable of finding depth, dip, extend and strike of the slab type discontinuity. Therefore, it is a powerful technique in determining subsurface geology by tracing alteration or fault zones. The ground survey is a decided advantage, both for discrimination of anomalies and amplitude of response.

Geophysical Interpretation

Interpretation is mainly qualitative in ground surveys. After interpretation, it was found that the estimated thickness of the overlying volcanic rocks is about 150 to 200 meters on the underlying Meander metamorphics. As seen on the total field map, Meander metamorphic is represented with lower magnetic fields of <46000 nT and volcanic rocks higher than >46000 nT. There is a magnetized thick slab extending on the northeast of the investigation area (Fig. 2). Although the anomaly is wide spread and has moderate magnetization on the south, it gets narrower and the magnitude increases as it proceeds to station A700 where it is confronted with higher gold mineralization (Fig. 2).

The VLF phase is negative over conductive zones and positive over resistive zones. One by one correlation of negative ϑ (phase angle) values, with that of silicified and strongly silicified zones, could promise to lead to discriminate targets. Also, SP is negative over conductive zones.

After data reduction, geophysical data were interpreted as 2D for each profile. 2D sections were interpreted both qualitatively and quantitatively by modeling. Subsurface geophysical sections were constructed in a way to enlighten the geology.

Various anomalies appeared on profiles depending upon physical discontinuities. Some discontinuities give only a unique anomaly for a single physical property. But in some places the same zone happens to have a few

physical value differences, with respect to background. Since the sampling interval is 50 meters, thinner veins were not detected. In order to get the exact location and decrease or increase resolution, a much smaller sampling interval should be selected.

Ferromagnetic mineral content is the main source of local magnetic anomalies. Most ground magnetic surveys measure the total field component, T , as we have measured at the Kışladağ caldera (Fig. 2). Occasionally the vertical derivative is measured in detailed work. The vertical derivative of total field varies from a maximum of approximately 20 gamma/m to a minimum (-18 gamma/m) at the field.

The regional and residual anomaly separation is very difficult and was often not even attempted. The matching of field anomalies with simple geometrical shapes is the most common method of interpretation. Frequently, there is a connection between magnetics and topography, as well as with buried geologic structures, particularly in mineral exploration areas.

In metamorphic regions on the northern part of the area, particularly where the basement depth is shallow, the magnetic contours are normally smooth, the values are small and the variations are low. On the northern part, magnetic anomalies reflect the basement rocks rather than near-surface features.

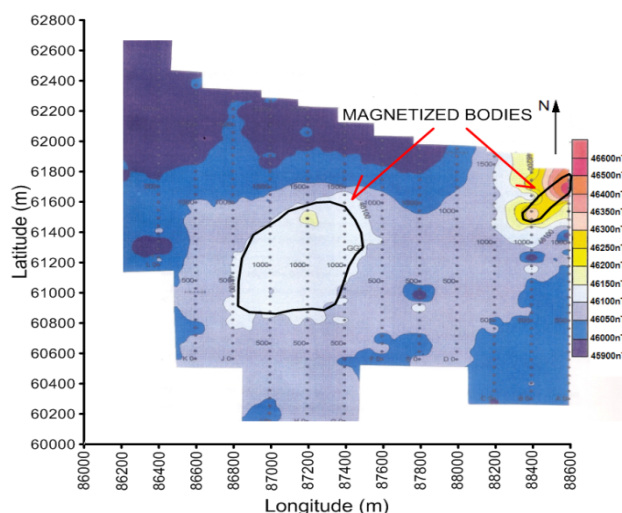


Figure 2. Magnetic Total Field Map And Magnetized Bodies (In Circles Driven By Bold Lines) In The Study Area

Conversely, regions like Kışladağ, in which metamorphic and igneous rocks predominate, usually exhibit complex magnetic variations. In such areas, basement features are frequently camouflaged by higher frequency magnetic effects originating near-surface. For crude preliminary interpretation a visual study of the magnetic map can be quite fruitful. A Kışladağ ground magnetic map reveals that there are predominant trends for magnetic anomaly systems, mainly in the northeast-southwest direction, which could be associated with shallow magnetized volcanic rocks (Fig. 2). The thickest part is at the northeast corner. The magnetic anomaly has its maximum on profile H, between stations H1000 and H1500. It has two components: one is regional and the other is local at about stations H1250-H1400. The regional anomaly caused by a horizontal slab has on approximate depth of 800 meters between stations H1000 and H1800. Along profile A, if the local anomaly is interpreted as an isolated pole whose lower pole has a negligible effect at the surface and represents a steeply dipping dipole with a small length, this could be a chimney or pipe-like structure. Around station B700, dT/dz gets negative minimums over the outcropping silicified ridges and veins. However, the fresh dacitic andesite derivative values reach the maximums and the positive values take place on weakly or non-altered volcanic rocks. Basalt is represented with an unimportant positive derivative. Strongly silicified andesite, with mineralization, also takes place in the negative derivative area. In conclusion, the prospect area is proposed to be limited in the negative derivative area. Depth of exploration is limited to about 60-70% of the skin depth of the surrounding rock or soil and the high frequency of the VLF transmitters (15-25 kHz) means that in more conductive environments the exploration depth is quite shallow. Penetration is about 10 to 15 m in 25 ohm-m medium. Furthermore, the presence of conductive overburden seriously suppresses response from basement conductors, while relatively small variations in overburden conductivity or thickness can generate significant VLF anomalies. For this reason, the VLF technique is usually far more effective in arid regions like in Uşak city, where the overburden is often relatively thin and resistive. Measurements made at different frequencies are responsive to different depths in the ground, and the sounding of resistivity as a function of depth can be

achieved. With the VLF resistivity technique only two pieces of information are available: the apparent resistivity and the phase angle, which of course severely limits the information that can be determined about layering. In the case of a very good conductor (or body), the anomaly in the filtered imaginary part can be of the same size as the anomaly in the filtered real part. In this case the amplitude of the imaginary part is typically much smaller than that of the real part. If the mineralization type is massive, IP (in phase) is the positive maximum and OP (out of phase) is the negative minimum.

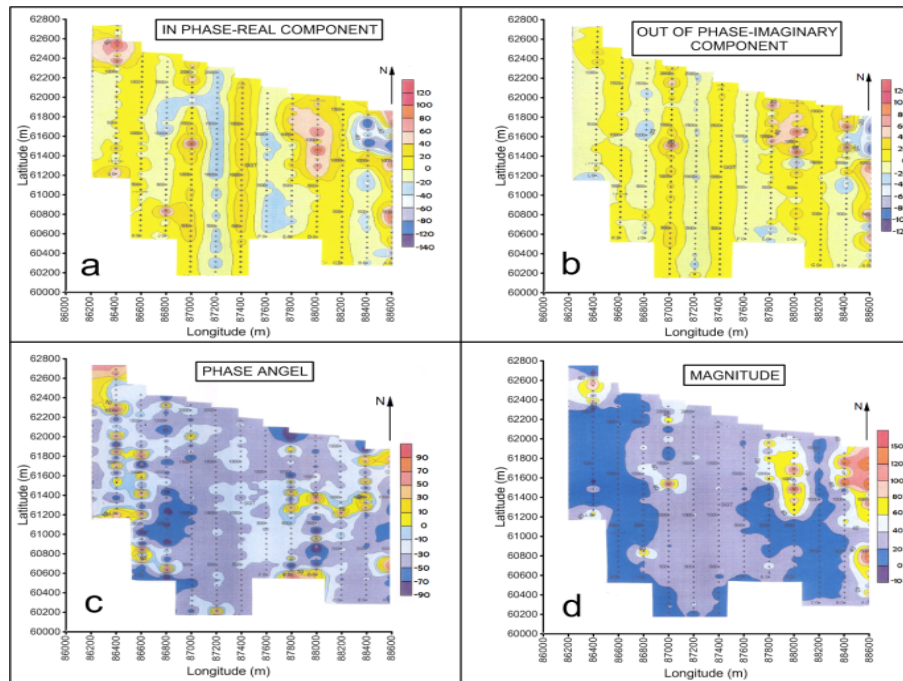


Figure 3. a- VLF In Phase-Real Component IP, B- VLF Out Of Phase-Imaginary Component OP, C- VLF Phase Angle And D- VLF Magnitude

The ore bodies provide fairly large imaginary-part anomaly indications that are sometimes on the same order of magnitude as those provided by the real part. IP and OP were measured and SIGMA-Current density was derived from IP, A (amplitude) and ϑ parameters from IP and OP components (Fig. 3a and 3b). Significant conductive discontinuities occur at stations A1000 and B1050, which coincides with the silicified vein on the northern side of station A1000 on the IP and OP maps. Similar discontinuity also occurs at station G1100, where the strongly silicified andesite, with mineralization, takes place. Positives, in Sigma, represent conductive (altered) zones and negatives stand for resistive areas. Silicified veins on the mid-east area and around station G1100 take place in conductive regions that have values higher than 0 (zero). There is one-to-one correlation between high magnetic field and high resistive region in the zone, which extends between stations A1350 and B1075. The conductive region should stand for highly altered andesite or mineralized veins. The VLF phase angle indicates negative phases on silicified veins. In conductive zones the phase is negative (Fig. 3c). Due to sparse sampling in the east-west direction there are misleading north-south elongations on VLF IP and OP maps (Fig. 3a and 3b). VLF magnitude varies between 0 and 150. The VLF magnitude is high in the magnetized region on the northern side of station B700 (Fig. 3d). The SP method was applied only on two profiles: A and B. There are lower SP values on ore bodies. Station A0 was selected as the base station. The horizontal derivative (dV/dx) of SP, which was called the SP electrical field, was numerically calculated. The SP electrical field is more sensitive to lateral discontinuities. SP polarization angles coincide well with the VLF's conductive discontinuity slopes, which dominates 45° southward on profile A at station A1100. This reveals that there is a bowl-like (like a synclinal) structure. This zone is very conductive and there is resistive overburden. This area has an approximate depth of 130 meters and is inclined 45° toward the south. Subsurface alteration zones were determined by using magnetic, VLF, and SP methods. Such alterations usually coincide with conductive argillized andesite veins with varying thickness and slope directions. Such discontinuities are usually in the form of conductive bars or, inversely of points. In some sections such bars align along an inclined line as a fault zone and they form a bowl-type alteration discontinuity. The most interesting subsurface structure is a bowl-like alteration in the area. Most commonly this bowl is in the form of a syncline and inversely in the form of an anticline. Place to place, these bowls were cut through by another fault-type line discontinuity. The inclination of flanks of such a bowl was estimated. Elongations and slopes of the target body were determined by the VLF method. The average angle of slopes are usually $35 \pm 5^\circ$ either northward or southward. The depth to the bottom

of the bowl is usually around 250 ± 50 meters. Fresh volcanic rocks are recognized by higher magnetization. Although there are outcrops of volcanic rocks on the eastern part of the field around station B700, there is no magnetic anomaly because of low magnetization, except around station A1400. A belt could be caused by over alteration and then demagnetization occurs by chemical decomposition. Lengths of basaltic volcanic rocks along the profiles are in disorder from one profile to another, varying between 200 to 1500 meters. The average thickness of magnetized volcanic rocks are about 220 ± 40 meters. The western end of magnetized volcanic rocks extends outside the investigation field, far behind profile M. The width of the magnetized body gets narrower toward the northeast corner (Fig. 2). Finally, exploration has been continuing through open cut mining with a yearly production rate of about 5 to 6 tons of gold minerals at depths varying between 50 to 225 meters.

RESULTS AND FINDINGS

By the geophysical prospecting at Kışladağ altered andesite and silicified veins cannot be discriminated by the magnetic method because both have the same low (or even zero) magnetization. However, volcanism, which is especially dacitic with hornblende crystals, seems to give rather big magnetic anomalies. Therefore, the magnetic method could be used to discriminate and define the rate of alteration and their size and dimensions.

VLF measurements are sensitive enough to give contacts between silicified veins with that of altered zones. By using VLF, following the lateral extend silicified veins is possible. The inclination of veins, for a tabular model, can also be given by interpretation. OP components of VLF directly relates to the soil conductivity. Therefore, an OP map could reveal mineral contamination in the soil. Some of the locations for proposed drill holes with varying depths will enlighten geology, and others will direct prospecting for ore bodies. They have varying depths between 50 to 225 meters. After this detailed geophysical study, the proposed drilling location successfully cut the ore bodies. Since that time, gold mineral production capacity has been about 5 to 6 tons/year.

CONCLUSION

Considering that the observed mineralized zones are characterized with low magnetization, moderate high conductivity (alterations) and low polarization, one should go and select such zones for drilling. There are such zones outside and beneath the magnetized cap rock.

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CONTRIBUTION TO THE STUDY OF THE EFFECTIVENESS OF *TRICHODERMA ATROVIRIDE* AND *TRICHODERMA LONGIBRACHIATUM* AGAINST *BOTRYTIS CINEREA* PERS. AGENT OF GRAY MOULD ON GRAPES

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ABSTRACT: *Botrytis cinerea* Pers. is an ubiquitous fungus that attacks a wide variety of plants, commonly known as grey mould, which causes losses and severe damage in vineyards around the world. The improper use of chemical fungicides to reduce the severity of the fungus and the disease leads to resistance development in *B.cinerea* toward almost all anti-Botrytis chemical treatments. For this reason, it is important to find an alternative control strategy against this pathogen that reduces the use of chemicals. This implicates the use of biological control agents and the development of biopesticides. The evaluation of the efficiency of two antagonists species *Trichoderma atroviride* (Ta13) and *Trichoderma longibrachiatum*(T4) in vitro, against seven isolates of *B. cinerea* was carried out. The isolates were obtained from grapevine organs expressing typical symptoms of the disease. The ability of *Trichoderma* to reduce the growth of *B.cinerea* was measured by two techniques: direct and indirect confrontation of culture media.

Keywords: *Botrytis cinerea*, *Trichoderma* spp., biological control, grey mould.

INTRODUCTION

Botrytis cinerea Pers. is an ubiquitous fungus that attacks a wide variety of plants, commonly known as grey mould, it is the most serious disease of table grape (*Vitis vinifera* L.) which causes significant crop losses in vineyards around the world. This disease affects the yield, duration of collection and the organoleptic quality of work of the wine. It therefore causes losses of crops as quantitative and qualitative (Camps, 2008). Chemical control of the grey mould and the reduction of the severity of the fungus was the standard treatments for many years but the improper use of chemical fungicides has become complicated due to the development of strains of the pathogen resistant to fungicides (Gullino and Garibaldi, 1986). The need of alternative control strategies that may help avoid an exclusive use of chemicals is becoming more important (Lynch, 1988). *Trichoderma* spp. have been widely used as antagonistic fungal agents against several pests as well as plant growth enhancers. Faster metabolic rates, anti-microbial metabolites, and physiological conformation are key factors which chiefly contribute to the antagonism of these fungi. Mycoparasitism, spatial and nutrient competition, antibiosis by enzymes and secondary metabolites, and induction of plant defence system are typical biocontrol actions of these fungi (Caron, 2002 ;Jijakli, 2003). The evaluation of the efficiency of two antagonists species: *Trichoderma atroviride* (Ta13) and *Trichoderma longibrachiatum* (T4) in vitro, against seven isolates of *B. cinerea* was carried out. Significant effect was observed against *B. cinerea*

MATERIALS AND METHODS

Isolation And Culture Condition Of The Pathogen And Antagonists

Trichoderma atroviride (Ta13) and *Trichoderma longibrachiatum* (T4) obtained from the collection of the mycology laboratory at Agricultural National High School- Department of Botany-(Algiers) were cultured on potato dextrose agar (PDA) in Petri dishes for 6 days at 18°C under continuous light.

Table 1: Origins And Years Of Isolation Strains Of *Trichoderma* Spp.

Strain	Specie	Origin	Year of isolation
T 4	<i>T. longibrachiatum</i>	Soil	2009 (by: Boureghda, H.)
Ta 13	<i>T. atroviride</i>	wheat seed	

Isolation Of *B. cinerea* From Plant Parts

The isolates of *B. cinerea* were obtained from grapevine organs expressing typical symptoms of the disease. The infected leaves are thoroughly washed in sterile water. Then the infected tissues along with adjacent small unaffected tissues are cut into small pieces of 3mm squares and transferred by using flame-sterilized forceps to sterile petri dishes containing sodium hypochlorite (2%) for 1min and washed in sterile water three times. The three or four tissue pieces are aseptically transferred to petri dishes containing a nutrient medium (PDA) which are incubated at room temperature (20-22°C) under continuous light. The origins, dates of isolation and the host plant are shown in the following table

Table 2: Origins And Years Of Isolation Of *Botrytis Cinerea* Isolates

Isolate	Host plant	Date of isolation
T1	Grape vine : Cabernet	September ,2012
N1		
R1	Grape vine: dattier of Beirut	
B3		
D3		
B2		

The Potato Dextrose Agar medium (PDA) is used for the cultivation of fungi even if it was *Trichoderma* spp. or *Botrytis cinerea*, it is required for their growth and reproduction. The media is sterilized at the required temperature and pressure during 120minutes.

Effect Of *Trichoderma*spp. On The Pathogen Growth

To study the effect of *Trichoderma* spp, both direct and indirect confrontations were carried out.

Direct Confrontation

The interaction between *Trichoderma* spp. and *B.cinerea* was carried according to the procedure described by Benhamou and Chet (1996). Mycelial plugs (8 mm) diameter collected from 7 days old colonies of both fungi were placed 5 cm apart, in the same time following a diametrical axis and equidistance of the center of PDA plate, and allowed to grow at 20-22°C, under continuous light for 7 days. Four replicates were made for each combination of *Trichoderm.-Botrytis*, control containing only the *Botrytis* was used. Inhibition of the diametrical growth of the pathogen colony and their overgrowth by *Trichoderma* spp. isolates were recorded at three days intervals.

Indirect Confrontation

This method described by Olivier and Germain (1983), consists on placing the antagonist and the pathogenic agent in two separate PDA plate, mycelial plugs (8 mm diameter) of 7 days old growing colony are placed in the center of PDA plate. Then, an assembly is carried out by superposition of both plates, *Trichoderma* spp. in the bottom and the *B.cinerea* on top. The junction between the two plates (without cover) is ensured by parafilm to avoid the losses in volatiles substances. Four replicates for each of treatment and control were carried. The control is made by superposition of two PDA plates, that of the top containing the pathogen whereas that of the bottom contains PDA medium only. The cultures are allowed to grow at 20- 22 °C in the dark. Data on *B.cinerea* colony diameter were recorded after 4 days.

Inhibition percentage **R (%)**of the pathogen mycelial growth in the two confrontations tests was estimated using the following formula: (Rapilly, 1968)

$$R(\%) = \frac{C_0 - C_n}{C_0} * 100$$

C_n: diameter of pathogen colony in the presence of the antagonist (mm).

C₀: Colony diameter of the control (mm).

RESULTS

Direct Confrontation

The study of antagonistic activity *in vitro* showed considerable reduction of *B.cinerea* growth compared to the control (Table 3). The results obtained after 6 days of incubation showed that the percentages of reduction of the mycelial growth were high, over 70%. After 8 days, the antagonists almost invaded completely and covered the colony of *B.cinerea*. The most important reduction of the mycelial growth was observed with the isolate Ta13 against B3 of *B.cinerea*, 83% of inhibition (Fig.1). While the least sensitive was R1 with 64% of inhibition, obtained with *T. longibrachiatum*. (Fig.2, 3)

Table 3: Inhibition Percentage Of The Pathogen Mycelial Growth Obtained By The Two Strains Of *Trichoderma* Pp.

Strains of <i>Trichoderma</i> spp.	Ta 13	T 4
% of inhibition	75,14%	63,89%

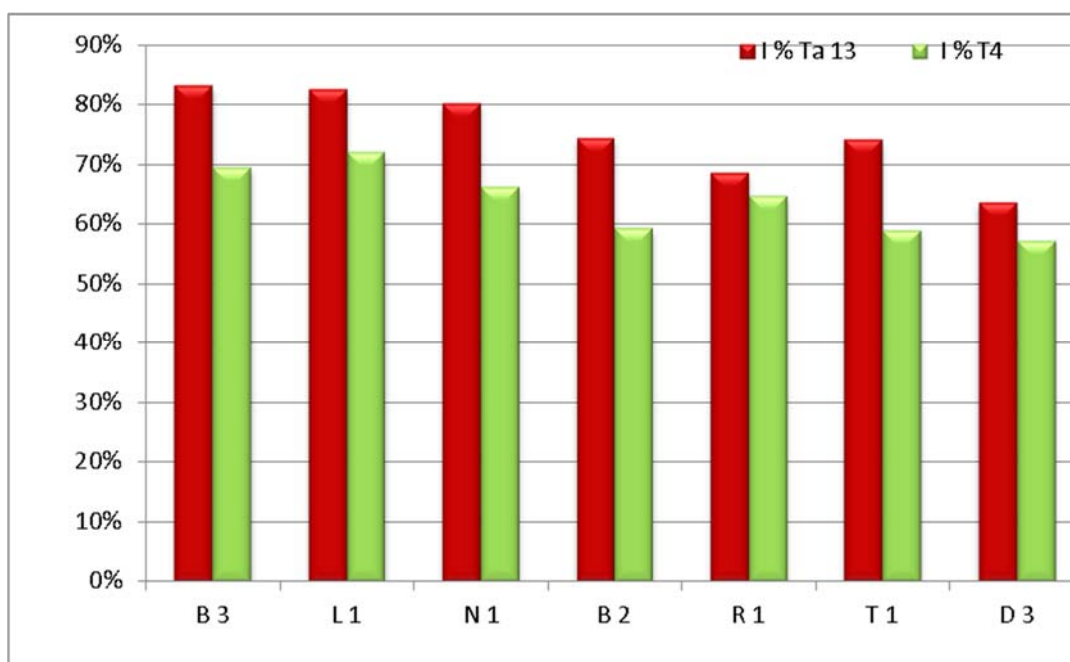


Figure 1: The effect of *Trichoderma* spp. on inhibition of mycelial growth of *B.cinerea*

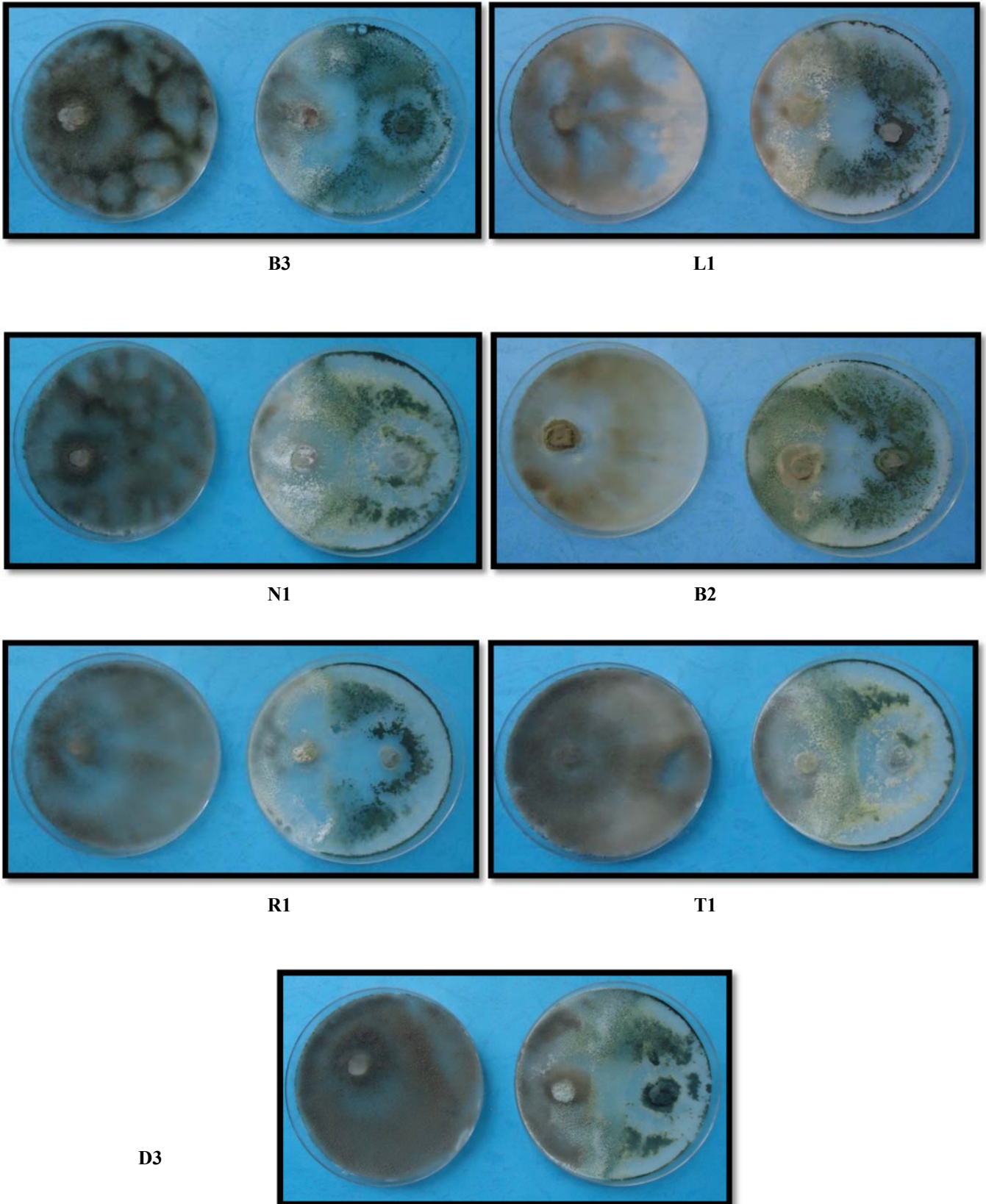


Figure 2: Direct confrontation of *Botrytis cinerea* with *Trichoderma atroviride*

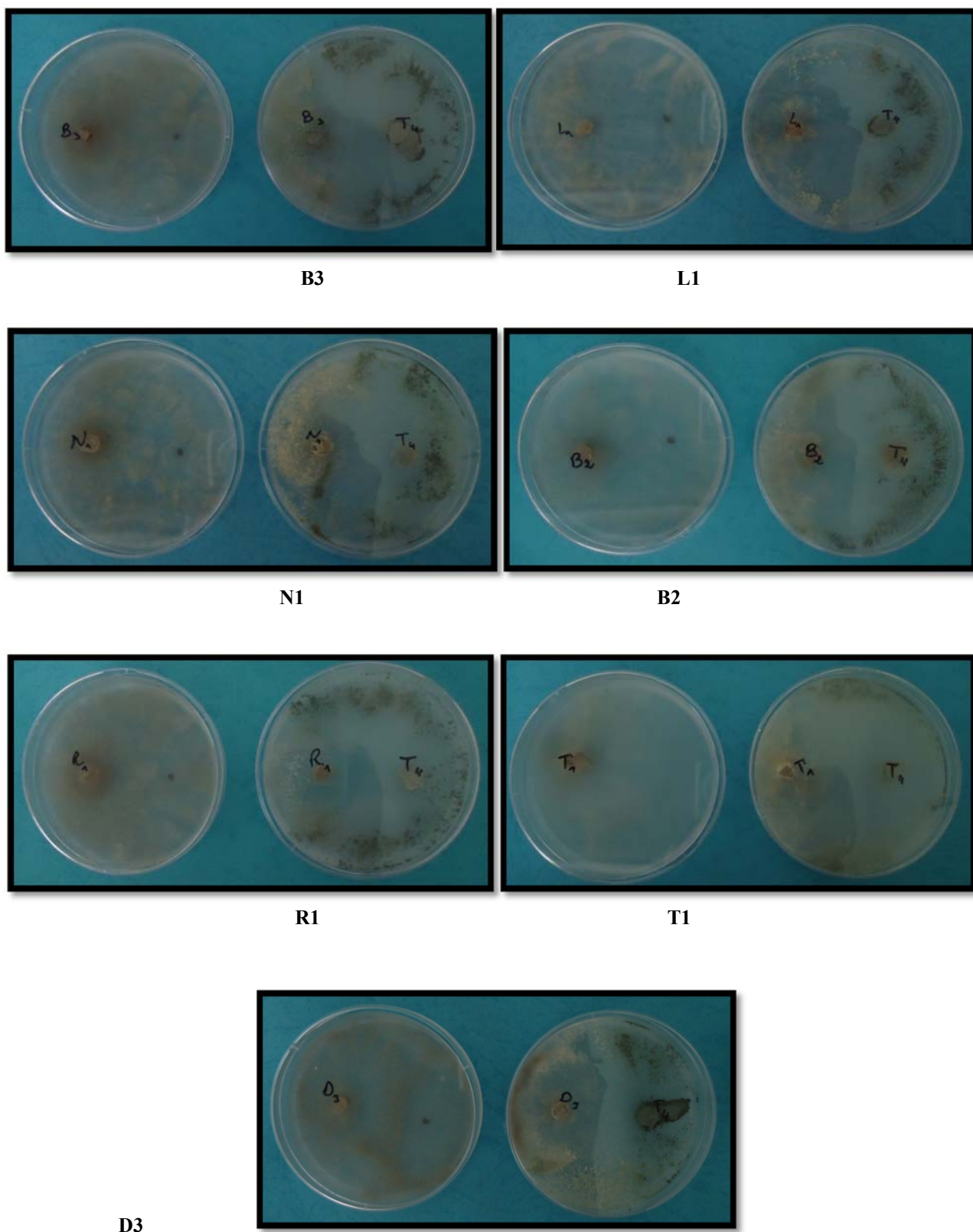


Figure 3: Direct confrontation of *Botrytis cinerea* with *Trichoderma longibrachiatum*

Indirect Confrontation

The results of the indirect confrontation test, obtained after 6 days, showed that the antagonists during the confrontation reduced the mycelial growth from 20% to 50%.(Fig.4) The most sensitive isolate of *B.cinerea* was R1 with 52.6% of mycelial growth inhibition, while the least sensitive was B2 with 15.5% of inhibition. *T. atroviride* showed the highest percentage of inhibition (35%) that was obtained against the isolate B3 of *B.cinerea*. (Fig.5,6)

Table 3: Inhibition Percentage Of The Pathogen Mycelial Growth Obtained From The Two Strains Of *Trichoderma* Spp.

Strains of <i>Trichoderma</i> spp.	Ta 13	T 4
% of inhibition	26,2%	33,3%

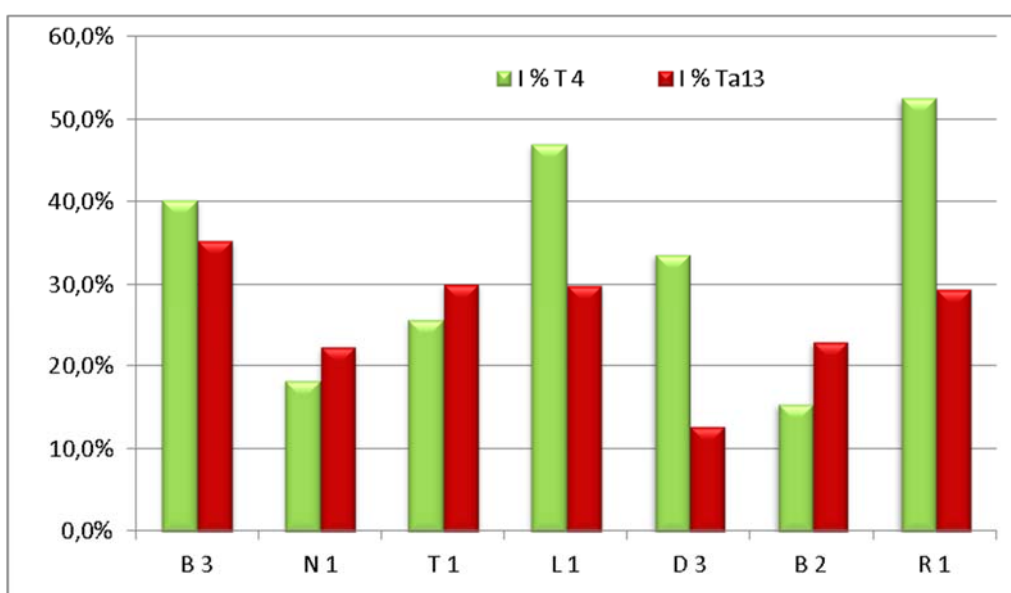


Figure 4: The Effect Of *Trichoderma* Spp. On Inhibition Of Mycelial Growth Of *B.Cinerea*

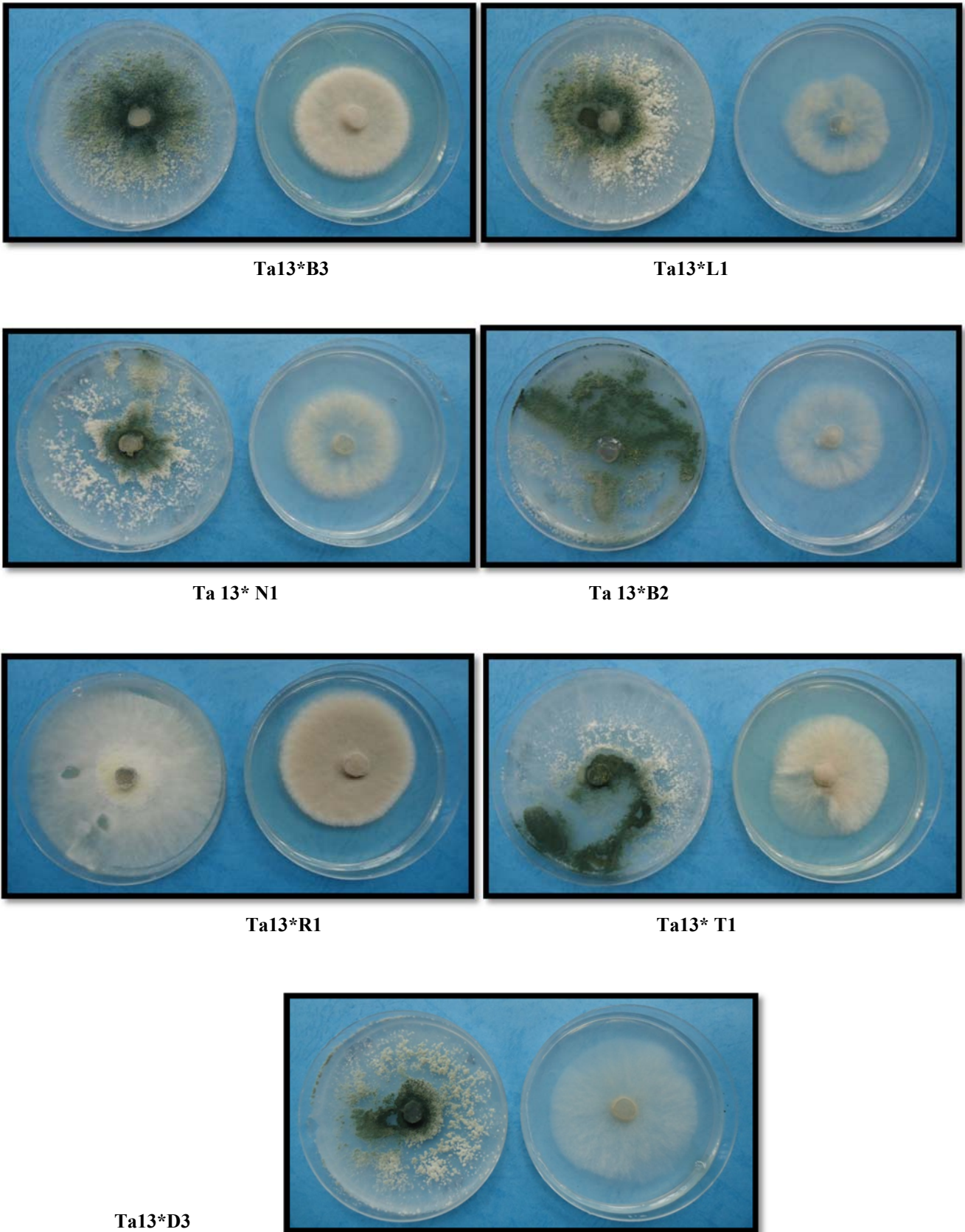
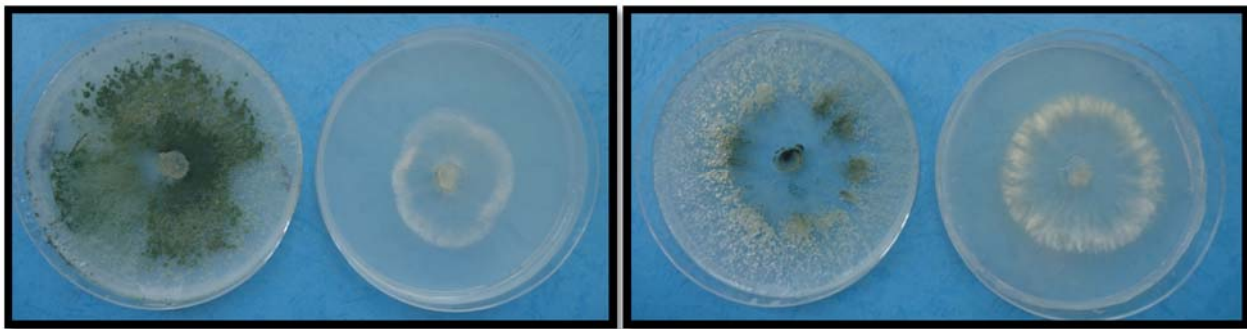
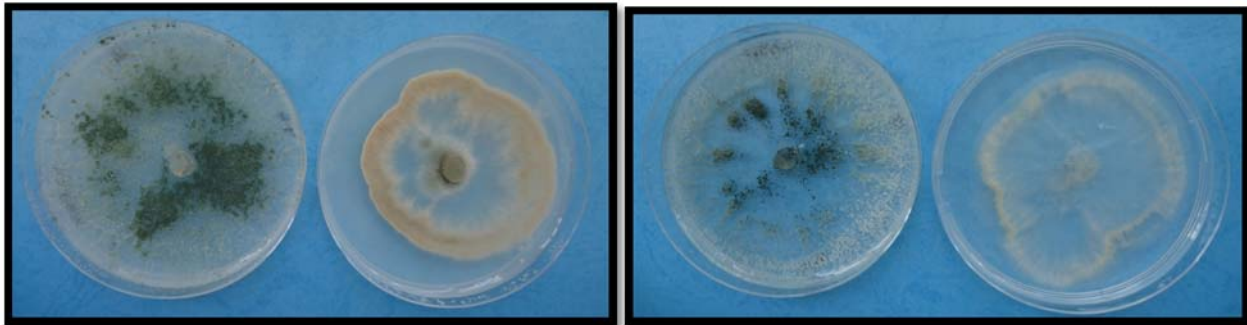


Figure 5: *B. Cinerea* Growth On Indirect Confrontation With *Trichoderma Atroviride*



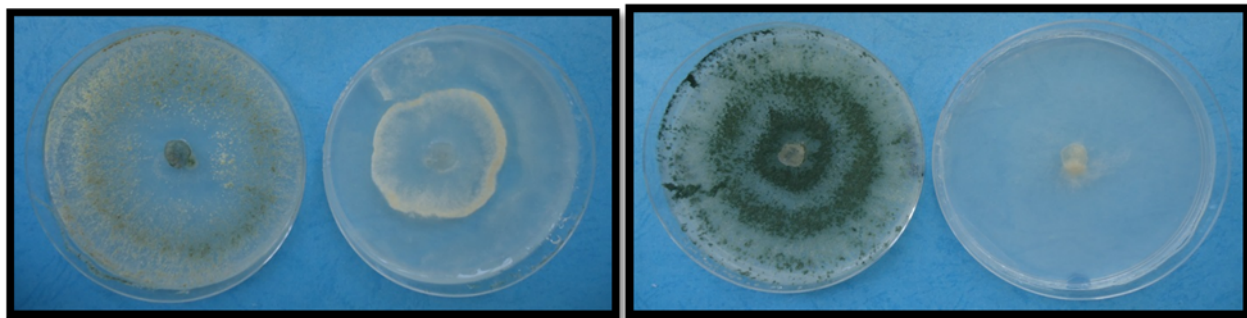
T4*B3

T4*L1



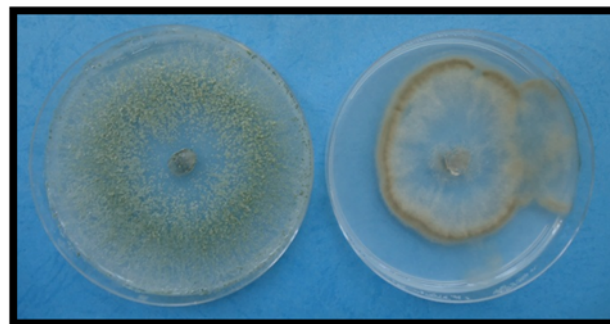
T4* N1

T4*B2



T4*R1

T4*T1



T4*D3

Figure 6: *B. cinerea* Growth On Indirect Confrontation With *Trichoderma Longibrachiatum*

DISCUSSION

In dual culture (direct confrontation), significant reductions of pathogen growth were shown compared to the control with *Trichoderma spp.* isolates, thus showing the highest parasitic capacity (mycoparasitism) of this species towards the pathogen. Similar phenomenon was observed with three strains of *Trichoderma spp.* (*T. harzianum*, *T. viride* et *T. longibrachiatum*) against *Botrytis fabae* and *Botrytis cinerea* by Bendahmane et al. (2012)

In indirect confrontation, the lack of direct contact between the antagonist agent and the pathogen, where the only means of growth inhibition is the production of antifungal volatile substances by antagonist. Boureghda and Bouznad (2009) have observed a significant reduction of *Fusarium oxysporum* f.sp. *ciceris* growth compared to the control which was recorded with all *Trichoderma* spp. (*T. harzianum*, *T. atroviride* and *T. longibrachiatum*) isolates used.

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LEARNING COMPUTER HARDWARE BY DOING: ARE TABLETS BETTER THAN DESKTOPS?

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ABSTRACT: In this world of rapidly evolving technologies, educational institutions often struggle to keep up with change. Change often requires a state of readiness at both the micro and macro levels. This paper looks at a tertiary institution that undertook a significant technology change initiative by introducing tablet based components for teaching a hardware course across nine campuses in the United Arab Emirates (UAE) using a Learning By Doing (LBD) philosophy. This paper adopts a readiness for change model (RFC) as a method of evaluating the results from a case study that captured the readiness perceptions of both students and faculty. The survey revealed that, while faculty thought that introducing tablets was a good idea and that there was a high level of RFC, they also thought that the students would learn more about hardware from desktop kits. The students' responses also indicates a high level of RFC with many describing tablets as easier to work on yet they were divided about which technology was better for learning hardware concepts. In this context a high level of readiness for change, while supported by LBD, did not necessarily equate to improved learning and effective change.

Key words: tablets, readiness for change, learning by doing, teaching hardware

INTRODUCTION

One of the most significant changes in computer technologies in recent years has been the shift away from desktop computers towards more mobile devices and in particular, the emergence of the tablet. Managing this change requires a high level of readiness by both individuals and organizations.

Tablet sales have skyrocketed since Apple introduced the iPad in 2010 and now outsell traditional desktops and notebook sales combined and are expected to continue to do so (see table one). Recently M2 Presswire observed that sales of desktop PC's have declined by nearly 20% evidently because, "consumers dedicate more of their budget to other devices like tablets" (2013).

Table 1. Worldwide Device Shipments by Segment (Thousands of Units) Atwal (2014)

Device Type	2013	2014	2015
Traditional PCs (Desk-Based and Notebook)	296,131	276,457	261,005
Ultramobile Premium	21,517	37,608	64,373
PC Market Total	317,648	314,065	325,378
Tablets	207,082	229,085	272,904
Mobile Phones	1,806,964	1,859,946	1,928,169
Other Hybrids/Clamshells	2,706	6,462	8,609
Total	2,334,400	2,409,558	2,535,060

There are signs that the interest in tablets is maturing, which has led some to argue that they are purely a niche consumer device (Reed, 2010). Regardless, tablets are now commonplace and are here to stay. This reflects changes in the way we commonly access information and will continue to change the way we access it with new tablet applications coming out every day. Atwal observes that, "the device market continues to evolve, with the relationship between traditional PCs, different form factor ultramobiles (clamshells, hybrids and tablets) and mobile phones becoming increasingly complex"(2014). The trend towards smaller, more mobile devices with primarily touch screen interfaces has implications for many sectors of the community including educational environments that specialize in teaching information technologies and systems.

Education is a complex business with a long history of practitioners looking for the latest gadget to improve or change learning. As with any new technology Murray and Olcese (2011) point out that there are the enthusiasts, or early adopters, that insist tablet technology will transform learning and then there are the skeptics who believe

that it will makes no difference. Technological change happens in Education, but, as Marcovitz observes, it is difficult and takes time. He adds that, “we must focus on the innovation, the people, and the culture of the school” (2006. P.13). The introduction of tablets into learning environments, therefore, is no different from a long list of other technologies introduced over the years; it must be done right.

Many studies exist that examine the use of tablets and their applications in various learning environments (Palmo Thinley et al, 2014). Despite the availability of hundreds of thousands of apps, Murray and Olcese in their review of educational software declared, “we do not think the iPad will ignite a revolution in schools” (2011, p. 48). Yet, there are many studies of instances in which tablets can aid learning indicating an evolution rather than a revolution in technology. In the UAE, for instance, Hayhoe demonstrated how well an iPad could be adapted for special needs students using its intuitive navigation and multimedia capabilities. Bennett has demonstrated how just a few tablets in a classroom can have a positive impact on individualized learning with the key being, “innovative instructional design”(2011-12, p.23). A tablet PC, as van Oostveen et al point out, “cannot by itself, instigate redefinition of learning tasks to allow for meaningful learning to occur” (2011, p 78). The learning environment needs to suit the affordances of the tablet.

This study takes a different perspective by physically deconstructing the tablets and using their components in an activity centered LBD environment for teaching hardware courses as well as desktop computer components used previously. The focus is on the hardware rather than the software. Moving from easily available stock components to tiny, bespoke pieces is a large change. Are the students and the organization ready for this change? Do they learn more or less about hardware using tablets? Is it an effective change, an improvement on the old way of doing things?

Readiness for Change

All organizations, including educational institutions, need to keep up to date and change to be relevant in the marketplace. As Edmunds puts it, “They need to react quickly to the global revolution while at a local and national level have to keep up with new technology and competition if they want to stay ahead of the game” (2011, p. 349). With the emergence of tablets globally as personal computing devices, educational institutions therefore, need to examine how they can best incorporate these new devices into learning environments. However, changes such as these naturally create tension or resistance to change within the organization, which can be addressed by examining models of readiness for change.

Stemming originally from Lewin’s (1948) work on unfreezing and freezing behaviors, organizational Readiness for Change (RFC) has been described as a process by Kotter (1995). This process is influenced by key factors which, according to Lehman, Greener and Simpson (2002), include aspects of the individuals involved in the change including their motivation, skills and knowledge as well as aspects of the organization, such as the availability of suitable resources and the organizational climate. Armenakis and Harris (2002) grouped RFC factors into five main categories namely: Discrepancy; Principal Support; Efficacy; Appropriateness; and Valence. Recently, in a study of a Dubai e-government initiative, we suggested that these categories can be viewed from a variety of depths from micro to macro depending upon whether the lens is focused on the individual or on wider organizational issues (Samara and Raven, 2014).

In this study we will use this micro-macro RFC model to examines an instance of technological change in a hardware class. Of interest is how efforts to meet current trends away from desktop PC’s towards more mobile devices in an educational setting are influenced by both individual and organizational RFC factors. The context of the study is at a vocational college in the United Arab Emirates (UAE).

Learning by Doing at HCT

The Higher Colleges of Technology (HCT) is the largest provider of tertiary level education in the UAE with 17 campuses around the country that offer applied bachelor degree programs to Emirati students in a variety of disciplines including Computer Information Science (CIS). As I have discussed previously, the colleges emphasize the applied aspects of learning with a view towards building vocational skills and the emiratization of the workforce in the UAE (Raven, 2011).

Recently HCT adopted the Learning by Doing slogan (LBD) to highlight its support for active learning strategies in all courses and programs of study. Support for activity centered learning is not new, deriving from Confucian ideals and underpinned by constructivist philosophies (Gergen, 1995, von Glaserfeld, 1995). Constructivist approaches to education encourage student- centered, active learning environments that Newman, Griffin, & Cole (1989) once described as a “construction zone”. LBD approaches help avoid the “catatonia” that can occur

in passive learning teacher centered environments (Felder and Brent, 2003, p.282). HCT similarly supports active learning strategies stating that LBD, “is an approach to education where students acquire essential knowledge and skills through active, self-reflective engagement with the world inside the classroom and beyond” (2015). Obviously some courses are better suited for LBD than others depending on the subject matter with IT classes typically being good candidates due to their emphasis on building practical skills and knowledge.

As Sakar and Craig point out, a common problem with computer hardware courses is that they can be, "rather dry and theoretical" (2006, p. 150), which can demotivate students. These authors specify that a hands-on, LBD approach should be used to enhance learning in this particular subject. Since their inception approximately 20 years ago, computer hardware courses at HCT have always been lab based, with a requirement that students build computers from components before going on to configure and network them. The stated course learning outcomes (listed below) of the current hardware course, listed as CIS-1103: Hardware and Networking, reflect this practical approach:

- CLO 1- Recognize various types of computer systems: identify and explain the function of their components.
- CLO 2- Construct a computer from physical components and recognize different hardware components and specifications.
- CLO 3- Define the role of operating systems and demonstrate the ability to install and apply the required configuration of an operating system.
- CLO 4- Explain standard network models and demonstrate the ability to construct and operate a peer to peer network.

In the first semester of the 2014-15 academic year it was decided by the system wide CIS academic team that tablet kits should be introduced in CIS-1103, being offered at nine separate campuses, to augment the traditional desktop kits that had been used for many years to meet the second learning outcome. All in one kits were sourced from China. Figure one illustrates the components and an assembled working tablet.

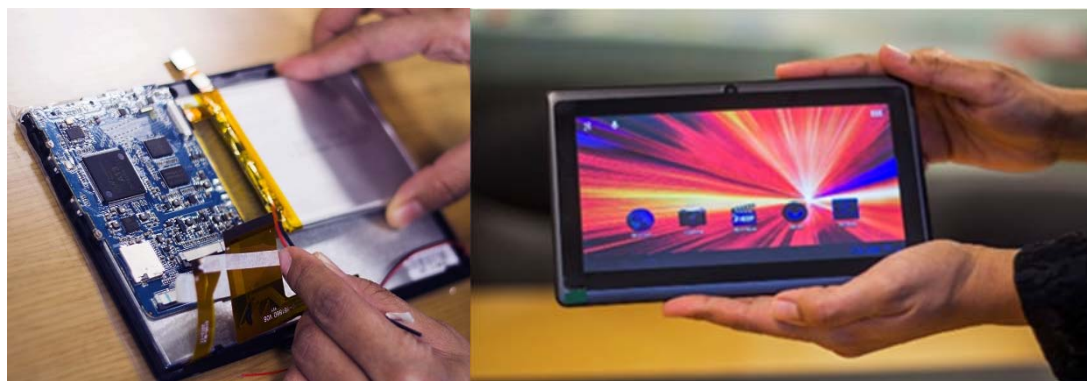


Figure 1: Examples Of The Tablet PC Kits

Unlike desktop PC components that can be used for many semesters, the tablet kits required soldering and can only be used once. To recoup costs, it was planned that the working tablet PCs would be sold off at the end of each semester. To help students, step by step instructions and videos for assembling the tablets were developed and provided to students, as seen on the laptop screen in figure two next to a student soldering wires that connected the individual components together.

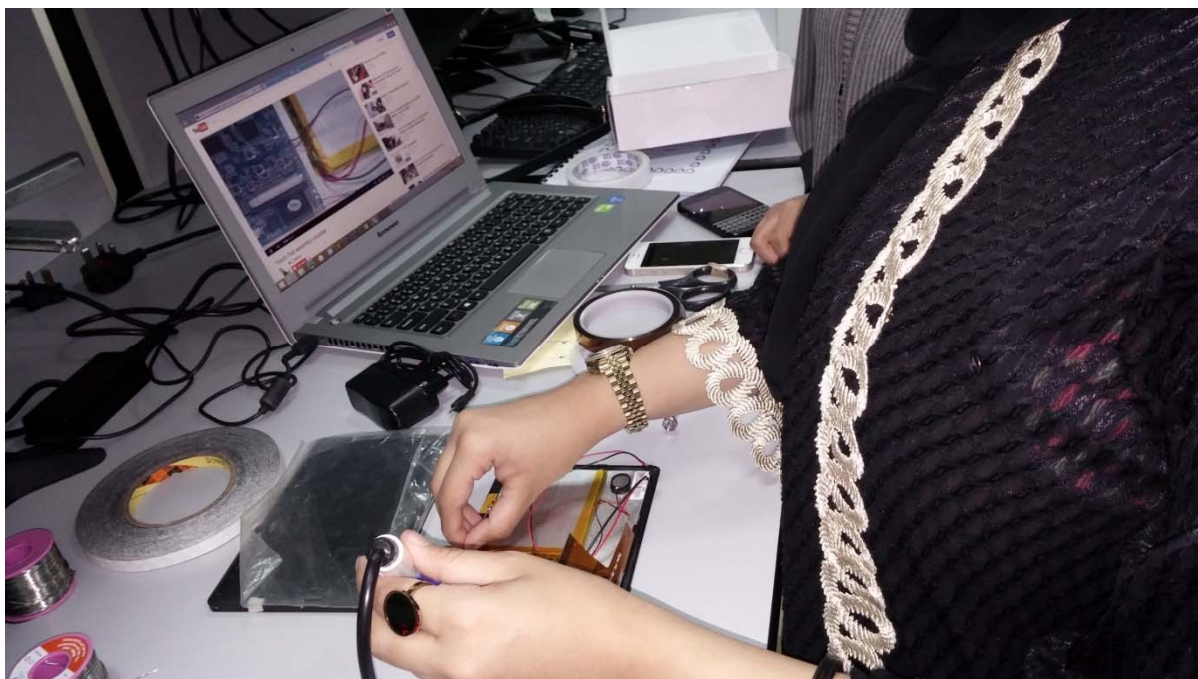


Figure 2: A Student Soldering The Tablet Components Together

Naturally there were concerns about how well teachers and students adapted to the tablets and learned from them with some enthusiasts and some skeptics - as expected. As part of the new initiative faculty at one of the largest campuses, located in Sharjah, decided to carry out research into the effectiveness of these changes being made to the way the course was being taught.

METHOD

Two different surveys were given out towards the end of the first semester during the 2014-15 academic year to students and faculty involved in the hardware course. During this semester both traditional desktop PC and tablets PC kits were used as a transition method so that the two platforms could be directly compared. One survey was designed for faculty teaching the course across different campuses and the other to five sections of students taking the course at the two Sharjah campuses. The survey used a mixed method approach containing quantifiable fixed choice questions and qualitative open ended questions. The questions are revealed in the results in the next section. Because the faculty were spread around the UAE and also because of the need for anonymity, the faculty completed the survey electronically (using surveymonkey.com) while the students filled in written surveys, which was easier as they were all in one area. A total of 11 faculty teaching the course and 82 students taking the course completed surveys.

RESULTS AND FINDINGS

The results are divided into two sections. First the faculty responses, or perceptions of change, in chart form with a representative selection of qualitative data followed by the student responses.

Faculty perceptions of change

The first three questions in the faculty survey were designed to assess readiness for change on both the micro, or individual level, and the organizational or macro level. Two other direct questions assessed whether the faculty thought that the change was effective for learning, that is, an improvement.

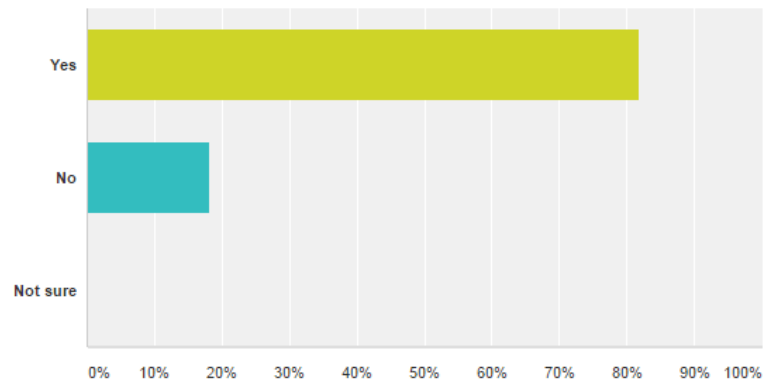


Figure 3: Was It A Good Idea To Switch From Building Desktops To Tablets In This Course?

This result shows how supportive the faculty were to the idea of incorporating tablets into the course. They were strongly in favor, which reflects their openness to change.

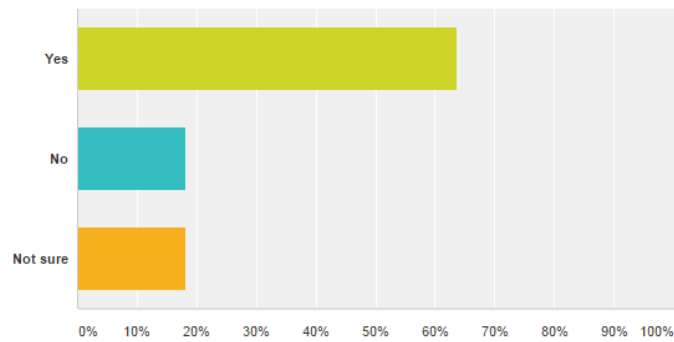


Figure 4: Was The College Ready To Change From Desktop To Tablet Kits?

This finding indicates that the faculty believed that sufficient resources were provided by the college for changing to the tablet PCs. This indicates a high level of organizational readiness for change at the macro or organizational level.

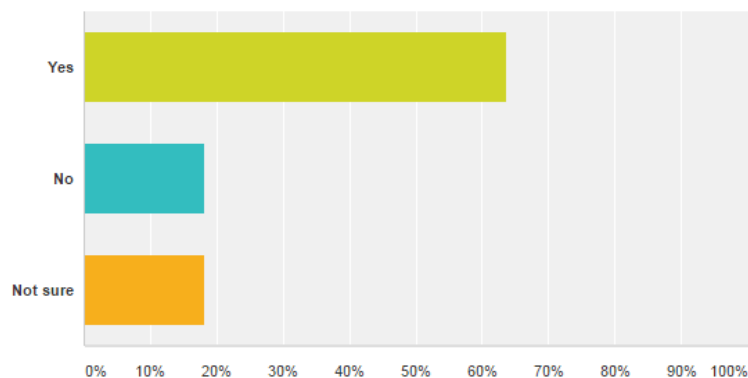


Figure 5: Were Faculty Provided With Enough Training And Skills For The Tablet Kits?

Individually the large majority of the faculty responded that they were sufficiently skilled to teach the course using tablet PC kits indicating a high level of individual or micro level readiness for change. This result also supports a high level of organizational readiness for change through the provision of sufficient professional development.

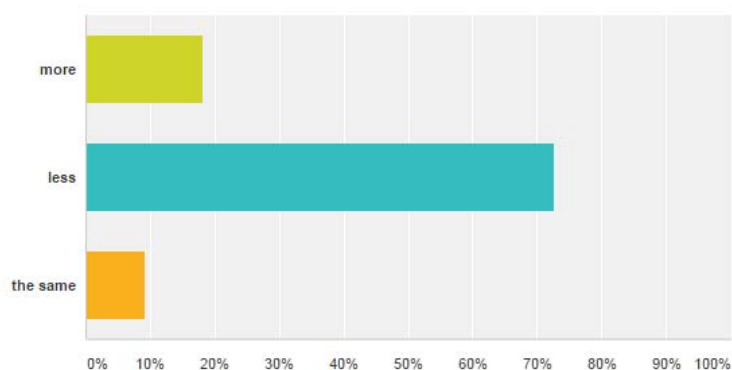


Figure 6: Do You Think Students Learn More Or Less About Basic Hardware Concepts Using Tablet Kits In comparison to desktop kits?

The large majority of the faculty, while ready for change, thought the students learned less about basic hardware concepts using the tablets. This is surprising given their support for the idea and individual readiness for change.

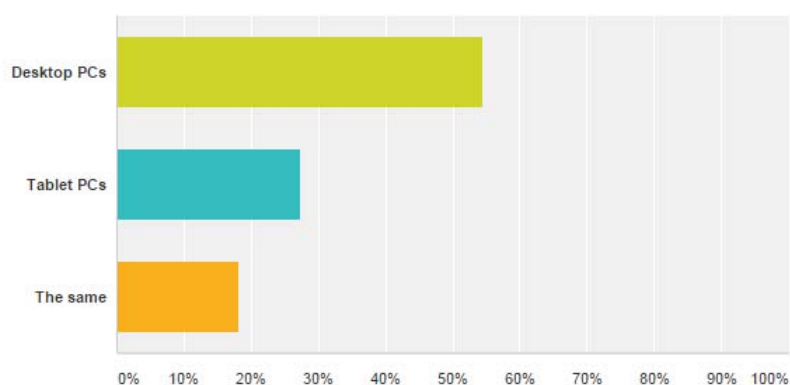


Figure 7: Which Do You Prefer For Teaching Hardware Concepts?

Adding to the result above, many of the faculty preferred using traditional desktop PCs for teaching basic concepts, although there was also some support for using tablets as well as for both. The qualitative results were designed to give more information regarding these preferences.

What are the benefits or advantages of changing to tablet technology?

The faculty comments listed below endorsed the need to keep up to date with new technologies:

- We should adopt using modern technology.
- New experience for the students. The experience was beneficial as the students are more attached to tablet devices
- The students found it very interesting and challenging. It is a product in the market not like desktops as they are losing the market to All in One computers.
- Its more up to date current technology. Students relate more to this than desktops.
- Students were excited and enjoyed learning wiring & soldering skills in addition to knowing how components are assembled in Tablets

The last comment reflected a new practical skill introduced with the tablet kits: soldering wires.

Describe any issues or disadvantages associated with changing to tablet kits

The faculty comments listed below indicate both practical and learning concerns:

- The number of the labs they practice is much less. No spare components if any is faulty. Not every aspect of the course outlines can be covered here.

- Not an option, students need to touch the basics before the in-built components
- We cannot only teach tablet kits assembly. Prior knowledge of desktop kits is required, because concepts can be more clearly explained here.
- Tablets can easily be damaged through wrong wiring or soldering.
- If better quality tablet kits were ordered, the number of working assembled tablets can be increased..

Half of the comments point out a concern with the fragility of the tablet kits used and half a concern that the tablet kits did not fully address the basic hardware knowledge required to meet the course learning outcomes.

Overall, the faculty feedback, while indicating a high level of readiness for changing from one platform to another in this course, also expressed doubt that the changes were effective in terms of improving learning outcomes.

Student perceptions of change

The students were the recipients rather than the instigators of the change process who worked on both desktop and tablet kits during the semester. We therefore took an indirect approach to assessing the change process and included survey questions that asked them to compare the tablet kits to the desktop kits. This addressed how well the course coped with the change from the students' point of view we believed.

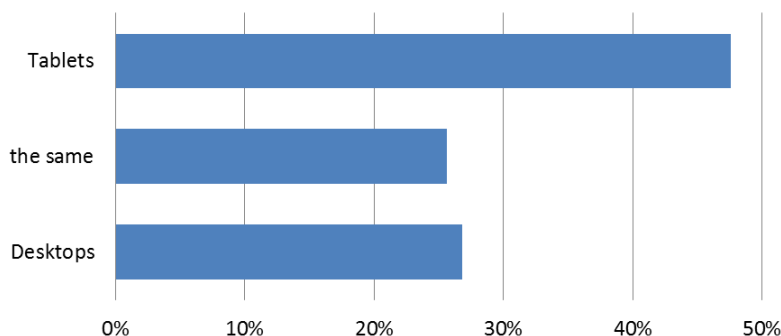


Figure 8: Which Was Easier To Work On – Tablets Or PC Kits?

This results indicates that, in general, the students had no difficulty in changing from building desktop PC kits to tablet kits. Indeed, nearly half, found the tablets easier to work on. This reflects that the course materials and instructions adapted well to the change. This supports the view of a high level of readiness for change for this particular course at both the micro and macro level.

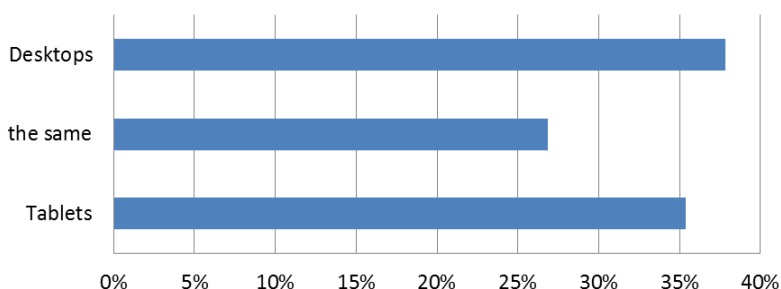


Figure 9: Is It Better To Learn Hardware Concepts From Desktop PC's Or Tablet Kits?

The mixed response to this question by the students indicates that they had no clear preference, or perception, about the best platform to use for learning hardware concepts which contrasts with the faculty perceptions. The qualitative questions were designed to find out more about their choices. Below is a representative selection of student comments regarding the choices they made regarding a preferred platform.

Student written responses: Why did you choose:

Desktops

- Because we can learn more on the desktops.

- Because desktops have a lots of parts to know and learn what to do.
- Because all hardware parts are bigger and easy to see.
- Tablets are tiny and hard to fix.
- Desktops are more easier to deal with.
- Because we see everything about the computer and know what it is.
- Because it's more difficult than tablets.
- We use desktops more than tablets.

Tablets

- Because it has welding.
- It is easier.
- They are simple. Not too many components.
- Because it's more handy and you are able to see everything clearly. Less complicated.
- Easier to use and smaller than the PC.
- Because it is easy to carry it.
- Because the parts of a tablet is easy to learn.
- Its more simple in our level and it's good for starting learning then we can learn more from the desktops in the next level.

The same

- Both are important to learn as an IT student
- Because we know it anyway if it is on tablets or desktops.
- Because I can identify every component in both of them.
- Because both of them give us the opportunity to touch the hardware.
- Because we know about any pieces on both and how work together and what the difference in between desktop PC and tablet.
- To know new information.
- Because they are different.
- To take more knowledge
- Actually we will never make tablets and desktops in our lives so it is unnecessary to do it here.

A wide variety of reasons were given by the students for their choices with no clear consensus or preference. Many of the comments about a specific platform concerned practical issues such as the size and number of the components and how they went together rather than how much they learned. Students who chose both the same tended to comment more on learning issues with the majority voicing the importance of both platforms. In terms of assessing readiness for change, the results indicate that the students readily adapted to the tablet kits even though they may not have been aware of broader learning issues that faculty raised.

CONCLUSION

The results indicate that the hardware course was ready for change at both the micro and macro levels even though the use of tablet hardware kits were less effective than desktop kits for meeting the learning outcomes of the course from the faculty point of view. Even though there was willingness to change, the evidence indicates support for retaining both desktop and tablet platforms as LBD activities for various reasons including recognition of the need to keep the course fresh using modern technology while retaining the learning benefits of using traditional desktop hardware. The results from the students indicate their willingness to change also, as many commented that tablets were easier to work on than PC's but were evenly divided about which technology was better for learning hardware concepts. These findings echo Lehman et al's observation that, "Although organizations need to be able to adapt to changing demands and environments, change for change sake does not necessarily lead to more effective outcomes"(2002, p. 198). In this course there is a need and a readiness to keep up with rapid changes in computer hardware yet retain the core concepts of computer systems at the same time using traditional components.

Readiness for change, while useful for understanding the factors that contributed to the acceptance of new technologies in this setting, was not sufficient in itself for supporting effective change. This suggests the need to view the outcomes, as well as the inputs and processes measured by the micro-macro RFC model, when assessing change in contexts such as this.

A possible link between LBD and RFC was illustrated in this study. We believe that the high level of RFC demonstrated at both the micro and macro levels in this context was due, in part, to the use of a student-centered active LBD approach. LBD incorporates active rather than passive learning, which by its very nature is dynamic and more ready to embrace the change process. This highlights that change and learning are intrinsically related. We suggest that further research could be conducted into the relationship between the LBD and RFC constructs.

RECOMMENDATIONS

It is recommended that a readiness for change perspective be taken into account for all courses that are undergoing significant change as well as traditional outcomes evaluation. For the CIS-1103: Hardware and Networking course it is recommended that PC kits be retained as well as the tablet kits as it has been demonstrated that both add value to student learning for different reasons. It is also recommended that this course continue using LBD activities and continue to be ready to change to include new hardware as it becomes available in the market and that the quality of the hardware be optimized as much as possible.

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A CFD ANALYSIS REGARDING THE DEVELOPMENT STAGE OF A PIPE FLOW

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ABSTRACT: In this paper, a numerical study regarding the entrance region of a circular pipe has been conducted for Newtonian and single phase fluid flow. The region at upstream of a fully developed pipe flow is called developing flow region and its effect on flow parameters are called entrance effects. There are many parameter being effective on a developing flow so the investigations in this field is hard and broadly. The published results concerning the development region are rather confusing and many uncertainty and discrepancies are seen between the results.

Here, the entrance length in a pipe flow development was examined numerically across low Reynolds Numbers ranging between 2000 and 25000. An experimental study has been carried out additionally to validate the numerical results. Entrance lengths are analysed numerically for five different pipe relative roughnesses. Comparison of numerical results with present experimental study and other outhors empirical datas has shown good agreement. Eventually, a well defined numerical correlation which was developed from the numerical results has been proposed for the prediction of entrance lengths.

Keywords: entrance length, developing flow, pipe flow, numerical

INTRODUCTION

In 18th century, Osborne Reynolds carried out many experimental studies with pipe flows. Through these experiments, he discovered the flow behavior as laminar, intermittent and turbulent, as a results of his observations on the shape of dye which is injected to a glass pipe water flow. Since then, the transition from laminar to turbulent flow has charmed many researchers since the interest had come from the requirements needed for the proper design of compact heat exchangers and other heat transfer and fluid flow devices or shortly those which the entrance effects are significant on their design. But still the mystery from laminar to turbulent transition has not been solved entirely.

Fig.1 illustrates the flow development at a pipe entrance. Here, the free stream has entered the pipe with a smooth velocity profile (u_∞) and with an arbitrary disturbance. Due to no slip flow condition, the wall bounded flow decelerate along the streamwise by the effect of fluid viscous forces. As a result, a velocity boundary layer adjacent to wall exists which shows the velocity gradient profile at wall normal direction and its thickness terminates where the flow velocity becomes equal to 99% of the flow velocity at outside of that boundary. The degradation in velocity in boundary layer causes the velocity outside the boundary layer to increase which is a result of mass flow rate at that cross-section must be equal to bulk mass flow rate. The thickness of the velocity boundary layer increases along the streamwise until it merge at pipe axis and after which the flow properties do not change any more and a fully developed laminar or turbulent flow govern the flow.

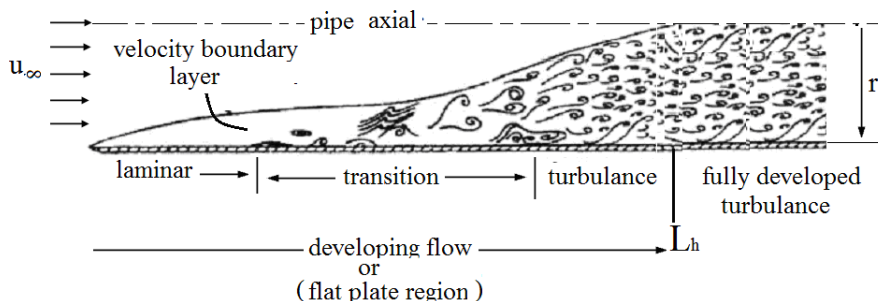


Figure 1. Laminar To Turbulence Transition At The Entrance Of A Pipe Flow

Fig. 2 shows the colour contour of velocity over the central axial plane in a pipe flow obtained from this numerical study. As depicted in Fig. 2, the colour of velocity changes from pipe inlet to a certain flow distance then no changes occur at downstream direction. Here, no changes region means fully developed flow region and the colour change region is the development of flow region.

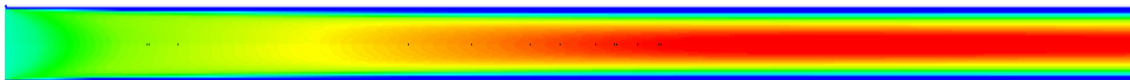


Figure 2. Colour Contour Of Axial Flow Velocity On Central Axial Plane

In a fully developed flow, some flow properties become invariable such as a constant parabolic or flat velocity profile or a constant wall shear stress or the same behavior seen in the turbulent fluctuations during their repeat processes which is homogeneously distributed in the flow field (Laufer 1954) are some of. In a developing flow, firstly a laminar boundary layer develops then the laminar flow breakdown to a transitional flow, which is intermittent between laminar and turbulent flows, and eventually a fully developed laminar or turbulent flow state govern the flow. The breakdown of the flow behavior to turbulent can be bound to many parameterse such as free stream trubulence, pipe inlet geometry, surface roughness or external vibrations. The flow developing process in pipe flow is the same as flows over a flat plate until interaction of boundary layer at pipe axis occured so the flow region before is mostly referered as the flat plate region which has been shown on Fig. 1. According to experimental study conducted by Salami (1986), the onset location of transition from flat plate towards pipe flow was observed at the onset location where the increase in turbulence intensity occured at pipe core first.

In Fig. 1, the transition onset location is the location where laminar flow breakdown first and the entrance length is specified as the distance from pipe inlet to the location where the fully developed flow first begins. In a pipe flow experiment the entrance length can be determined through some flow properties measurements. Pressure drop, velocity profile and turbulent fluctuations statistics measurements in an experiment can be scaled to the entrance length. Therefore, the location where the wall shear stress or velocity profile becomes invariant first and the location where the same flow behavior are observed in turbulent structures in their repeat processes can be scaled to entrance lengths.

The entrance length based on constant wall shear stress or constant velocity profile is shorter than the one based on high order turbulent statistics according to the available data given by Doherty et al. (2007) since some turbulent motions still has not completed their growing processes at downstream of the merging point of boundary layer at pipe axis. If the pressure drop calculations must be performed for a fully developed pipe flow then the onset location of fully developed flow must be scaled to constant wall shear stress. Here, in this study the entrance lengths are scaled to constant wall shear stresses.

1.1. Published Studies

There are many published studies subject to entrance lengths in pipe flows. The first measured entrance length experimentally belong to Osborne Reynolds who had reported an entrance length of 80D in the pipe flow turbulent. In a fully developed laminar flow, the entrance length can be determined through some empirical relations suggested. However in a fully developed turbulent flow, the entrance lengths has not been correlated to a well defined theoretical or empirical base since there are many discrepancies and inconsistencies between the empirical or theoretical results conducted. According to the published results, there are many parameters which have direct impact on the entrance length. Pipe inlet geometry, upstream flow conditions and wall roughness are those significiant parameters being effective on the entrance length. Afshin et al. (1995) has experimented the pipe flow with reentrant, square-edged and bell-mouth inlets and concluded that the type of inlet configuration influences the beginning and end of the transition region as such that the entrance length in a pipe flow through a bellmouth inlet are longer than the square edged one. Minkowycz et al. (2009) has investigated a numerical analysis on laminar to turbulent transition Reynolds Number across low and high turbulence intensity at pipe inlet together with flat and parabolic velocity profile seperately and it was concluded that low intensity turbulence and parabolic velocity profile has delayed the onset of full turbulence to $Re=10000$. In an experimental study conducted recently by Hou Kuan et al. (2013), it was found that the entrance length required for the square-edged inlet was shorter than the re-entrant inlet one and the consequence has been attributed to the additional disturbance caused by the re-entrant inlet.

The entrance lengths measurements and the empirical correlation suggested by some authors through experiments have given in Table 1. Here, in Table 1, the entrance length is given in dimensionles form as L/D and the flow measurement method through which the entrance length are assigned is also specified.

Table 1. Dimensionless Entrance Length Measurements And The Empirical Correlations Suggested Through Experiments

Dimensionles Entrance length (L/D)		Reynolds Number	Authors
Constant wall shear stress	Mean Turbulent Statistics		
$L/D = 2.09 \times 10^{-8} \cdot \text{Re}^{1.66}$		5000-15000	Augustine (1988)
$L/D = 1.6 \text{ Re}^{1/4}$		10 ⁵ - 10 ⁶	Fabien et al. (2009)
$L/D = 4.4 \text{ Re}^{1/6}$			
A long Empirical formula		1,95x10 ⁵	Salami (1986),
25 - 40		3x10 ³ - 3x10 ⁶	Nikuradse (1966)
30		5x10 ⁴ - 5x10 ⁵	Laufer (1954).
50 - 80		10 ³ - 10 ⁴	Patel & Head (1969)
70		3x10 ⁴ - 1x10 ⁵	Zanoun et al. (2009)
		72	Perry & Abell (1978)
50		80	Doherty et al. (2007).
Not attain to 40		388000	Barbin&Jones (1963)
		70	Zimmer et al. (2011)

NUMERICAL PIPE FLOW STUDY

2.1. Numerical Set Up

Numerical study is a mathematical solution method for the physical problems whose solution require very high cost in experiments or detail solutions can not be attained through experimental ways or analytic ways are impossible. In this numerical study, the turbulent flow field are solved with RANS equations (RANS: Reynolds averaged Navier-stokes) and an SST k-omega (SST: Shear stress transport) turbulence model are executed for the solution of turbulent Reynolds stresses. Since SST k-omega model is a low Reynolds Number model and is proposed for the flows in which laminar to turbulence transition and wall separations include. A Gamma Theta Model which is based on empirical correlation for the transition onset location are used together with the SST model which has been extensively validated for a wide range of transitional flows (Menter 1994). The boundary conditions and flow field properties assigned in the numerical study are given in Table 2.

Table 2. Numerical Set Up

Numerical Set-up	
<i>Flow state</i>	steady state, isothermal, constant properties
<i>Governing Equations</i>	RANS Equations
<i>Turbulence Model</i>	SST + Gamma Theta Model for transitional flow turbulence
<i>Inlet</i>	smooth velocity profile & turbulence intensity (T_U) = 7%
<i>Wall</i>	Roughness values specified in the experimental study
<i>Exit</i>	at experimental pipe pressure exit
<i>Fluid</i>	Newtonian fluid, water at 27 °C

Here, the direct numerical solution (DNS) and large eddy simulation (LES) are not executed as a numerical methods due to their high computation cost. All turbulent motion in three dimension, growing spatially, can be solved by DNS. DNS simulate a real flow but required high time in computations restrict it just only with the solution of simple low turbulent flows. LES solve large turbulent motions as like in DNS and modeled the small motions with RANS equations. Utilisation of a RANS solution over a LES one is low cost in computations and to let the axisymmetrical pipe flow field which lower the CPU time and provide a higher resolution mesh in the flow field.

In the numerical study, a pipe flow geometry at a 5 degree angle was constructed for the numerical simulations as shown in Fig. 3.

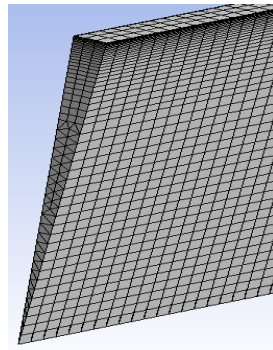


Figure 3. Pipe Flow Meshed Geometry At 5 Degree Angle

2.2. Comparison with Empirical Data

The numerical results must be tested across experimental data to demonstrate the validation. So an experimental study, in addition to numerical study, which cover the Reynolds Number between 3443 and 24317 was performed also. Five pipe sorts were used in the experiments which the materials is aluminium, copper, steel, galvanised and PPRC. Experiment were carried out through a 2m pipe length, which is enough to let the flow being fully developed in it.

The fluid used in the experiments was water and its properties according to the mean temperature of 27 °C are given in Table. 3. Table 4. shows the relative roughnesses and pipe diameters used in experiments.

Table 3. Fluid Properties

Dynamic viscosity (μ)	85x10 ⁻⁶ kg / m.s
Density (ρ)	996 kg / m ³

Table 4. Relative Roughnesses And Pipe Diameters Of Each Pipe Used In Experiments

Pipe Type	Diameter	Relative Roughness
	(mm)	ϵ / D
Aluminium pipe	25	0,00159
Copper Pipe	26	0,000163
Steel Pipe	28	0,00237
Galvanized Pipe	28	0,00256
PPRC pipe	21	0,00033

In experiments, hydrostatic pressure were measured through seven pressure taps which were implemented on pipes with 10 cm intervals in the developing flow region and with one meter interval between last two taps in fully developed flow region. Numerical study was carried out in paralel to experimental study so the flow condition and Reynolds Numbers are the same at both studies. Comparison between numerical results and experimental data in terms of static pressure drop are illustrated in Fig. 4 for some given Reynolds Numbers.

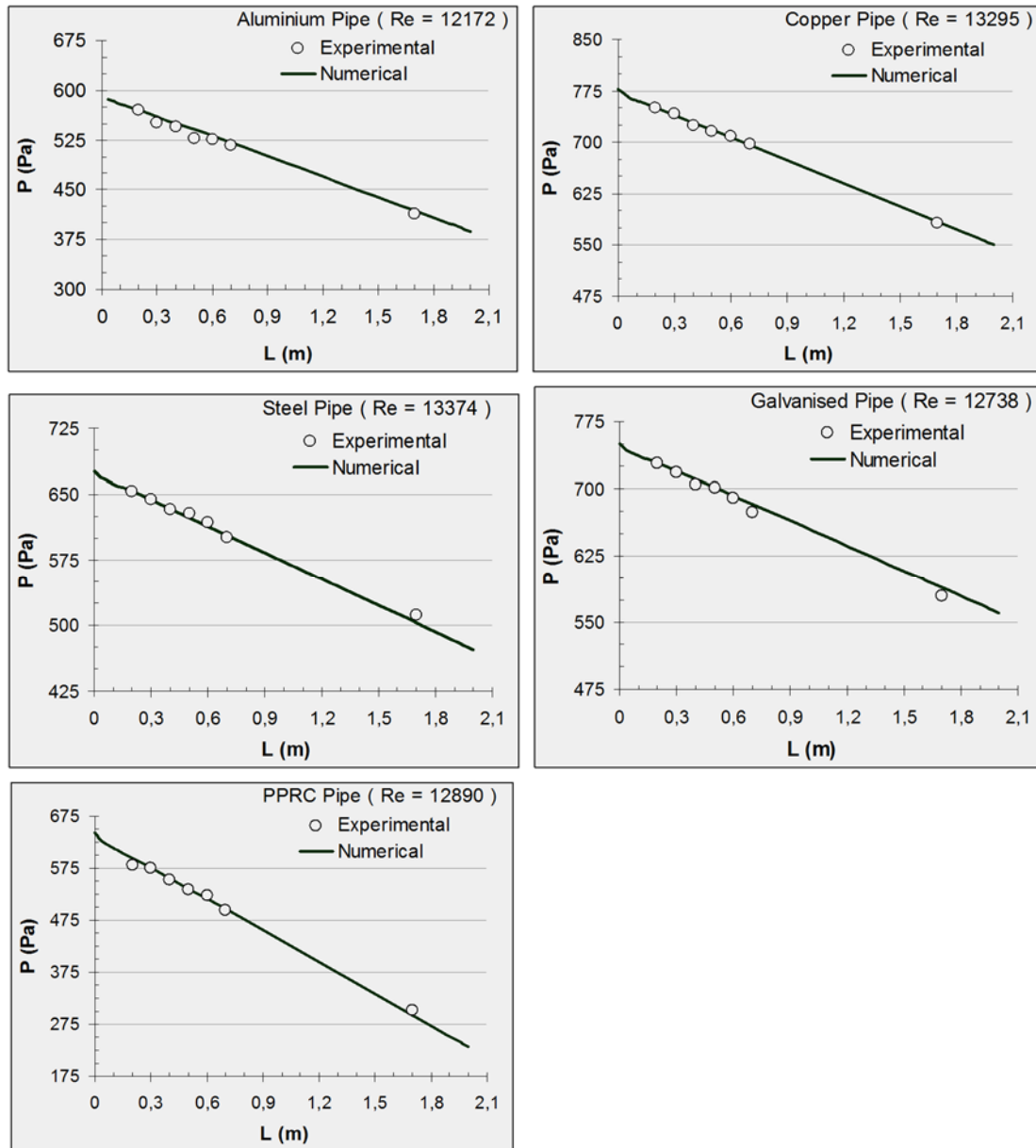


Figure 4. Comparison Of Numerical Results With Experimental Data Of Each Pipe Respectively

As observed through Fig. 4, numerical results has shown good agreement with the experimental data and the remaining other Reynolds Number not shown on Fig. 4 has shown also good agreement with experimental datas. Entire numerical results has shown a $\pm 5\%$ mean deviation from the experimental datas where the calculations are based on static pressure drop between 0.2 m and 1.7 m pipe locations.

NUMERICAL RESULTS AND FINDINGS

As mentioned above, the entrance length is a distance measured from pipe inlet to where a fully developed flow begins. A fully developed flow can be defined according to flow properties mentioned so the entrance length can variate according to what flow properties it scaled to. The location of constant wall shear stress and constant flat or parabolic velocity profiles first seen in the downstream flow can be scaled to an entrance length and the location where turbulent fluctuations repeat the same process at sequent measurements during downstream can be scaled to it also. Here, in this study the location where wall shear stress first becomes constant at downstream is scaled to measurement of entrance lengths.

Fig. 5 illustrates the variation of wall shear stress along the pipe flow which is obtained from numerical study. Here, a sharp drop in wall shear stress are being observed shortly after pipe inlet then a slow down to a minimum

value is seen where the laminar flow first breakdown to a transitional flow. Here, minimum value is scaled to transition onset location. In the transition region, wall shear stress increases during gradual inclined slope until a fully developed turbulent state reached and after that the downstream flow continue with constant wall shear stress value. A constant value of wall shear stress, first seen at downstream, sign to a beginning of a fully developed flow and as well sign to the entrance length. In this study the entrance lengths are obtained from the numerical results of wall shear stress variation.

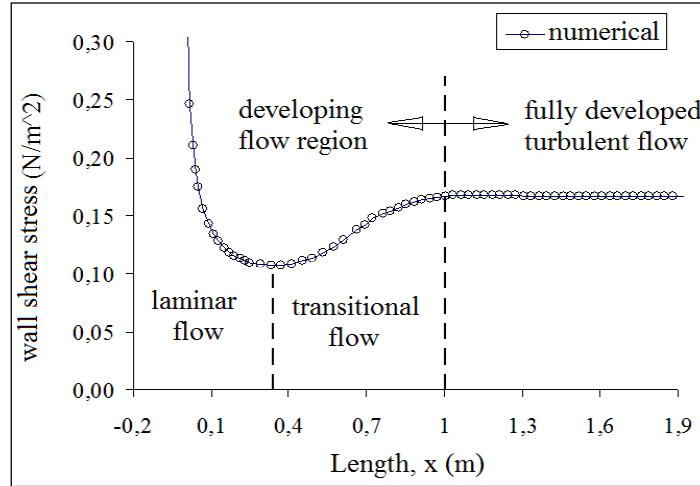


Figure 5. Numerical Wall Shear Stress Variation Along Pipe Flow, Re=5539

The wall shear stress variation along the flow has shown on Fig. 6 for some given Reynolds Numbers. The fully developed empirical wall shear stress which is determined from Colebrook Equation through the relation between Darcy friction factor in terms of pressure drop are also given on Fig. 6. Here, in fully developed flow region, numerical results has coincided with the empirical wall shear stress values. Though a little deviation is being appeared at high Reynolds Number but has not exceeded 1% deviation. The location where the wall shear stress first becomes constant are separated by a dashed line. Upstream of the dashed line shows the developing flow region and downstream of it shows the fully developed flow region. The location of the dashed line from pipe inlet gives the entrance length. As can be seen from Fig.6, the entrance lengths becomes closer to pipe inlet as the Reynolds Number increases.

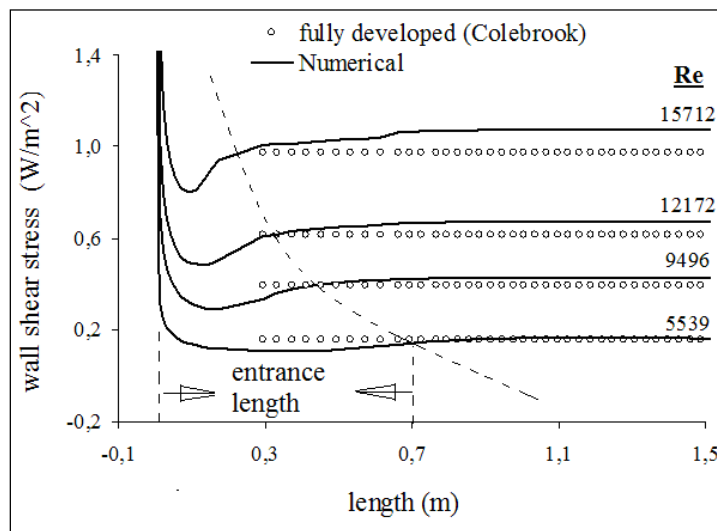


Figure 6. Variation Of Entrance Length With Reynolds Number And Separation Of Developing And Developed Flow By Utilizin From Wall Shear Stress Variations

Fig. 7 shows the effect of the pipe roughness on wall shear stress variations. The same pipe diameter and the same Reynolds Number but different roughness value are taken as a benchmark to the impact of roughness on flow properties. As seen from Fig. 7, roughness value has not a considerable impact on entrance length but pipe

diameter is being enough effectively on entrance length since PPRC pipe which has the lowest diameter one among others has a shorter entrance length than other pipes.

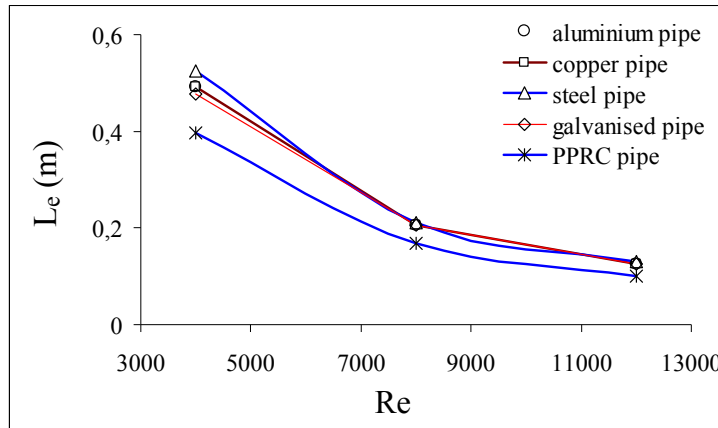


Figure 7. Entrance Lengths Of Each Pipe Across Reynolds Number

Fig. 8 shows the dimensional entrance lengths across Reynolds Number. As can be seen from Fig. 8 the dimensionless form has brought the values near each other for the same Reynolds Number. Here the roughness effect on entrance length can be ignored since its impact on entrance length, as can be seen from Fig.7, is very low. If Fig. 8 is observed, it will be seen that the entrance lengths shortens as the Reynolds Number increases. The empirical correlation suggested by Augustine (1988) which was developed from the entrance length datas of his experiments, covering a Reynolds Numbers range between 5000 and 15000 has shown on Fig. 8 also. It is seen that the numerical results is being faraway from the experimental data of Augustine (1988) especially at low Reynolds Numbers for $Re < 16000$. The discrepancy appeared between numerical and empirical correlation is considered to be caused of that parameters followed, which the first one is the pipe inlet turbulence level since inlet flow disturbances are regarded as first degree responsible on triggering a flow to turbulence so a high turbulence level assigned in the numerical study has caused the flow to be transitioned at early locations and thus brings a shorter entrance length. In the numerical study, a high free stream turbulence level (7%) always has been established at pipe inlet for all the Reynolds Numbers but in the experimental study the free stream turbulence level can change according to upstream flow state whereas any upstream obstacles, which disturb the flow at the same turbulence level, has not been placed by the experimentalist. Pipe inlet geometry is an another important degree on the beginning of transitional flow since a square edged inlet which was used in the experiments of Augustine (1988) can be regarded as an another reason cause to this difference.

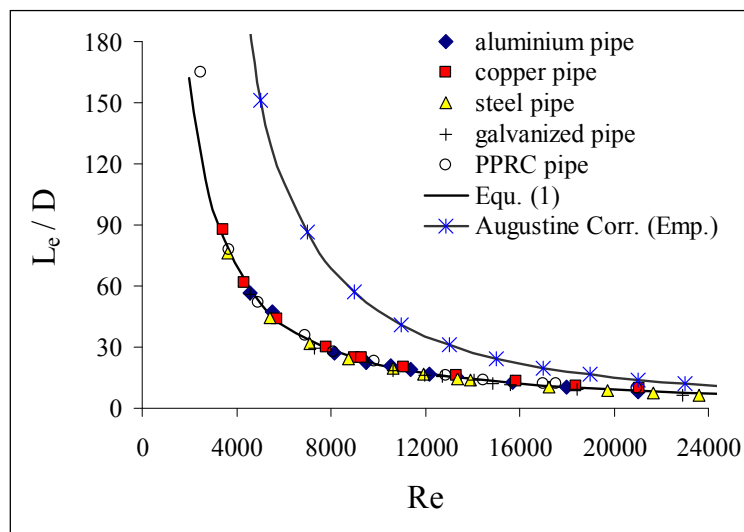


Figure 8. Dimensionless Entrance Length Versus Reynolds Number

From these plots of constant wall shear stress a correlation (Equ.1) was developed to predict the entrance lengths. The correlation that was developed is solely based on a fully developed wall shear stress as opposed to being based on the development of the velocity profile as was done by White (2003).

$$\frac{L_e}{D} = \frac{2166718}{Re^{5/4}} \quad (1)$$

As can be seen in Fig. 8, Equ.1 has coincided with numerical data very well. Here the validation of numerical results are tested across present experimental data and Augustine (1988) empirical correlation and good agreement was also provided. Here the numerical results correspond to those empirical datas available in literature for flows over flat plates. There is a flat plate region partly covering the developing pipe flow region until where the velocity boundary layer merge at pipe axis. For flows over a flat plates, Reynolds Number are based on the streamwise location (x) and a critical Reynolds Number also are based on the transition onset location (x_{crit}). A critical Reynolds Number is strongly affected by the surface roughness and the free stream turbulence level. According to empirical datas reported by (Özışık, 1985) for flows over a smooth flat plate, present of high turbulence in the free stream may begin the transition at a Reynolds Number as low as 10^5 but no any disturbances in the free stream may delay the transition until a Reynolds Number of 10^6 or more and in practical engineering flows laminar to turbulence transition can be occurred in the Reynolds Number range between 2×10^5 to 5×10^5 mostly. So any flow which include roughness and free stream turbulence always will be turbulent before reaching a $Re_{crit} = 2 \times 10^5$. In the present numerical study, the highest critical Reynolds Numbers obtained from the transition onset locations is found as $Re_{crit} = 94502$ for a pipe Reynolds Number of $Re=2907$. This has enforced the numerical results onefold more because high free stream turbulence level was given at boundary condition of pipe inlet in the numerical study.

CONCLUSION

A Numerical study has been conducted for flow development over the inner surface of a circular pipe. The flow state is steady, incompressible and single phase Newtonian flow. Here, the entrance length are analysed numerically for low Reynolds Numbers ranging from 3443 and 24317. Numerical study has been performed in parallel to an experimental study which is carried out additionally for the verification of numerical results with five pipe sorts which the materials are different. SST k-omega model together with a Gamma-Theta transitional flow model has been used for the solution of the flow in the transition to turbulence. Numerical results was compared with the present experimental data and other authors experimental datas and good agreement was found. The entrance lengths are obtained from the plots of wall shear stress variations along the pipe flow and are analysed across Reynolds Number, pipe diameter and pipe roughnesses. The impact of these parameters on both factors are given in the following as articulated.

- Pipe diameter has a considerable effect on the results as such that reduction in pipe diameter has shortened the entrance lengths and cause the transition onset location to move upstream.
- Pipe Roughnesses has a negligible effect on the entrance lengths since at the same pipe diameters, a fifteen fold rise in roughness heights has caused very small increase in the entrance length.
- Critical Reynolds Numbers obtained from the Numerical results which is based on the transition onset location has coincided with the empirical critical Reynolds Number those obtained for flows over flat plates (Özışık, 1985).

A numerical correlation (Equ.5) which well define the variation of entrance length across Reynolds Number was obtained as a byproduct of the numerical results. The correlation just includes the effects of pipe diameter and Reynolds Number but not include the effect of wall roughness since it was demonstrated that the roughness had negligible effect on the entrance lengths so it was ignored. Numerical correlation was compared with empirical correlation suggested by Augustine (1988) as seen in Fig. 5. Both correlations have corresponded with the datas very well which they have been the byproduct of. The empirical correlation of Augustine (1988) has started to deviate from the numerical correlation towards low Reynolds Numbers for $Re < 16000$ however for $Re > 16000$ both have closed to each other. The difference seen between both are being considered to be sourced from parameters which have impact on pipe inlet conditions such as pipe inlet geometry and free stream turbulence level.

The correlation is appeared valid in the scope of this study at now so to be able to see its applicability on a more extended Reynolds Numbers range, new studies must be performed which comprise the comparisons with new experimental datas which include the effect of different parameters. So the subject opens to new investigations.

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REINFORCEMENT OF PROFESSIONAL TEACHER CANDIDATES IN INDONESIA THROUGH PROGRAM OF GRADUATES EDUCATING IN THE FRONTIER, OUTERMOST, AND DISADVANTAGED REGIONS (SM-3T)

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ABSTRACT : This research aims to evaluate the implementation of the Program of Graduates Educating in the Frontier, Outermost, and Disadvantaged Regions (hereinafter called SM-3T) which has been implemented since 2010 in order to be reinforced for the future period. The scope of evaluation includes: (1) the effectiveness of the program in achieving its purposes, and (2) the compatibility of the pre-condition implementation (training) with the real condition and need of the regions. The subject of this research was the 38 participants of SM-3T program of Semarang State University who were sent to Ende Regency of East Nusa Tenggara (NTT) Province. The data was collected through questionnaire, Focus Group Discussion, interview, documentation, and observation. The data was analyzed by using narrative description method. The result suggests that the implementation of SM-3T is effective in achieving its purposes. The non academic material delivered in the pre-condition implementation, namely the orientation toward social, culture, and infrastructure condition of the regions should be provided in district-based orientation.

Keywords: reinforcement of professional teacher candidates; graduates educating in the frontier, outermost, and disadvantaged regions

INTRODUCTION

Program of Graduates Educating in the Frontier, Outermost, and Disadvantaged Regions (hereinafter called SM-3T) is one of MBMI Programs (program of making progress together to be smart Indonesia) designated for pre-service teachers to teach in the Indonesian remote area for a year. The SM-3T program is a volunteer program for graduates of education bachelor degree to participate in the education development acceleration of Indonesia. It also aims to prepare the future professional teachers who are then recruited in a professional teacher education program (Rustad, 2013). The targeted regions of SM-3T program is the Indonesian remote regions which are categorized as frontier, outermost, and disadvantaged based on the criteria of the Ministry of Disadvantaged Regions Development. It includes the regions in eight provinces: Aceh, Riau Archipelago, East Nusa Tenggara (NTT), East Kalimantan, West Kalimantan, North Sulawesi, Papua, and West Papua. The SM-3T program aims to help the regions to overcome the problem of the lack number of teachers. It also aims to prepare the professional teacher candidates who are tough, independent, care to others, and having a sincere heart to help Indonesian children to be smart so that they could make progress together to achieve the nation noble dream as taught by the Indonesian founding fathers (Rustad, 2013).

The purposes of SM-3T program in detail are: (1) to help the remote regions to overcome the education problems especially the lack number of teachers; (2) to give volunteer experience for graduates of bachelor degree so that they possess professional attitude and skilled in solving education problems; (3) to foster the characters of loving the homeland, defend the country, care, empathy, and responsible towards the nation progress; (4) to build the struggling power and survival to stay and to develop the education in the disadvantaged regions; (5) to improve the love toward the profession as a teacher who are having duty in the remote regions; and (6) to prepare the future professional teachers before joining the professional teacher education program (PPG) (Rustad, 2014).

The scope of SM-3T program includes: (1) implementing the learning process in the education unit based on the participants' expertise and the demand of the region's condition; (2) enhancing the learning innovation activities at school; (3) implementing the extracurricular activities; (4) helping the tasks related to the education management at school; (5) doing the social tasks and society empowerment to support the development program of education and culture in the remote regions (Rustad, 2014).

Before the SM-3T candidates sent to the remote regions, the candidates must join the pre-condition activity in 12 days. The pre-condition activity includes the general orientation about the condition of social, culture, and infrastructure of the targeted regions. This orientation is needed by the pre-service teachers. A study conducted by Middleton & Pettit found that the positive perception of the students toward their teacher is important in the learning and it is produced through the good relationship between teacher and students (Balagtas, et.all, 2014). The study also explains several factors affecting the students' perception: gender, teacher's ethnic background, the age of teacher and students, experience, and the number of students in the classroom. In order to make the teacher knows what the students demand, the teacher has to learn about the background of his or her students and the nature of the society first.

The problems raised are: (1) are the purposes of SM-3T program achieved? and (2) is the implementation of the pre-condition implementation suitable with the real condition of the region? The result of the evaluation will be used to determine the improvement of the SM-3T program as the reinforcement of the professional teacher candidates and the participants of the SM-3T program.

METHOD

This research is a descriptive research. The subject of this research was the 38 participants of SM-3T program of Semarang State University who were sent to Ende Regency of East Nusa Tenggara (NTT) Province. The location determined based on the research focus, namely the tourism and agriculture. The data was collected through questionnaire, Focus Group Discussion, interview, documentation, and observation (Syaodih, 2009; Widjaja, 2004). The questionnaire was filled by the SM-3T participants. The triangulation process involved the principals, teachers, the office of education youth and sport, and the society (the headman). The data was analyzed by using simple statistics and narrative description method.

RESULT AND DISCUSSION

The Effectiveness of the SM-3T Program toward the Achievement of its Purposes

Based on the result of questionnaire, the triangulation process involving the school principal, education office, and society, interview, and observation, the evaluation result can be detailed based on the program purposes as follows.

The SM-3T program helps the remote regions to overcome the education problems especially the lack number of teachers. In education field, the existence of SM-3T participants provides the good quality human resources in improving the human quality. The school condition in Ende Regency faces the problem of lack number of teachers. Some subjects are taught by those with irrelevant qualification. For instance, history subject is taught by mathematics teacher. This condition confirms the data from the government of Ende Regency that Ende is still lack of 36.58% teachers until 2012. The elementary school teachers' qualification based on the national standardized competence is also lack of 41.91%. The number of junior high school teachers is lack of 48.77%. The junior high school teachers' qualification based on the national standardized competence is also lack of 52.83%. The number of senior high school teachers is lack of 63.24%. The senior high school teachers' qualification based on the national standardized competence is also lack of 67.24% (Marheni, 2014).

The SM-3T program participants in Ende Regency have been distributed to villages in 21 districts of Ende in all of education level (elementary schools, junior high schools, senior high schools, vocational high school) both public and private. The placement considered the problems of lack number of teachers, the absence of teacher of certain subjects, and the need of learning quality improvement. Ende has 21 districts, 165 villages, and 20 urban villages. Among 4 batches of the SM-3T program from 2010 to 2014, the distribution of the participants' placement can be seen in the Table 1 as follows.

Table 1. The Distribution Of The SM-3T Placement In Ende Regency Based On Districts

No.	District	Batch				Total	No.	District	Batch				Total
		1	2	3	4				1	2	3	4	
1	Ende	4	4	1	0	9	12	Wolowaru	6	7	8	6	27
2	Ende Timur	1	0	1	1	3	13	Wolojita	4	1	3	2	10
3	Ende selatan	1	0	0	0	1	14	Ndona Timur	4	6	0	0	10
4	Ende Tengah	3	0	2	1	6	15	Ndori	2	2	0	0	4
5	Ende Utara	2	1	1	0	4	16	Lio Timur	6	2	0	1	9
6	Nangapanda	9	7	3	4	23	17	Detukeli	0	2	5	8	15
7	Pulau Ende	6	3	0	2	11	18	Wewaria	10	5	2	3	20
8	Ndona	6	6	4	1	17	19	Maurole	7	5	2	2	16
9	Detusoko	2	0	0	1	3	20	Kta baru	5	2	0	2	9
10	Kelisoke	6	0	1	1	8	21	Maukaro	5	3	2	3	13
11	Kelimutu	4	1	0	0	5		Total	93	57	35	38	223

Source: The office of education, youth and sport of Ende, 2014

The SM-3T program provides volunteer experience to the graduates of education bachelor degree in order to shape the professional attitude and skill of education problem solving. The SM-3T participants have already possessed the pedagogical, social, personal, and professional competence as the indicators of the professional teacher. The achievement of each competence can be discussed as follows. **Pedagogical Competence**, the SM-3T program successfully increases the students' learning motivation, passion, achievement, and it motivates students to be diligent to attend the classes. The SM-3T program increases the practice of innovative learning by stimulating students to be more creative. The participants of the SM-3T program have improved the communicative learning for students. It can be confirmed by the condition that the students involved more actively and critically in asking, were brave enough to interact and to communicate both with teacher and students. The SM-3T participants also run all of the education activities based on the planning program. The result of the activities such as constructing lessonplan, handout, learning tools, learning media, evaluation devices, implementing the learning, helping the school education administration, attending the teachers council or teacher group discussion, and celebrating the Indonesian Education Day can be regarded as good. The guidance program toward students who need it, extracurricular activities, and tutoring activities for students after class also run well. The local teachers recommend that the SM-3T program should be sustainable and the number of participants increased so that the program could be optimized. **Social Competence**, the SM-3T program affects the social life of the local people in positive way. The local people could welcome new members (the SM-3T participants). However, the SM-3T participants have not been able to create any movement in the society yet. They also have not been able to empower the local people because not all of participants could socialize in maximum manner. Among the 2014 SM-3T participants, there were only 15% of them who have done the society empowerment activities. The adaptation toward the use of local language and culture seems to be very difficult for the participants especially in the starting months. Every village has its own dialect which is different each other. The local people also uphold their culture tightly. Ende has so many cultural villages. Each village performs its ceremonies in different moments. It is a treasure that should be preserved by the society as well as the SM-3T participants as the member of the society for 1 year. The participants start to be comfortable with the society, students, teachers, staffs, and education office after 2 to 3 months. In some places, the society has not known about the SM-3T program yet because the participants live separated with the society because it was not possible to do that. Though the participants have not been able to do social actions with the society, they could cooperate with the other participants, schools, and society because they conduct discussion every month.

There is no participant breaking the law or the existing norms such as being involved in practical politics, immoral actions, or defamation during the program. The local teachers suggest to the participants to be more active socializing with the society. The other comments from the society are that the participants could increase the education quality and educate students to achieve the highest score in the national examination. They are also involved in donating blood activity, planting mangrove, and others. **Personal Competence**, the SM-3T participants behave according to the existing norms, values, habit, and regulation of the local people. They also become a raw model for the students both at school and in the society. The students start to behave and to socialize well and they have better habit. The participants have good work ethic. They respect the school regulation, work on time, and are able to be responsible agent of change. However, the society has not been inspired by the conduct of the SM-3T participants. Professional Competence, the participants of SM-3T could master the material they teach because their teaching duty is based on their qualification. The participants have mapped the competence standards and basic competences to identify the material which is regarded as difficult by students. They plan and run the learning as well as allocate the appropriate time by considering the lesson plan and the students' ability.

The professionalism of the SM-3T participants affects positively toward the students. The students understand more about their responsibility. It also affects the schools in terms of teachers, administration, and school

regulation to become better. There is no suggestion from the society since the participants have been considered professional. However, the society argue that the participants have not yet conducted research, nor participated in scientific activities nor writing papers to develop innovative product.

The SM-3T program foster the character of loving the homeland, defend the country, care, empathy, and responsible toward the nation progress. Every participant has agreed to be sent in all over regions of Indonesia by signing an agreement. Besides, they have run all of their tasks and obligations, as well as obeying all the regulation during the pre-condition. They also have run their tasks and obligations in the regions and faced the challenges. The secretary of government office of Ende, Constantinus Djara, S.Sos, M.Si suggested that the existence of SM-3T program in the society affects some fields. The society gets assistance in the transfer process of science and knowledge development. This statement was supported by principals in Ende, such as Drs. Ferdinandus Benda (Principal of SMA N 5 Ende-Maukaro), Aloysius Satu, S.Pd. (Principal of SMK N 1 Ende Timur), Fransisca J.S Ndoi (Principal of SMK Pelayaran St. Paskalis Ende-Ndonga), Yoseph Djuma (Principal of SMP Negeri 3 Ende), and Jawaru Yoseph, BA (Principal of SMK N 6 Ende-Detukeli). Most of them said that the existence of SM-3T affects positively toward the social life of the society. The participants are active in donating blood, or initiating the blood donation, cleaning the environment together, planting mangrove in the northern part of the region, computer training, and being involved in active discussion in village level or district level. They also contribute in the donation for disaster victim and some ceremonies such as wedding party. The participants have good communication with the local teachers and parents. It was a positive note for the participants. The principals suggested that the participants increase their social solidarity toward the people with difficulties by conducting social events with the society.

Beside the openness, Ende society has high tolerance. The owner of the house where the participants stay, who uphold non-moslem religion often remind the moslem participants to do prayer. The owner of the house also turns their radio or television volume lower when the participants perform prayer. In many events, the participants are invited to a wedding party or graduation party. The host usually provides two types of meal, the dog meat or pork and the chicken or beef. The host will guide the guests to select the appropriate food according to their religion teaching. The guests coming from outside Ende will be served with chicken or beef (Marhaeni, 2014).

The SM-3T program builds struggling power and survival in developing education in remote regions. The long distance of the homestay to the school, the limited condition of infrastructure, far away from public facilities, academic challenge condition of the society, the lack of motivation to study, and many other difficulties should be faced by the SM-3T participants. Various experience, both happiness and sadness, are recorded in a journal of the participants. The journal is then known by the principal for the education activities, known by the head of village for the social activities, and known by the head of education office for the whole activities.

The SM-3T program increases the love toward the teacher profession having duty in the remote region. The participants have been regarded as the part of the society. They have particular name, Pak Guru and Bu Guru, refer to Mr and Mrs Teacher. When the participants finish their duty and take leave, many of the society suffer loss, especially the students. They said, "If you leave us, who will guide us? Who will teach us?" Being SM-3T participant is not only by attending the class, implementing teaching tasks, analyzing students' response, and assessing students' performance, but also many details before the learning process conducted, such as motivating students to go to school. Teacher should concern in the affective and psychomotoric aspects of the students, not only the cognitive one. In order to motivate student to go to school, the participant is not only giving instruction by words, but also picking them from home. Many of the participants should follow the students' daily activities, motivate them step by step, give understanding to their parents, so that in the end the students have willingness to go to school. The SM-3T participants have run their duty including: to implement the learning process in the education unit based on the participants' expertise and the demand of the region's condition; enhancing the learning innovation activities at school; implementing the extracurricular activities; helping the tasks related to the education management at school; (5) doing the social tasks and society empowerment to support the development program of education and culture in the remote region.

Based on the analysis above, we can conclude that the SM-3T program in Ende Regency is effective in achieving its purposes. According to the society demand, some recommendations should be followed up as the result of evaluation of program implementation particularly in Ende Regency.

The Compatibility of Pre-condition Implementation (Training) with the Real Need of the Targeted Regions

The pre-condition program is started by giving general orientation about the education in remote region. The material includes the condition of lack number of teachers, quality disparity, mismatched, the high number of drop out, the low number of school participation, the condition of social life, culture, and infrastructure. The pre-condition activities include academic and non-academic activities. The academic pre-condition includes: (1) training on how to run education tasks in challenging condition (lack number of teachers, low ability of the students, and low access of facilities); and (2) education leadership and management at school. The non-academic pre-condition includes: (1) training of mental and survival, (2) training of social skill, (3) concept of nationalism and defending the country, and (4) scouting and first aid. The material of pre-condition for the SM-3T participants is suitable with the reinforcement provision of professional teacher candidates. A study about the 21st century image of teacher for the stakeholder toward the teacher education institution in Philippine stated that the 21st century teacher is a teacher who does not only function in the classroom but also function in the society efficiently, productively, and optimally (Balagtas, 2014).

In the academic pre-condition, the candidates of SM-3T participants batch 4 in the year 2014/2015 were demanded to be ready to implement the 2013 curriculum in the designated region. Thus, they got training about the basic concept and implementation of the 2013 curriculum within 10 hours of training. This material completes the provision to run the education tasks in particular condition. The example of particular condition is the lack number of teachers in a school, thus, participants got training on how to teach in multi-classes or multi-subject. The other example is the lack of learning media, thus, participants got training on the creation of learning media, students' worksheet, handout, and the others. The training on how to run the education tasks in particular condition was facilitated by two instructors for each class within 40 hours of training. The training also involved the best participant of SM-3T who is still joining the teacher profession education (PPG SM-3T) after finishing the SM-3T program. The number of the best participant of PPG SM-3T involved in the training is based on the need of the training.

The material of the education leadership and management at school is aimed to provide provision for the SM-3T participants to have knowledge about education leadership and management at school. The education leadership material focused on the function of school principal as a leader, manager, and supervisor. The education management material focused on the organization of curriculum, facilities, and students. The allocation time for this material is 10 hours of training.

The non-academic material such as the social skill is aimed to provide provision to the participants so that they can communicate effectively with the school and the society. The material includes: (1) adaptation ability (socio-anthropology and social communication ability), (2) society and family empowerment (culture, economic, and ecology-based) including the applied technology, and (3) leadership. The trainer for the material number (1) and (2) is the competence and relevant head of office from the targeted region, while the trainer for the material number (3) is the competence lecturer from the university. The allocation time for the social skill training is 10 hours of training. Based on the result of pre-condition evaluation, beside the trainer is provided from the targeted region, the trainer should also come from the research and community service institution since the material related to the society education and empowerment as well as the applied technology. Based on the time allocated, the sub material of society and family empowerment (culture, economic, and ecology-based) should cover the practice of the candidates to analyze the situation, to identify and to formulate the problems of the region, and to determine the alternative solution by using the effective technology. However, the result of the questionnaire about the effectiveness of the program purposes, the result of interview with the participants, head of education office, and society, and the result of survey, we know that the SM-3T participants have implemented social activities, limited to the meaning of social competence as a professional teacher, while the application of non-academic training based on the pre-condition curriculum particularly the society and family empowerment (culture, economic, and ecology-based) have not been optimally implemented. We realize that the success of the society empowerment is determined by both SM-3T participants and society. The society empowerment expected is the sustainable empowerment. It is as explained by Hishiyama (2013) that the consciousness of the society is the keyword to sustain the empowerment system.

The Alternative Solution to Overcome the Barrier and to Optimize the Society and Family Empowerment based on Culture, Economic, and Ecology

Based on the evaluation result of the effectiveness to reach the program purposes and the compatibility of the pre-condition material with the real need of the targeted region, we formulized the things which should be concerned for the next batch. The barriers which should be concerned are: (1) During the starting months, the participants meet difficulties to communicate with students, schools, and also the society because of the different language and culture of the targeted region. There are 2 tribes in Ende, the Ende tribe and the Lio tribe. Within

Lio tribe, there is also difference in the dialect; (2) The unclear description or information got from the pre-condition about the targeted region, for instance, the culture, local potential, and infrastructure; (3) The SM-3T participants have not contributed in research, scientific activities, writing paper to develop innovation, and others yet; (4) The SM-3T participants have not optimally run their social tasks and society empowerment to support the development of education and culture of the targeted region; (5) The SM-3T participants have not utilized the existing local potential together with the society to be the outstanding product of the targeted region.

Responding the problems and barriers above, we formulized the alternative solutions for the improvement of the SM-3T program. (1) Reinforcement of pre-condition implementation particularly in terms of non-academic material, namely the orientation about social, culture, and infrastructure condition of the targeted region (Ende Regency) should be provided in district-based (21 districts). The orientation should provide instructors from the targeted region and from the best participants of the previous batch. Within the orientation, it is important to provide the basic of the local language such as the phrase or expressions mostly used during the interaction with the local people. Besides, candidates should also get understanding about the habit of the local people and things that should be prohibited so that they are ready to interact with the people. (2) The pre-condition activities in the related material should result a research proposal (classroom action research) applicable in the school and ready to be implemented. The research result is then presented in a seminar together with the local teachers. (3) Reinforcement of scientific article or popular article writing ability using the existing literature around the region. (d) The material of cultural, economical, and ecological based empowerment of family and society should start with the orientation of local potentials in the 21 districts, then followed by the skill training to utilize the local potential with orientation of economic productive business (producing commercial products). The material also covers the strategy or method to empower the society considering the characteristics of the society.

CONCLUSION AND RECOMMENDATION

Based on the research result, it can be concluded that: (1) the implementation of the SM-3T program is effective in achieving its purposes, (2) the general orientation about the condition of education, social, culture, and infrastructure of the targeted region is still not enough to provide provision for the SM-3T participants to adapt optimally, (3) the development of professional competence related to the scientific paper of the participants is still low, (4) the social activities and the family and society empowerment to support the development of education and culture in targeted region is still low.

Based on the conclusion above, it is recommended that: (1) the non academic material delivered in the pre-condition implementation, namely the orientation toward social, culture, and infrastructure condition of the regions should be provided in district-based orientation, and provide the society need operationally; (2) there is demand for the SM-3T candidate to create a classroom action research proposal which is ready to be implemented at school; and (3) it is needed to schedule an effective technology practice based on the placement region, thus the pre-condition class distribution would be done based on the placement region.

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EXPLOITATION OF WHEY BY MODIFIED STRACH HYDROPOPHYL E1442 TO OBTAINING HIGH ADDED VALUE TO FRUIT DRINKS

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ABSTRACT: Our study is to provide a solution to emissions from whey issued by the dairy industry, through its direct incorporation through modified starch hydropropyled (E1442) in fruity drinks that helps prevent the amino acids coagulate to close ph phi and offering a clear and homogeneous final beverage, this incorporation has the advantage of obtaining a high-value product while allowing prospects to evade as some malnutrition seen the rich whey proteins and minerals

Key words: whey , pollution, valorization, fruit drinks ,coagulation of proteins

INTRODUCTION

Whey derived from dairy is a product considered for a long time as a compact and highly polluting waste, despite its functional and therapeutic properties (**Roger, 1979 Azzaz ,2006;Bounous, G ,2006**);his production in Algeria is steadily increase, and coincides with a prominent production of non-alcoholic beverages in recent years. Techniques and perspectives paving the way for its value while incorporating it into food products is one of the solutions that avoid the adverse consequences that can result from being released into the environment .and could be a prospect in order to 'eradicate the problem of malnutrition and trace elements deficiency

METHODS

Serum proteins consist of amino acids characterized by their amphoteric properties, which leads to their precipitation when in an acidic medium, the study of the precipitation percentage of whey shown that

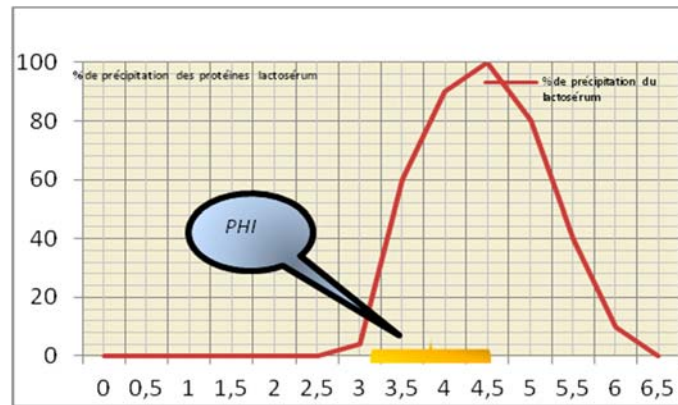


Figure 1 : Behavior Of Whey At Different PH.

Preparing whey beverages require in the first places two steps (Figure2):

STEP1: it consists on a preparation of a 1% solution of phosphate starch hydropropyled (E1442) is mixed with 30g of sucrose in order to increase its solubility

STEP 2: it is to add the stabilizer to 960 ml prepared solution of treated water to bring the volume to 1 liter

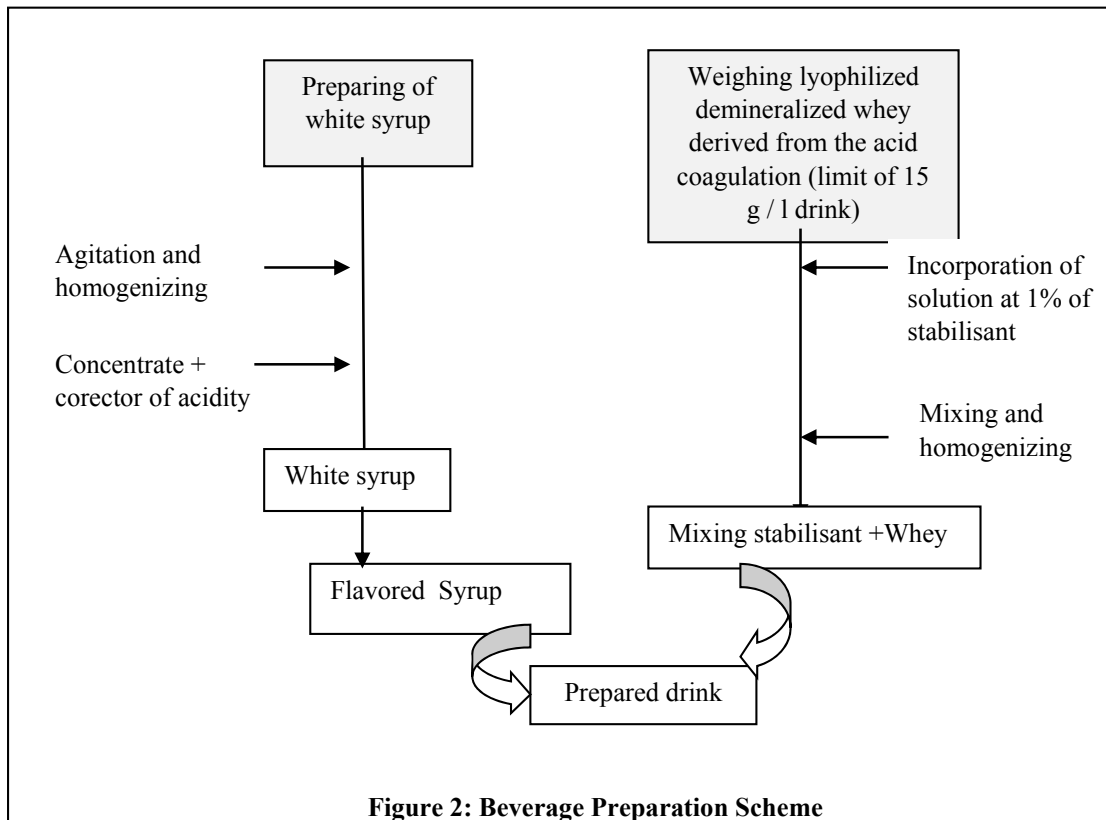


Figure 2: Beverage Preparation Scheme

RESULTS AND FINDINGS

Visual analysis of beverages shows an effect quite convincing on the color and homogeneity of the drink, This preparation enabled starch molecules wrap serum proteins and prevent them from coagulating in contact with acidity of the medium (juice) creating an adherent barrier whey protein, and preventing the structural change recent dimeric forms (A) to form octamers (B and C).(Cachaud,2005)

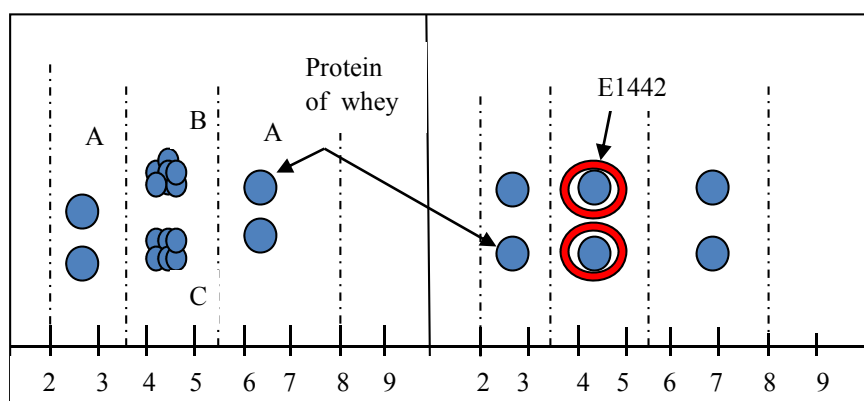


Figure 3:

Having obtained the enriched drink whey, we proceeded to the evaluation and comparison of 40 drinks (cocktail and ACE) enriched whey to the contents of the same drinks before the incorporation of whey, statistical results using test comparing averages (Student) are shown in the table below :

Table: Comparison Between The Composition Of Beverages Before And After Adding The Complex (E1442+Whey)

	Ace Without E1442	Ace with E1442	P Student	Cocktail without E1442	Cocktail with E1442	P Student
	Mean (\pm SD)			Mean (\pm SD)		
Ca +2 (mg/l)	211,2 \pm (54)	613,1 \pm (92)	0,03*	119 \pm (23)	591 \pm (61)	0,045*
K+ (g)	2,54 \pm (36)	3,31 \pm (2,7)	0,02*	1,25 \pm (1,32)	4,33 \pm (1,91)	0,031*
Proteins Total (Kjeldhal) (g/l)	0,02 \pm (0,01)	2,19 \pm (0,35)	<0,00*	0,035 \pm (0,012)	2,26 \pm (0,34)	0,011*
Na+ (mg/l)	121,3 \pm (30)	648,7 \pm (62)	0,03*	113 \pm (71)	600 \pm (89)	0,045*

*Significative

CONCLUSION

The results showed that the addition of mineralized whey resulting from acid coagulation significantly improved levels of Ca + 2, Na + 2, K + and protein (P <0.05) of the drinks, this richness is not influenced by the deterioration of organo-leptique quality formulated beverages (confirmed by Kramer taste test), this advantage makes it possible to make them more appetitive drinks and will be firstly a real alternative to protein supplements if taken with a healthy balanced diet and also saw its wealth of lactoferrin and some antioxydants (ascorbic acid, retinol, it could be a suitable solution to iron deficiency problems in Algeria including some vulnerable categories such as deficiency children.

RECOMMANDATIONS

At the end of this work, we hope that other studies that focus on the effect of daily consumption of such drinks on the nutritional status of the individual and in particular its status trace items.

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THE ESTIMATION OF LIVE WEIGHT FROM BODY MEASUREMENTS USING MULTIPLE REGRESSION METHOD (STEPWISE) AND CREVAT METHOD IN OULED DJELLAL BREED IN THE HIGHLANDS OF SETIF (ALGERIA)

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ABSTRACT : This study was designed to estimate live weight (BW) using fourteen body measurements in Ouled Djellal sheep reared in the highlands of Setif region. 66 female and 15 male Ouled Djellal breed aged over 2 years were used to investigate the relationships between live weight and body measurements such as total body length (TBDL), Body length (BDL), scapular-ischial length (SIL), withers height (WH), heart girth (HG), chest depth (CD), paunch girth (PG), shoulder width (SW), hip-width (HW), trochanter width (TW), Ischia width (IW), Pelvis length (PL), Cannon length (CL) and Cannon perimeter (CP).

In the herd, the highest correlations ($p < 0.001$), were respectively recorded between live weight and heart girth ($r = 0.93$) and the withers height ($r = 0.91$), with variations by sex.

The results of multiple regression (stepwise) show that heart girth (HG), the withers height (WH), the scapular-ischial length (SIL) and the Cannon perimeter (CP) are the best prediction parameters of body weight in the animals studied.

Furthermore, comparison of weight rocking sheep estimated by the formula of Crevât and using the HG (in meters) brought out the following formula: $BD = 57.9 HG^3$ in Ouled Djallal breed.

Key words : ouled djellal ; body measurements; live weight; Algeria.

INTRODUCTION

Livestock farming based on local breeds constitutes a very valuable animal industry from the economic, social and environmental points of view. Local breeds have remarkable special characteristics like resistance to prevailing diseases, fertility, maternal ability, longevity, adaptation to the environment and unique attributes of their final products, among others (García, 1980). Knowledge of phenotypic characteristics is important to the farmer, but especially for the veterinary. Indeed, the body measurements constitute the basis of the scoring table in a given breed; in addition, some of these measurements are supporting the estimation of body weight, which allows to monitor the growth and the development of the sheep, or to determine suitable medication dosage during health care and required feed amount of the animal (Kunene *et al.*, 2009)

In sheep, the objective of body dimensions and measures of muscular development were shown to serve either to supplement body weight as a measure of productivity (Afolayan *et al.*, 2002) and condition of the animal as a selection criterion (Lawrence and Fowler, 2002 ; Cam *et al.*, 2010) to evaluate carcass yield (Iyeghe *et al.*, 1996) or as predictors of some less visible characteristics (Gilbert *et al.*, 1993)

The aim of the present paper was to estimate live weight based on a combination of body measurements using multiple regression method (stepwise) in Ouled Djellal breed.

MATERIELS AND METHODES

Sheep samples

A total of 66 ewes and 15 rams with an age range between 2 and 6 years (3.35±0.85 years) of Ouled Djellal breed reared in highlands of Setif were used in the study. The number and tooth form were used to estimate the age of the animals.

Body measurements

The body weight (BW) and fourteen body measurements were measured for each animal before morning feeding to avoid abdominal swelling due to excessive intake of water and feed. The animals were weighed by sheep weighing balance. The body measurements were taken through the sheep measuring scale (tape) and a homemade measuring rod with double bracket (table 1).

Table 1. Definition Of The Body Measurements Calculated For Each Ouled Djelle Individual

Measurements	Definition
Total Body length (TBDL)	Distance from the head of the humerii to the distal end of the pubic bone.
Body length (BDL)	Distance from the base of the tail to the base of the neck (first thoracic vertebra)
Scapular-ischial length (SIL)	Distance between the tip of the shoulder and the tip of the ischium
Withers height (WH)	Distance from the highest point of the processus spinalis of the vertebra thoracica to the ground
Heart girth (HG)	Measured as body circumference just behind the forelegs
Chest depth (CD)	Vertical distance from the top of the withers to the xyfoid process of the sternum,
Paunch girth (PG)	Circumference of the body just a little behind the hypochondrium, in the most curved part of the body.
Shoulder width (SW)	Measurement taken between the two heads of humerii
Hip width (HW)	Maximum distance between the outer edges of the major hip bones on the right and left side
Trochanter width (TW)	Distance between the two trochanters (hip joint)
Ischia width (IW)	Distance between both ischia
Pelvis length (PL)	Distance from point of hip to the tip of the ischium or ileo-ischial distance
Cannon perimeter (CP)	Perimeter of the right foreleg, between the knee and the pastern.
Cannon length (CL)	Length of right metacarpus

Formula studied

In the present study, the method of CREVAT calculated using the thoracic perimeter (c) used in cattle was used (Marcenac, 1980): $BW = 80.HG^3$, then, in sheep the formula is as follows: $BW = x.HG^3$. So to define a specific formula for local sheep, it a constant "x" was determined which is $x = BW/HG^3$

Statistical Analysis

Descriptive statistics

To determine the mean and standard deviations of body weight and body measurements studied.

Correlation

Correlation coefficient was used to determine degree of the linear relationship between body weight and other continuous variables. A simple linear correlation was used when there is only one explanatory variable, simple matrix between body weight and body measurements. Correlation was calculated using the formula of Snedecor and Cochran (1981):

$$r_{xy} = \frac{(\sum xy - (\sum x)(\sum y) / n)}{\sqrt{(\sum x^2 - (\sum x)^2 / n)(\sum y^2 - (\sum y)^2 / n)}}$$

Where r = correlation coefficient, x = first character, y = Second character, n = total number of observations, Σ = Sum of observations.

Multiple linear regression

A Multiple linear regression was used when there is more than one predictor variable. This model was used to assess the relative contribution of body weight and different body measurements using the following equation (Snedecor and Cochran, 1981):

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_nx_n$$

Where Y is the dependent variable (body weight) X_s are independent variables (body measurements), a is the intercept coefficient on the y -axis, and b are coefficients related independent variables to predict the dependent variable.

Stepwise

The stepwise regression method was used to determine which linear body measurement or combination of measurements was a good estimator of the body weight of Ouled Djellal sheep. The body weight (BW) as dependent variable and body measurements as independent variables were considered.

L'ANOVA a été utilisée pour déterminer l'influence du sexe sur les paramètres étudiés. Pour cette étude on a utilisé le logiciel SAS 9.1.

ANOVA was used to determine the influence of sex on the parameters studied. For this study we used the SAS 9.1 software.

RESULTS AND DISCUSSION

Body measurements

The size and age of the sheep are strongly associated with productivity. Larger animals generally produce more meat than small animals (Desta, 2009). The mean (\pm SD) and coefficient of variation of each parameter studied were shown in Table 2.

Table 2. Descriptive Statistics Of Body Weight (Kg) And Body Measurements (Cm)

Measurements	Mean \pm Sd			CV	P
	Male	Femal	Total		
BW (kg)	100.47 \pm 15.58	56.24 \pm 6.28	64.43 \pm 19.32	29.98	<0.001
TBDL (cm)	118.13 \pm 8.82	104 \pm 8.43	106.62 \pm 10.09	9.46	<0.001
BDL (cm)	102.6 \pm 6.79	84.89 \pm 3.85	88,17 \pm 8,25	9.35	<0.001
SIL (cm)	96 \pm 6.00	80.83 \pm 3.83	83.64 \pm 7.30	8.73	<0.001
WH (cm)	93.47 \pm 3.56	79.64 \pm 2.22	82.20 \pm 5.95	7.24	<0.001
HG (cm)	120.67 \pm 6.14	99.02 \pm 4.84	103.02 \pm 9.86	9.57	<0.001
CD (cm)	42.67 \pm 2,13	36.48 \pm 1.98	37.63 \pm 3.13	8.32	<0.001
PG (cm)	129.2 \pm 9.27	108 \pm 6.92	111.93 \pm 11.07	9.89	<0.001
SW (cm)	27.4 \pm 2.29	20.35 \pm 1.28	21.65 \pm 3.14	14.49	<0.001
HW (cm)	27.33 \pm 2.41	21.73 \pm 1.57	22.76 \pm 2.80	12.29	<0.001
TW (cm)	30.13 \pm 2.47	23.53 \pm 1.55	24.75 \pm 3.11	12.57	<0.001
IW (cm)	14.47 \pm 1.88	11.85 \pm 1.06	12.33 \pm 1.60	13.01	<0.001
PL (cm)	33.33 \pm 2.26	28.03 \pm 2.13	29.01 \pm 2.98	10.27	<0.001
CP (cm)	11.47 \pm 0.64	8.91 \pm 0.38	9.38 \pm 1.09	11.62	<0.001
CL (cm)	13.93 \pm 0.88	12.58 \pm 0.86	12.83 \pm 1.01	7.87	<0.001

Body weight (BW), body length (TBDL), Body length (BDL), scapular-ischial length (SIL), withers height (WH), heart girth (HG), chest depth (CD), paunch girth (PG), shoulder width (SW), hip-width (HW), trochanter width (TW), Ischia width (IW), Pelvis length (PL), Cannon perimeter (CP) and Cannon length (CL)

The influence of sex is significant ($p < 0.001$); rams are heavy (BW), longer, higher and wider with a well developed Heart girth, a fairly large chest depth, greater Paunch girth, a larger Cannon perimeter and relatively long legs than ewes (Table 2).

Correlation between body weight and different body measurements

Results of the simple correlation coefficients of the linear measurements to one another and to the body weight of Ouled Djellal sheep breed are presented in Table 3.

Table 3. Correlation Coefficients Showing Interrelationships Between Various Measurements Of Body Weight Of Ouled Djellel Sheep Breed.

	Sex	TBDL	BDL	SIL	WH	HG	CD	PG	SW	HW	TW	IW	PL	CP	CL
PV	M	0.50	0.68**	0.71**	0.64*	0.78***	0.71**	0.77***	-0.03	0.28	0.19	0.37	0.55*	-0.01	0.10
	F	0.43***	0.32**	0.20	0.39**	0.70***	0.39**	0.82***	0.63***	0.08	0.37**	0.36**	0.45***	0.36**	0.16
	T	0.65***	0.87***	0.84***	0.91***	0.93***	0.82***	0.89***	0.85***	0.75***	0.81***	0.69***	0.76***	0.85***	0.52***

Body weight (BW), body length (TBDL), Body length (BDL), scapular-ischial length (SIL), withers height (WH), heart girth (HG), chest depth (CD), paunch girth (PG), shoulder width (SW), hip-width (HW), trochanter width (TW), Ischia width (IW), Pelvis length (PL), Cannon perimeter (CP) and Cannon length (CL), *Significant Correlation at $p < 0.05$, **Significant Correlation at $p < 0.01$, *** Significant Correlation at $p < 0.001$.

The relationship between body measurements and body weight depends on the species, breed, age, size, sex, body condition score of animals (Heinrichs *et al.*, 1992 ; Yanar *et al.*, 1995 ; Afolayan *et al.*, 2006) and type of lambing of ewes (Tabbaa, 2003). Positive correlations were observed between the PV and all body measurements.

Result on Table 3 showed that the linear measurements were highly correlated with body weight of Ouled Djellel sheep. Similar results were reported by (Topal and Macit, 2004; Atta and Elkhidir, 2004; Yakubu *et al.*, 2005 ; Afolayan *et al.*, 2006 ; Cam *et al.*, 2010 ; Mmereole and Obinne, 2010 ; Yakubu, 2012)

The heart girth (HG) (Yakubu A., 2012) and paunch girth (PG) were highly correlated ($p < 0.001$) with body weight of Ouled Djellel ram. Thus, highly significant positive correlations between the HG, HS and PV were reported by Cam *et al.*, (2010); Mmereole and Obinne (2010); Yakubu (2012). However, no significant correlation was observed between the Shoulder width (SW) and the hips width (HW) ($p > 0.05$) unlike to Yakubu (2012) in Uda breed where the HW showed a significant positive correlation ($p < 0.001$).

Heinrichs *et al.* (1992) suggested that some body measurements such as height at withers and the hips width can be the best skeletal parameters because they are not influenced by body condition.

Cannon perimeter (CP) of Ouled Djellal ewe showed a significant positive correlation ($r = 0.36$) ($p < 0.01$) with body weight, while Cam *et al.* (2010) showed no significant relationship ($p > 0.05$) between the CP and the BW in Yankasa females unlike males ($p < 0.001$).

In this herd, the highest correlations ($p < 0.001$) were observed between body weight and the heart girth (HG) ($r=0.93$) (Dekhili and Aggoun, 2013), the withers height (WH) ($r=0.91$) and the paunch girth (PG) ($r=0.89$) (Djaout A., *et al.*, 2012). The paunch girth is practically no longer used because it can cause errors (excessive drinking, pregnant females). For this reason, the hearth girth (HG) alone was a good estimator on body weight in Ouled Djellel breed. Khan *et al.* (2006) indicate that the body measurement which has a highest correlation with the body weight of the animal can be used as a selection criterion in traditional production systems in rural areas.

Multiple linear regression analysis

Regression coefficients and the probability of the estimated variables in predicting the body weight of Ouled Djellal sheep are presented in Table 4. The obtained results showed that the prediction model equation for body weight is formulated using the body measurements as follows: $BW = -153.98375 + 0.08TBDL + 0.17BDL + 0.35SIL + 0.49WH + 0.45HG + 0.07CD + 0.39PG + 0.01SW - 0.24HW + 0.54TW - 0.37IW + 0.67PL + 1.62 CP - 0.61CL$

Where : Body weight (BW), body length (TBDL), Body length (BDL), scapular-ischial length (SIL), withers height (WH), heart girth (HG), chest depth (CD), paunch girth (PG), shoulder width (SW), hip-width (HW), trochanter width (TW), Ischia width (IW), Pelvis length (PL), Cannon perimeter (CP) and Cannon length (CL),

Table 4. The Regression Coefficient (B), Standard Error (SE), T-Value And Probability (P) Of The Estimated Variables In Predicting Body Weight By The Multiple Linear Regression Analysis

Variables	b	SE	t	P
TBDL	0.08746	0,09091	0.96	0.3396
BDL	0.17190	0.19344	0.89	0.3774
SIL	0.35434	0.15800	2.24	0.0283
WH	0.49411	0.35827	1.38	0.1725
HG	0.45438	0.21770	2.09	0.0407
CD	0.07193	0.45457	0.16	0.8747

PG	0.39146	0.16146	2.42	0.0181
SW	0.01105	0.49080	0.02	0.9821
HW	-0.24720	0.41857	-0.59	0.5568
TW	0.54308	0.39356	1.38	0.1723
IW	-0.37844	0.60780	-0.62	0.5357
PL	0.67806	0.34556	1.96	0.0540
CP	1.62000	1.39626	1.16	0.2501
CL	-0.61673	0.83209	-0.74	0.4612

Intercept = -153.98375. R2=0.9336; R2 Adj= 0.9195

Stepwise multiple linear regression

Stepwise multiple regression prediction of body weight from body measurements was presented on Table 5. The results showed that the scapular-ischial length (SIL), the heart girth (HG) and the paunch girth (PG) have a significant influence on body weight (Table 5), the other variables were not included in the model because of their relatively low contribution. Therefore, the last step of the regression model, equation for predicting the body weight obtained was presented on Table 6.

Table 5. Relative Contribution (Partial And Model R²). Regression Coefficient (B). Standard Error (SE). And Probability (P) In Predicting Body Weight By The Stepwise Procedure Analysis

Sex	Step	Variable Entered	Partial R ²	Model R ²	b	SE	P
Male	1	HG	0.6064	0.6064	1.97661	0.44170	0.0006
Female	1	PG	0.6669	0.6669	0.56061	0.06868	<0.0001
	2	SW	0.0558	0.7228	0.98664	0.38060	0.0119
	3	PL	0.0216	0.7443	0.52353	0.20300	0.0123
	4	TW	0.0167	0.7610	0.55364	0.26832	0.0433
Flock	1	HG	0.8584	0.8584	0.39600	0.20553	<0.0001
	2	WH	0.0375	0.8959	0.81655	0.26886	<0.0001
	3	PG	0.0161	0.9120	0.50528	0.14359	0.0003
	4	SIL	0.0098	0.9218	0.43513	0.14614	0.0029
	5	CP	0.0043	0.9261	2.37742	1.13852	0.0402

Intercept M= -138.04450. Intercept F= -52.08208. Intercept troupeau = -158.73958

The multiple linear regression and stepwise showed that the heart girth (HG), the withers height (WH), the paunch girth (PG), scapular-ischial length (SIL) and the Cannon perimeter (CP) are the best measurements (p <0.001) to determine the body weight of the animals studied.

Table 6. Multiple Linear Regression Of Body Weight With Body Measurements

Sex	regression equation
Flock	BW= -158.73+0.39HG***+0.81WH***+0.50PG***+0.43SIL*+2.37CP*
Ram	BW= -138.04+1.97HG***
Ewe	BW= -52.08+0.56PG***+0.98SW*+0.52PL*+0.55TW*

Body weight (BW), heart girth (HG), withers height (WH), paunch girth (PG), scapular-ischial length (SIL), Cannon perimeter (CP), shoulder width (SW), Pelvis length (PL), trochanter width (TW), *p<0,05 ; **p<0,01 ; ***p<0,001.

Determination of the body weight according the formula of CREVAT

The formula of CREVAT: $BW = x.HG^3$ was used to estimate the body weight of the sheep. Modern authors have criticized QUETELET for his mathematical reasoning in an imperfect cylinder, and CREVAT for his empiricism.

They sought to develop more precise formulas which take into account, among others, changes in the ratio between heart girth and body weight by age and sex. Besides, the thoracic perimeter is the most convenient method for use in field conditions; this measurement is fast and requires minimal manipulation (Suhaila et al., 2013).

According to the method of CREVAT, the formula obtained was as follows: $BW = x.HG^3$ where $x = BW/HG^3$. HG (in meters). $x = 57.9 \pm 6.27$. The body weight of Ouled Djellal sheep is obtained by the following formula: $BW = 57.9.HG^3$

Table 7. Body Weight According To The Formulas

	Flock	Ram	Ewe
x	57,90±6,27	56,96±6,16	58,12±6,32
HG (m)	1,03	1,20	0,99
BW= x.HG³ (kg)	63,27	98,43	56,39
BW (kg)	64,43±19,32	100,47±15,58	56,24±6,28

CONCLUSION

This paper has shown that there high correlations between body weight and body measurements. It may be concluded that the body weight of sheep Ouled Djellal can be estimated using a simple linear measure of body: Withers height (WH), Scapular-ischial length (SIL) and Cannon perimeter (CP) or using the formula $BW = 57.9.HG^3$ (m). The application of this method in rural zones where weight measurements might not be possible such as small sheep herders who do not have a weighbridge.

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ANTIOXIDANT ACTIVITY OF *OLEA EUROPAEA L.* LEAVES

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ABSTRACT: There has been growing interest in the beneficial health effects of consuming medicinal plants in all parts of the world. Mainly, the presence of phenolic antioxidants is believed to have the protective mechanisms. In the present study, the leaves of *Olea europaea L.* were extracted with methanol and chloroform. On one hand, the quantitative analysis of the phenolic compounds and flavonoids reveal that the extracts are rich in these compounds. So, methanolic the extract (ME) of *Olea europaea L.* contains the higher value of flavonoids (52,54 µg quercetin equivalent/g of extract; 67,25 µg rutin equivalent/g of extract); whereas the total polyphenols are most in chloroformic extracts (ChE) (572,94 µg gallic acid equivalent/g of extract) and for tannin, the ChE showed (856,88 µg tannic Acid equivalent/g of extract). On the other hand, the antioxidant activities of the extracts determined by the β-carotene/ linoleic acid system assay were presented an increase value of chloroformic extract which shows appreciable inhibition of 73,67% whereas the methanolic extract have an effective inhibition (54,17 %) in β carotene/linoleic acid assay.

Keywords: *Olea europaea L.*, antioxidant activity, polyphenols, β-carotene, chelating capacity.

RATIONAL MYTHOS AND IRRATIONAL LOGOS: THE NARRATIVE FORMS OF CHINA'S 'SHE' PEOPLE

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ABSTRACT: This article considers the myths of China's She people in the light of the distinction made by western mythographers between *mythos* and *logos*. In the analysis of ancient Greek myths, *mythos* and *logos* have been seen as standing for irrational and rational elements, respectively. Within the Chinese education system, however, myths and history are not rigorously separated, and people believe that myths tell of real events that happened in prehistoric times. By examining my collections of She narrative epics and graphic depictions of these stories, I will suggest that the association of *logos* with the rational and *mythos* with the irrational is reversed in the She case, and that the effective transmission of the epics down the generations has required the adoption of rational elements to the oral tradition or *mythos*, whilst the sacred or irrational component of the stories is preserved in the graphic depictions or *logos*.

Key Words: myth-logo-she ethnic group-epic

INTRODUCTION

Although numerous scholars have discussed the meaning of myth (e.g. Cruz, L., & Frijhoff, W. Th. M., 2009:1), there is little agreement on a clear definition of the term. The origins and meanings of myths have generated heated debates in the fields of the humanities and social sciences throughout the world. Every country has their own epics and myths, and whilst some of them may have similarities in plot, structure and even in interpretation, most nations' myths have their own characteristics. Vernant (1979:186) however, has suggested that myths are of two fundamental natures, the 'unreal' which means opposed to everyday life, and the 'absurd' that stands for the irrational.

China has many myths with features that seem to fit Vernant's typology, from the ancient stories of 'The Bird Jingwei That Tried to Fill the Sea' (精卫填海) and 'The Foolish Old Man Who Wanted to Move the Mountains' (愚公移山), to stories from the end of the Qing Dynasty such as 'Journey to the West' (西游记) and 'The Story by the Water Margin' (水浒传). Whilst these well-known stories derive from the majority Han ethnic group, many other ethnic inhabitants have their own myths, and people in one place often cannot tell the stories of another. Some of these stories share commonalities with myths and legends in other parts of the world. Most Chinese people, however, seem to believe that these stories are based on fact rather than fabrication and they do not distinguish between true history and myth. In this paper, I use She narratives and copies of ancient graphics collected during fieldwork in 2014 to consider the applicability of the concepts of *mythos* and *logos* which have been important in western academic understandings of myth, to the research of Chinese mythology. Using the mythology of the 'She' ethnic group as an example, I demonstrate the unique ways that myth is used in China for the education of the younger generation.

1. *Mythos* and *logos*: their origin and usage in western countries.

A general dictionary defines myth as: a traditional narrative usually involving supernatural or imaginary persons and often embodying popular ideas on natural or social phenomena. (Fowler and Fowler, 1995:900). In etymological terms, the origin of the English word 'myth' can be traced back to the Greek word μῦθος (*mythos*). This word originally meant formulated speech, so it could include a narrative story, a communicative dialogue or the enunciation of a plan (Vernant, 1979:186), and it is clear that this term has a strong relationship with oral expression. Most of the Greek narrative stories that we know were passed down orally, so no original storyteller can be identified, and they may have been changed repeatedly in the telling, rendering the character as well as the plot of myth indeterminate.

Between the eighth and fourth centuries B.C., the Archaic period saw the rise of the *polis* (city-states), the founding of colonies, the annexations by the Persian empire, as well as the first inklings of classical philosophy, theatre in the form of tragedies performed during Dionysia, and written poetry, which appeared with the reintroduction of the written language. This cultural flowering caused a multiplicity of differentiation. There are breaks and internal tensions within the mental universe of Greece in the following Classical period as well, as the winners of power-struggles revised the historical myths which were responsible for distinguishing one domain

from another (Vernant 1979, 187). During these centuries of dissemination, the narrative stories were finally recorded in written forms such as the *Homeric Hymns*, Hesiod's *Theogony*, *Works and Days* and other poems, dramas shows, historical and philosophical works. It is in and through written literature that this type of discourse reached later generations. However, when the authors of literature turn these narrative stories into written language, myths no longer communicate the viewpoints held by those who originally narrated them, but take on the ideas of the writers. Willcock, for example, suggest that Homer invented some of the details of the *Iliad* (Willcock, 1976:43) whilst even in terms of one author, Hesiod's two books contain quite different versions of the same story: Prometheus' theft of fire (Vernant, 1979:168-185). It seems, therefore, that the original plot and meaning of such myths may well have changed from the original oral tradition when the work was finally solidified in writing.

The concept of myth that we have inherited from the Greeks belongs, by reason of its origins and history to a tradition of thought peculiar to Western Civilisation in which myth is defined as fiction (Vernant, 1979, 186). The term *mythos* is usually paired with *logos*. In its current English form, logo, this word means abstract graphs or marks usually used for commercial purposes, but historically, the Greek word referred to stone cylinder seals or golden coins (Herodotus, 1987:I.94) which were associated with holiness and absolute power. The semantic significance of *logos*, then, includes a strong religious colour, signifying the communication to initiates of secret knowledge forbidden to the common crowd. According to Athanasius, the Great *Logos* refers to the God Word, and there is space in it for humans to gain access to the mercy of God (Prague, 2013), so this kind of *logos* should be understood as characteristic of written language. Since the works of God are seen to contain their own logic, We can conclude that *logos* is, at very beginning, set in opposition to the speech of *mythos*, both in form and in fundamental significance. It is important that *logos* is no longer simply speech written down, but has come to imply demonstrative rationality. Its philosophical abstractions differ from the divine powers whose dramatic adventures are the subject of myth, and *logos* acts upon the mind at a different level from an operation involving mimesis or emotional participation on the part of audience as well as speaker (Vernant, 1979, 187).

To sum up, *mythos* and *logos* stand in two overlapping areas, but directed to different ends. Both are forms of expression and types of thought, but the former is narrated by speakers and if written, it follows the oral. It is usually understood as the stories that people use to make their own life and surroundings (Cruz, L., & Frijhoff, W. Th. M., 2009:1) and it can bring the story closer to the contemporary audience. *Logos*, in contrast, can be detected at very heart of religious tradition and the public who reads such texts will feel the content distanced from them. Even people who have a relationship with the *logos* are held in awe and veneration when the *logos* appear in front of them.

2. *Mythos* and *Logos* in the narratives of the She people

From the above examination of the origins and uses of the terms *mythos* and *logos* it is clear that they have been significant concepts in the study of ancient Greek myths by western scholars. These concepts are not well known in the study of Chinese mythology, however. In the last century, one of China's most eminent mythographers, Jingwen Zhong (钟敬文) asserted that, epic is a kind of ancient expression which has a large scale of length in Chinese folk narrative. It uses poetic language to describe every Chinese ethnic group, how their people came into being and migrated from one place to another, their historical heroes and the valiant battles they fought against their enemies, the epics growing together with the ethnic group's history (Jingwen Zhong, 1990, 581-586). In Chinese mythography, most scholars analyse myth in opposition to history, and the distinction of *mythos* and *logos* are totally new to the Chinese field. In this paper, I will use these concepts to consider the epics of the She (畲) ethnic group: perhaps the only tribe in China which has concepts analogous to the western theoretical distinction between *mythos* and *logos*.

The She people form one of the 56 ethnic groups officially recognized by the People's Republic of China in 1956, although their history extends back centuries earlier. The earliest genealogical booklet recorded that She people revolted against their oppressor as early as the Tang Dynasty in the 7th century. (Zhejiang Ethnic Affairs Commission. 1992, Intro.) The name 'She' is a Chinese Han appellation meaning 'slash and burn', specially referring to their mode of horticultural production. The She invariably designate themselves as Sanhak (山哈) which means 'the guest of the mountain'. Their view of the mountain as their host accords with Ellen's (1986:9) and Milton's (1996:115) assertions that different societies, regard Nature in their own image, sometimes benignly, sometimes with hostility, but rarely with indifference. By their own account, the She were forced to migrate to the hills to escape from the discrimination of other tribes and to protect themselves by geographic isolation. Now they occupy the mountain areas in the southeast part of China, mainly consist of south of Zhejiang Province, west of Fujian Province and northern part of Canton Province. (See map below.)



Map 1. Ethnic Groups Within China

The She group is not the only ethnic group who has their own epics in China, but it is unique in being the only one to create graphic depictions matched with the narratives they tell. The She people regard these two cultural forms in very distinct ways: whilst narratives may be flexible, the pictures seem more sacred in the eyes of She people. I suggest that the former resembles the western concept of *mythos*, while the latter can be treated as *logos*. Before presenting evidence to support this claim; it is first necessary to outline the central narrative of She mythology: the Song of Gao Guang or *Gao Guang Ge*.

The *Gao Guang Ge* describes the origins of the She people's ancestors.

The myth begins in the time of the God-Emperor Gao Xin, whose wife had a severe pain in her ear. The emperor summoned doctors who discovered a bloody ball in the queen's ear. The doctors plucked out the ball, which grew rapidly into a beast with the head of a dragon and the body of a unicorn, named Panhu. Years later, invaders attacked the kingdom, overcoming all resistance. Emperor Gao Xin promised that the person who could protect the homeland against these enemies could marry the princess. The dragon-unicorn took up the challenge and defeated the invaders. After his return, Panhu married the emperor's daughter and became his successor. Panhu and the princess had four babies, which were given different surnames by the emperor. As their father migrated from one area of southeastern China to another, they each settled in a different area where they started their own families, which are the ancestors of the present-day She groups in these provinces. Panhu was appointed to rule Canton Province, before finally going to study under a Taoist priest.

The following group of pictures, now held by Zhejiang Museum, portray scenes from this myth.



4-1、高辛当朝

Fig. 1. The Emperor Gao Xin Had A Queen Who Was Called Liu.



4-2、龙麒出世

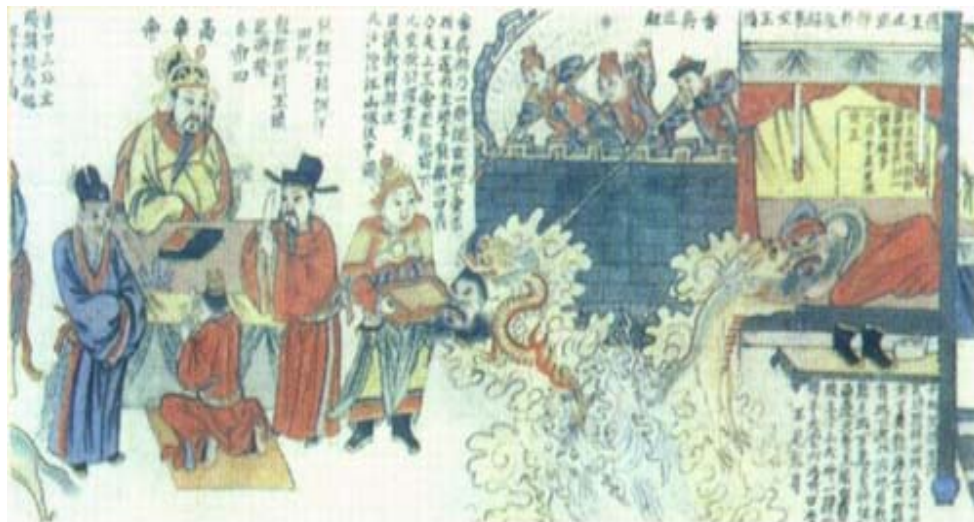
Fig 2. The Queen Suffered Pain In Her Ear. Doctors Were Called And Extracted A Bloody Ball. The Blood Ball Started To Grow, And In A Sudden Flash, Turned Into A Dragon-Unicorn, Named Panhu.



Fig. 3. When Invaders Entered The Kingdom, Nobody Dared To Resist, But The Dragon-unicorn Promised To Defend The Kingdom Against Its Enemies.



Fig. 4. Panhu Did Not Use Any Armies; Instead, He Entered The Camp Of The Invaders Alone And Gained The Trust Of Their Leader. Panhu Then Killed The Invader's Leader By Biting His Neck While He Was Sleeping. The Invaders Were Defeated Without Any Soldiers And Weapons.



4-5、归朝奉献

Fig. 5. Panhu Took The Head Of The Leader, And Returned To Present It To The Emperor.



4-6、金钟变身

Fig. 6. Gao Xin Rewarded The Dragon-Unicorn With By Giving Him His Third Daughter In Marriage. The Day Before The Wedding, Panhu Transformed Into A Man, Crowned By A Large Bell.



Fig. 7. The Marriage Was Celebrated With A Large Party, And Panhu Became The Prince Of The Kingdom.



Fig. 8. Panhu Was Given Surnames For His Four Children By The Emperor Gao Xin.



Fig. 9. Panhu Was Made Ruler Of Canton Province, And Moved His Whole Family To This Area.



4-10、閻山學法

Fig. 10. Later, Panhu Went To The Mountains To Learn Skills From A Taoist Priest.



4-11、打猎殉身

Fig. 11. Panhu Was Killed Accidentally When Hunting.



Fig. 12. His Offspring Buried His Body And Built A Tomb For Him In Canton Province.

The story of Panhu is an origin myth memorialising the heroic ancestor of the She, but the group presents the story in two different ways: orally and pictorially. I will now illustrate the ways that these two forms are used by the She in order to teach the story to their young people in ways that make it meaningful for them.

Epics such as the story of Panhu are most frequently passed on through oral narrative, but some of them can be found recorded in illustrations in family pedigree books or inscriptions on stones as well. From this point of view they share similarity with myth in form and characters. For example, the epics are usually told during rituals offering sacrifices to the ancestors. As such rituals are organised every year in every family during the Spring Festival, they various from area to area. I Will take a ritual in Zhejiang Province as a case study, which has been categorised as part of the province's intangible cultural heritage. Almost all of rituals hosted by She people in Zhejiang area move through three stages: first proposing a toast to the ancestor, then bowing to Heaven and Earth, after which the oldest person, respected as the most knowledgeable in the group, will sing the epic. Not only the rituals, but also the epics narrated by elders vary significantly from one area to another. It is becoming a concern that there are fewer elders left who can sing the epics required in sacrifice ceremonies, and although the plot-lines and lyrics are recorded in archival literature, there is a fear that the oral rhythm of the epics may not be passed on to future generations.

The images associated with epics take a variety of forms. Most of the versions presented here were painted on white cotton cloths which were either inserted at the beginning of genealogical-tree books, or used in ancestral temples for decoration. The core character in these pictures is the hero-figure of the dragon-unicorn, regarded by She people as divine. Fig. 13 shows a carved wand, of a type which is invariably enshrined at the center of ancestral temples. The figure of the dragon-unicorn is carved at the top of the wand. The dragon-unicorn, then, has come to be seen as a logo of the She people: a symbol referring to their historical roots.



Fig. 13. Carved Wand Featuring Dragon-Unicorn. (Photo By Author: 27 January 2014).

In the final part of this paper, I will examine the transmission processes of She epics, and show that the roles of *logos* and *mythos* as rational and irrational components of culture, are reversed in comparison to the western context within which these concepts were originally applied.

3. Rational myths and irrational logos

When exploring the transmission processes by which She epics are passed from one generation to another, I interviewed, a young She man, who told me that for most of his generation, myths are not learnt orally from elders, but from descriptive books produced by Han Chinese people. The She, then, recognise themselves first from the descriptions of others. This is not a new phenomenon, since She myths appear to have been based on Han narratives produced during the period from the Han to the Qing Dynasties, and reconstructed by the She. By comparing stories I have collected from She areas with those recorded in Han classical literature, I will suggest that the She have engaged in a process of transformation and re-evaluation of the kind described by Lévi-Strauss (1963, Vol.1, 219-228). This process can be seen through three aspects of these epics.

The first of these aspects is the rational modification of the myths. According to Boas (1898, 18) “it would seem that mythological worlds have been built up only to be shattered again, and that new worlds were built from the fragments”. This idea of myth as composed of discrete elements which could be combined and recombined in different ways to produce different meanings was developed by Lévi-Strauss (1963 Vol.1, 210-11), who regarded myths as analogous to language, with its discrete elements of phonemes, morphemes and sememes, asserting that “there are gross constituent units in a higher and more complex order in the myth, and more specifically they are bundles of relations”. Lévi-Strauss (1978, 3) suggested, therefore, that “Its basic structure is the same, but the content of the cell is not the same and can vary”. The Han classical work on which the epic of Panhu appears to be based, *Fengsutongyi* (General Discussion about Customs), published about 189AD during the Han Dynasty, describes the origin of the She people and mentions an emperor who raised a dog with colourful fur. The dog was named Panhu (Ying, 2010, 489). Over several hundred years following the publication of *Fengsutongyi*, stories of Panhu appeared in books, using Han Chinese characters, which were produced by She people themselves. In the She versions of the story, however, the dog was transformed into a dragon-unicorn. Whilst the dog is seen by the Han as a mundane and humble animal, the dragon and unicorn are both mythical creatures regarded as highly prestigious. The transformation of the humble dog into the prestigious dragon-unicorn may be seen as a rational move which makes the content of the epic more acceptable to younger generations of She. In Lévi-Strauss’s (1973, 79) words, the notion of ‘myth’ can include everything we are thinking, as we use this word randomly to refer to natural phenomena, products of oral literature, philosophical speculation, and other cases through which we can realize linguistic processes. The She, then, adapted the Han version of the legend of Panhu to be compatible with their own imaginings of their history and daily life.

Another example of rational modifications to the *mythos* is in relation to migration routes. In each area, She people would add their own migration route to the end of the story, so the epic would make sense to their children. According to Lévi-Strauss (1963, Vol. 1, 231), the kind of logic in mythical thought is as rigorous as modern science. The She people modify their myths in rational ways, therefore, so that the fantastical elements set in ancient times connect to the known history of more recent periods.

The second aspect of She mythology in which transformations may be observed is in the graphical depictions of the myths. Whilst orally told epics are modified in rational ways to connect to the known history and lived experience of particular groups, the graphical depictions: the group's *logos*, are regarded as sacred and are not subject to modification. Nevertheless, there is evidence that transformations have taken place in the past. The most meaningful figure depicted is that of the dragon-unicorn, venerated as a symbol of the She people. I have showed how the She people transformed the animal from dog to dragon-unicorn, regarded as a more dignified creature by the dominant Han group. Why, however, did the She choose this specific animal rather than others? Lévi-Strauss notes that that there is no direct relationship, based on contiguity, between man and totem. The only possible relationship must be 'masked', and thus metaphorical (Lévi-Strauss, 1973, 87-8). From this metaphorical perspective, we can offer an explanation for the choice of the dragon-unicorn as the crucial character of their *logos*. Since neither dragon nor unicorn are actually existing creatures, their extraordinary rarity makes them creatures of high-status, and the dragon is the symbol of the dominant Han group in China. The choice of the dragon merged with the unicorn suggests that the She are asserting a status equal or greater than that of the Han. A similar explanation may be advanced for the frequent use of another non-existent creature, the phoenix, in She embroidery and women's hair accessories (see Fig. 14). The phoenix is a mythical bird which is widely known in many cultures, its crucial feature being that does not die, but is reborn in fire, more beautiful than before. In China, the phoenix has the same status as the dragon, but represents the female principle, in contrast to the masculinity of the dragon. As the She were traditionally a matrilineal society, the phoenix is particularly important to them, and is paired with the male dragon-unicorn as a symbol of She female identity (Pangjin, 2007).



Fig. 14. Women's Ornaments Featuring The Phoenix. (Photo By Author: 27 January 2014)

What then, of the dog, which featured in the classical Chinese references to the She? In fact, whilst the Han regard the dog as a humble animal, it is respected by the She, who see it as a symbol of loyalty and honesty, and its status amongst the group is no less than that of the dragon-unicorn. Statues in the ancestral temple pictured below (Fig. 15) portray She men accompanied by dogs, and most of the She villages I visited in Zhejiang Province prohibit the eating of dog meat, as do many of the She villages do in parts of Canton Province.

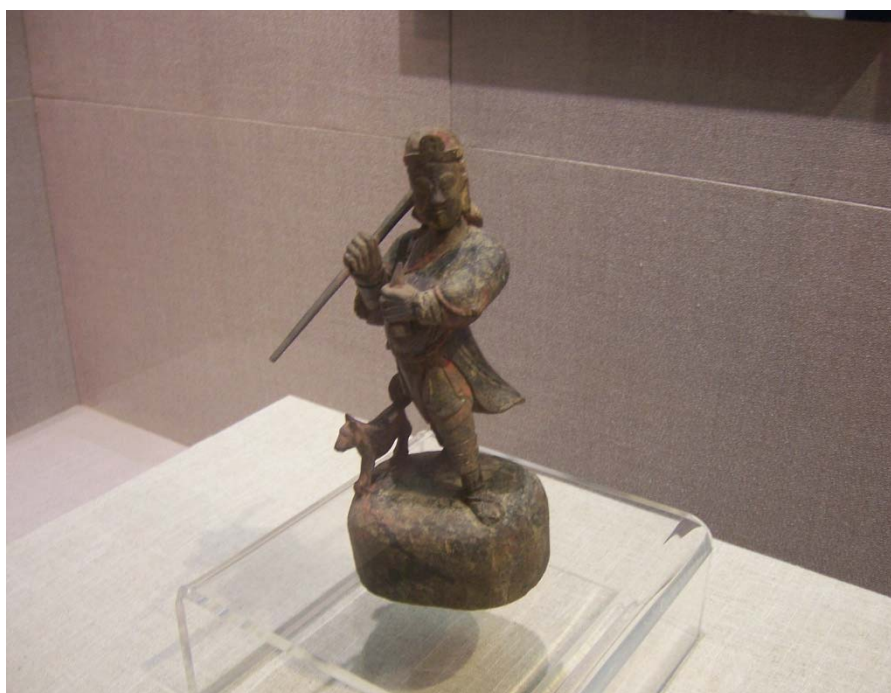


Fig. 15. Statue Of She Man Accompanied By Dog In Ancestral Temple (Photo By Author: 27 January 2014)

The English trader and interpreter Long, speaking of the Ojibwa at the end of the eighteenth century, declared that there was confusion between clan-names and beliefs concerning guardian spirits (Levi Strauss, 87, 1973). Similarly, in this case, the dragon-unicorn, like the phoenix, could be seen as symbols of the She group, and the dog could be seen as a guardian animal. These differences may not have been apparent to outsiders such as the Han, however, who may have seen these animals venerated at festivals and rituals, without fully understanding the meanings attached to each.

The third aspect of She mythology in which transformation and re-evaluation are evident is in the process of narration. When recounted by others, such as the Han, She epic stories may seem strange and unbelievable, but when narrated by the She themselves, the stories take on a greater power due to the storyteller's ability to fill the tale with emotion and relate it to his audience. Although the structure of the story may be fundamentally the same, the meaning and emotional content is reconstructed from their own perspective, as is apparent in the position of the narrator. In Han narratives, the third person is always used. The narrator is thus situated as an outside observer, looking at, and sometimes looking down on, the lives of other ethnic groups. When the materials created by the Han writers are reused by the She, however, the subject is shifted from the third to the first person, so the stories are told from their own standpoint. "The substance of myth", Lévi-Strauss observes, "does not lie in its style, its original music, or its syntax, but in the story which it tells" (Levi Strauss, 210, 1963 Vol.1). I suggest that the content of the story, on which Lévi-Strauss focuses, includes not only the plot, but also the emotion that the narrator conveys to the audience. She storytellers, then, add what seems rational to them, and leave out what seems meaningless or absurd. Lévi-Strauss (1963 Vol. 2, 224) also notes "that a fairy tale is nothing more than a narrative that puts into words a limited number of functions in a constant order of succession . . . nothing prevents the making up of tales where fairies have a role, without the narrative's conforming to the rules". Myths, then, have to be made. She people draw from the epic narrations they have heard told by the older generation in ceremonies, in records in their own family books, and in the artefacts and rituals in the ancestral temples, in reconstructing these myths for themselves. Even though the stories were originally based on Han classical literature, and today's She may learn them first in Han schools, She renditions are based on their own sources, rather than the versions told by the Han. It is due to the rational adaptation of narratives so that they continue to make sense in the modern world that I associate the She *mythos* with rationality, and due to the veneration of graphic depictions as sacred objects that I associate the She *logos* with irrationality.

CONCLUSION

The She people have a long history of oppression and migration, and their *mythos* and *logos* are seen as a realistic reflection of their experience. All the She to whom I spoke regarded these epics as precious treasures, although their recreation is a continual process and not an overnight work. Mythical thought always progresses from the awareness of oppositions toward their resolution. (Levi Strauss, 1963, Vol.1 224). Hundreds of years have seen the transformation of the stories from an outsider's view of the She to their own perspective, from shattered fragments to integrated stories, and from rational modification to irrational veneration.

The She way of educating their younger generations differs from the practices of modern society in that it is largely conducted through oral tradition and ritual, as well as graphic imagery. Although very different from scientific conceptions of education, She practices have their own rationality, which seeks to prepare their children for life as part of the particular social group into which history has delivered them.

In seeking to apply western concepts to understand Chinese material, this essay has faced complexities and difficulties. Yet if anthropological concepts are to be useful, they should be capable of being applied cross-culturally. The concepts of *mythos* and *logos* can open up new ways to think about the cultural manifestations of the She, and at the same time, the way the She think about their own cultural manifestations may shed new light on the concepts of *mythos* and *logos*.

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PSYCHOMETRIC PROPERTIES OF THE UNDERGRADUATE CLINICAL EDUCATIONAL ENVIRONMENT MEASURE UCEEM IN IRANIAN NURSING AND MIDWIFERY STUDENTS

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ABSTRACT: Background: Students' perceptions of the educational environment are an important construct in assessing and enhancing the quality of medical training programs. Reliable and valid measurement, however, can be problematic especially as instruments developed and tested in one culture are translated for use in another.

Materials and method: This study sought to explore the psychometric properties of the undergraduate Clinical Educational Environment Measure (UCEEM) for use in Iranian nursing and midwifery students. We translated the instrument into Persian and ensured its content validity by back translation and expert review prior to administering it to 215 nursing and midwifery Students Tehran Medical Sciences branch Islamic Azad University.

Results: One hundred and ninety seven questionnaires were analyzed. The factor analysis yielded four factors: F1: Opportunists to learn in and through work and Quality of supervision (8 items), F2: Preparedness for student entry (8 items), and F3: Workplace interaction patterns and student inclusion Supervision (7 items), F4: Equal treatment (2) items. All correlations were $r > 0.3$. Pearson's correlation coefficients indicated that the relationships between subscales conformed to the theoretical model. Coefficients for subscales ranged between 0.27 and 0.75. All correlations were significant ($p < 0.005$). The equal treatment subscale had a lower correlation with the other subscales (range 0.27–0.36). Relationships between the other three subscales varied between 0.53 and 0.75 and the reliabilities (Cronbach's α) of the items was 0.93.

Conclusion: The Persian version of the UCEEM appears to be a reliable and potentially valid instrument for use in Iranian nursing and midwifery schools and may find favor in evaluating the educational environments of nursing and midwifery programs nationwide

Key words: environment, undergraduate, evaluation, psychometrics

INTRODUCTION

Since knowledge, thinking, and learning are context dependent (Durning 2011), it is important to acknowledge the relationship between students' educational environment and their academic achievement and satisfaction (Soemantri 2010). Clinical education, in particular, is an environment with unique challenges and an effective clinical teaching environment balances and integrates the relevancy of professional education to patients as well as students' active participation, professional thinking, and behaviors (Clapham 2007). There are many tools to measure the educational environments in general, in different settings and different disciplines. Among them are: the Dundee Ready Education Environment Measure (DREEM) (Roff 2005), the Postgraduate Hospital Educational Environment Measure (PHEEM) (Aspegren 2007) and The Clinical Learning Environment Inventory (CLEI) (Chan 2003, Polio 2007). These instruments aim to explore the educational environment in general and its effect on the learning process. Factors related to academic atmosphere, facilities, and psychosocial characteristics of the clinical learning environment were the main focus of these instruments.

Despite the increasing interest to measure the effectiveness of the clinical education for undergraduate medical students, only a few studies have addressed the quality of teaching in undergraduate clinical education (polio 2000, Daleman 2004)

Assessing the quality of the clinical learning environment, then, should be done periodically. However, the reliability and validity of the resulting scores should first be established in the setting the instrument is to be used. The Undergraduate Educational Environment Measure (UCEEM) was developed and validated in Sweden using qualitative and quantitative methods (strand 2012).

UCEEM is a 25item questionnaire with three subscales tapping respondents' perceptions of: 1) Opportunists to learn in and through work & Quality of supervision; 2) Preparedness for student entry; 3) Workplace interaction patterns & student inclusion. and 4) Equal treatment Each item is measured on a five-point Likert-type scale, and is scored: 5 for 'Strongly Agree', 4 for 'Agree', 3 for 'Uncertain', 2 for 'Disagree', and 1 for 'Strongly Disagree' (There aren't any items with reverse coded . Total scores range from 27 to 125, with higher scores indicating a higher quality educational climate (strand 2012). Validity of Undergraduate Educational Environment Measure in an Iranian training context is unknown. Thus, this study assesses the psychometric properties of Persian (Farsi) version of the UCEEM in an Iranian nursing and midwifery program setting.

Table1. Comparison of Factors Extracted in The Study and the Original Questionnaire

Sub scale	<i>Factor& names</i>	<i>items</i>	<i>mean</i>	<i>min score</i>	<i>max score</i>
Original Subscale	<i>F1:Opportunists to learn in and through work & Quality of supervision</i>	3,4,5,6,13,14,15,16,17,18,25	36.6(8.9)	11	55
Original Subscale	<i>F2:Preparedness for student entry</i>	1,2,9,10,11,12	19.3(5.8)	6	30
Original Subscale	<i>F3:Workplace interaction patterns & student inclusion'</i>	7,8,19,20,21,24	20.5(4.9)	6	30
Original Subscale	<i>F4: Equal treatment</i>	22,23	8.2(1.7)	2	10
Study subscale	<i>F1:Opportunists to learn in and through work & Quality of supervision</i>	2,9,10,11,12,13,14,15	32(7.9)	8	40
Study subscale	<i>F2:Preparedness for student entry</i>	1,3,4,5,6,7,16,17	24.5(7.34)	8	40
Study subscale	<i>F3:Workplace interaction patterns & student inclusion'</i>	18,19,20,21.22,23,25	19.58(5.76)	6	30
Study subscale	<i>F4: Equal treatment</i>	8,24	5.47(2.37)	2	10

METHODS

After garnering the author's permission to adapt the UCEEM, two Iranian teacher proficient in English individually translated the instrument into Persian. We then sent the translated version to two reviewers (one clinical teacher and one medical education expert) who were asked to assess item relevance for Iranian nursing and midwifery programs.

Based on their comments, we made minor modifications to several items. To make the wording more appropriate in an Iranian context. The edited questionnaire was then back translated to English by a professional translator, who was blinded to the original version. We send back-translated version to original authors subsequently and he reviewed the back-translated version alongside the original questionnaire and found no conceptual differences. Finally, 20 selected medical education teacher of Shaheed Beheshti University of Medical Sciences, Tehran, Iran reviewed the Persian version to assess its face validity and reliability. Spaces for written suggestions were provided after each item; however, no comments were made regarding item exclusion or obscurity.

The pre-tested questionnaire was then administered to 30 nursing and midwifery students of the university. Construct validity of the scores was assessed using an Exploratory Factor analysis (EFA) and a Varimax rotation. We considered Eigen values 1.5 and factor loadings 0.5; a visual inspection of the inflection point in the scree plot dictated the factor extraction criteria. All analyses were conducted using SPSS Version 16.0 (6), and a critical p-value of 0.05 was set for all inferential analyses.

RESULTS AND FINDINGS

Two hundreds and fifteen (215) nursing and midwifery students returned completed questionnaires. The corrected response rate was 91.3% (eighteen returned instrument with less 50% of items completed was excluded from the study). Participants consisted of 64.4% nurse and 35.5% midwife, with a mean age of 23(19-36) years. Per the original subscales, the internal consistency (Alfa Cronach's) was 0.93 for total 25 items and (0.84-0.5) for inter items respectively. An EFA of student's responses revealed four factors with Eigen values 1.5 accounting for 51.8% of total variance. Items loading on multiple factors were assigned based on the largest coefficient. Extracted factors were identified by two researchers (Table 1). As shown in (Table 1), 8 items loading on Factor F1, were part of the 'Perception of Opportunists to learn in and through work & Quality of supervision'. 8 items loaded loading on Factor F2 similarly on 'Preparedness for student entry'. 7 items loaded on Factor F3 similarly on 'Workplace interaction patterns and student inclusion'. 2 items loaded on Factor F4 similarly on 'Equal treatment'. A summary of factor loadings is presented in Table 1. Some items, now loading on different dimensions, could be better interpreted when allowing them to contribute to another.

Description of the four factors

Items experience in the first version of the questionnaire appeared to change on the Persian version. Items that were intended for the factor F1 "Opportunists to learn in and through work & Quality of supervision". The initial version of this factor had six items. Two new items emerge in this factor." Factor F2 items loaded similarly on 'Preparedness for student entry'. The initial version of this factor had eleven items. Three of these items did not emerge in this factor. Factor F3 loaded similarly on 'Workplace interaction patterns & student inclusion'. The initial version of this factor had five items. Two items emerge in this factor. 'Factor F4' "Equal treatment". The initial version of this factor has had two items. Any of items has not been deleted. Table 1

DISCUSSION

In this study, we describe the development of a new instrument (UCEEM) for the evaluation of the clinical learning environment from the perspective of undergraduate nursing and midwifery students. This instrument was needed because of shortcomings in already existing instruments that were developed in the past. The 25 items of the (UCEEM) were based on a Sweden on the perceptions of students and teachers concerning an effective clinical learning environment (strand 2012), and on a survey of the literature. These items were placed under four factors. The main aims of the study were to investigate whether these factors could be confirmed by means of factor analysis and to determine the reliability and validity of the instrument. After establishing the final factor structure of the UCEEM the items of this instrument were attributed to the factors on which they had the highest loading. All factors were positively related to each other. Although, the highly significant correlations between all four factors might indicate that there is no need to differentiate between them, the fact that the correlations are all around. Moreover, the results have shown that the new instrument is to some extent able to discriminate between the qualities of the clinical learning environment of the fifteen hospitals that were involved in this study. In the assessment by a group of experts (clinical teachers and medical educators), the instrument

showed acceptable content validity. In pretesting with medical education teacher, the instrument also had suitable face validity. Regarding construct validity, the EFA revealed a multi-dimensional structure. The loading of items related to quality of learning through work and quality of supervision in the first factor reflects student' perceptions of the experiential learning Billet (2002, 2010). and loading of items in the third factor reflects social participation(Guile & Griffiths 2001).Both the original and the revised instruments showed good internal consistency across the representative subscales. Our Study was in accordance with Dr Strand study, have reported high internal consistency for the UCEEM. Our EFA results are similar to Dr Strand study (strand 2012), in which the UCEEM was also found to four unique factors. Comparison of factors extracted in the study and the original questionnaire.

Comparing the results of this study with the original questionnaire shows that the most of items in the original work loaded on three factors of our study: 'education system', 'training facility' and 'supervision' and two items of the original instrument ' equal treatment ' subscale loaded on our Workplace interaction patterns & student inclusion factor, with the remaining seven distributed to other factors. As the nature of knowledge, thinking, and learning is context specific, the cultural and educational system differences may have caused. These contextual considerations may also underlie observed differences in the educational support factor.

CONCLUSION

The Persian (Farsi) version of the UCEEM shows promise as a reliable and potentially valid instrument for assessing the clinical educational environment in this context.

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RECOMMENDATIONS

We recommend expanded study of this instrument perhaps in combination with qualitative approaches to identify factors affecting differences in group perceptions of the educational environment.

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SEASONAL VARIATIONS IN SPERM PRODUCTION, TESTICULAR SIZE, SERUM TESTOSTERONE LEVELS OF OULED-DJELLAL RAMS RAISED IN SOUTHEAST ALGERIA (BISKRA).

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ABSTRACT: The experiment was carried out in Southeast Algeria (34°25' N latitude). Six Ouled-Djellal rams were used to study the effect of day length on seminal characteristics, testosterone (T4) and testicular size. Semen of rams was collected with an artificial vagina, one ejaculation per month during the breeding season (autumn) and no-breeding season (spring) (2013) and blood samples were obtained via jugular vein.

The means (\pm SD) obtained for the different parameters studied were respectively during the autumn and spring: live weight 88.0 ± 7.4 kg and 94.7 ± 9.6 kg, testicular weight 838.9 ± 215.3 g and 916.7 ± 173.2 g, scrotal circumference 32.1 ± 3.4 and 34.1 ± 2.4 cm, scrotal width 10.7 ± 1.2 cm and 11.1 ± 1.0 cm, sperm volume 1.0 ± 0.3 ml and 0.9 ± 0.3 , massal motility 2.9 ± 1.4 and 2.1 ± 1.6 , sperm concentration $2.7 \times 10^9 \pm 1.4 \times 10^9$ spz/ml and $2.8 \times 10^9 \pm 1.8 \times 10^9$ spz/ml, total sperm number $2.6 \times 10^9 \pm 1.8 \times 10^9$ spz et $2.8 \times 10^9 \pm 2.3 \times 10^9$ spz, pH 6.9 ± 0.2 and 6.7 ± 0.4 , percentage of dead spermatozoa 36.4 ± 22.6 p. 100 and 50.4 ± 19.9 p. 100, percentage of abnormal spermatozoa 11.3 ± 10 p. 100 and 13.1 ± 9.1 p. 100. Serum testosterone concentration was similar in both seasons 3.0 ± 2.2 ng/ml vs 5.1 ± 4.1 ng/ml.

No variation of the semen characteristics among rams of seasonal variation in semen quantity (volume, concentration and total number of spermatozoa per ejaculate), semen quality (percentage of dead spermatozoa, sperm motility and percentage of abnormal spermatozoa), serum testosterone concentration and testicular size were not significant ($P < 0.05$). However, the existence of differences among rams ($P > 0.05$) in semen quality and quantity makes it necessary to perform a semen evaluation on individual basis in order to select the best males before they are used for breeding.

Key words: production, season, ram, ouled-djellal, Algeria.

INTRODUCTION

The Ouled-Djellal is considered to be the most predominant and important sheep breed in the Algeria. It is raised to provide mutton and wool. In Algeria, sheep produced 172,300 tons of red meat (Algerian Ministry of Agriculture, 2009). This breed has good characteristics, such as the quality of meat and wool, the ability to walk long distances, and the ability to cope with harsh environmental conditions (Saad, 2002).

Males are less influenced by seasonal changes in reproductive patterns than females although monthly variations in testicular size and semen characteristics were reported in different breeds and among individual rams of the same breed (Salhab *et al.*, 2003). Monthly variations in semen quality and quantity are due to differences in length of daylight throughout the year (Chemineau *et al.*, 1992). Although information is available on the semen characteristics of several sheep breeds (Gundogan and Serteser, 2005), very little is known regarding seasonal variation in semen characteristics of Ouled-Djellal sheep.

This study was designed to evaluate seasonal variations in live weight (BW), SC, SW, TW, semen characteristics and serum testosterone concentration of Ouled-Djellal rams in the southeast of Algeria.

MATERIALS AND METHODS

General

The study was conducted at the Regional Center for the Artificial Insemination and genetic improvement located in the southeast part of Algeria at 33°25' N latitude. Data were collected during the breeding season (autumn) and no-breeding season (spring) (2013).

Animals

A total of 6 mature Ouled-Djellal rams were used in this study. All these rams were in good health. They were 2 to 4 years old with live weight ranging from 74.0 to 96.0 kg and a SC from 28.1 to 34.1 cm. Rams were maintained in open-front barns (with free access to water, shade, mineral and salt blocks). Rams were fed 0.9 kg per head per day of barley and 0.4 kg per head per day of roughage (shredded wheat straw and alfalfa).

Data collection

Data were collected monthly for all rams. On the day of testing, all rams were weighed (BW). Scrotal circumferences (SC) were measured using a flexible tape at the widest scrotal diameter. Scrotal width (SW) was measured with a caliper ($1 \pm$ mm) at the maximum level of the scrotum. Testicular weight (TW) was taken by the technique of water displacement (Oldham *et al.*, 1978) using a graduated bucket full of water, immersing the testicles in this bucket and noting the volume of overwhelmed water.

Semen samples were collected using an artificial vagina. Ejaculate volume (V) was determined immediately after collection from a transparent graduated vial. pH was performed using pH paper. Massal motility (MM) was assessed by viewing one drop of semen at low magnification ($10\times$) and assigning a score from 1 to 5 (Baril *et al.*, 1993). A 50 μ l fresh semen sample was diluted with 10 ml of NaCl for determination of spermatozoa concentration (C) using a spectrophotometer. The total sperm per ejaculate (TSN) product is the product of volume and concentration (Marco Jimenez *et al.*, 2005). It is calculated immediately after the assessment of the concentration. Furthermore, a semen smear was stained with eosin–nigrosin to determine percentages of dead (PDS) and abnormal spermatozoa (PAS). Each of these measurements was made by the same person throughout the experiment to minimize between-operator variation. Blood samples were collected from the jugular vein. Plasma testosterone (T) was measured by electrochemiluminescence (ICLIA).

Statistical analysis

Data were expressed as means (\pm SD). Means comparison was performed using Costat software (1994).

RESULTS

This study evaluated the effect of season on BW, SC, SW, TW, and semen characteristics of Ouled-Djellal mature rams. Ram LW was not influenced by season ($P > 0.05$) (Table 1) (figure1). Their weights during the season of autumn and spring (88.0 ± 7.4 and 94.7 ± 9.6 kg, respectively). Similar to TW, CS, SI (Tab. 1) was not affected ($P > 0.05$) by season of the year (Table 1).

There was no significant effect of seasons on pH, volume, massal motility, concentration and total sperm number ($p > 0.05$). High percentage of dead spermatozoa was observed in spring months (50.4 ± 19.9 %) but it's not significant ($p > 0.05$) (figure 2). The percentage of abnormal spermatozoa in Ouled-Djellal rams recorded highest values in the no-breeding season (13.1 ± 9.1 %), but it's not significant ($p > 0.05$).

The results of Table 2 show that the means of serum testosterone concentration ejaculate for breeding season and no breeding season were 3.0 ng/ml and 5.1 ng/ml, respectively. Testosterone concentration of autumn and spring were not statistically different ($P > 0.05$) (table 1 and figure 2).

Table 1. Testicular Parameters, Live Weight And Semen Characteristics (Mean ± SD) Of Adults Ouled-Djellal Rams

Variable	Season		P-value
	Autumn	Spring	
Live weight (kg)	88.0±7.4 ^{ns}	94.7 ± 9.6 ^{ns}	0.2289
Testicular weight (g)	838.9 ± 215.3 ^{ns}	916.7± 173.2 ^{ns}	0.6833
Scrotal circumference (cm)	32.1±3.4 ^{ns}	34.1 ± 2.4 ^{ns}	0.5630
Scrotal larger	10.7±1.2 ^{ns}	11.1± 1.0 ^{ns}	0.8824
Ejaculate volume (ml)	1.0 ±0.3 ^{ns}	0.9 ± 0.3 ^{ns}	0.5628
pH	6.9 ± 0.2 ^{ns}	6.7 ± 0.4 ^{ns}	0.4111
Massal motility (%)	2.9 ±1.4 ^{ns}	2.1 ± 1.6 ^{ns}	0.2166
Sperm concentration (10 ⁹ /ml)	2.7±1.4 ^{ns}	2.8 ± 1.8 ^{ns}	0.2764
Total sperm number	2.6±1.8 ^{ns}	2.8 ± 2.3 ^{ns}	0.1441
Percentage of dead spermatozoa (%)	36.4 ± 22.6 ^{ns}	50.4 ± 19.9 ^{ns}	0.6489
Percentage of abnormal spermatozoa (%)	11.3 ± 10 ^{ns}	13.1 ± 9.1 ^{ns}	0.3569
Serum testosterone concentration ng/ml	3.0± 2.2 ^{ns}	5.1 ± 4.1 ^{ns}	0.3733

ns (not significant): $p>0.05$.

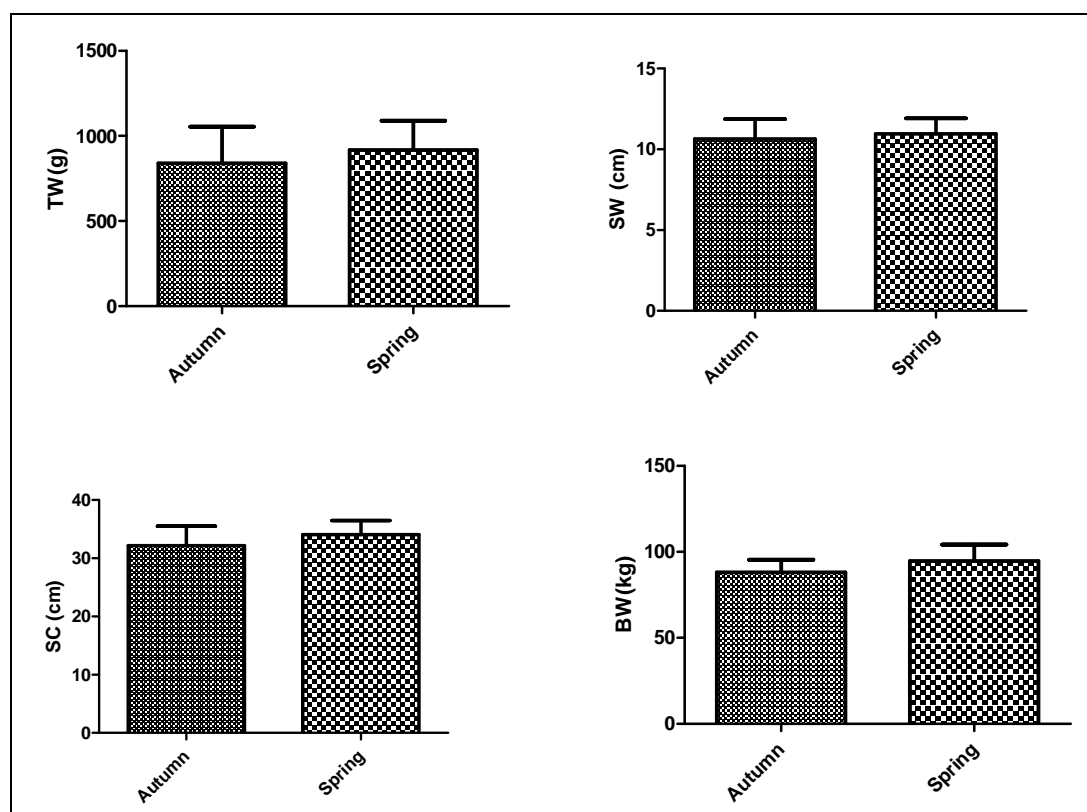


Figure 1. Seasonal Changes In Mean ± S.D. Testicular Weight (TW), Scrotal Width (SW) And Scrotal Circumference (SC) And Body Weight (BW) In 6 Ouled-Djellal Rams

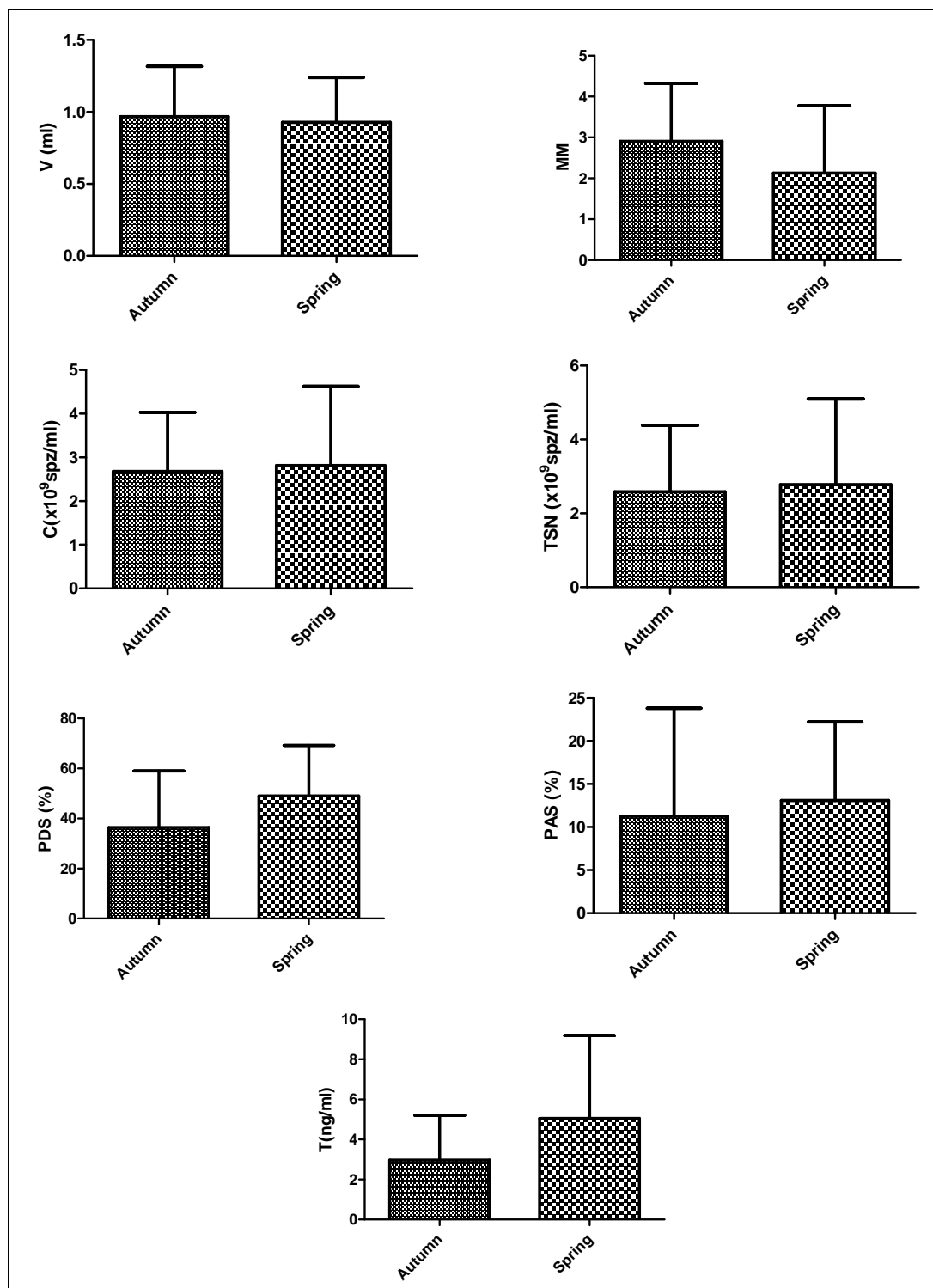


Figure 2. Seasonal Changes In Mean \pm S.D. Volume (V), Missal Motility (MM), Concentration Of Spermatozoa (C), Total Sperm Number (TSN), Percentage Of Dead Spermatozoa (PDS), Percentage Of Abnormal Spermatozoa (PAS) And Plasma Concentrations Of Testosterone (T) In 6 Ouled-Djellal Rams

Statistical analysis showed that the existence of differences among rams ($P < 0.05$) in size testicular, live weight, semen quality and quantity and serum testosterone concentration (table 2).

Table 2: Variation In Testicular Size And Body Weight Depending On The Individual

Size testicular +BW Ram	BW (kg)	TW (cm)	SW (cm)	CS (cm)
A	104.16±8.2 ^a	891.66±191.9 ^{ab}	11.16±0.8 ^a	33.8±2.4 ^a
B	94.83±5.6 ^b	950±217.6 ^{ab}	11.11±1.0 ^{ab}	34.2±3.2 ^a
C	85.16±7.8 ^b	708.33±208.9 ^b	9.56±1.1 ^c	29.56±2.8 ^b
D	88.08±7.8 ^b	1016.66±181.5 ^a	11.7±1.5 ^a	35.15±4.0 ^a
E	88.66±5.3 ^b	916.66±163.5 ^{ab}	11.15±1.0 ^{ab}	34.01±2.1 ^a
F	87.16±5.6 ^b	783.33± 155.4 ^b	10.13±1.0 ^{bc}	31.83±2.5 ^{ab}

Mean values with different letters in the same column are significantly different ($p < 0.05$).

BW (poids vifs); TW (Testicular weight); SW(Scrotal width), SC (Scrotal circumference); (mean ±SD).

Table 3: Variation In Semen Characteristics And Serum Testosterone Concentration Depending On The Individual

Semen characteristics +T	V (ml)	pH	MM	C (10^9 spzs/ml)	TSN (%)	PDS (%)	PAS (%)	T (ng/ml)
Ram								
A	0.55±0.3 ^b	6.8±0.3 ^a	2.81 ±1 ^{ab}	3.31±1.7 ^a	1.83±2.5 ^c	38.08±21.9 ^b	22.66±20.7 ^b	5.8±3.5 ^a
B	1.16±0.2 ^a	6.7±0.3 ^a	2.63±1 ^{ab}	2.48±0.9 ^b	2.86±1.9 ^b	46.33±8.7 ^{ab}	29.58±11.7 ^b	6.3±4.3 ^a
C	1.1±0.3 ^a	6.7±0.4 ^a	2.73±1.3 ^{ab}	2.56±1.2 ^b	3.01±2.2 ^a	36.41±20.7 ^b	16±17.0 ^c	2.8±3.4 ^{ab}
D	0.96±0.4 ^{ab}	6.7±0.4 ^a	3.7±0.6 ^a	1.26±1.1 ^c	1.48±1.3 ^c	68.91±14.9 ^a	42.08±20.4 ^a	6.3±2.7 ^a
E	0.95±0.3 ^{ab}	6.7±0.4 ^a	2.73±1.8 ^{ab}	3.23±1.7 ^a	3.43±2.4 ^a	42.3±27.2 ^{ab}	19.25±12.2 ^c	4.3±3.4 ^{ab}
F	0.95±0.3 ^{ab}	6.8±0.4 ^a	3.56±1.9 ^a	3.61±2.4 ^a	3.44±1 ^a	26.91±22.6 ^b	16.5±23.1 ^c	2.1±1.0 ^{ab}

Mean values with different letters in the same column are significantly different ($p < 0.05$).

V (volume); M (massal motility), C (concentration); TSN: (total sperm number); PDS (percentages of dead spermatozoa); PAS (percentages of abnormal spermatozoa); T (plasma testosterone); (mean ±SD).

DISCUSSION

The current study monitored no seasonal variation in testicular parameters and live weight of Ouled-Djellal rams raised in Center of Artificial Insemination in Algeria. So, day length is not one of the most important factors that determines the breeding season in small ruminants within temperate latitudes. The constancy of live weight and testicular parameters during the study period is typical for this region, especially when taking into consideration a constant ratio of wheat and hay during this time of year. Plane of nutrition (Thwaites, 1995) and daily gain (Tulley and Burfening, 1983) influence SC. Several previous studies reported a higher SC during the autumn months for bucks (AlGhalban *et al.*, 2004) and rams (Kafi *et al.*, 2004; Dickson and Sanford, 2005).

The effect of season and/or day length on semen quality has been studied in different breeds of rams (Ibrahim 1997; Kafi *et al.*, 2004; Deldar Tajangookeh *et al.*, 2007; Makawi *et al.*, 2007). Contrary to our expectation, results of the present study showed that semen characteristics and serum testosterone concentration of Ouled-Djellal rams did not change at all throughout the period of breeding season and no breeding season. In the present study, the rams were fed in the same way during the whole experiment, and the semen was sampled regularly. The results of the present study showed that Ouled-Djellal rams had continuous and acceptable spermatogenic activity during all seasons of the year.

Season effects on semen quality and production were less pronounced like those reported in seasonal breeds of goats (Roca *et al.*, 1992; Kridli *et al.*, 2007) and sheep (Kafi *et al.*, 2004; Gundogan, 2006). Percentage of dead spermatozoa and percentage of abnormal spermatozoa were numerically lower during spring but no significant difference was revealed ($p>0.05$). Similarly, Perez and Mateos (1996) and Kridli *et al.* (2007) reported lower percentage of dead spermatozoa and percentage of abnormal spermatozoa during the spring compared to autumn in bucks. These results are in agreement with those reported previously (Amir *et al.*, 1986). Similar to results reported by Salhab *et al.* (2003), sperm motility was not influenced by season. The lack of a significant month effect regarding semen quality may be attributed to the high individual variations among rams.

Karagiannidis *et al.* (2000) concluded that differences among individual rams within a breed in semen quantity and quality parameters indicate performing semen evaluation before using them for breeding.

CONCLUSION

In a country like Algeria where the majority of sheep farming is extensive, nutrition may be the most important factor influencing reproductive performance. Day length may don't have the greatest effects on testicular parameters and spermatogenic characteristics during the season. Because similar semen characteristics were recorded, both autumn and spring can be used for non-breeding while taking into consideration the ram to ewe ratio with respect to ram age. The fact that considerable individual ram variation existed indicates that better male selection and conducting semen evaluation of rams are essential to obtain good fertility.

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THE IMPORTANCE OF REASON OF TOURISM EDUCATION IN IRANIAN SCHOOLS

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ABSTRACT: The accurate touch of life and living environment for every child is a requirement of growth.

Adolescence period is between childhood (period of irresponsibility, irrationality and movements with many variable errors) and youth (a period in which individual shall enter the community and acquire many experiences and knowledge, in which the formed personality hardly changes).

Tourism is an item promoting and completing this growth (Anderson, 1997). Since the developed countries perform the scientific and practical plans for this age range for having the specialist, aware, self-reliant youngsters but neither is there a system in Iran working in this range and giving us the living information, education and skills, nor does they have found out the value of this importance. They include the natural and wild sections, eco-farm and enclosed workshop space, and may solve the current problems of societies such as parents' business, lack of good entertainment facilities and high expenses of travel for families which cause many parents in different reasons can't provide suitable entertainment and amusement for their children.

The results show that because many adults acquire knowledge in adulthood and they are not institutionalized in their origin, they will face problem in practice; therefore, they fail to undertake management position of a related system while childhood structure of a child will form correctly in terms of the environment, travel, nature and the child identity by developing the tourism and ecotourism schools so that they may progress in adulthood for sustainable development as an individual or citizen.

Therefore, it is necessary for this age range to have a professional center. Even if we are willing to manage schools with a scientific approach, better we guide our children to a green and knowledgebase future and jobs as tourism and ecotourism schools are a good field for this purpose.

Key words: tourism, ecotourism, tourism education, tourism and ecotourism schools

INTRODUCTION

About 300000 newborns are daily born in the world. It means that 300000 newborns enter the world in which they should be supported, cared and their welfare should be supplied at the beginning of the birth. The child should enjoy economic, social and legal rights for promotion and growth. The child is entitled to understand and identify himself/herself as much as possible during childish periods, when his/her character is formed. Respecting on human rights, the fundamental freedoms, language, respecting on others from person to civilization, are the cases if are not rooted in childhood period, are formed in adolescence hardly. Identification of humans, human groups, nations and religion and above all, identification of surroundings i.e. natural environment also require notification in childhood periods (Ederton, 2005). There is no need to comparison and exemplification: The societies in which the adolescence more respect on their surroundings. their training structures for the children, for long years are formed more beautiful and scientific. As Beyken said "Travelling in Youth is a kind of education" (Ali Mohammadi 2012). The basis of an advanced training, is that the children can experience directly all dimensions of life. We should help the child could communicate with other human and his/her ecosystem with his/her method. If the children can go beyond the course, find out and experience their surrounding environment together with the nature teacher, is very effective experience. We cannot keep the children in a closed space of the school and then expect that they are trained art, literature, history and many other subjects (Chisforth 2003).

At present the training outside framework of course and learning through, is considered as one of the main aspects of children training in the world. Travel courses combination of official and unofficial training which is referred to as a strategy for lifetime learning. At present, many researches are done in the field of children

tourism which indicates influence of travel children training and education. As it was said, the children tourism plays an important role in health and happiness of them. Experience of new communications and group games causes promotion of their social and emotional skills and attendance in group influences on development of accountability spirit and their cooperation. Exploration, objective perception and experience of attendance at different urban and natural information and increase interest in learning (Hijdran 2013). Kavi Nature and Tourism Schools are established and developed throughout all regions of the country. for this purpose, this research attempts to study influence of tourism training on the Iranian children and Youth via Kavi Nature and Tourism Schools.

Research Question:

1-May development of Kavi Nature and Tourism Schools affect on tourism development via tourism at these schools

Background:

Mr. Saeid Rastegar 2014, has done a research under title of Presentation of Integrated Algorithm for solving problems of tourism training to the students, 5 to 10 years old, with approach of multipurpose decision taking dealt with training programming in urban and regional tourism development plans, as one of main axes of the research, when there is extensive scope of tourism plan and there are many limitations for establishment of training places, met heuristic algorithms can be used for optimal establishment of the training centers in the environment by spending acceptable time and material expense. The goal of this research, at first, is introduce integrated approach for modeling of tourism training problem and then introduce a new algorithm for solving the problem. In this regard, tourism zone with an area of 14 and 600 ha. of lands at Persian Gulf as the case study based on the mentioned algorithms were studied and based on indices such as economic goals, complex traffic volume, .. was trained in the form of a mathematics programming with 3 functions of tourism training goal to the children, material and time expense in integration of allocated parcels. This modeling process and solution of tourism training problems scientifically regarding to the new resources, are considered as suitable alternate or traditional methods regarding relative high speed in design as well as providing a system-decision support as a new approach in tourism training problems.

Ms. Fatemeh Salarvandian 2013, did a research under title of Evaluation of Training System of Iran Nature and Tourism Schools with developed countries via regression Model in Ardebil province with the purpose of comparison of tourism training systems of Iran and Netherlands, correct and appropriate use of progressive countries experiences in tourism training to the children and youths that are considered as primary and important principles of sustainable development of tourism. In this research, tourism training plan of both countries was prepared and evaluation of Iran tourism training system power in Ardebil province by establishment of Nature and Tourism Schools and comparison of power of this training system by Amsterdam – Netherlands was done. The result showed that ecological and historical power is not properly used for tourism training to age-group, object of research in the ancient and Kavi nature fields, in the sample of Iranian Study, but in sample of Dutch study, in addition to establishment of Kavi Nature and Tourism Schools, neutral and historical potential of the city along with establishment of hotels and amusement parks appropriate to tourism training, for target age-group, has been used.

Mr. Abbas Alimohammadi Sarab 2012 did a research under title of Evaluation of Tourism Training System with Fuzzy AHP (analytic hierarchy process) method. Evaluation of tourism training system requires particular consideration of relationship and dependence of state training system with and on state tourism system. The methods indicating Management Information System and Multi-criteria decision making are considered as Usefulness Tools. Since dealing with mentioned matter requires the people's partnership with different views and tastes, Evaluation of Tourism Training System to the target group, has nature of collective decision making. In this research, by integration of management information system capabilities and Multi-criteria Fuzzy collective decision making, the children and youths are provided with method for evaluation of tourism training system. In applied method, the general process for assessment of training with Fuzzy AHP (analytic hierarchy process) method including selection of effective criteria, determination of significance and weight of each criterion, have been studied by using tourism management information system. Results of model in the scope of case study in Esfahan were assessed. Results of this modeling show sufficient ability of Fuzzy AHP (analytic hierarchy process) method and tourism management information system in evaluation of criteria affecting on tourism training to the children and youths with collective decision making viewpoint. The comparison of the results arising from Fuzzy AHP (analytic hierarchy process) model with results of known method indicating adding up the expert opinions, show that existence of a tourism management information system is effective in analysis of tourism training requirements and making training topics regarding tourism potentials of each zone.

METHOD

Achieving knowledge with research methodology is considered as a science. Scientific research methodology is a set of explicit guidelines on which research is based. The research methodology differs from subject to subject and is affected by nature of research (Zolfaghari 2009). The research methodology is the combinative method depending on descriptive, casual-comparative methods. To evaluate quantitatively and qualitatively, the statistical data of Kavi Nature Schools at Kavi Konj Nature School and the institutes holding tours and data at Tourism, Cultural Heritage and Handicrafts Org. of the above provinces are used and for collection of data, the interview with statistical universe of the research including experts, personnel of the concerned institutes and organizations with subject of research including Education Departments, Tourism, Cultural Heritage and Handicrafts Org. and Municipalities and opinions of several youths obtaining the training in such schools were used.

DISCUSSION

Media development, either succeeded or failed, could have transferred some concepts to the past generation, but it is not sufficient for the present generation. Media conflicts and misconduct tastes in Media products, sometimes misleads. The present generation needs a thing which sometimes leads to destruction of the child's identity (I10211).

Correct-touch of life and life environment by each child is one of growth necessities and tourism is one of the cases can promote and compete this growth (even when child is handicapped physically or mentally, should enjoy a complete and respectful life in the condition containing status and increase of self-confidence, - (child rights convention) tourism by means of direct touch of life behind the life, shall provide the child's curious and sensitive mind with many opportunities. (Mapel Craft 2012). The effects which seem simply but are deep and it can be found at memories after children's travel. Each small accident in childish period, from touching a stone to running, falling down in the hill of mountain, from seeing a mosquito to seeing a pelican, even eating food in a new space or purchasing a device at related destination as it was noble to the children, remain beautiful memories for the children for a long time or several years which are described with the same childish emotion even in adolescence periods. The happening never occurs during adolescence periods. Many psychologists and sociologists believe that family travel and tours influences on the future life of children so that they refer to it as early university in the training of children (Vedrana 2011). In advanced countries, to have young skilled people having self-confidence, have spent a lot of money to do scientific and practical programming for this age-group. Tourism of children and youths in different countries are provided by Tour Leaders and Tour and Travel Agencies, not only in the form of travels and camps but also in the form of specialized tour services of the children and youths and tour leaders, narrators, and designers of collective and drama plays, for child and youth go along them. They prepare and design different destinations including museums, training camps, cultural-sport centers, promenades for accommodation of children and youths and provide their addresses with annual and monthly visas.

Youth periods, the interval between childish periods (irresponsibility, unreasonableness and wrong actions periods which are changeable) and youth periods (the periods when the person enters the society and gets many experiences and information. In this age, the formation of character will be changed hardly). At present, unfortunately there is no system in our system acting between these two spectrums, and gives information, trainings and skills of life to children was remarkable signified in the past times. The only social status of our children in the past times, designs and engraves of Ilam rocks in which excavate the children's role along with royal family. Existence of centers initial tablets of scribe training in the centers known as EDUBBA indicates training of persons containing class of children and youths. Nature tourism and tourism exist from past times and allocated to special groups and has been considered as scientific tour that the students went to nature accompanied by an expert, trained and returned.

FINDINGS

Nature tour and tourism is an experience. It may be so related to the classic training. Whatsoever, we see in the nature and ancient and culture places motivates curiosity and causes find the component of whatever we may have no academic knowledge in the nature (Birness 2001). We experience an ecosystem without hearing it and understand the relationship among their components. Thus, we can find the significance of any component in continuation of nature. Then, we are motivated to preserve the environment, but when we see them in a collection, we find they make the natural environment together with each other, we find motive of preservation (Rastegar 2014)

But when we talk about ecotourism and tourism in the nature we see both sections , some of them are the leaders leading in the nature , and some of them are addresses going to this tour and are planning to learn something.

In this respect Kavi Nature and Tourism Schools are established. In such schools, the training is about to meet the child's needed. This training may help the children deeply reach different stages of life and experience it. This is a cycle whose different sections fulfill each other. These schools contain natural and wild sections, Ecofarm section and roofed workshop space. Children and youths studying at Kavi Nature and Tourism Schools have opportunity (open) interaction with water, soil, stone , heat, cool, plant, insect and animal. The open, single or group interaction, based on intrinsic motivation and unlimitation. If we are supposed to manage schools with scientific approach, we direct our children toward green future, green jobs and knowledge – based. In this respect, Kavi Nature and Tourism Schools is good field.

Nature Tour Training Section:

In the context of Kavi Nature training, naturally one of the main dimensions is ecology. In order that the children can properly perceive the environment in which they live. In this school the children under the age of 5 to 15-year youths can unlimitedly and indirectly run, touch, identify, learn and explore in the corner of this free space. The students get familiar with different natural spaces and enjoy the environment facilities for training of students and promote happiness spirit of the children. Three main points in training program of the schools should be taken into consideration: the first point is the present generation in apartment spaces and the deprivation of open and natural spaces. The second one, their loneliness who only at nature school and in organic and free space may communicate with each other children in unstructured groups, third one: their deprivation of the nature that at present can communicate with nature under safe conditions. Programs of this school shall not be formed officially so that the children may be conducted toward programs, but they live in open space and school plays the role of facilitator for attendance and their activities children can run on the land, find insect, lively experience plants and children, touch them, construct small houses on the tree by using natural devices. The children and youths are helped to invent irregular games and they are said that any game is possible in the nature. Another property of which is to take a role model in world of the current science. When the children are familiarized to nature, they detect the pattern in the future when they refer to the industry.

Tourism Training Section

The current conditions of the societies such as the parents' concerns, lack of proper facilities of recreation and relatively high expenses of travel for families , has caused that many parents fail to provide their children with proper recreation for different reasons. Therefore, it is necessary to establish a professional center for this group. We should provide this age-group with happy and recreations with the help of experts of different fields, provide them with effective training (unfortunately its vacuum is seen academic courses) practically and attractively. For example, physics training by applying its rules on daily life, training of daily works in the nature collectively (by group), method of accountable conduct with nature and enjoying the environment without harming it. Thus, the above plan, emphasizes on child and youth's age, provides them with social, scientific and recreations training in the nature by using natural facilities. These programs are arranged by using proper and standard equipment by relying on the experts' knowledge and experience. The children are used at different training workshops and they attend in collective competitions and games for creation of memorable day.

To familiarize the children with category of cultural heritage , several objects are hidden in on the earth and the children are familiarized with scientific methods of archeology and extract them, thus by establishment of simulated space of archeology site, the children are familiarized archeology occupation , tools, procedure, discovery, identification and transfer of historical objects and trained . By hardware maquets and or software simulation, the children and youths are said that how they live, which accent they speak, and totally sometimes there are many differences . The differences between life and the life of the environment of the people we travel to their city or place of life are very respectable and we are not entitled to blame anyone for these differences are valuable and without them, the travel was not useful.

By this way, they are helped make unique memories for them even if they might not travel to the region in reality. These memories in such schools are defined and restrictive which is the strategy for saving many adolescences confusions, on the other hand, the child who has not experienced a target travels in childish period, in adolescences with all their interests and tastes less may go to travel, identify the destination, receive the environment, enjoy travel based on his purpose, and act positively and effectively. May be it is better to say when the childish structure of a child in communication with the environment , travel , nature and identity has not properly formed, in adolescences periods, he fail to take step with sustainable development . The most adults have got a lot of information since these training have not been institutionalized and face the problem. Many

training are formed in childish period. Even very initial training such as : avoid leaving the garbage in the nature, breakage of trees branches , non offending the animals , non imposition of damage to the respectable places such as cultural heritage , mosques and tombs,...

DISCUSSION AND CONCLUSION

Since the most important age-group is to familiarize with such processes which may form intellectual and behavioral fundamentals of the child. Integration of three factors of the children's introduction to sport, environment and tourism can be studied. Despite some believe that it is difficult to children to understand concepts such as tourism in younger ages , the author of this paper believes that each training to be institutionalized, should be started from the beginning and youth period , tourism concepts can be trained to the children by simple method at the younger ages. Training of tourism in younger ages does not mean study of structure of tourism industry but it can be transferred to the child to make the children familiarized with process of leaving the home for recreation in the nature and then coming back home. Within the process, all necessary training of the children is taken into consideration.

If the process is planned in the places such as Kavi Nature and Tourism Schools, it may contain transfer of children and youth. In the places such as Kavi Nature and Tourism Schools, the bioenvironmental concepts can be trained. These concepts include observance of bioenvironmental principles to introduction to the plant and animal. The children are familiarized with many national and religious cultures and ceremonies. However, integration of the environment and tourism, at Kavi Nature and Tourism Schools, for the younger children, is the proper strategy for transfer of fundamental concepts. Since such activities are defined in these schools in the form of defined process and transferred to the children and youths and may attempt to attain the goals demanded by the programmers and make ready the children and youths for optimal understanding of the surrounding world. When many elders face with problems with understanding of environmental, cultural and ancient concepts, even observance of initial concepts of sustainable development in tourism and neglect to execute them, by integrated training of the children in the initial ages of each age group can have better cultural investment for the future in such schools.

Suggestions:

The following cases are considered as suggestions and strategies for completion of activities of such schools:

- Considering interdisciplinary skills
- Making interaction and understanding between training and education and tourism industry.
- Educating specialized leaders of children and youths
- Professional and safety design of training program and training tours of children and youths.
- Managing the skilled tour leader along with teachers of such schools
- Non reducing tour, travels and nature tour to a camp without programming
- Enjoying the tourism, to leading and tour leader experiences in the country in the field of children and youths.
- Preparing centers and goals for children and youths.

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INTERPRETING TABOO: DEVELOPING AND EVALUATING STRATEGIES IN THE TRANSFER OF TABOO LANGUAGE

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ABSTRACT: Taboo is anything which is said or done that is seen as offensive or embarrassing. Equally it is an agreement amongst people to NOT say or do something as it may be seen as embarrassing or offensive! To interpret taboo is hard within the same language community as the definition of taboo differs according to many factors such as gender, age, social class, era and context, but it is even harder to interpret between two language communities especially if the two belong to cultures that are vastly different. However, omitting taboo can lead to severe consequences that may have legal implications or may even be fatal; hence it can no longer be ignored. Some scholars have described taboo in its cultural and linguistic forms while others discuss to a small extent a method to translate swear words by freeing them from their referential duties. However, not much literature has been found so far on interpreting or the teaching of interpreting of taboo or on the consequences of avoiding interpreting taboo. This paper will attempt to raise awareness of the consequences of not interpreting taboo in public service interpreting (PSI). The author has undertaken a pilot study on 20 public service interpreting students, as part of her PhD research, with the aim of showing and quantifying attitudes towards interpreting taboo and to compare them with what is described in the literature review.

Key words: taboo, interpreting, training, culture.

INTRODUCTION

Interpreters look at taboo differently according to their cultural and religious background; gender also plays a role in their choice of whether they deal with taboo or not. Raising awareness of what is taboo, be that spoken or body language taboo, and what would happen if taboo was not dealt with correctly during interpreting events, should help interpreters in accepting the need to interpret such things. Having guidelines to help them along the difficult path of doing what they may see as an unacceptable task would lead to fulfilment of this target. Through years of teaching translation and interpreting, many students have either refused to interpret specific speeches because they were given by someone they disagreed with politically, or they would not interpret certain words, even in medical settings, because they considered them to be taboo, such as bodily functions, ladies' undergarments and certain body parts; yet all those are vital for effective communication between a doctor and a patient. It soon became clear that guidelines and training in practicing those guidelines would help greatly in such situations.

Most research on taboo has been in the field of sociolinguistics, mainly studying the origins of taboo word usage, to the reasons behind the use of such words, discussing the effect of their use on society, but not much is found regarding methods of translation (Trudgill, 1988).

Eco (2003), McEnery (2009), Hughes (1998), Allen and Burridge (2006) and Baker (2008) describe the effect of taboo on language and on culture plus the link between taboo and translation. For example, Allen and Burridge (2006) look at how words evolve through the use or avoidance of taboo words. Other scholars look at other aspects of taboo (impoliteness) and communication (Bousfield, 2010). Andersson and Trudgill (1990) discuss bad language, indicating that sometimes swear words cannot be interpreted literally as they are used to express emotion rather than for the sake of swearing per se, so if a person uses the word shit, it is suggested we 'free' the term of its literal meaning (i.e.: excrement) from its referential duties, and then we can use it to express emotions and attitudes; this is relevant to the subject in hand.

Terms of Reference and Classifications of Taboo

Taboo, according to the Oxford Advanced Learners' Dictionary (OALD) (2002: 1322) is 'a cultural or religious custom that does not allow people to do, use or talk about a particular thing as people find it offensive or embarrassing'. OALD (ibid) also defines taboo as 'A general agreement not to do something or talk about something'. As for taboo words specifically, they are defined by the OALD (ibid) as 'words that many people consider offensive or shocking, for example because they refer to sex, the body or people's race'. All languages have taboo terms, the British anthropologist Edmund Leach (cited in Andersson & Trudgill, 1990: 14) has suggested that taboo words, in English, fall into three major groups, they are

- a. 'Dirty words' relating to sex and excretion, such as fuck,
- b. Words that have to do with the 'Christian religion', such as Jesus Christ

c. Words that are used in 'animal abuse', such as bitch, cow.

However, these groups can be blurry, and may merge into each other; turning what was once blasphemous, for example, into a non-blasphemous term in current use such as the word 'gee!' which was originally Jesus, (current: non-blasphemous originating from a blasphemous term).

Another classification by Abrantes (2005) of taboo topics divides them into

- a. Fear based topics (Death, diseases)
- b. Shame based topics (Sex and bodily functions)
- c. Politeness based topics (insults)

This change in the status of what is nowadays considered to be taboo, and what is not, demonstrates the rapid changes within different societies; it also highlights one of the difficulties in interpreting taboo since an interpreter needs to stay abreast of what is currently acceptable and what is not.

Breaking taboos can lead to punishment, which is meted out depending on which taboo was broken (Thomas, cited in Freud, 1919). This punishment could be self-regulated, or if that taboo was against the God or a priest, then God or the priest will punish you. However, if the broken taboo has the potential to affect the whole community or someone other than the person who broke the rules, then with time, it became that society would take it upon itself to punish the offender; in fact, this is seen by some as the origin of punishment in society. The breaking of taboos makes the offender himself a taboo item too.

Significance of Taboo and Frequency of Its Use

Although taboo is about words and expressions we are not supposed to utter, we find that people use such words almost daily. The use of taboo reflects many aspects, such as a person's emotional state at the time of uttering such terms (anger or frustration), or it can simply be an indicator of the speakers' values or beliefs, or even their personality (vulgar, or cool and hip, for example). The relationship between interlocutors and their audience, the context and the moral or cultural code and attitude of the society, all affect what is seen as taboo (Allan & Burrige, 2006; Wardhaugh, 2006). According to the neuro-psycho-social (NPS) theory of speech, we use swear words driven by autonomic reactions caused by feelings, such as pain or anger or similar; while on the other hand, we use taboo terms, such as dirty jokes, deliberately, using the right half of our brains for strategic purposes. This is shown in people with neurological disorders, who have lost their ability to construct creative sentences but who still have the ability to swear articulately to express their emotions (Jay, 2000, cited in Ardó: 2004).

The importance of recognising taboo terms, and the ability to handle their interpretation in a sensitive manner stems from the fact that misunderstandings could easily arise when members from different communities meet and converse, and while one speaker may utter a phrase that indicates warmth in his own culture, it may be inadvertently offensive and insulting to the member of the other culture, the end result being that they part on bad terms (Lakoff, 1975). This could have dire consequences had the two parties been political adversaries or business negotiators. Despite this, there are not many theories on the translation (therefore the interpretation) of taboo words, possibly because in some societies, the use of taboo words may lead to punishment. What complicates matters here is that taboo can also be things that are not used or words that have not been said (Trudgill 1988); this adds another difficulty when researching this topic as how can one interpret what has not been uttered?

Once the consequences of not interpreting taboo are pointed out and guidelines are in place, it is hoped that the embarrassment factor would disappear, leading to a more professional output. An example of possible dire consequences of misinterpreting taboo is that of a Bengali rape victim, where the female Bengali interpreter was too embarrassed to interpret accurately the question in court, 'did penetration take place?' she rendered it as 'did lovemaking take place?'. The response by the victim could have been 'No' as penetration through rape is not equal to penetration through lovemaking, and this may have led to the alleged rapist to be set free and for the case to be dropped altogether.

Paying attention to, and applying guidelines on interpreting taboo, will not only lead to a more accurate, faithful and efficient interpreting, but once the interpreters understand why people swear and use bad language it will help them realise when a situation is threatening to get out of hand. For example, in mental health assignments, where the gradual increase in bad language may indicate a negative change in the patient's mental status that may lead to disruptions and maybe even violence. Training interpreters who aim to work in the health sector to be aware of those signs means they will ensure they interpret those 'bad' words appropriately hence allowing the healthcare worker to make an informed decision on the gradual deterioration of the patient. With a lack of such

awareness, the interpreter may assume the bad language is due to bravado only, so he may ignore it altogether which may later create a difficult and awkward situation for him and the healthcare professional. The avoidance of such situations can only lead to better conditions for patients needing interpreting services as well as for the healthcare worker looking after them. This can be extended to those needing interpreting in legal or business settings too.

Taboo and Interpreters

Currently, interpreters make their own decisions regarding the extent to which they interpret taboo units such as swear words or words implying bodily functions or of a sexual nature, not realising the effect this has if they omitted or diluted such terms. A study conducted by Hale (2007) shows how interpreters perceive their own roles. In answer to a question sent to 293 participants, many interpreters answered that their role was to interpret faithfully and accurately and that it was not their role to explain cultural nuances or ambiguities; one went as far as to say that his role was to: 'ensure that communication has occurred, but not necessarily to ensure that the information has been understood. That is the responsibility of the parts involved'; another sees his role would extend to educating the parties at a cultural level, if the situation necessitated this; while a third sees his role as a cultural bridge amongst all parties involved, and a fourth sees that by brokering communication on cultural issues, he is thus breaking the rules of his Code of Ethics. Further, this Hale study showed that the role of interpreters, as seen by the interpreters themselves, is seen differently depending on the various interpreting settings. Many interpreting training providers focus on the transfer of linguistic skills and coping techniques and leave the ethics' training for the student to obtain as they go along building their experience. Angelelli (2004: 47) asks if it is fair to expect interpreters to be cultural ambassadors. She writes how some interpreters admit that culture was not a part of their training, while others are happy to bridge any cultural gap they are faced with, if they are able to do so. According to Angelelli, AIIC members think that conference interpreters do not interact with their clients as they think that they shielded by their booths; they do concur though, that they are communication facilitators, but more importantly, they think that their AIIC Code of Conduct requires them to be neutral, and nothing more; they think it is not their job to explain. There is clearly a dichotomy here between conference interpreters, who are not part of this study, and Public Service interpreters and how each one sees their role regarding intercultural mediation and this must be borne in mind when, and if, further studies are to be conducted on this matter.

Scholars have highlighted the difficulties interpreters face in certain settings. In public service interpreting, some of the difficulties in interpreting taboo could be attributed not just to language but also to the logistics of the settings. Yudina (1982) discusses the way the physical distance between the client and the interpreter or the way they are facing each other and how these can negatively affect the standard of interpreting; this is because the interpreter is unable to see the reaction of his interpreting on his client. This problem is naturally exacerbated if the words being interpreted include some which are considered to be taboo.

Theorists have differed greatly about the extent an interpreter should go to in order to facilitate communication amongst all parties involved. Clarifying the role of interpreters is relevant when deciding whether interpreting culturally linked matters such as taboo should be interpreted or not. As seen earlier, choosing to not interpret taboo which may not be uttered but implied, can be destructive with dire consequences either legally or financially; linking this to the role of interpreters within the confines of any Code of Ethics may make it easier for inexperienced interpreters to handle.

Interpreters as Cultural Mediators

Seleskovitch (1978) has what could be seen as the first account of the interpreter's role as a cultural mediator since the 1950s. She sees that interpreters are there to explain cultural differences rather than pretend that those differences do not exist. The extent of the interpreter's intervention varies according to many factors amongst which would be the interlocutors' knowledge of each other, their education background and more significantly, the distance between their languages and cultures. Larson (1998) states that translators, and by extension: interpreters, have to consider not only the two spoken languages but also the two cultures associated with those languages, since, in his opinion, there will be concepts in the source language which do not have lexical equivalents in the target language. This is due to many differences including cultural differences. Many other theorists see that translators and interpreters have two barriers to overcome: the first being the linguistic barrier and the other a cultural barrier. Ignoring one aspect and separating it from the other can be a risky business and can lead to negative consequences as mentioned earlier.

According to Al-Omari (2009) communication differs also depending on the type of culture the person belongs to; Arabs for example belong to a high context culture where their systems of communication are very complex

that they rely heavily on body language, intonations, idioms and hidden meanings of words. Low context cultures (Scandinavians for example) on the other hand are more direct in their speech and they tend to say what they mean (with words).

Cultural differences have been divided by Jones (2002) into two types: the first being the Explicit Differences where the speaker refers to things and systems that exist in one culture but not the other (examples include culture specific catchphrases, academic institutions); here the interpreter needs to explain those missing concepts to fill the gap. Implicit Differences include irony, the speaker's hyperbole, and understatement and so on. These implicit gaps are more difficult to convey to the listener as the interpreter in these instances will be 'betraying' the speaker's intentions. An example of this would be when the speaker would say 'maybe': for most Arabs this is mostly an indication of a refusal, while for Westerners, it means they will be thinking about the matter in hand. This is vital to know and convey if a person is interpreting at business meetings, for example. The same for the word 'problem' which for the Japanese could be extremely negative and might impede communication or negotiations in a deal; an interpreter would be better off replacing this word with 'difficulty or challenge' which is received by the Japanese in a slightly more acceptable way. In such instances, as we can see, it is seen as the interpreter's role to make their audience understand those undercurrents even if they have to re-word those utterances so the listeners can fully understand what was originally said, or by using appropriate synonyms and then through their non-linguistic means, for example: tone of voice (Ibid).

Ultimately, an interpreter faced with having to extend his role to that of mediator of matters that are cultural and non-linguistic (non-verbal, paralanguage) will have to rely on his experience to judge whether his intervention is the correct one or not; however, as Kondo (1997) warns that when bridging cultural gaps, interpreters must be careful not to over interpret, and more importantly, they must not assume the delegates' role; he argues that interpreters must only interpret what is said and they must not interpret what has not been said; this last statement conflicts with interpreting taboo, as we have already seen previously that much of taboo issues relate to what has not been said. Additionally, if the interpreter is to be faithful not to the linguistic structure or meaning, but to the sense of the spoken message, then both explicit and implicit information should be relayed to the audience to ensure no ambiguity is present.

METHODOLOGY

A mixed method approach to the main research shall be followed: quantitative in the form of a questionnaire and qualitative in the form of an interview. However, for the purposes of the Pilot Study and this paper, only the questionnaire shall be undertaken. The quantitative part of the research is aiming to calculate the frequency of incidents facing interpreters when handling taboo and the frequency of the methods they choose when such things occur and the intensity of their reactions and attitude to such occurrences, while the qualitative part aims to emphasise the process and meaning of their responses.

The questionnaire, which is really a means to an end, is designed based on the major theories seen in the literature review and which include,

a. Pragmatics (Grice's maxims of communication (1989), Austin's Speech Acts (1962) and Searle's Indirect Speech Acts (1969); the notion of face as described by Bousfield (2010); Brown and Levinson (1987) plus the notion of supposition and presupposition as described by Fawcett (1997). In addition to Bousfield (2010) and Culpeper's discussion (2011) on the models of politeness, impoliteness and implicature.

b. Dynamic equivalence as discussed by Nida (1964), Newmark (1998), Bassnett-McGuire (1991), as this theory is concerned with *the effect* words have, which fits with this research well.

The questionnaire method is appropriate to use in this research as the responses from it will identify gaps and difficulties interpreters face when dealing with taboo in addition to highlighting consistencies of their handling of taboo with what is found in the literature review. Dörnyei (2011) sees this method as a reliable source of collecting statistical data, and that it allows us to collect answers using specific questions that are central to the study. Further, Dörnyei (2011) sees questionnaires as a form that allows us to ask factual questions (age, gender, qualifications), behavioural questions (what they do or have done in the past, in this instance, dealing with interpreting taboo) and attitudinal questions (beliefs, opinions, values), all of which are relevant to this type of research.

Although the questionnaire part of the research will be in a structured and formal way, it shall also be descriptive (Descriptive statistics) where the aim is to use the questions to give an overview of whether the respondents do handle taboo, for example, or not, and if so, how. Descriptive statistics as a process describe patterns of

behaviour and relationships between them; such techniques use tables, charts and other diagrams to present data. This method makes it easier to identify patterns that may not be so easily identifiable from raw data (Brewer, 2007). For the type of research required here, there is no requirement for a more rigorous technique to explore the data as what is required is the detection of possible patterns only.

The pilot questionnaire was distributed to practising public service interpreters and to DPSI (Diploma in Public Service Interpreting) students. The respondents are chosen so that they are of a variety of social, religious and ethnic backgrounds and their age groups will also vary greatly. This sample falls under the category called by Dörnyei (2011) 'convenience sample' where it is easy and convenient to send the questionnaire to the respondents as they will be chosen from public service interpreting registers, and where the respondents have certain features related to the purpose of the investigation.

The questionnaire includes questions related to personal details of the respondents as this may shed a light on reasons behind how they handle taboo as it will look at the age, cultural and religious background and the gender of the respondent. There will be questions on how interpreters would (or indeed already have done so) handle certain situations when faced with taboo. The results of those questionnaires, in addition to what is summarised from any theoretical research, will be collated and converted into guidelines that may be used in practice and in training at universities and interpreting institutes.

The questionnaire was sent via an internet survey site; respondents were assured of anonymity and that the Data Protection Act would be adhered to.

The expected bias includes non-respondents in the first instance, plus information bias, where the respondents may lie in their answers, plus social desirability bias. In-depth, open-ended interviewing is a useful and appropriate tool where the information bias could be overcome and where the respondents answer more freely and from their own frame of reference rather than being confined by the structure of pre-arranged questions (Brewer, 2007). However, interviewer bias might come into play as the respondents may feel they need to respond in a certain manner in the presence of the interviewer (Brewer, 2007). The expected responses will be a mix of 'prospective' where it is expected that students will anticipate how they would handle taboo when finally they enter the workplace. This has the disadvantage of the students responding in a manner they think is expected of them rather than responding in how they would truly behave in real life. On the other hand, interpreters who are already practising and who may have come across taboo already will give 'retrospective' responses which have the disadvantage of relying on their recall.

The disadvantage of this method according to Brewer (2007) is that it is seen as more subjective than objective in its evaluation, but the advantage is that it is seen as the ideal for discovery and description. Further, Brewer (2007) sees it as an optimum method to broaden our understanding and increase the possible interpretations of human behaviour, which is relevant in this context. In addition to the disadvantages identified by Brewer (2007), (Dörnyei (2011: 41) lists the weaknesses to include the potential 'over-reading' of the individual responses which is due to the relatively smaller sample size numbers used in such a method in addition to the researcher role, personal bias and idiosyncrasies when analysing the data, there is also the lack of methodological rigour and finally the lengthy time it takes to process the data collected this way.

The sample selected for this research was chosen using the 'simple random selection' method to a certain extent inasmuch as the respondents have to be either interpreters or trainee interpreters, but the numbers of each sample may not be equal.

The minimum number required to make this a viable method of collecting data is 100 according to Dörnyei (2011: 99) but it was decided that a larger number should be sent (about 200). The use of a number larger than the minimum required allows for a safety margin to be applied which may be needed due to unforeseen circumstances, such as participants dropping out from one aspect of the study as suggested by Dörnyei (2011). The figures were decided on when looking at The (UK) National Register of Public Service Interpreters (NRPSI) which currently holds 2200 interpreters on its register (sourced January 2014). Dörnyei (2011: 99) suggests, as a rule of thumb, that we should use a range between 1-10% of the sample population, which means the minimum acceptable for this study should be about 20, which is the number used for this pilot study, while the higher range comes in at about 200, which is the number suggested for the full study.

The Pilot Study

The initial responses of the questionnaire were as follows:

1. Which of the following would you personally consider to be taboo in everyday life?

This is based on the various definitions of taboo as listed by scholars such as Eco (2003), McEnery (2009), Hughes (1998), Allen and Burridge (2006) and Baker (2008) who agree that taboo varies from one culture to another. Taboo differs greatly between Western and non-Western cultures and students need to learn that although a term may not be taboo in their mother tongue, it may indeed be a serious taboo in their other language and therefore they must deal with it appropriately.

This will answer the question of whether guidelines to interpret taboo are necessary or not. The response shall be expanded on later by sub-categorising what each religious/ cultural background responses matched which category to add more detail in the training of taboo awareness.

2. How would you deal with interpreting taboo?

The strategies listed for this question are based on what is found in the literature review of interpreting culturally linked items (there is scarce, or no, literature on interpreting taboo specifically) from strategies such as Ivir (1987), Venuti (1995) and Nida's dynamic equivalence (1964). The responses will give an indication of the current trend in trainees' thinking which can guide in formulating the guidelines.

3. When interpreting taboo, do you: Maintain eye contact / Avoid eye contact

Eye contact is paramount in any interpreting event as part of the communication and raising confidence and building rapport with the client (Kondo, 1997); this is more important when it comes to interpreting sensitive matters such as taboo.

4. If swearing is accompanied by lurid gestures, do you: Mimic the gestures / Ignore the gestures

This is also part of the overall communication process and must not be ignored especially as some cultures may not understand the gestures and may not see them as lurid and the effect hence will be diluted, so it is the interpreter's role to interpret them correctly and appropriately (Kondo, 1997).

Should some respond that they might use a little of both strategies, then this shall be followed up by an interview and the outcome analysed accordingly.

5. Do you find it easier to interpret taboo

Into your mother tongue (You are used to hearing and using such terms)

Out of your mother tongue (It doesn't feel real when you say them in the other tongue)

I don't see any difference in relationship to the direction

I don't know; I don't interpret taboo

This question is based on the directionality of uttering taboo; research found that it is easier to swear using not your mother tongue, but the other language that you associate with (Allen and Burridge, 2006; Trudgill, 1988).

This responds to the question of the directionality aspect rather than the linguistic aspect of difficulties in interpreting taboo.

6. Is it appropriate to ignore taboo when interpreting?

This question is based on the theory that states that if we fail to interpret cultural nuances then this would lead to possible irreparable loss of communication (Lakoff, 1975, Alexieva, 1999; Nolan, 2005, Lewis 2012).

This question will also give us a deeper insight into the perception of interpreters and interpreting trainees regarding the possible conflict between the Codes of Ethics and taboo interpreting.

7. Knowledge of both language cultures helps me deal with taboo

Lewis 2012, Alshaer (2012) and Newmark (1998) all see culture and language to be inseparable. Therefore, cultural awareness must be raised. This is for normal interpreting in any case but perhaps linking culture to taboo in the guidelines will emphasise the point further.

8. Having guidelines on interpreting taboo would help me when faced with interpreting it

This shows how respondents might feel the need for structured training to feel more confident in interpreting taboo. Training competencies in translation, and therefore interpreting, have been detailed by Hatim (2001) plus Schäffner and Adab (2000). This is in response to the question on whether having guidelines will have any impact on the interpreters' competence or not.

SUMMARY AND FINDINGS

Below we find the results to the questions posed to the trainees.

1. Which of the following would you personally consider to be taboo in everyday life? (Please tick as many as appropriate)

Sexism	40%
Racism	40%
Religious taboo (Blasphemy)	45%
Ageism	30%
Bad, offensive language (Swearing, cursing, insults)	50%
Sexual taboo (Bodily functions)	50%
Political in-correctness	30%
None	15%

2. How would you deal with interpreting taboo?

Omit totally	10%
Lower the tone/ harshness of the taboo	20%
Use exact equivalence in target language (Keeping tone and level of taboo)	50%
Substitute with a less harsh phrase/word	40%
Interpret literally if no equivalent exists	25%
Explain to others that 'these are not my words'	30%
Not sure/ Don't know	5%

3. When interpreting taboo, do you

Maintain eye contact	60%
Avoid eye contact	40%

4. If swearing is accompanied by lurid gestures, do you

Mimic the gestures	65%
Ignore the gestures	35%

5. Do you find it easier to interpret taboo

Into your mother tongue (You are used to hearing and using such terms)	45%
Out of your mother tongue (It doesn't feel real when you say them in the other language)	50%
I don't see any difference in relationship to the direction	0%
I don't know; I don't interpret taboo	5%

6. Is it appropriate to ignore taboo when interpreting?

No, we need to be faithful	60%
No, there are consequences if we ignore taboo	60%
Yes, it is embarrassing	5%
Yes, we must not encourage this kind of speaking	0%
Yes, the others will think it is me talking 'dirty'	5%

7. Knowledge of both language cultures helps me deal with taboo

Agree	95%
Disagree	5%
Don't know	0%

8. Having guidelines on interpreting taboo would help me when faced with interpreting it

Agree	100%
Disagree	0%
Not sure/ don't know	0%

DISCUSSION

This remains a study in its initial phase, but even at this stage we can see how sexual taboo and swearing take the lion share (50%) when it comes to trainees identifying with taboo; this is closely followed by blasphemy at 45% and then sexism and racism (40% each). This corresponds with what theorists have classified and defined taboo where those categories were top of their lists too.

For the matter of dealing with taboo, using equivalence was suggested by 50%, followed closely by 40% saying that they would substitute the taboo term with a less harsh term. Looking further into those figures, in an attempt to see if the literature reviews match real life today, and in order to ascertain whether this choice of strategy is due to religion or not, the researcher looked into the various religions of the respondents. Equivalence was a clear winner among Christians and those who define themselves as having no religious affiliations, while Muslims use this strategy but at a lower percentage than the other two categories; Muslims seem to favour more the strategy of substitution where they replace the offensive words with softer ones, or in the case where they do use equivalence, they inform the audience that the words they are saying are not actually their own words, reflecting the embarrassment factor involved here. Christian trainees also use substitution but at a more frequent rate than their Muslim peers (30% more). Interestingly enough, for the strategy of omission, only 1 trainee identified with this strategy (Bahai faith), which is encouraging news as this strategy, as seen in the literature review, can have dire consequences and must not be followed. This is also confirmed in the responses to Question no. 6, regarding the appropriateness of interpreting taboo; where 92% agree that taboo must be interpreted, although this figure is halved when it comes to the reasons why they think it should be interpreted: 46% think we should interpret taboo as a matter of fidelity to the speaker, while an equal number (46%) think it should be interpreted as there may be consequences if taboo was left out. Of the remaining 8%, half (4%) think it is embarrassing, while the other 4% worry that the listeners may think it is them 'talking dirty'; this emphasizes the need to train future interpreters on the consequences of not interpreting taboo, regardless of its severity, and on the need to get them accustomed to it while training in order to avoid future embarrassment in their working lives, where it really matters.

For non-verbal communication (Gestures and eye contact) the average was about 60% who agree that they should mimic the speaker's non-linguistic communication. This shows that we need to work harder when training future interpreters to show them the significance of this aspect of communication. Theorists agree that much of our real communication comes through our non-linguistic mode, and hence it certainly should not be ignored by interpreters.

The question regarding culture showed that 95% agree that knowledge of the cultures of their language pair would facilitate their interpreting of culturally linked words, of which taboo is one. Again, this highlights the need to train interpreters not just on linguistic matters, but also on cultural ones. This is quite important, in the light of how some interpreters perceive their role as mere machines that transfer words into another language, rather than act as cultural mediators in order to facilitate effective communication.

The final question asking if the trainees would like to see guidelines to help them interpret taboo terms, the response was unanimous (100%), which clearly indicates the lack of such guidelines in their training and the urgent need to draft some and to include them in any training programme.

CONCLUSION

It was evident that there is a need for guidelines for taboo; the guidelines clearly need to link culture to taboo, underlining the importance of dealing with taboo, within the framework of the Interpreting Codes of Ethics. The guidelines should include training suggestions such as raising awareness of the different types of taboo, and how taboo varies in type and severity across cultures, and that training in practising how to deal with it, in order to reduce the embarrassment factor, should probably be bi-directional rather than just into the mother tongue. Training in recognising taboo gestures and un-uttered taboo should also form part of the guidelines.

Most of the initial findings match and reinforce the literature review so far, but as the questionnaire has only been distributed to students, there is a need to widen the net to include practitioners in order to check if the initial findings stand when it comes to experienced interpreters.

What now needs to be done is to send questionnaires to a larger number of interpreters and interpreting students (200) in order to verify that the majority of them do follow their own rules on interpreting taboo and to confirm the need for the guidelines. Some responses to this pilot questionnaire raised new questions that need to be

answered before the final guidelines are written. sub-categorising and matching some of the responses according to the ethnic background in order to highlight the differences that arise according to those backgrounds.

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THE STATE OF SCHOOL AND UNIVERSITY TEACHER SELF-DEVELOPMENT IN GEORGIA

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ABSTRACT: In conditions of continuous education reform teacher self-development is indispensable to provide high quality of teaching as well as simply to maintain the job. The goals of the paper are to analyze the intrinsic and extrinsic motives for teachers to be engaged in self-development, to show the difference between the terms “development” and “change”, “professional development” and “professional (re)training”, and to find the state of the matter of professional self-development in Georgian schools and universities. School / university policies concerning professional training and development will be discussed. Such approaches to self-development as introspection (journals/diaries/self-recording and observation), self and peer assessment, technology use and getting new experiences of teaching will be presented. The reasons of great popularity of ICT as a tool for self-development will be viewed: being free of charge, flexible in time, getting practical ideas and theoretical knowledge, also developing some skills, and almost limitless variety of offers. A study involving Georgian school teachers and university lecturers will be offered, comprising interviews and a questionnaire. The questionnaire will try to find out who (age, experience, computer literacy) are involved in teacher self-development, how often they take practical measures to do so, and in what way the teachers prefer to realize self-development. Besides, reasons why some teachers (almost) are not involved in self-development will be analyzed. In conclusion an effective model of teacher self-development will be suggested.

Key words: self-development, ICT, motivation, professional identity, self-observation, peer and self-assessment

INTRODUCTION

Today, when society changes occur so fast and the education reforms are practically ceaseless, doing their best to catch up with social developments, teacher development has become really a must.

Bertani and Tafel (1992) see educators' professional development as “the acquisition of knowledge, experience and skills, and the development of personal qualities for the execution of professional and academic duties that enable the individual member to effectively contribute to the institution and the community” (p. 12).

However, not all views are that positive. Diaz-Maggioli (2004) describes the professional development day as associated with “images of coffee breaks, consultants in elegant outfits, and schools barren of kids” (p. 1). This sceptic attitude towards professional development is caused by the assumption “that teachers need to be forced into developing [and that they] have deficits in knowledge and skill that can be fixed by training” (Clark, 1992: 79). Teachers often feel that trainers who hold the trainings, workshops and seminars are too theoretically-minded and not knowledgeable about the realities of the classroom.

The problem of the research is that not all teachers are (sufficiently) involved in self-development. Correspondingly, the goal of this study was to find out teacher motivation (not) to engage in self-development, and to investigate the state of the matter in Georgian schools and universities concerning teacher self-development.

DEFINITION

Jackson (1992) emphasizes that there is a distinction between teacher development and teacher change. He maintains that teachers undergo many changes throughout their careers. They grow more experienced and knowledgeable, gain wisdom, and may even attain excellence. According to him, these positive changes are desirable and thus qualify as professional development. On the other hand, teachers might lose interest in their job and develop “an increased sense of discouragement” (Jackson, 1992, p. 63). These negative changes are undesirable and do not qualify as development.

On the other hand, “professional (re)training”, including the in-service training and “professional (self-)development” are not the same. In-service training is, according to *Collins Dictionary* (n.d.), “training that is given to employees during the course of employment”. According to *The Glossary of Education Reform*, “in education, the term professional development may be used in reference to a wide variety of specialized training, formal education, or advanced *professional learning* intended to help administrators, teachers, and other

educators improve their professional knowledge, competence, skill, and effectiveness". So, while professional (re)training is usually initiated by the institutions administration, professional union and some other organizations, professional development includes training organized by others as well as teacher-initiated and fulfilled. Thus, professional self-development is an essential part of professional development. Teacher in it is not a passive recipient of knowledge and skills, but is their producer.

WHY DO TEACHERS GET ENGAGED IN SELF-DEVELOPMENT?

Bouchard (1996) believes that professionals get involved in self-development to solve a real self-defined and immediate problem to meet their specific needs. However, my opinion is that more often and more effectively teachers work on the improvement of their professional level based on intrinsic motives.

Luehmann (2007) and Forbes and Davis (2007), for instance, argue that teacher self-education education aims at the development of professional identity (defined by Luehmann as including professional philosophy, passions, commitments, ways of acting and interacting, values, and morals).

Research (Abes, Jackson, & Jones, 2002; Banerjee & Hausafus, 2007; Hardy & Schaen, 2000; Simons & Clearly, 2006) has revealed that academic staff believed that their professional self-development results in students' deeper understanding of the course material.

Below in tables 1 and 2 see the comparison of teacher (re)training and teacher self-development as well as the classification of teacher motivation for (self-)development.

Table 1. Teacher (Re)Training Compared to Teacher Self-Development

	Teacher (re)training	Teacher self-development
Organizer / trainer-centered or teacher-centered	Administration (or other organizer)-initiated, scheduled and planned	Teacher-initiated, scheduled and planned
Disadvantages	<ul style="list-style-type: none"> • trainees' needs may not be taken into consideration • timing may be inconvenient, • quality may not be adequate (too easy or too difficult, not informative, boring) • teacher is expected to be an active participant, but often it does not happen (intrinsic motivation may not exist) 	<ul style="list-style-type: none"> • teacher may be unable to choose adequate topics, to find relevant resources • teacher qualification may not be enough for comprehension of available materials • teacher in most cases is isolated • teacher cannot prove to administration s/he did it
Advantages	<ul style="list-style-type: none"> • proofs exist (certificates are issued) • if the trainer's qualification is adequate, answers to questions may be received • sharing with other teachers takes place • provides orientation in the huge flow of topics and issues 	<ul style="list-style-type: none"> • teacher in intrinsically motivated • s/he chooses issues interesting and/or necessary for him/her, adequate to his/her qualification and goals, and is usually persistent • timing, frequency and amount of "sitting" are flexible

Table 2. Extrinsic and Intrinsic Motivation of Teacher (Self-)Development

Extrinsic motivation	Intrinsic motivation
<ul style="list-style-type: none"> • administration requirement 	<ul style="list-style-type: none"> • progress in career
<ul style="list-style-type: none"> • job competition 	<ul style="list-style-type: none"> • realizing the imperfect knowledge obtained at university
<ul style="list-style-type: none"> • seeking for solutions for particular problems 	<ul style="list-style-type: none"> • realization of continuous education necessity in connection with fast-changing environment
<ul style="list-style-type: none"> • need to adapt to the changing environment 	<ul style="list-style-type: none"> • self-efficacy and self-actualization (positive image of self as a teacher and as a person)
	<ul style="list-style-type: none"> • need in interaction

We need to keep in mind that, to be engaged in self-development, teachers need to know how to do it. According to McDonnough and Matkins (2010) teachers who had undergone research and study skills training within the BA course or after it benefitted from self-development and increased their self-efficacy, while those who had not, did not show a real increase.

As shown in Table1, both (re)training and self-development have advantages and disadvantages. Besides, we cannot expect that all teachers will be always intrinsically motivated to develop professionally. So, a reasonable balance between them will achieve optimal results.

SCHOOL/UNIVERSITY POLICY

It is essential what the school's policy is – to find highly qualified teachers and probably have a high teacher turnover (without providing them conditions to improve) or to create for hired teachers conditions for professional development, thus, having teachers loyal to the school. The first attitude is easier and seems to be cheaper, but eventually it is not efficient (Barnes, Crowe, & Schaefer, 2007; Marinell and Coca, 2013).

APPROACHES TO SELF-DEVELOPMENT

Self-development can be done in a variety of ways:

- Self-observation: teacher journals / diaries, video-recordings of one's classes and their analysis
- Peer-assessment
- Out-of-service trainings undertaken on one's own initiative, obtaining corresponding certificates
- Taking part in various projects, competitions, etc.
- Getting new experiences of teaching (private students, in another institution or country, informal or semi-formal education, such as camps, clubs, etc.)
- Reading articles, books at home and/or in the library
- Holding research and publishing its results, presenting them at conferences of various levels
- Using technology

Each way deserves discussion and research, but in the frames of this paper it is impossible to discuss in detail all, so I will only give a short overview of the most popular today (the below research also confirms it) way – technology application (Chen et al, 2012). It is definitely the most time-saving and flexible in scheduling, and offers almost limitless resources. Most of resources are free of charge, it is possible to get theoretical or practical knowledge, develop some skills. Without leaving home, teachers may be part of an online social network, including some popular self-selected teacher communities (Hur & Brush, 2009).

To investigate the application of ICT (and some other approaches) for teacher self-development the following issues have to be clarified:

- Who (teachers of what subjects; what age, experience, technical skills and ICT access at school or at home) applies them
- How often they are used
- What goals does the teacher have (to find materials to be used in class; to increase his/her knowledge on the subject, education, methods of teaching, psychology, classroom management, to deal with a concrete problem, or to communicate/share with colleagues)
- What kind of technologies are used

METHOD

A quantitative research was held to study the state of school and university teacher self-development in Georgia. The questionnaire involved 12 questions in Likert scale and multiple choice or mixed format. The ones in Likert scale had to be assessed as 1- strongly disagree, 2- disagree to some degree, 3- neither agree, nor disagree (neutral), 4- agree to some degree, and 5- strongly agree. A couple of demographic questions were also included, to see, how representative the questionnaire results are. To see if there are any differences between school teachers' and university lecturers' opinions, the questionnaire was held as two separate questionnaires (with the same questions in both).

DATA COLLECTION

The results were gathered with www.surveymonkey software and questionnaires shared both in-person (by e-mail) and via social networking on the Facebook. Many questionnaires were handed out during the 10th National ETAG (English Teachers' Association of Georgia), due to which about half of respondents were English and related subjects' teachers. Some questionnaires (translated into Georgian, for those teachers who do not know English well enough) were done by personal distribution and then the results manually entered to www.surveymonkey by hand. 80 questionnaires were distributed and 57 returned (return rate 0.71, which is not bad). Totally 114 questionnaires were filled in. The participants were all volunteers, 58 school teachers from 5 schools and 56 university teachers from 7 universities. Some of them work both at schools and at universities, so they were requested to fill in only one questionnaire – according to their main job.

RESULTS AND DISCUSSION

The results are presented in table 3.

Table 3. Questionnaire Results

question	School teachers' answers	University lecturers' answers (56)
1. Gender: m/f (<u>underline</u>)	89.7% female, 10.3% male	89.3% female / 10.7% male
2. Teaching experience:	a) 0-2 years	7.1%
	b) 3-10 years	28.6%
	c) 11-20 years	35.7%
	d) 21-30 years	14.3%
	e) 31 years and above	14.3%
3. Subject/course(s) taught:	English, mathematics, Georgian language and literature, history, physics, primary education (basic courses).	English, translation, lexicology, discourse analysis, poetics, organizational behavior, leadership, business, linguistics, stylistics, history of international relations, the role of NATO in international relations, introduction to business, introduction to finance, international finance, finance and investment, financial management, history of political thought, Academic Writing, Western Literature, Media Language.
4. My computer skills are sufficient to do self-development via ICT.	Average: 4.31 out of 5 (nobody assesses as "0", 3.45% as "1", 13.79% as 3, 31.03 as "4", and 51.72 as "5")	Average: 4.39 out of 5 (nobody assesses as 1 or 2, 3.4% as 3, 53.6% as 4, and 42.9% as 5)
5. The computer access at school/university permits me to do self-development at work.	Average: 3.62 out of 5.	Average: 3.54 out of 5 (3.4% as 1; 18% as 2; 25% as 3; 29% as 4; and 25% as 5)
6. My school / university / professional organization provides good quality and sufficient in number trainings, seminars, workshops, etc.	Average: 3.52 out of 5 (3.45% as "1", 6.9% as "2", 37.92% as "3", 37.93% as "4", and 13.79% as "5").	Average: 3.14 out of 5 (10.7% as 1; 10.7% as 2; 39.3% as 3; 32.1% as 4; 7.1% as 5)
7. In what way do you prefer to	a) Self-observation: teacher journals / diaries, video-recordings of	
	Average: 3.76 out of 5 (6.9% as "1", 3.45% as "2", 10.34% as "3", 58.62% as "4",	Average: 3.4 out of 5 (14.3% as 1; 7.1% as 2; 25% as 3; 28.6 as 4; and 25% as 5)

self-develop?	one's classes and their analysis	and 17.24% as "5")	
	b) Peer-assessment	Average: 3.86 out of 5 (3.45% as "1", 0 as "2", 17.24% as "3", 58.62% as "4", and 17.24 as "5")	Average: 2.8 out of 5 (14.3% - as 1; 7.1% as 2; 10.7% as 3; 25% as 4; and 39.3% as 5)
	c) Out-of-service trainings undertaken on one's own initiative, obtaining corresponding certificates, taking part in various projects, competitions, etc.	Average: 3.93 out of 5 (0% as "1", 3.45% as "2", 17.24% as "3", 27.59% as "4", and 51.72% as "5")	Average: 4.2 out of 5 (3.6% as 1; 3.6% as 2; 14.3% as 3; 25% as 4; and 53.6% as 5)
	d) Getting new experiences of teaching (private students, in another institution or country, informal or semi-formal education, such as camps, clubs, etc.)	Average: 4.21 (6.9% as "1", 6.9% as "2", 13.79% as "3", 20.69% as 4, and 55.17% as "5")	Average: 4.20 (10.7% as 1; 3.5% as 2; 0% as 3; 42.9% as 4; and 46.4% as 5)
	e) Reading articles, books at home and/or in the library, via Internet	Average: 4.41 (3.45% as "1", 0 as "2", 6.90% as "3", 31.03% as "4", and 58.62% as "5").	Average: 4.40 (3.6% as 1; 3.6% as 2; 7.1% as 3; 21.4 as 4; and 64.3 as 5)
	f) Holding research and publishing its results, presenting them at conferences of various levels	Average: 2.10 (17.24% as "1", 34.348% as "2", 37.93 as "3", 6.90% as "4", and 3.45% as "5")	Average: 4.50 (3.6% as 1; 0% as 2; 7.1% as 3; 35.7% as 4; and 53.6% as 5)
	g) Using technology	Average: 4.14 (3.45% as "1", 0% as "2", 6.90% as "3", 41.38% as "4", and 44.83% as "5")	Average: 4.50 (3.5% as 1; 0% as 2; 7.1% as 3; 35.7% as 4; and 53.6% as 5)
8. Explain the choice of those items in question 8 which you graded as "5".	<ul style="list-style-type: none"> ✓ I'd rather observe myself than be observed by others. ✓ To develop professionally, various ways are needed. ✓ I don't do too much self-development, this is why I didn't mark any item as "5". ✓ I try to do a little bit of everything, whenever I have an opportunity. However, I don't think school teachers should be required to do research. ✓ I do all except research, I do not think I have qualification to do research, all others are indispensable. ✓ I always think over the way I teach and try to improve ✓ I seldom do self-development, as I need to make money, and no time is left. ✓ I am a bit passive doing things on my own, I need 	<ul style="list-style-type: none"> ✓ New experiences are needed to widen the horizon. ✓ Reading articles is the fastest / best way to develop professionally. ✓ Action research really permits to improve teaching. ✓ I know enough theoretically, but workshops improve my practical skills. ✓ I prefer to do self-development by myself: when flying alone, you have more chances to fly higher. ✓ New experience is good - to break through the boredom of working at the same place for years and, hence, doing the same thing routinely. ✓ To see myself through another qualified person's eyes is very beneficial. ✓ Obtaining certificates contributes to my self-esteem. ✓ New experiences - it's so 	

	<p>to be pushed to develop professionally.</p> <p>✓ I like better learning from experiences than from reading theoretical materials.</p> <p>✓ I like being assessed by friendly peers (whom I choose myself)</p> <p>✓ I like to choose trainings (including abroad) myself.</p> <p>✓ All of them help to be highly qualified.</p> <p>✓ When you use technologies, hypermedia help you understand.</p> <p>✓ When in the net I notice a catchy title dealing with my profession, I never miss a chance to read about it.</p> <p>✓ Lots of new experiences are available nowadays, and it's challenging! Why not try something new?</p> <p>✓ Using technologies has become an important part of my lifestyle.</p> <p>✓ I do not like somebody to plan my time. Also I prefer to choose the topics on which I read up myself.</p> <p>✓ I get information about the trainer and according to it choose which trainings to attend.</p> <p>✓ I like to read up what's new in my profession.</p> <p>✓ I didn't grade any as "5", so there is nothing to answer.</p> <p>✓ I support and try to apply all forms of self-development.</p> <p>✓ Trainings permit to receive knowledge on a variety of topics.</p> <p>✓ I do self-development both for maintaining the job and for self-esteem.</p> <p>✓ EFL Teacher education without going abroad to acquire knowledge and enrich experience is lack of good layout of knowledge chance and experience, because at home you need years to achieve something, while abroad you have a very good support and educational system, you can do it faster.</p>	<p>challenging! I like challenge!</p> <p>✓ I prefer to choose trainings myself and not to have those offered by administration.</p> <p>✓ I like the formats of self-development which are flexible in schedule.</p> <p>✓ Using technology and getting new experiences of teaching help us, teachers, to develop more teaching strategies and methods of approaching to children. As for technology, the more we use it, the more effectively we can integrate it into our lesson.</p> <p>✓ Self-observation is the best way for development. Nobody can teach you directly how to teach. Teaching is like art you have to discover your own skills and perspectives by the help of others encounter.</p> <p>✓ Peer-assessment is a very good way to maintain the flow in the teaching, to overcome the complexity and anxiety, to try to find a critical friend who helps you to develop, gives confidence and recommendations.</p> <p>✓ I still prefer to work with on-paper materials. Even when I find them on the internet, I print them out and then work on them.</p> <p>✓ I prefer to work on my own / independently.</p> <p>✓ I feel comfortable with technology.</p> <p>✓ To pass competition for the academic position, research is important.</p> <p>✓ Out-of-service trainings not only enable educators to get more information, but also provide opportunities for experience sharing.</p> <p>✓ Reading resources from internet is crucial for research purposes which is pivotal for educators.</p> <p>✓ To learn more from other people's experience. To maintain self-confidence and job.</p> <p>✓ New teaching experiences let you see more problems and try to solve them.</p> <p>✓ My position requires to make research.</p> <p>✓ Using technologies is comfortable and time-saving.</p>
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			✓ It's important to know how to do research, by publishing them you can reach high qualification.
9. I prefer in-service trainings, workshops and conferences to self-development.		Average: 3.69 (3.45% as 1; 10.34 as 2; 24.14 as 3; 37.93% as 4; and 24.14% as 5)	Average: 3.6 (3.5% as 1; 10.7% as 2; 35.7% as 3; 21.4% as 4; and 28.5% as 5)
10. How often you (on your own initiative) are involved in professional self-development (read up literature, participate in conferences, trainings, projects, do drills, carry our research, etc.)?	a) never	0%	0%
	b) seldom (once in several years)	13.79%	14.3%
	c) regularly (at least once a year)	65.52%	50%
	d) often (at least once a month)	20.69%	35.5%
11. If your answer to question 10 is "never" or "seldom", why? (percentage is given out all respondents) (more than one answer could be chosen)	a) do not see the need	6.9% chose it as the most popular answer	0% chose it as the most popular answer
	b) there are more interesting/useful things to be done in my free time	6.90%	3.2%
	c) the training done by school/university is more effective	6.9%	6.5%
	d) the training done by school/university is quite sufficient	10.3%	3.2%
	e) too heavy teaching load and other (e.g., administrative, family) duties	13.79%	9.7%
12. If your answer to question 10 is "regularly" or "often", why? (percentage is given out of all respondents) (more than one answer could be chosen)	a) It is administration requirement	6.9% chose it as the most popular answer	3.2% chose it as the most popular answer
	b) Due to tough job competition (afraid to lose the job and/or be unable to find a new one)	13.79%	19.4%
	c) To achieve progress in career	58.62%	61%
	d) I am seeking for solutions for particular problems	41.38%	74.2%
	e) I realize the imperfect	31.03%	6.5%

	knowledge obtained at university		
	f) I realize the necessity of continuous education in connection with fast-changing environment	68.97%	74.5%
	g) I need to have high self-efficacy and to self-actualize (to have a positive image of self as a teacher and as a person)	58.62%	74.2%
	h) I need to interact with my colleagues on professional issues	75.86%	71.0%

The majority of respondents (89-90%) were female, which exactly reflects the situation at school. As for university, there certainly are more male lecturers than 10% (no exact statistics is available), but male lecturers often avoid “doing such nonsense” as filling in questionnaires, female academic personnel is more cooperative in such research. Anyway, the population of the study is representative enough.

All age categories were represented, more or less proportionately, which makes the results reliable enough. However, inexperienced teachers are definitely underrepresented (7.1 – 10.3%), probably, due to being too busy with struggling with the challenges of the newly acquired profession (see, e.g., Barrett et al, 2002).

Various enough subjects are taught by the respondents, however, among university teachers only humanities and social sciences are represented. Thus, the results are more or less reliable.

The level of computer skills is high enough, though a little lower with school teachers (4.31 with school teachers and 4.39 with university lecturers), the majority assessing their skills as “4” or “5”.

The level of computer availability at work for the purposes of self-development is lower than desirable and almost equal at school and university (3.62 and 3.54, correspondingly).

The school/university/professional organization does not organize enough trainings, workshops and seminars (3.52 at school and 3.14 at universities, some teachers and lecturers even choose the answers “1” or “2”, which shows their dissatisfaction).

The most popular ways of self-development for both school teachers and university lecturers are: (all of them got an average above “4”): getting new experiences of teaching, reading articles, books at home and/or in the library, via Internet, and using technology. There are two answers, popular with university lecturers and unpopular with school teachers: out-of-service trainings undertaken on one’s own initiative and holding research. This is easily explained by job competitions held every 4-6 years, which require from lecturers to have both. Among the anti-leaders is peer observation (3.86 among school teachers and 2.8 among university lecturers), which can also be easily explained by national character.

The answers to the question why they assessed as “5” certain ways of self-development aver various and more or less coincide with the literature analysis above. They are too many in the table to repeat them here.

The average 3.69-3.30 to the item “I prefer in-service trainings, workshops and conferences to self-development” reveals that the respondents approximately equally value trainings organized by the institution and self-development.

The majority of both school teachers (65.52% regularly and 20.69% often) and university lecturers answered that they are actively involved in self-development (50% regularly and 35.50% often), which I view as doubtful, knowing the general situation in Georgia. I mean not the answers are doubtful, but they do not reflect the real situation, as survey participants were all motivated teachers, while unmotivated ones do not voluntarily take part in any educational research.

The major cited reason for seldom being involved in self-development is too heavy teaching load and other duties, which is, of course, largely a reality, however, motivated teachers somehow manage to find time for everything.

The major cited reasons for being regularly / often involved in self-development for both groups of respondents were “I realize the necessity of continuous education in connection with fast-changing environment” (68.97% of

school teachers and 74.5% of university lecturers) and “I need to interact with my colleagues on professional issues” (75.86% of school teachers and 71.0% of university lecturers). University lecturers also pay much attention to “I am seeking for solutions for particular problems” (74.2%), which was a little unexpected choice, and “I need to have high self-efficacy and to self-actualize” (74.2%). The least popular answers deal with external motivation: “It is administration requirement” and “Due to tough job competition (afraid to lose the job and/or be unable to find a new one)”, which is a good result. On the other hand, as it has already been mentioned, the questionnaire was filled in by more motivated teachers / lecturers, which means that the real picture may not be so optimistic.

LIMITATIONS AND FURTHER RESEARCH

The main limitation of research deals with its scale. In the future larger-scale research is necessary. Besides, in the future the questionnaire can be held separately for different focus groups (novice teachers, teachers with some experience and very experienced teachers; teachers by subjects). And, of course, it would be interesting to compare results obtained from Georgian teachers / lecturers to results in other countries.

CONCLUSIONS & RECOMMENDATIONS

Teacher development, to be efficient, needs to embrace both trainings organized by administration and professional organizations and teacher self-development. Though internally motivated development is more efficient in terms of teaching quality, externally motivated development should be also kept in mind as a tool to regular teacher development, especially to conceited teachers thinking they are so good they do not need any more work on themselves, and to the lazy ones.

As the survey showed, Georgian school teachers and university lecturers possess sufficient computer skills to be involved in self-development via computer applications (4.3-4.4 out of 5 points). On the other hand computer and software availability at work for self-development purposes is not high enough (3.5-3.6 out of 5 points). This does not necessarily mean schools and universities do not have enough computers, but, most probably, that they are mostly used for educational and administrative purposes. School / university administration should take measures that teachers can use computers for self-development purposes at working places. For this teachers need to have individual computers and more ‘free’ time during work hours to be involved in development.

The quality of trainings organized by schools/universities/professional organizations should increase, they should become more needs-based and interactive.

Teachers / lecturers should be stimulated to initiate trainings / seminars / round tables, etc. based on self-development (when they come across a very good article / book, have some exciting experience to share, etc.).

High teaching load in combination with dissatisfactory salary will definitely decrease teacher development, so education administrators should think about creation of fruitful development environment for their staff, even if it is costly, as eventually it will pay back.

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FAMILY QUALITY OF LIFE: CONTENT VALIDITY OF A TOOL FOR FAMILIES OF ADULTS WITH INTELLECTUAL DISABILITIES IN BRAZIL

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ABSTRACT: On an international level, studies on the quality of life (QOL) are becoming more and more frequent, and few of them focus on the study of the quality of life of people with DI and their families. All of these studies identify a number of fields or areas that define the QoL, on both individual and family levels (Brown, MacAdam-Crisp, Wang, & Iarocci, 2006; Turnbull, Brown, & Turnbull, 2004; Schalock et al., 2002). In Brazil, legal guidelines exist that are moving relatively forward with respect to people with disabilities. However, in spite of all of the legislation and benefits, the insertion or inclusion of people with disabilities in the job market, schools and leisure centers is still low. The aim of the current research is to present the translation, adaptation and content validation of the Beach Center Family Quality of Life (Summers, Poston, Turnbull, Marquis, Hoffman, & Mannan, 2005) in the Brazilian context. To carry out the adaptation and standardization of the scale the seven steps proposed by Tassé and Craig (1999) and Beaton, Bombardier, Guillemin and Ferraz (2000) will be followed: (1) translation/adaptation to Portuguese; (2) consolidation of translation/adaptation; (3) preliminary normalization of translation; (4) review/adjustments; (5) pilot test of translation; (6) revision/adjustment of translation; (7) standardization the scale and obtaining index of validity and reliability. The research is currently on Step 4, review/adjustments, in which the content validity is implemented in order to achieve semantic, conceptual, idiomatic and experimental equivalence between the original tool and the final one (Tassé & Craig, 1999; Beaton et al., 2000). It is important to mention that the aim of the research is to understand the family quality of life, not only of the person with intellectual disabilities, but those of all of their family members.

Keywords: family, quality of life, adults, intellectual disabilities, tool.

INTRODUCTION

There is historical evidence that disabilities have always been considered a differential mark, whether it was related to the idea of sin, supernatural powers or even as a kind of link with sainthood. According to studies carried out by Diniz (2007), Amiralian (1997), Belarmino (1997), Mazzota (2005) and Silva (2006), different historical moments show evidence of changes in the ways of understanding people with disabilities with relation to social, philosophical, religious, ethical and moral values. However, people with disabilities still face different social barriers and still experience denial of certain fundamental aspects of life, such as work, education, housing and leisure activities. In Brazil, legal guidelines exist that are moving relatively forward with respect to people with disabilities. However, in spite of all of the legislation and benefits, the insertion or inclusion of people with disabilities in the job market, schools and leisure centers is still low.

Among the laws that deal with various aspects of the quality of life, there are a few that stand out: the *Constituição da República Federativa do Brasil de 1988* and *Legislação de 7.853/89*, regarding fundamental rights and guarantees, *Decreto nº 914/93*, which establishes the *Política Nacional de Integração das Pessoas com Deficiência* (National Integration Policy for People with Deficiencies), and *Legislação nº 8.112/90*, which calls for the reservation of up to 20% of the spots in public contests for people with disabilities. Additionally, there are some benefits which can be applied for by people with intellectual disabilities, such as the *Benefício de Prestação Continuada (BPC-LOAS)*, which guarantees a minimum monthly salary (Brasil, 1993), free public transportation, and tax exemption for the purchase of a car. However, in spite of all of this legislation and these benefits, the insertion and inclusion of people with disabilities in the work force, schools and leisure centers remains low. This situation raises concerns about the quality of life for disabled people on the part of the government, reflected in some official documents; on the part of researchers, seen in academic research projects;

and on the part of society, generally visible in the social context. The objectives of these official government documents focus on the promotion of improvements, such as the elimination of barriers and the design of services and programs, in addition to encouraging the general participation of disabled people in society (Brasil, 2009, 2013; Senac, 2006).

Therefore, it is fundamental to carry out these studies on how to improve quality of life for these people and their families. The aim of the current research is to present the translation, adaptation and validation of the content of the Beach Center Family Quality of Life (Summers, Poston, Turnbull, Marquis, Hoffman, & Mannan, 2005) in the Brazilian context. It is part of a greater study, the objective of which is the validation of the Beach Center Family Quality of Life (Summers et al., 2005) in order to identify the quality of life of families with a member with intellectual disabilities over 18 years old in various states of Brazil. On an international level, studies on quality of life (QoL) are becoming more and more frequent, and few of them focus on the study of quality of life for people with DI and their families. All of these studies identify a number of fields or areas that define the QoL, on both individual and family levels (Brown, MacAdam-Crisp, Wang, & Iarocci, 2006; Turnbull, Brown, & Turnbull, 2004; Schalock et al., 2002).

Quality of Life

Quality of life refers to the degree of satisfaction that a person perceives from his/her surroundings in relation to having their needs met (Giné, 2004). As a result, it is a concept that is linked to a paradigm change with an ecological focus, centered on the person and considering that person's family, which should promote actions on individual, organizational and social levels (Verdugo, 2006). This also means that it is a multi-dimensional concept, with eight empirically determined dimensions: emotional well-being, interpersonal relationships, material well-being, personal development, physical well-being, self-determination, social inclusion and rights (Schalock et al., 2002).

In other words, quality of life touches on both subjective aspects, such as psychological indicators, and objective ones, such as social and ecological indicators. Studies on the quality of life help us to understand family in its broadest possible meaning (Brown et al., 2006) and drive us to consider the difficulties that can appear when a family has a member with an intellectual disability, such as the stress of chronic conditions, as in adult cases. The various ways of facing these situations are conditioned, on the one hand, by the individual characteristics of each family, which are unique in the moment in which their values, beliefs and expectations interact, and, on the other hand, by an organization and access to services and resources.

Family Quality of Life

According to Zuna, Summers, Turnbull, Hu, & Xu (2010, p. 10), family quality of life is the "dynamic sense of family well-being, defined in a subjective and collective manner by all of the members of the family, in which needs interact on an individual and a family level". This approach recognizes the singularity of the family as a unit and the context of development. It tells us that family quality of life is a critical area to study with the challenge of improving the skills of the family with relation to the intellectual disability of their family member, recognizing their strengths and providing service and support (Zuna, Seling, Summers, & Turnbull, 2009; Giné et al., 2013).

The findings of these studies on the quality of life for families of people with DI led the researchers to develop three instruments with which to measure family quality of life: (a) Beach Center Family Quality of Life, with elaboration and normalization carried out by the Beach Center on Disability (KU) and with adaptation and normalization in other countries such as China, Spain and Colombia (Summers et al., 2005), (b) Family Quality of Life Survey, carried out by the group Quality of Life Research Unit and applied in Canada, Australia, Israel, South Korea and Taiwan (Brown et al., 2006) and (c) Latin American Family Quality of Life Scale, constructed by Aznar and Castañón (2005), with the objective of being more accessible to intervention programs. In addition, in the Spanish context, two scales have been developed to measure the CdVF (CdVF-E) (Giné et al., 2013), one for families of people under 18 years of age with DI and one for families of people over 18 years of age with DI.

According to Brown et al. (2006), these studies on family quality of life offer useful information gathered with instruments used in the research and that promotes the construction of a model that could be useful in designing interventions. However, Zuna et al. (2009) expressed concern about the limited number of studies that deal with the applied aspects of family quality of life. There are many family quality of life scales, and much research has been done, but there are no studies that direct professionals on how to put to use the results of research on the measure of effective intervention. Zuna et al. (2009) defend the necessity to move on from the conceptualization

and measure of the intervention. Therefore, they consider the need to currently analyze and synthesize the developed research in order to suggest a unified theory that describes the relationships among the variables that make up this model of family quality of life and the needs of the families.

Zuna et al. (2009) propose a theory on family quality of life that explains how some factors, such as the individuals and the family unit, influence the results understood as family quality of life. It is therefore necessary to have joint and reciprocal work involving professionals, researchers and the families in order to be able to positively influence the families. In other words, it is of utmost importance to incorporate the knowledge of professionals in developing the construct (Healy, 2005).

In accordance with the ideas stated in the previous paragraphs, the objective of this work consists of presenting the validation of the content of the scale Beach Center Family Quality of Life (Summers et al., 2005) as one of the first steps towards the normalization and adaptation of the scale to the Brazilian context.

METHODS

Participants

The participants were three researchers, four translators and four experts. All of them had a high level of both Portuguese and English. The table below briefly explains their profiles.

Table 1: Table Participants

Participants	Roles	Profile
Translator 1	Translation of the original version in English to Portuguese	Portuguese native speaker and trained in English
Translator 2	Translation of the original version in English to Portuguese	Portuguese native speaker y certified Portuguese-English translator
Translator 3	Translation of the Portuguese version for English	English native speaker and trained in Portuguese
Translator 4	Translation of the Portuguese version for English	English native speaker and certified English-Portuguese translator
Expert 1	Analysis translations	Portuguese native speaker and trained in English
Expert 2	Analysis translations	Portuguese native speaker and trained in English
Expert 3	Analysis translations	Portuguese native speaker and trained in English
Expert 4	Analysis translations	Portuguese native speaker and trained in English

INSTRUMENT

The Beach Center Family Quality of Life is composed of twenty-five items grouped into different areas: family interaction, parental roles, emotional well-being, physical well-being, material well-being and support for the disabled (Summers et al., 2005). It offers five response options: no need, low need, need, elevated need and highly elevated need.

PROCESS

To carry out the adaptation and standardization of the scale the seven steps proposed by Tassé and Craig (1999) and Beaton, Bombardier, Guillemin and Ferraz (2000) will be followed: (1) translation/adaptation to Portuguese; (2) consolidation of translation/adaptation; (3) preliminary normalization of translation; (4) review/adjustments; (5) pilot test of translation; (6) revision/adjustment of translation; (7) standardizing the scale obtaining validation and reliability.

The research is currently on Step 4, review/adjustments, in which the validation of the content is implemented in order to achieve a semantic, conceptual, idiomatic and experimental balance between the original questionnaire and the end one (Tassé & Craig, 1999; Beaton et al., 2000).

(1) Translation/Adaptation to Portuguese

Committee 1 was composed of three researchers together with professional translators (English/Portuguese) with expert knowledge of the subject matter, in addition to being native Portuguese speakers. Two translators were asked to do the translation/adaptation independently; that is to say, they were asked to go beyond a literal translation to Portuguese and to consider the cultural characteristics of Brazilians. Both translators were native Brazilians. The translators had different profiles: one of them had expert knowledge of the subject matter in the questionnaire, while the other was not familiar with the topic (Beaton et al., 2000).

(2) Consolidation of Translation/Adaptation

The consolidation of the translation/adaptation was done in a meeting of Committee 1 (three researchers and professional translators, English/Portuguese, with expert knowledge of the subject matter and native Portuguese speakers), during which they compared the translations/adaptations, identified the discrepancies, and then combined the two documents into one single document through a discussion between the translators (Beaton et al., 2000). The scale was later exhaustively analyzed, an agreement was reached by all of the members of Committee 1, and a report was written in which the process of synthesis was carefully documented, each of the questions was addressed and the resolution of the differences was recorded. This phase ended with the first version of the scale, which we call here the preliminary translation.

(3) Preliminary normalization of translation

This first version was submitted to an inverse translation carried out by a second committee, Committee 2, consisting of two people who were not familiar with the scale and were asked to translate it back to its original language; in other words, to translate it from Portuguese to English. The translators were people with a high level in Portuguese, and both were native English speakers. At the end of this phase, we had a second version of the Beach Center Family Quality of Life in English. Adjustments were made to the first version after studying the discrepancies identified between the inverse translation and the original version. The translation, grammatical structure and adaptation to cultural context were confirmed at this time. A third version of the scale was obtained at the end of this process.

(4) Review/Adjustments

In order to validate the content of the scale, two people who were not involved in the translation process were invited to participate as experts. Experts allow for the verification of questions that originated with the normalization of the preliminary translation in order to reach a consensus (Tassé & Craig, 1999; Beaton et al., 2000). The role of these participants, considered experts in both languages, was to review all versions of the questionnaire—the original version and the translated versions—as well as the written reports explaining the decisions made in the previous phases. These experts reviewed the authentic meaning of the items and their semantic, conceptual, idiomatic and experimental equivalence between the original questionnaire and the final translation (Tassé & Craig, 1999; Beaton et al., 2000).

DATA ANALYSIS

The analysis of the data of the translations was carried out in a qualitative manner, making comparisons between the different translations and suggesting a new version for some items based on the established criteria, such as making it a priority to keep the language simple, accessible and clear. It is important to point out that the root of the key word of the item was taken into account during the revision in order not to lose any meaning. In other words, analysis of equivalences (semantic, idiomatic, experimental and conceptual) was carried out in order not to lose the essence of the items.

In order to validate the content, the agreements of the experts were calculated using the Holsti coefficient (1969, quoted by Stemler, Steve, 2001) and the degree of concordance by the Kappa de Kyalseth coefficient (1989 quoted by Stemler, Steve, 2001). This coefficient was calculated for each of the dimensions analyzed by the experts: (a) semantic equivalence, (b) idiomatic equivalence, (c) experimental equivalence, (d) conceptual equivalence (e) other errors.

RESULTS AND FINDINGS

This section will be divided into three parts. The first and the second will present a qualitative discussion of the analysis carried out during the process of translation from English to Portuguese and the inverse translation. The third will present the degrees of agreement among the four experts in relation to: (a) semantic equivalence, (b) idiomatic equivalence, (c) experimental equivalence, (d) conceptual equivalence and (e) other errors.

(1) Translation/Adaptation to Portuguese and Consolidation of Translation/Adaptation

The different profiles of the translators contributed to the elaboration of a translation that was adjusted to the content and the Brazilian culture. The first translator was familiar with the material and could be more sensitive to the vocabulary and semantic aspects of the specific topic. In contrast, the second one was not familiar with the topic, and their reading and revision was closer to that of a normal person answering the questions on the scale without a lot of knowledge of the topic (Beaton et al., 2000).

The two translators used different Portuguese words to refer to the same items in doing the translation. Therefore, Committee 1 had to establish criteria for making a choice, which consisted in choosing the easier word in order to make the language more accessible to the general population. These criteria have to do with the intended population of the study, families of people with disabilities, who usually belong to a lower socio-economic level and have possibly had less access to education. At the same time, the translation that maintained the closest meaning to the key words of the item, so that the item did not lose the meaning of the original version, was considered to be the best translation.

Of the twenty-five items composing the scale, sixteen were by Translator 2, one was by Translator 1, five were translated the same way and three items were written after a consensus between the translations of the two was reached.

Table 2: Consolidation of Translation/Adaptation

Original version (English)	Translator 1 (Portuguese/ English)	Translator 2 (Portuguese/ English)	Version 1 (Portuguese)
<i>Item 1</i> <i>My family enjoys spending time together.</i>	<i>Minha família gosta de passar tempo junta</i>	<i>Os membros da minha família gostam de passar tempo juntos</i>	<i>Os membros da minha família gostam de passar tempo juntos</i>
<i>Item 6</i> <i>My family members have transportation to get to the places they need to be.</i>	<i>Membros da minha família têm transporte para ir aos lugares que precisam estar</i>	<i>Os membros da minha família têm transporte para ir onde precisam</i>	<i>Os membros da minha família têm transporte para ir onde precisam</i>
<i>Item 12</i> <i>My family members show that they love and care for each other.</i>	<i>Os membros da minha família mostram que se amam e se importam uns com os outros.</i>	<i>Os membros da minha família demonstram que eles se amam e se importam com o outro</i>	<i>Os membros da minha família mostram que eles amam e cuidam uns dos outros.</i>
<i>Item 14</i> <i>Adults in our family teach the children to make good decisions.</i>	<i>Adultos em minha família ensinam as crianças a tomar boas decisões.</i>	<i>Os adultos na minha família ensinam às crianças a tomarem decisões sensatas</i>	<i>Os adultos na minha família ensinam seus filhos a tomarem boas decisões</i>
<i>Item 17</i> <i>Adults in my family know other people in the children's lives (friends, teachers, etc.).</i>	<i>Adultos em minha família conhecem outras pessoas nas vidas das crianças, ou seja, amigos, professores</i>	<i>Os adultos da minha família conhecem outras pessoas que fazem parte da vida das crianças (amigos, professores)</i>	<i>Os adultos da minha família conhecem outras pessoas que fazem parte da vida dos seus filhos (amigos, professores)</i>
<i>Item 19</i>			

<i>Adults in my family have time to take care of the individual needs of every child.</i>	<i>Adultos em minha família têm tempo para cuidar das necessidades individuais de cada criança.</i>	<i>Os adultos da minha família têm tempo para cuidar das necessidades individuais de todas as crianças</i>	<i>Os adultos da minha família têm tempo para cuidar das necessidades individuais de todos os filhos</i>
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In most of the cases, the choice was made based on what the translator suggested, because two of them had to do with expressions like “my family” and “my family members”, which were mostly changed to “my family members” by Translator 2. In addition, the article “os” was added to the beginning of sentences, changing the expression to “os membros da minha família”. We believe this modification to be relevant in order to highlight the objective of the scale, which is to measure family quality of life. Additionally, Translator 2 had a more accessible Portuguese, except in Item 12, where the version by Translator 1 was chosen.

Items 14, 17 and 19 were rewritten based on the criteria of the two translations. In Item 14, the word suggested by both translators was used. In Items 14, 17 and 19, Committee 1 decided to change the word “criança”, which means children in a general sense, to “filhos,” which means sons and daughters. This decision had to do with the general proposal of the study, which is to work with families of adults with disabilities. Therefore, the choice of sons and daughters expresses the best possible meaning.

(2) Preliminary Normalization of Translation

The two native English-speaking translators carried out the inverse translation, which was the most adequate time to evaluate the qualitative manner of the translation of the scale and to confirm the validity of the translation, ensuring that the translated version reflected the same content of the items (Tassé & Craig, 1999; Beaton et al., 2000). The people participating as experts were crucial in achieving transcultural equivalence (Beaton et al., 2000).

Of the twenty-five items that make up the scale, thirteen were suggested by Translator 4, five were written by Translator 3, five were translated the same way by both and two items were rewritten based on the synthesis of the proposals of the two translators and the considerations of Committee 4 to adjust the meaning of the item.

Table 3: Consolidation of Translation/Adaptation

Version 1 (Portuguese)	Translator 3 (Portuguese/English)	Translator 4 (Portuguese/English)	Version 2 (English)
Item 22 O membro da minha família com deficiência tem apoio para progredir na escola ou no trabalho	The member of my family with disability has support to make progress at school or at work	The disabled member of my family has support to progress at school or at work.	My family member with a disability has support to accomplish goals at school or at workplace
Item 23 O membro da minha família com deficiência tem apoio para progredir na escola ou no trabalho	The member of my family with disability has support to make progress at school or at work	The disabled member of my family has support to progress at school or at work.	My family member with a disability has support to accomplish goals at home.

After obtaining the two version of the scale, the two committees met and compared the version to the original one to find possible discrepancies and/or incongruences. Nineteen items of the version remained the same and six changed. Of these items, numbers 5, 10, 11, and 25 were re-written because of discrepancies among the translators, and items 22 and 23 were re-written because it was considered that Version 3 did not convey the same idea as the original version.

Table 4: Consolidation of Translation/Adaptation

Version 2 (English)	Original version (English)	Version 1 (Portuguese)	Version 3 (Portuguese)
Item 5 The members of my family help the children with their homework and other school activities	My family members help the children with school work and activities .	Os membros da minha família ajudam as crianças com os deveres de casa e outras atividades da escola	Os membros da minha família ajudam as crianças com as tarefas da escola e atividades
Item 10 The members of my family solve problems together.	Our family solves problems together.	Os membros da minha família resolvem os problemas juntos	Os membros da minha família resolvem problemas juntos
Item 11 The members of my family support each other to achieve goals.	My family members support each other to accomplish goals.	Os membros da minha família apoiam um ao outro para atingir metas	Os membros da minha família apoiam uns aos outros para atingir metas
Item 22 My family member with a disability has support to accomplish goals at school or at workplace	My family member with a disability has support to accomplish goals at school or at workplace.	O membro da minha família com deficiência tem apoio para progredir na escola ou no trabalho	O membro da minha família com deficiência tem apoio para conseguir a suas metas na escola ou no trabalho
Item 23 My family member with a disability has support to accomplish goals at home.	My family member with a disability has support to accomplish goals at home.	O membro da minha família com deficiência tem apoio para progredir na escola ou no trabalho	O membro da minha família com deficiência tem apoio para conseguir as suas metas em casa
Item 25 My family has a good relationship with the service providers who work with the disabled family member.	My family has good relationships with the service providers who provide services and support to our family member with a disability.	Minha família tem um bom relacionamento com os prestadores de serviços que trabalham com o membro com deficiência	Minha família tem um bom relacionamento com os prestadores de serviços que trabalham e prestam apoio ao membro com deficiência

(3) Expert judgment

Version 3 is the result of the expert judgment by four native Portuguese speakers, all with a high level of English. In this phase, they all reviewed the process of translation and adaptation between the original questionnaire and the final version, while considering the five categories of analysis: a) semantic equivalence, b) conceptual equivalence, c) idiomatic equivalence, d) experimental equivalence and e) other errors (Beaton et al.,

2000). They did so with the intention of maintaining the authentic meaning of the item from the original version and suggested some changes for Version 4.

Semantic Equivalence

With relation to semantic equivalence, the concordance between the results was calculated using the Kappa statistic, and the result was $Kappa = -0,140873$, $p = 0.0845$, which demonstrates that the degree of concordance among the experts was low.

The discrepancy among them was due to the fact that some of them considered the use of synonyms correct, and others considered it incorrect and suggested a modification in the Portuguese word because it was a literal translation from English. For example, in Item 20, “*cuidado dentário*” and “*assistência dentaria*” mean the same thing in Portuguese, but “*cuidado dentario*” is a more accessible term. The same thing occurred in Items 22 and 23, where the words “consequir” and “alcançar”, which mean the same thing, yet “consequir” is more accessible and, therefore, was used.

In Item 1, one of the experts suggested that the expression “os membros da minha familia gosta” be changed for “minha familia gosta”; in Items 14, 17 and 19, they suggested changing the word “filhos” for “criança”. However, both issues have to do with decisions made previously which will not be taken into consideration in the interest of achieving the end goal of the research: to introduce a scale able to reach families from various social classes, with varying levels of education and with adult sons and daughters who do not fit the word “children”.

Other issues related to semantic equivalence considered pertinent were: i) nuances with relation to missing words in adjusting the translation of an item, such as, in Item 5, instead of the word “atividades”, they suggested “atividades escolares”; ii) changes with relation to pronouns, such as “seus” instead of “nossos” in Item 9 and “minha” instead of “nossa” in Item 13, which changes the meaning of the sentence; iii) the mistaken use of the word “junto”, which one of the experts suggested changing to “unida”; and, iv) the change of the word “mostra” for “demonstran”, which totally changes the meaning of the item.

Conceptual Equivalence/Idiomatic Equivalence/Experimental Equivalence

With relation to conceptual, idiomatic and experimental equivalence, the general concordance generated a $Kappa = 1$ among the experts, signifying perfect agreement among the evaluators.

Other Errors

With relation to other errors, the dependability among the experts registered $-0,020408$, $p = 0.08026$ on the Kappa index. The discrepancies were related to errors identified by two of the experts with relation to verb tenses, such as changing “relacionarem” to “relacionar” in Item 8.

CONCLUSION

This study has presented the process of the translation, adaptation and validation of the content of the scale Beach Center Family Quality of Life (Summers et al., 2005) to a Brazilian context. For this transcultural adaptation, we considered the phases presented in this article to be important because they are the base for achieving cultural equivalence. Therefore, it needed not only to be translated, but it was also necessary to adapt the items in order to incorporate cultural aspects of Brazilian society. All of the participants in the study had a fundamental role, especially the experts, as their evaluation regarding the different equivalences contributed to the most adequate translation for the Brazilian reality.

It is important to point out that, in addition to the validation the content of the scale Beach Center Family Quality of Life (Summers et al., 2005) by experts of both languages, another validation of the content will be carried out by other experts. In this case, the experts will be mothers of disabled adults and professionals in order to verify that there is a good understanding of the scale. Finally, there will be a pilot study and the normalization of the scale in order to be used for the Brazilian population.

RECOMMENDATIONS

In general, a high index of agreement was reached among the experts for most of the established criteria. In addition, we believe that further modifications to the scale will be made in the next phases, such as the pilot study and the normalization of the research in order to adjust the adequacy of the scale to the Brazilian context.

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CONTENT VALIDITY OF THE QUESTIONNAIRE ON LEARNING EXPERIENCES ASSOCIATED WITH THE USE OF DIGITAL INFORMATION AND COMMUNICATION TECHNOLOGIES BY UNDERGRADUATES

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ABSTRACT: This work aims to analyze the validity of the content of the structured questionnaire for identifying learning experiences associated with the use of digital information and communication technologies (DICT) by undergraduates. It also integrates the pilot study carried out within the framework of a larger study on the construction of learner identity through participation in the learning activities mediated by the TDIC. The content validity allows us to analyze the adequacy of the data collection instruments, taking into account the theoretical concepts proposed for evaluation. The methodology of the work is carried out in two phases. In the first phase, the structured questionnaire is elaborated according to institutional reports on the use of the DICT and the results of research on the theoretical concepts of interest that have been published in scientific databases. The second phase consists of carrying out an expert judgment for evaluating the instrument. The group of judges is comprised of 10 people: 5 professionals that have knowledge of the subject and 5 undergraduates from several courses to give us relevant information on the clarity of the instrument. The participants are given a document describing the questionnaire (purpose, theoretical concepts and dimensions of interest) and an instrument to assess each of the items within it. The indices of agreement between the judges are calculated for the questionnaire in totality and for the dimensions studied, and individual interviews are conducted to discuss controversial questions. We find an acceptable index of agreement (higher to 80%) and consider that the participation of the judges from the profile specified has the potential to give us relevant information for constructing the structured questionnaire for use in research.

Key words: content validity, structured questionnaire, digital information and communication technologies (DICT).

INTRODUCTION

This paper aims to analyse the validity of the content of the structured questionnaire for identifying learning experiences associated with the use of digital information and communication technologies (DICT) by undergraduates. The analysis of the content validity of the instrument integrates the pilot study of larger research on the learning experience impact associated with DICT-mediated activities on learner identity construction.

From the perspective of social constructivists and situated learning, interest in studying how undergraduates construct meaning about themselves as learners through participation in learning activities that take place in several DICT-mediated contexts leads us to propose a mixed method research design which provides qualitative and quantitative procedures for data collection.

This work integrates the first part of the research that refers to the quantitative study on the uses of DICT in various contexts and the learning experiences associated with them. However, beyond the aim of generating data to support understanding of the subject of study, this moment has an en goal of offering relevant information about participants as a way to select a subsample for the second part of the research, which will focus on learning experiences and learner identity construction from a qualitative perspective.

Subjective experiences are understood as individual experiences in situations in which the subject is learning something, and, from our theoretical approach, we study it through the discursive re-construction of the experience lived in the real or imaginary field (Falsafí, 2011).

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With this in mind, we want to be clear that the aim of the questionnaire is not to cover the theoretical and methodological complexity of the subjective learning experiences of the students in several DICT-mediated contexts. The idea is that the instrument provides information about some elements that we consider as constitutive of learning activities from the our theoretical mark (Coll et al, 1992; Colomina et al., 2001; Falsafi, 2011) and aspects that seem to be important in the preliminary approach to subjective learning experiences of undergraduates with a quantitative focus.

In this way, we think that the data collected through the questionnaire, beyond just the opportunity to select a diversified sub-sample with respect to experiences with DICT, allows us to identify elements to be explored through in-depth interviews studying learner identity construction (Aldana, Campos & Valdés, 2015).

From the theoretical mark that we adopt, consider the learner identity (LI) as the recognition of oneself as a learner and the ability to learn in specific contexts and conditions (Falsafi & Coll, 2010). These meanings about oneself are constructed by people through participation in learning activities that take place both inside and outside of formal educational contexts (Lave & Wenger, 1991). Therefore, we understand education as a social practice based on the ideas of Leontiev (1979) about the activity theory, involving the socialization and individualization processes through the construction of shared meanings, motives and goals of the individual participation in social practices, the role of emotions and the presence of others in the activity.

To study learner identity construction through participation in several contexts, consider DICT as an important social-cultural artefact present in the different contexts of activities in which people move. In addition, we assume that the widespread use of DICT has enabled the setting of new social practices, the transformation of communication patterns, and that it drives discussion about what learning means and the development of citizens in the information society (Coll, 2013).

In this manner, we consider that the changes in the communication processes and cultural exchanges generated by DICT development within the framework of the information society (Castells, 1999) increase opportunities for learning both inside and outside of formal educational contexts. Thus, we think that the uses of DICT in the many kinds of tasks realized daily make it possible for people to participate in activities which potentially promote learning experiences and, in this case, not exactly about curricular contents, but on other subjects of individual interest.

Much research has focused the uses of DICT in general daily activities or in specific learning situations in both formal and informal educational contexts (Coll, 2004; Coll & Engel, 2014; Coll, Rochera, Mayordomo & Naranjo, 2007; Erstad, Gilje & Arnseth, 2013; Eynon, 2009; Ito et al., 2008; Mauri & Clarà, 2012; Sefton-Green, 2004).

Reports on the general uses of DICT by the worldwide population have shown an increase of 8% in internet users over the last year (España, 2014). With respect to the European continent, it is estimated that broadband services are available to 95,2% of population and that people use the internet for: sending e-mails (67%), searches for information on property and services (59%), shopping online (47%) and access to professional and social networks (45%). The uses of the internet by the Spanish population is generally similar to that of other Europeans, and the least-used activities for both groups are video calls and search for employment.

Data on the Spanish population's access to and use of DICT show the growth in the purchase of mobile phones, smartphones and tablets, as well as an increase in the use of laptops, reaching 46%. One particularly interesting piece of data for our research is the increase in the number of the homes with internet access (reaching 69,9%) and the site of the home as the main setting in which users access the internet (87,1) as compared with other contexts. At home, the users access internet primarily from laptops (68,4%) and desktops (66,6%).

This data indicates that the activities carried out by using several devices are influenced by the kind of context in which the users connect to the internet, and this is verified by the use of social networks and the downloading of content, which is more practiced at home than in other contexts, especially when compared with the workplace and school or university.

As for the uses of DICT by undergraduates (España, 2006), around 86% use searches, 85,5% send e-mail, 64,4% read the news and 53,4% use it to access public administration websites. The least common activities are video calling (7%), shopping (8,9%) and online games (8,5%).

The Spanish report offers information relevant to our research, considering that it shows that 37,6% of undergraduates have commented on the use of DICT as a tool in aiding them to study, as well as the influence of the different kinds of contexts in which they connect to the internet for activities that help them to study: school (56,5%), public settings (38%), library (49,6%), at home (41,5%), friends and family's home (39,3%), at the workplace (33,4%), cybercafé (36,9%) and others (34,7%).

Research carried out in the United Kingdom (Kirkwood, 2008; Selwyn, 2008) shows that the searching for information is also an activity done often by undergraduates, and that information searches on academic subjects are specifically verified more than searches for other kinds of contents (Selwyn, 2008).

We think that the activity of the academic information search can be a study aid and can potentially generate learning experiences. Significant differences are identified between the frequency of access to the internet for academic information searches according to the context in which undergraduates connect to the internet: there is a higher frequency mentioned by students that access the internet from their own devices, especially a desktop or a laptop than in students who access the internet from shared devices in public settings, such as the library or a computer lab at the university.

Gender and different areas of study are important variables that influence the use of the internet for academic information searches: women stand out when compared to men; and undergraduates of medicine and social sciences stand out more than students of architecture and arts (Selwyn, 2008).

From the idea that the academic information search as well as the several DICT-mediated activities are potentially able to generate the learning experiences, it is very important to clarify complex factors also have an influence, such as the kind of devices used, the quality of the connection in various contexts and the different social demographic profiles that characterize the populations of different countries (Bolliger & Wasilik, 2009; Kirkwood, 2008; Macleod et al., 2002; Marriot, Marriot & Selwyn, 2004; Tella & Mutula, 2008).

Our main aim in this work is to construct a powerful instrument to collect data that will help us to understand the learning experiences associated with the use of DICT in different contexts, as well as the interest of analysing the content validity of the questionnaire from the theoretical mark adopted and the various research projects on the use of this technology by undergraduates. In this way, we understand that the content validity allows us to make the necessary adjustments to the instrument, considering the theoretical concepts focused on and the clarity of the language, taking into account the characteristics of the public to which it is addressed (Alexandre & Coluci, 2011; Escobar-Pérez & Cuervo-Martínez, 2008; Rubio et al., 2003).

METHODS

In this paper, we analyse the content validity of the Portuguese version of the "Questionnaire on the use of digital information and communication technologies and learning activities", addressed to Brazilian undergraduates, through a panel of experts. We consider a panel of experts to be an effective way of evaluating the content validity of the instruments largely employed in the research of Psychology (Escobar-Pérez & Cuervo-Martínez, 2008).

Participants

In the literature, the studies do not show agreement on the number of judges needed to evaluate the instruments (Escobar-Pérez & Cuervo-Martínez, 2008). A group of two people considered to be experts on the research subject is recommended, with the end goal of analysing the theoretical relevance; however, if possible, it is also important to add other people that are not theoretical experts on the subjects and can contribute in improving the linguistic clarity of the instrument, taking into account the public to whom it is addressed.

In the interest of achieving both purposes, in this paper, a group of 10 people have participated: 2 professionals from a Spanish university that have experience with research and DICT-mediated teaching; 3 teachers and researchers from one of Brazil's public university with experience in teaching with DICT-mediated activities; 5 undergraduates from different degrees (Law, Architecture, Product Engineering, Psychology and History).

Procedures

The analysis of the content validity has been led through three phases that have instrument construction and panel of experts using quantitative and qualitative procedures as end goals (Polit & Beck, 2006). All three phases will be described below.

Phase 1: Construction of the Instruments

This phase involves the construction of the “Questionnaire on the use of digital information and communication technologies and learning activities” (originally called “Questionario sobre o uso das tecnologias digitais da informação e comunicação”), addressed to Brazilian undergraduates, as well as the “Instrument for the assessment of the Questionnaire on the use of digital information and communication technologies and learning activities” for its evaluation by the experts.

It is very important to reiterate that the main goal of “Questionnaire on the use of digital information and communication technologies and learning activities” is to provide relevant information on the learning experiences of undergraduates associated with the use of DICT in various activity contexts. In addition, the main goal of “Instrument for the assessment of the Questionnaire on the use of digital information and communication technologies and learning activities” is evaluate the instrument addressed to undergraduates with regard to the theoretical relevance and linguistic clarity.

Both instruments were made in the online version made through the computer tool called Limesurvey (version 2.05) that allows us to create inquiries online.

Phase 2: Panel of Experts

This phase consists of the analysis of the two instruments by the judges in agreement as previously described: the Questionnaire on the use of digital information and communication technologies and learning activities” addressed to undergraduates and the “Instrument for the assessment of the Questionnaire on the use of digital information and communication technologies and learning activities” that the participants should answer.

The participants were contacted previously, we explained how they could help with our research by participating in the process of the analysis of the content validity of the instrument. Following that, we sent an e-mail with the links to access the online versions of both instruments.

Before the presentation of the items to the judges, the necessary instructions for replying to the instrument are given, as well as explanations about the questionnaire being analysed (the main aims, theoretical concepts and dimensions of the interest, assistance and application conditions).

The data was processed through Limesurvey (Version 2.05). For data analysis, it calculated the agreement index among the judges by using the following equation, in which $\sum A$ is the sum of the agreements obtained among the judges and $\sum D$ is the sum of the disagreements:

$$\frac{\sum A}{\sum A + \sum D} \times 100.$$

As data analysis criteria, 80% was adopted as the minimum acceptable value for the index of agreement among the judges (Polit, Beck & Owen, 2007). Moreover, in addition to the questions with values below 80%, we intend to reformulate all questions that have not been evaluated as “Very relevant” and “Very clear”, taking the qualitative data (comments by participants in the instrument and interviews) into account.

Phase 3: Interviews to Agree on Questions

Individual interviews were conducted with the judges to reach an agreement on the questions with values below 80%, trying to improve the instrument and to adjust it to the proposal of the research. As before, the interviews were about the questions that obtained index of agreement rates of below 100% among the judges, taking on the comments and advice identified in the qualitative analysis of the instrument under evaluation as key points for discussion.

RESULTS AND FINDINGS

Construction of the Instruments

The construction of the “Questionnaire on the use of digital information and communication technologies and learning activities” is based on the assumption that the use of DICT in learning activities affects the organisation of the joint activity (Coll, Mauri & Onrubia, 2008). In effect, from the individual's learning experiences associated with learning activities, a source of meanings for the construction of the learner identity comes about (Coll & Falsafi, 2010).

Beyond the theoretical exploration explained, the elaboration of the instrument was guided by the systematic revision of the articles and reports currently published on the use of DICT in different contexts by participants with varying profiles (Centro de Estudos sobre as Tecnologias da Informação e Comunicação [CETIC.br], 2013; CETIC.br, 2010; Coll, Mauri & Onrubia, 2008; España, 2015; España, 2014; Ito et al., 2008; Kirkwood, 2008; Marriot, Marriot & Selwyn, 2004; Selwyn, 2008; Tapia, 2009).

From the above-mentioned purpose and based on the perspective of social constructivists and learning as situated, the theoretical approach to understanding activities and learning experiences (Coll et al. 1992; Colomina et al., 2001; Falsafi, 2011), the items of the questionnaire have been set out to obtain data on the following aspects or dimensions: social demographic profiles (gender, college career, face-to-face teaching or distance education, university campus or centre of distance education, place of birth and current residence, as well as living situation); the use of DICT (devices used for access, frequency of use and the various contexts in which various devices are used); DICT-mediated activities in which the undergraduates participate (characteristics of activity, the contexts in which they take place, aims, learning experiences associated with them, contents of learning and emotional impact of the activities); DICT as tools for learning (characteristics of DICT to support learnings).

The structured questionnaire is made up of 57 items that cover the social demographic profile of the participants and all of the previously cited dimensions. The instrument that presented to the judges (“Instrument for the assessment of the Questionnaire on the use of digital information and communication technologies and learning activities”) was made from the organisation of the items in a table in which the participants value the theoretical relevance and linguistic clarity of each item presented, attributing a number on a scale of 1 to 3. With regard to the theoretical relevance, it is possible to select from three options: 1 – Not relevant; 2 - Little relevant; 3 – Very relevant. In reference to clarity, there are the following choices: 1 – Not clear; 2 – Little clear; 3 – Very clear.

Furthermore, for this quantitative value, the instrument is made up of a part in which the participants should comment on the reasons that justify their answer to each item, especially in the cases that they think that the items aren't “very relevant” and “very clear” (Option 3 in the scale of value).

Analysis of the instrument by experts

In accordance with procedures, was used an equation to calculate the index of agreement among judges. The index of agreement among the judges was calculated for the instrument in general, for the three dimensions analysed and for each individual question. In this way, we find the index of agreement to be 90,33% for the total questionnaire and the following values for the dimensions analysed: 86,66% for the use of DICT; 90,67% for DICT-mediated activities in which undergraduates participate; 100% for DICT as tools for learning.

The data analysis showed values considered acceptable for the content validity of the questionnaire in general and for the dimensions analysed, taking on the data analysis criteria designated which is 80% of agreement (Polit, Beck & Owen, 2007). However, analysing the index of agreement among the judges for each question separately, we find values below 80%, which are shown in Table 1.

Table 1 – Questions With Inferior Values to 80%

Dimension	Question (In Original Language)	Index of Agreement (%)
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The uses of DICT	Video game	67,5
	<i>Ipod</i> , MP3, MP4	72,5
	<i>E-book</i>	75
	Câmera digital	72,5
	Instituições sociopolíticas (sedes de partidos, ateneu, etc.)	75
	Outros lugares (na casa de outras pessoas, local de trabalho, na rua, lojas, festas, viagens, bancos, restaurantes, <i>lan house</i> , etc.)	75
DICT-mediated activities	Contactar e conhecer novas pessoas	70
	Participar de debates sobre temas políticos e sociais	70
	Tirar e editar fotos	70
	Utilizar folhas de cálculo	65

The qualitative analysis of the comments by participants has contributed important information to support the revision of the questions with the aim of improving clarity, taking into account the public to whom the questionnaire is addressed. Thus, we redraw the questions with index of agreement below 80% and, we then held individual interviews with the judges to reach an agreement on the changes introduced. In continuation, we talk about the process of the revision and reformulation of the questions and mention examples in Tables 2 and 3.

Redrawing of the Questions from the Interviews of Agreement among judges

The process of revision and reformulation of the items considered the contributions from the judges that indicated the need to add a brief description of the devices or examples to help the respondents identify them easily in daily activities. As follows, Table 2 demonstrates examples of the questions reformulated with the advice given by the judges.

Table 2 – Redraw of Question With Inferior Values to 80%

Dimension	Question (In Original Language)	Redraw (In Original Language)
The uses of DICT	Videogame	Videogame (<i>Playstation</i> , <i>Nintendo Wii</i> , etc.)
	<i>E-book</i>	<i>E-book</i> (Leitor de livros digitais)
	Tirar e editar fotos	Tirar e editar fotografias (<i>Instasize</i> , <i>Pic Collage</i> , etc.)
DICT-mediated activities	Utilizar folhas de cálculo	Utilizar folhas de cálculo (<i>softwares</i> con planilhas eletrônicas para dados numéricos, como o <i>Excel</i>)

In accordance with the procedures described, beyond the questions that have an index of agreement below 80%, the qualitative data analysis has considered all of the comments and advice from the judges for all of the questions, even though it has obtained acceptable achievement values. Table 3 shows examples of changes in these last cases.

Table 3 – Redraw of Questions With Superior Values to 80%

Dimension	Question (In Original Language)	Redraw (In Original Language)
The Uses of DICT	Diariamente (ao menos 5 dias por semana)	Diariamente (uso igual ou superior a 5 dias por semana)
	Semanalmente (menos de 5 dias por semana)	Semanalmente (uso igual ou inferior a 4 dias por semana)
DICT-Mediated Activities	Bastante importante	Medianamente importante

The reformulation of the questions presented in Tables 2 and 3 demonstrates the importance of the procedure in improving the clarity of the questionnaire and the role that the analysis of content validity plays in the construction process of research instruments. The clarity and relevance of the questions can mark the boundaries between the adjustment of responses by participants (provided by the adequacy of the instrument) and the data collected that does not provide scientific information pertinent to the subject of study.

CONCLUSION

The analysis of the content validity of “Questionnaire on the use of digital information and communication technologies and learning activities”, Portuguese version addressed to Brazilian undergraduates, demonstrates the potential of the instrument for data collection about the subject of study. The comments and advice from the

judges have led us to adjust items with the end goal of increasing its quality as an instrument of data collection to achieve the aims in both phases of the research. In addition to the relevance of the questionnaire constructed from a strong theoretical basis and the systematic analysis of several publications on the subject, it is very important to use procedures that can guarantee the understanding of the public to whom the instrument is addressed.

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ADVANTAGES AND LIMITATIONS OF USAGE OF OPEN EDUCATIONAL RESOURCES IN SMALL COUNTRIES

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ABSTRACT: Educational resources in the competitive world of higher education were often considered as key intellectual property, so access to those resources was restricted to privileged groups of students and professors, which is unacceptable in today's networked society. Today, an increasing number of institutions and individuals share such digital resources via the Internet free of any legal, financial or technical barriers. Open Educational Resources (OER) are the right way which enables free and accessible education to everyone and access to knowledge as public good. OER cherish the culture of participation, collaboration and sharing and with an open access to scientific information it brings a notable contribution in knowledge society development. The implementation of OER has certain limitations, in particular for small countries which use a non-English language, have limited resources and support to customize and create OER, their educational practice is founded on traditional teaching methods with occasional use of digital contents and ICT. The awareness raising and positive attitudes about OER are the first important step towards its acceptance. The empirical part of this paper is analysing attitudes toward OER among the scholars at few smaller public faculties in Croatia and their practice of sharing knowledge and teaching materials.

Keywords: open educational resources, OER, sharing, teaching materials, creative commons

INTRODUCTION

Access to information and knowledge are the fundamental right of every human, but this is not always achieved without limitations. Teaching and learning resources in the competitive world of higher education were often considered as key intellectual property accessible exclusively to privileged groups of students and professors. Today, an increasing number of institutions and individuals share such digital resources via the Internet free of any legal, financial or technical barriers. With Open Educational Resources (OER) education can become accessible to everyone who want to learn, while teachers have the opportunity to enrich their teaching practice. The beginning of the open access in education was marked by the OpenCourseWare (OCW) initiative of the Massachusetts Institute of Technology (MIT) which uploaded most of their course materials on the Web in 2001, thus making them accessible worldwide and free of charge. Their example was followed by numerous world-renowned universities which, in this way, extended their influence both within the academic community and among those who wish to learn. Although exchange of educational resources is not a new phenomenon, the concept of Open Educational Resources was mentioned for the first time in 2002 at the UNESCO Forum on Open Courseware for Higher Education, emphasizing the idea of free sharing of knowledge and digital teaching, learning and research materials (Butcher, 2011; Poposki, 2010). Open Educational Resources (OER) encompass any educational and research resources including curriculum maps, course materials, entire and parts of e-courses, lessons plans, learning materials, textbooks, audio and video records, simulations, experiments, multimedia content, applications and games, and any other materials that have been designed for use in teaching, learning and researching that are openly available for use without an accompanying need to pay fees (Butcher, 2011; Groom, 2013).

Furthermore, the concept of Open Educational Resources does not refer only to teaching and learning material, but includes software and tools which enable development, usage, adaptation and sharing of teaching/learning content, learning management systems (such as e.g. Moodle), tools for the development of learning communities and resources required for the implementation of the above-mentioned items, such as open licences (OECD, 2007). The most important documents which bring guidelines and recommendations for a wider acceptance of open learning resources are the Cape Town Open Education Declaration (2007), the Dakar Declaration on Open Educational Resources (2009), the Commonwealth of Learning and UNESCO Guidelines on Open Educational Resources in Higher Education (2011) and the Paris OER Declaration (2012).

When someone puts their lesson plan or presentation on the Internet, those materials are copyright protected and others cannot share or modify them in any way, unless they have permission from author (copyright owner) or author makes them open. The main feature of the Open Educational Resources is that they can be freely and legally downloaded, adapted, remixed and used to create new ones while their authors retain credit for original creation, which allows the Creative Commons (CC) licences (Butcher, 2011; Klang, 2008). This is how the OER differ from other digital teaching and learning resources available on the Internet. "An OER is simply

educational resource that incorporates a licence that facilitates reuse, and potentially adaptation, without first requesting permission from the copyright holder" (Butcher, 2011). With regard to educational resources, the UNESCO recommends two types of Creative Commons licences: CC-BY licence with author attribution, which allows for unlimited forms of use of the OER subject to giving credits to the author of the original. The second is the CC-BY-SA licence with the Share-Alike attribution, which requires that all derivative works be shared under the same conditions, thus augmenting the number of Open Educational Resources.

The spreading of OER was further influenced by the idea of Tim O'Reilly on collaborative creation of contents and interaction within virtual communities of interest, with this idea being in the background of Web 2.0. applications, thus placing emphasis on the process of learning, not just its end result. In addition, OER cherish the culture of participation, collaboration and sharing in learning and creating of knowledge; together with an open access to scientific information and open source software, the OER brings in a notable contribution to economy based on knowledge and knowledge society.

USAGE OF OPEN EDUCATIONAL RESOURCES

The advantages of the usage of Open Educational Resources are manifold. It is considered that OER and open education will reduce the gap between different strata of society and between countries, improve the quality of education, accelerate the knowledge flow and increase the number of people involved in the educational process (mostly informal and lifelong). "One of the main values of OER is that they can be used worldwide independently of the system of education and national curricula frameworks" (Grodecka, Sliwowski, 2014). The European Commission has also recognized the values of OER, stressing that Open Educational Resources and open practices allow more personalised learning, a better learning experience, and an improved use of resources, which promote equity by increasing the availability of knowledge because individuals may learn anytime, anywhere, with the support of anyone, using any device (<http://ec.europa.eu/> and <http://openeducationeuropa.eu/>).

Despite its numerous advantages, OERs are still in the early adoption stage (Mc Kerlich at al., 2013), which calls for a discussion on factors slowing the spread of their usage. Research has shown that a wider acceptance of OERs requires development of awareness and reaching an understanding of all their dimensions, increase of recognisability of the OER repositories, ensuring quality of content and development of online collaborative communities (Torres, 2013; Grodecka, Sliwowski, 2014; Mc Kerlich at al., 2013; Rolfe, 2012; Kortemeyer, 2013). Whilst teachers exchange informally their teaching material with colleagues within their own organisations and share them to their students, this is not very often the case at the global level and through formal channels, and when it is done, there is very little use of suitable licences (Reed, 2012). One of the obstacles hindering the larger-scale use of OER is an uncertainty regarding the copyright on educational content – does content belong to the teacher creating it and investing his knowledge, experience and time into it; or to the organisation, financed by the Government budget, that is paying the teacher's salary. Creative commons licences must therefore be popularised amongst teachers and those creating educational content. Production, and even modification of the existing OER does not come free; it requires certain hardware, software, organisational, human and time resources. Furthermore, the usage of OER may include adaptation to an actual pedagogic context (teaching or learning styles), but also to a country's cultural context (Torres, 2013). "The localization process is at the heart of OER – it exemplifies its diversity, openness and reusability" (Grodecka, Sliwowski, 2014). One of the recommendation of the Paris OER Declaration (2012) reads that "Encourage the development and adaptation of OER in a variety of languages and cultural contexts. Favour the production and use of OER in local languages and diverse cultural contexts to ensure their relevance and accessibility. Intergovernmental organisations should encourage the sharing of OER across languages and cultures, respecting indigenous knowledge and rights."

The greatest number of Massive Open Online Courses (MOOCs) in Europe is provided in Great Britain (234 courses), followed by France (137 courses) and Germany (111 courses), as shown in Figure 1. At the global level, 27% of MOOCs originate from the USA, 17% from India, 13% China, 4% from Great Britain, Australia and Canada each, while the remaining 31% come from other countries (<http://www.moocs.co/>). Accordance to this, mostly OERs in well-known repositories are on English language: in OER Commons 96%, in Curriki 94%, in Merlot 89%.

Spreading of OER in small countries is additionally hindered by their lack of OER implementation policy at national or institutional levels; limited resources and support to customize and create OER; educational practice which is mostly founded on traditional teaching and learning methods; the digital competence and information literacy are mostly non-adjusted to search for appropriate OERs and to create new ones, and there is a "language

gap” (Mc Kerlich et al., 2013; Iiyoshi, Kumar, 2008; Yuan et al, 2008; Cobo, 2013). Finally, "In the OER movement, educational systems face the greatest of challenges: to break the aversion to openness" because "...the mindset of the majorities is set on the culture of not-open" (Torres, 2013).



Figure 1. Distribution of MOOCs by Country, in Europe
Source: http://openeducationeuropa.eu/en/european_scoreboard_moocs

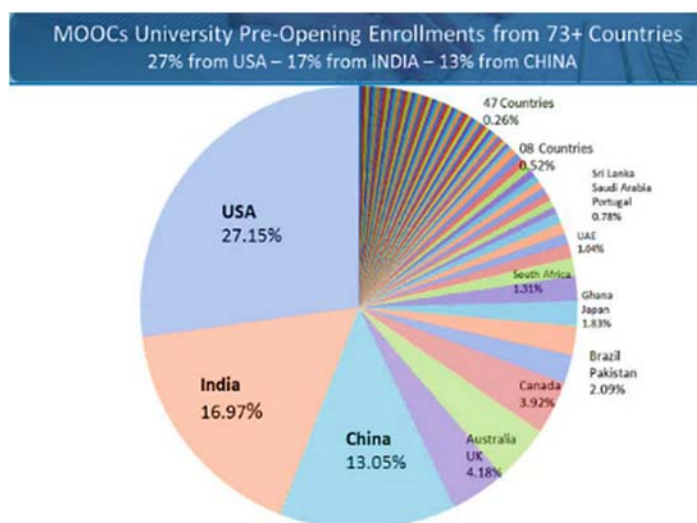


Figure 2. Distribution of MOOCs worldwide

Source: http://www.moocs.co/Higher_Education_MOOCs.html

METHODS

The empiric section of this paper deals in analysing attitudes toward OER and of knowledge sharing at some public institutions of higher education (Pula and Rijeka). The institutions comprising this research come mostly from the fields of social sciences with a few from the field of technical sciences. The research was conducted in 2014 using an online questionnaire created in GoogleDocs as the instrument. The questionnaire was distributed via mailing lists to 4 institutions of higher education. There are only 64 respondents who filled the questionnaire, 56% female and 44% male.

According to their academic status, the sample consisted of: 28% teaching assistants, 22% lecturers, 16% senior lecturers, 14% assistant professors, 11% full professors, 5% associate professors and 5% college professors.

RESULTS AND FINDINGS

The majority of the respondents support the idea of Open Educational Resources and were agreed (mostly 41% and strongly 48%) with the statement: “*The academic community should be the first to contribute to the realisation of the right of every individual on open access to educational resources*”. Only 8% of the respondents were undecided and 3% of them did not agree with this statement.

When answering to the statement “*I have doubt about quality assurance of Open Educational Resources*“, the respondents were mostly undecided (39%) or had diametrically opposite views (Figure 3), indicating need to raise awareness about these issues in academic community.

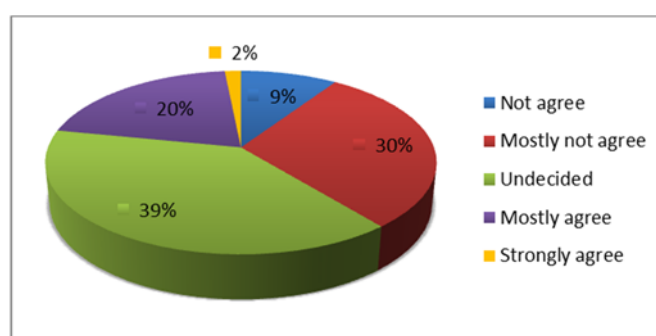


Figure 3. I Have Doubt About Quality Assurance Of Open Educational Resources – Response Distribution

The majority of the respondents mostly (60%) or strongly (17%) agreed with the statement: “*I think that most of Open Educational Resources are not suitable for use in the classroom without customisation and localization*”, while 20% of them were undecided and only 3% disagree with the statement (Figure 4).

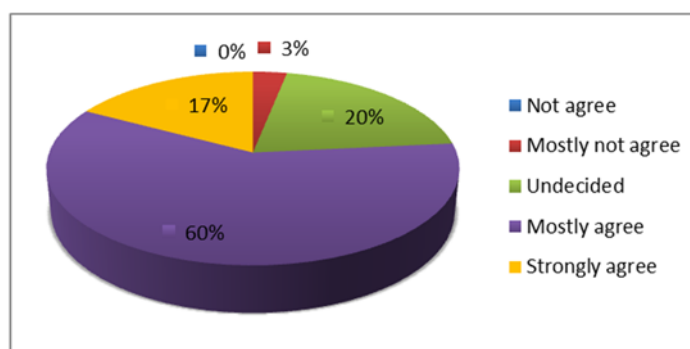


Figure 4. OER Need Customisation And Localization – Response Distribution

Whilst most of the respondents (56%) did not show any concern that the OER would reduce student’s attendance in classes, there was an equal part of undecided (22%) and those who were concerned (22%). Most respondents (67%) agreed that *sharing OER’s increases the reputation of an educational institution*, 20% of the respondents were undecided and 13% disagreed with this statement. Furthermore, respondents agree (75%) that *educational institutions should publish Open Educational Resources in behalf of all those who want to learn*.

Like in other similar studies (Masterman, Wild, 2011; Reed, 2012; Torres, 2013;), while the benefits of using OERs are mostly accepted, there is very little active contribution in the open sharing of knowledge and teaching materials. Only 20% of the respondents have their teaching material accessible on a public web (web pages of institutions of teachers, blogs, document exchange services, social networks), while 70% of the respondents answered that their teaching material was accessible in digitized formats only to students who are attending classes (login is required), like shown in figure 5. It shows that there are digital teaching materials that could be shared much wider and become OER. But respondents most often uploaded the simple documents (.doc, .pdf, and presentations), which require no additional time and effort. From those respondents which published digitized teaching materials only 12.5% of them use Creative Commons licences.

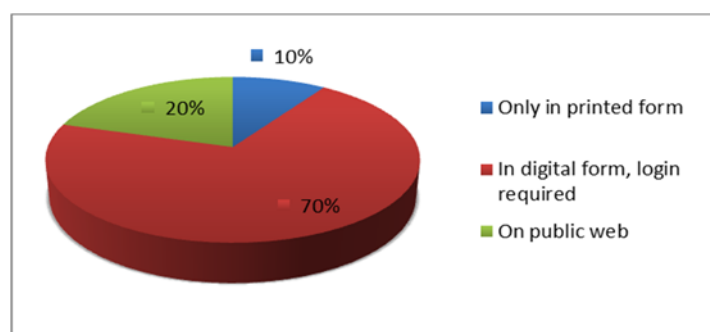


Figure 5. Accesibility Of Teaching Materials – Response Distribution

CONCLUSION

The initiative of open access to scientific and educational resources indicates the direction the changes in the educational system are following. With this, the traditional systems of teaching and learning will be enriched with open education materials and online tools which can be used without limitations both in online or in standard teaching, through collaborative and constructivist learning, critical consideration and through creation of online communities aimed at the exchange of ideas, opinions, experience and creation of new knowledge.

The research that was carried out on a small number of respondents clearly shows that, despite positive attitudes toward OER, there is actually very little sharing of teaching materials by the respondents. The research was not aimed at determining the reasons for such a situation. Nevertheless, following the records from the OER repositories it is obvious that the largest number of those resources is written in English language. Their usage requires adaptation to local languages, cultures and educational context, which, furthermore, requires certain digital skills, ICT resources, time and organizational resources. Teachers who altruistically share their teaching material usually don't use any licence for that. Hence it is required fostering awareness and educating teachers and scholars on the advantages and possibilities of Creative Commons licences and Open Educational Resources in general.

Also, there is need to adopt an OER policy and implementation plan at the organisation level, just as it has been done by the world-renowned universities of MIT, Yale, Berkeley, Stanford, Rice and many others, and as it recommended European Commission in their "Horizon 2020" programme and through the "Opening up Education" initiative.

RECOMMENDATIONS

The institutional, legal, cultural, technical and individual opportunities and barriers toward wider acceptance, usage, re-usage and creation of OER should be more deeply researched, especially in small countries, including scholars in all scientific fields and all public universities.

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THE IMPACT OF COOPERATIVE LEARNING IN TEACHING COMMUNICATION SKILLS FOR PSYCHIATRIC NURSING STUDENTS

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ABSTRACT: Effective communication has long been recognized as a corner stone and vital component of high-quality nursing care process starting from assessment till evaluation of care. It is necessary for nurses to be effective communicators, so that they can deliver safe and effective nursing practice. To be effective within a dynamic complex psychiatric care system and to help patients achieve positive outcomes, psychiatric nurses need to be proficient in communication skills as they are in clinical skills. Poor communication can lead to angry feelings, omission or distortion of important information, and subsequently deleterious effects on patients' outcomes.

Professional nursing education aims to produce quality nursing graduates who can respond to demands of the changing healthcare environment. Cooperative learning (CL) is one of the learning methods that have social well as academic benefits. It lowers the students' anxiety; promote students responsibility for their own learning, and improves interpersonal skills and higher level thinking ability. Researches found that cooperative learning results in higher achievement, more positive relationships among students, and greater psychological adjustment. Application of cooperative learning will prepare psychiatric nursing students to able to work cooperatively with patients as well as with other psychiatric team members.

This paper provides a brief overview of the literature on the impact of cooperative learning in teaching communication skills for psychiatric nursing students. It could be said that CL is helpful in developing student nurses ability to practice communication skills effectively and successfully with psychotic patients.

Key words: communication skills, cooperative learning, psychiatric nursing education, nursing students.

INTRODUCTION

Communication is central to human interaction. It is necessary for people in order to relate to those around them and make their needs and concerns known (Casey & Wallis, 2011). Interpersonal communication is the process of exchanging, generating and transmitting information between two or more individuals (Townsend, 2008; Videbeck, 2004). In psychiatric nursing, therapeutic communication is defined as an interpersonal interaction between the nurse and patient during which the nurse focuses on the patient's specific needs to promote an effective exchange of information. Skilled use of therapeutic communication techniques is essential to maintain effective and sensitive relationships with patients, families and psychiatric team members. Goals of this therapeutic communication include helping the nurse gain the patient's perspective, establish rapport, actively listen, explore patient's thoughts and feelings, empathize with the patient's experience and guide the patient in problem-solving (Videbeck, 2004).

Effective communication has long been recognized as a corner stone and vital component of high-quality nursing care process starting from assessment till evaluation of care. It is necessary for nurses to be effective communicators, so that they can deliver safe and effective nursing practice. To be effective within a dynamic complex psychiatric care system and to help patients achieve positive outcomes, psychiatric nurses need to be proficient in communication skills as they are in clinical skills (Townsend, 2008; Włoszczak-Szubzda & Jarosz, 2012).

Unfortunately, it was observed that nurses often lack the skills to communicate with patients and other health care professionals (Chan & Cheng, 2001; Wikström, & Svidén, 2011; Włoszczak-Szubzda & Jarosz, 2012). Poor communication skills are barriers to successful nursing practice which can lead to increase nurse's feelings of stress and angry, being isolated and dissatisfied. Poor communication can also lead to omission or distortion of

important information, and subsequent deleterious effects on patients' outcomes (Kutzin, 2010; Zaoutis & Chiang, 2007).

From a practical point of view, nursing students should be able to use proper communication techniques with accuracy, clarity and efficiency with patients, especially those with psychotic disorders (Baghcheghi, Koohestani, & Rezaei, 2011; Townsend, 2008; Videbeck, 2004). The student should be able to demonstrate interaction with different patients. They should also be able to apply communicative strategies which are relevant in different situations, e.g., giving and gathering information, giving support, intervening with patients' beliefs or values and encouraging compliance with medications (Wikström & Svidén, 2011). Nursing students perceived a high level of stress from interacting with patients who have mental illness. To minimize stress and increase students' self-confidence in caring for these patients, effective communication skills are needed (Chan & Cheng, 2001; Townsend, 2008; Videbeck, 2004).

However, therapeutic communication skills are neither innate nor automatic. These skills are acquired and refined only through education and practice (Włoszczak-Szubda & Jarosz, 2012). In this respect, teaching methods should not only serve the academic purpose, but also develop communication skills. To serve this purpose, among all the teaching methods being followed in the higher education, the cooperative learning has its own philosophic and psychosocial significance today (Mehta & Kulshrestha, 2014).

The term cooperative learning (CL) refers to a teaching strategy in which small teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding and they will be rewarded on the basis of group success (Felder & Brent, 2007; Mehta & Kulshrestha, 2014; Ruiz-Gallardo, López-Cirugeda, & Moreno-Rubio, 2012). In CL students are expected to help each other, to discuss and argue with each other, to assess each other's current knowledge and fill in gaps in each other's understanding. Emphasis is placed on student involvement in active learning and the development of social skills (Kaufman, Sutow, & Dunn, 1997). The cooperative learning theory aroused the interest of the experts in the field of education in terms of designing a curriculum which enables the students to learn through cooperative effort, problem solving, and decision making (Mehta & Kulshrestha, 2014).

The teacher in cooperative learning becomes a guide, a stimulator, and one who encourages, but not one who lectures nor dispenses information. He/she is a resource person who has much knowledge of keeping learners on task (Mehta & Kulshrestha, 2014; Zuheer, 2008). Teachers should take an active role in helping students acquire, develop, and refine the communication skills necessary for meaningful social relationships and interactions (Morris, 2002). These teachers are responsible for the selection of each group to be sure that there is a variety of experience among students, follow up the group activity to achieve their specific task on time, and assess group cohesiveness and productivity. Thus, by cooperative learning students will learn together and take advantages of each other's expertise to achieve their goal (Faryadi, 2007).

Cooperative learning in universities has its roots in the theories of cognitive development, behavioral learning and social interdependence (Dahley, 1994). According to the Johnson and Johnson model (1989), CL is an instructional activity that involves students working under certain preconditions/characteristics which have to be met (Johnson & Johnson, 1989). The first condition is **positive interdependence**, which rests upon the idea of students working together to attain a common goal and caring about each other's learning. Another feature of CL is **individual accountability** and it implies that each team member is responsible for their share of the work and that they make contribution to the group. After establishing positive interdependence, the teacher must ensure **face-to-face promotive interaction**, i.e., that students interact to help each other accomplish the task, produce in order to reach the group's goals and promote each other's success. **Social skills**, which enable students to work effectively and function as a group. Students must exercise their communication, leadership, trust-building and conflict resolution skills so they can function efficiently and effectively. **Group processing** is very important for it enables students to discuss how face-to-face communication helps them periodically assess how well they are working together and how they could improve to ensure successful and efficient completion of their academic tasks, describe what member actions were helpful and unhelpful, and make decisions about what actions to continue or change. In order to successfully interact and exchange communication, students need to be clustered in small groups, facing each other, while teachers are supposed to allow students enough time for successful processing to take place and to keep students involved in processing (Basta, 2011; Farrell & Farrell, 2008; Felder & Brent, 2007; Kaufman et al., 1997; Zuheer, 2008).

Despite the emphasis on efficiency of student-based approaches and competitive learning groups, teacher-based learning and personal activities are more welcomed and facilitated in universities (Noohi, Abaszadeh, & Maddah, 2013; Schaefer & Zygmunt, 2003). In the perspective of interaction and knowledge sharing, analysis,

interpretation, a large and rapidly growing body of research confirms the great utility and effectiveness of CL in higher education (Felder & Brent, 2007; Mehta & Kulshrestha, 2014; Noohi et al., 2013; Włoszczak-Szubda & Jarosz, 2012). It was argued that Cooperative learning is one of the learning methods that have social as well as academic benefits (Mehta & Kulshrestha, 2014; Włoszczak-Szubda & Jarosz, 2012).

More specifically, cooperatively taught students tend to exhibit higher academic achievement, greater persistence through graduation, better high-level reasoning and critical thinking skills, deeper understanding of learned material, greater time on task and less disruptive behavior in class, lower levels of anxiety and stress, greater intrinsic motivation to learn and achieve, greater ability to view situations from others' perspectives, greater psychological adjustment, have responsibility for their own learning, develop more positive and supportive relationships with peers, more positive attitudes toward subject areas, and higher self-esteem (Felder & Brent, 2007; Megahed & Mohammad, 2014; Zuheer, 2008). Furthermore, it was demonstrated that CL method does influence students' academic achievement positively and there is a positive relationship between academic achievement and interpersonal skills of students (Khalil, Tajudin, Tajuddin, Mamat, & Abd Hadi, 2014)

Therefore, CL provides good educational opportunities to develop students' interpersonal skills they will need in their professional life (Farrell & Farrell, 2008). It was argued that to achieve improvements in students' interpersonal, professional and written communication skills, CL was adopted as a tool to achieve the objectives of the subject. The choice was based on the view that the students enrolling in the subject were from a variety of cultures and educational experiences (Farrell & Farrell, 2008). Researchers reported a remarkable improvement in the communication, and social skills of the students with patients at clinical settings after practicing CL. It was found also that the foundation for the nurse-patient relationship (the ability to listen skillfully and to communicate clearly) was promoted after CL (Baghcheghi et al., 2011; D'Souza, Isac, Venkatesaperumal, Nairy, & Amirtharaj, 2014; Mehta & Kulshrestha, 2014). Moreover, Bahar-ÖZvariş et al. (2006) reported that students who learned psychopathology through a cooperative learning strategy and took part in a cooperative assessment gained more knowledge of the topic than students who learned through lectures and took an individual assessment.

It was believed that improvement of functioning in psychiatric nurses depends on intra-personal skills like communicational skills, understanding, acceptance, and knowledge and awareness about signs and behaviors caused by mental disorders (Videbeck, 2004). Application of cooperative learning will prepare psychiatric nursing students to able to work cooperatively with patients as well as with other psychiatric team members. Besides learning how to have proper communication with patients, cooperation between nurses causes them to learn patient's needs better and find a more effective treatment for them (Fard, Mehrabi, & Fanian, 2011).

CONCLUSION

There has been a paradigm shift in the teaching learning approaches in recent years, which has moved away from teacher-centered to student-centered learning (D'Souza et al., 2014). Professional nursing education aims to produce quality nursing graduates who can respond to demands of the changing healthcare environment. Faculties of Nursing may be in a unique position to help prepare nursing students for successful transition to practice by teaching effective communication (Kutzin, 2010). Cooperative learning is a unique format where more interactions occur among students, between the teacher and students as well as between students and patients. Therefore, it sets the stage for students to learn more effective communication skills (Zuheer, 2008). This paper provides a brief overview of the literature on the impact of cooperative learning in teaching communication skills for psychiatric nursing students. In psychiatric nursing education, it could be said that CL is helpful in developing student nurses ability to practice communication skills effectively and successfully with psychotic patients.

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HOW CAN CULTURALLY DIVERSE CHILDREN PRESERVE THEIR MOTHER TONGUE AND ENHANCE THEIR SECOND LANGUAGE SKILLS-A STUDY OF FAMILY INVOLVEMENT FOR CHINESE MIGRANTS IN NORTHERN IRELAND

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ABSTRACT: This paper undertakes a review of international and national literature on bilingual education in order to reveal the extent of family involvement for purposes of good practice and further development of the language skills of bilingual children in Northern Ireland. The paper not only explores the present situation for the children of Chinese migrants, while highlighting the distinctiveness of the mother language and the particular opportunities and challenges of preserving it, but also concludes with recommendations for the ongoing development of their second language.

Keywords: family involvement, L1 and L2, children bilingual development, ER.

INTRODUCTION

Background of the study

There has been a dramatic increase in the number of Chinese migrants coming into the UK due to the effects of globalisation. The children of these migrants are growing up in two ethnic cultures, being able to communicate in two languages (bilingual language users). The key question here is the extent to which they are able to preserve their knowledge and use of Chinese, while still continuing to use and develop their second language which holds a clearly dominant position in the wider society and culture in which they live. This issue is a common concern of overseas Chinese communities and particularly parents (Mesthrie, 1999). In addition, English has been a significant foreign language and child learners are nowadays required to learn the language as they grow and progress through their schooling. A learner is required to be able to read, write and speak English fluently in order to succeed at university and in work environments. Therefore, language education has been a considerable tributary of mainstream education. Despite this importance given to learning the English language, the endeavour of bilingual parents' should be taken into account as well. Parental involvement in education is particularly important for elementary school children, whose native language is not English (Constantino, Cui, & Faltis, 1995; Swap, 1990). Therefore, I will conduct a small scale research project that will investigate the function and influence of parents in preserving their children's mother tongue and enhancing their English language proficiency within an overall curriculum. The reason why I chose this area for my project is because I believe that it is valuable and worthwhile to explore the impact of the family upon learners and instructors in terms of language education.

Purpose of the study

This paper intends to explore this overlooked strand of early childhood language education. This study proposes to use the awakening-to-languages approach as an alternative project that maps the future course of foreign language education based on an appraisal of the problems and challenges in this area. The research will focus on Chinese origin primary school students aged between 6 and 11. The possible benefits will emerge from family functioning related factors like (i) socio-cultural identity maintenance, (ii) family literacy, and (iii) guiding their children in extensive reading. For example, parents should first foster the national identity of the children, create a harmonious family atmosphere, and enhance communication with local schools. Secondly, parents should adopt knowledge of language transfer, such as vivid vocabulary teaching strategies consistent with British schools, encourage their children's phonetic learning strategies, construct their internal grammar, and finally guide their children in extensive reading, and providing available extensive reading materials to achieve a balanced bilingualism.

This paper critically discusses the efficacy of these methods, looks into their limitations and inherent potential, and evaluates the effects of providing both language and cultural support to children. My thesis focuses on the benefits of culturally and linguistically relevant bilingual programs for young immigrant children and their

families in the hope of developing metalinguistic children's learning and fostering awareness of skill-based attainments.

LITERATURE REVIEW

The context and current situation of Bilingual Chinese Children in Northern Ireland

Language is at the center of human life (Cook, 2008). According to the European Commission (2005), the more languages you know, the more of a person you are. And for UNESCO (2003a), the first language that the child acquires is often the mother tongue. A second language is acquired by a person in addition to his/her mother tongue. Bilingual education refers to instruction in two languages and the use of one or two of them as the medium of instruction in the school curriculum (Anderson and Boyer, 1970). UNESCO (2003a) espouses: a. Mother tongue instruction as a means of improving educational quality, b. Bilingual and/or multilingual education as a key element in linguistically diverse societies; as a means of promoting both social and gender equality, c. Language as an essential component of inter-cultural education to encourage understanding between different population groups and ensure respect for fundamental rights.

An increasing number of Chinese people have emigrated and settled abroad since the 1990s, and their children have become an important part of the overseas Chinese population. Unlike an ethnic survey conducted in England which showed ethnic Chinese to be the smallest ethnic group when compared with other Asian minorities, the Chinese community in Northern Ireland is the largest ethnic minority, and has a population of over eight thousand people (Holder, 2003; Chinese Welfare Association: Annual Report, 1998).

The current study of ethnic Chinese children requires more complex classification criteria. Swan (1985), for instance, classified them into Chinese immigrant children, British born children and adopted children. There are presently two groups of sub-ethnic Chinese children, namely those who are the children of parents who have migrated from Mainland China and Hong Kong respectively to Northern Ireland (Feng, 2009). Given the history of the colonial relationship between Hong Kong and the UK, most Hong Kong Chinese originally came to Northern Ireland to start catering businesses. Gradually, their families and relatives came over to join their businesses. However, the majority of the Mainland Chinese migrants came to Northern Ireland as students or researchers, as a result of the "Open Policy" brought forward by Deng Xiaoping in the 1980s. Hundreds of Mainland Chinese students have come to the UK since then, including Northern Ireland and these numbers are increasing every year. Most of these students go back to China at the end of their courses, but some promising ones have managed to stay on to pursue professional jobs in Northern Ireland. They are regarded as part of a new immigrant group in the United Kingdom.

Chinese children are a significant group in Northern Ireland schools. They are socialised differently in the learning of their first language and in their family literacy practices from local children. Even second and third generation Chinese children experience very different literacy teaching and learning contexts within the immigrant Chinese community (Hu, 2005; Jin & Cortazzi, 2002; Liao, 2004; Savignon & Wang, 2003).

This means that Chinese children are exposed to an unfamiliar way of teaching and learning when they attend school. The imbalanced language development, the gradual decline and even partial fading of Chinese proficiency leads to miscommunication between parents and children, and ultimately leads to various problems within the family. The loss of Chinese language skills have made the children gradually lose a sense of their Chinese identity, and this results in a dilemma for parents forcing a hard decision to stay or leave the country (Gregory, 1993). Li (1994) contends that the most common pattern is one where the English-Chinese children's bilingual development model is a mix of English and Chinese, with their English language proficiency higher than Mandarin Chinese, and the ability to speak and listen surpassing their ability to read and write. This paper attempts to explore this issue by analysing the status of Chinese immigrant children's language education in Northern Ireland and the role parents play in their bilingual development. The following paragraphs will offer a brief summary of the limitations of Chinese schools in Britain as they endeavour to inculcate the Chinese language and culture in students.

First, Chinese schools in Britain are small-scale endeavours with limited teaching time. Thorpe (2011) points out that there are about 2059 weekend language schools, with 288 Chinese schools accounting for 14% of such schools. These are located mainly in large cities such as London and Manchester among others. Most Chinese schools are non-profit ventures, set up or organised by the local Chamber of Commerce Chinese Students and Scholars Association (CSSA). The language of instruction is either Cantonese and/or Mandarin because the target student population for these schools is mainly ethnic Chinese children from Mainland China and Hong

Kong. The course content primarily consists of phonetics and simple characters. As a result, the cultural information input of these Chinese language schools lags far behind regular domestic schools in China.

Second, the sources of textbooks used for the weekend Chinese schools in Britain are not standardised. Creese *et al.* (2007), in their study of these Chinese schools, state that textbooks used by the Chinese schools are primarily “Yu Wen” published by the China People’s Education Publishing House, GCSE, A-level test materials, other donated textbooks and books from the local Chinese Embassy. These contain a large number of Chinese characters, and a limited number of new words with phonetic transcription rather than an English counterpart. These Chinese textbooks and their content, structure and format are aimed at a domestic audience (children based in Mainland China or Hong Kong). The poems and stories about Chinese history or traditional culture are therefore alien to and pose problems for ethnic Chinese children in the UK.

Third, the teachers in the Chinese schools are insufficiently trained. Ma (2003) and Creese (2003) both contend that the overseas Chinese school teachers are usually part-time employees with an inadequate understanding of pedagogy and teaching philosophy. This in turn contributes to low proficiency in the Chinese language. In the UK, Chinese is a language with low usage potential as it is mainly used in everyday conversation within family circles and private correspondence. English is more prominent as it is used in official institutions, mainline media, and formal teaching situations, such as classrooms, educational publications and legal documents.

The impact of family involvement on Young Children’s Literacy Development in English and Chinese

Bilingual education simply refers to instruction in two different languages (Cook, 2008). ‘Young children learning L2 are one of the fastest growing segments of the global population.’ (Kan & Kohnert, 2005, p380). Fluency and literacy in the mother tongue lay a cognitive and linguistic foundation for learning additional languages. In every corner of the world, many initiatives provide support for children to continue to develop competence in L1 and self-confidence as learners of any additional languages. One way to counter linguistic and cultural loss is to encourage parents to teach their infants and young children the local language in the home, and to deliver primary and formal education systems in the second language (Jessica Ball, 2010). In the UK, Chinese is a minority spoken language when compared to English and yet Chinese parents attach a great deal of importance to it and insist that their children learn Chinese. Chinese parents today believe that given the increasingly frequent cross-border economic exchanges, bilingual capability will become the dominant priority for ethnic Chinese children’s future learning and work. Lu, Haworth and Edwards (2006) found that Chinese migrant parents were in general willing to make the effort and take responsibility for teaching their children Chinese at home in order to maintain and develop their children’s heritage, language and culture. They expect their children to learn English through schooling and the society around them. Lu and his fellow authors (2006) conclude that, for the children involved in their study, “bilingualism seemed to occur naturally in their daily lives” (p. 4). Wong (1994) observes that “the effort made for language maintenance of the mother tongue besides English remains the responsibility of the family” (p. 90). However, the reality is that many families may not be in a position to help their children make an effort in this regard.

In his bio-ecological model, Urie Bronfenbrenner (1979) suggested that the relationship between the home and school is contributes a cohesive and effective learning environment for children. The parents’ perception of how their children are being educated in school, and the how they can be instructed at home is important to this relationship. This is particularly important for preschool children whose native language is not English, because the transition to school may be more stressful for young children learning in a new language. Parental support and close interaction with the school may ease some of these difficulties (Constantino, Cui, & Faltis, 1995; Swap, 1990). The current author, after having reviewed the theory and practices of the recent of bilingual research, concludes that Chinese parents can play a positive role in the development of three aspects: socio-cultural identity, literacy and reading skills.

Social and Cultural identity.

Ethnic Chinese parents must enhance and upgrade their children’s motivation to learn the Chinese language. This is not only confined to improving the child’s own preferences for Chinese, but coordinating them with complex surroundings, engaging them in miscellaneous diverse social and cultural practices and creating opportunities for the bilingual development of ethnic Chinese children. Nearly all of the Chinese immigrant parents from Hong Kong in Northern Ireland are engaged in the catering business, while most of the academic Chinese Mainland parents are engaged in long working hours. Such lifestyles have prevented many parents from establishing a more intellectual relationship with their children, from engaging in cultural pursuits or educational opportunities and ultimately, from integrating into the wider community (Watson and McKnight, 1998, 128). Cultural alienation for them refers to a subjective complexity which causes ethnic Chinese children living in

Northern Ireland to dismiss their own ethnic Chinese culture as inferior to that of mainstream society. Such feelings can even transform into a sense of cultural embarrassment (Feng, 2009). An analysis of such discourse practices and strategies can help us see the process of their negotiation as they make sense of the meaning of ethnicity, identity and self-perception.

Family literacy

The term “family literacy” was forwarded by Taylor (1983) to describe the model of literacy practices that take place within families. Besides parent participants’ English proficiency and their knowledge and experience of instruction, parental beliefs, parental roles children’s achievement and communicating still have differences among them from diverse cultural backgrounds. All these differences make the provision of family literacy an issue which targets minority families as a single group in the UK. Kaushanskaya *et al.* (2011) asserts that native-language skills (L1) can influence second-language acquisition (L2). Likewise, the development of (L2) phonological inventory (Durgunoglu, Nagy, & Nancin-Bhatt, 1993; Harrison & Kroll, 2007), lexical skills (Ordonez *et al.*, 2002; Proctor *et al.*, 2006), grammatical competence (MacWhinney, 1997; 2002), and literacy (Gottardo & Mueller, 2009) has been linked to (L1) skills. This study has proved that a family literacy level, adapted for use with Chinese preschoolers and their parents, can have a significant and positive impact on children’s bilingual literacy development, such as the children’s knowledge of the alphabet and their ability to produce letter-sounds. Their expressive vocabulary often improved significantly if their parents participated in the exercise.

The study has also shown that the provision of culturally and linguistically appropriate family literacy support goes a long way in helping diverse families to foster optimal literacy experiences for their young children at home. The information would also help schools get effective assistance from Chinese immigrant parents (Zhang, 2010).

Guiding their children in Extensive Reading.

Learning to read is essentially learning both the spoken form and print form of the language (Adams, 1990; Perfetti, 1992; Treiman, 1993). Extensive Reading (ER) has been successfully implemented by EFL learners (Shlayer, 1996), who sometimes have a hard time finding appropriate reading material, maintaining discipline, and creating time to read and manage their schedules to include the learning of a second language (Leung, 2002). It is obvious that learners could get discouraged if they are not able choose suitable reading material and manage their time properly. The lack of reading time can result in a crucial difficulty in pedagogy. This could negatively impact the fulfilling of ER in the teaching process.

In numerous research findings, the positive impact of ER on language skills has been evidenced. In the following paragraph, I shall discuss ER advantages and enforcement within the home environment.

According to Renandya and Jacobs (2001), extensive reading helps develop sight words, general words and the knowledge of the language. Krashen (2004a) notes that it is powerful that develops vocabulary as well as grammar, writing and reading skills. Smith (2000) further suggests that ER enables children to learn not only words, sentences or stories, but also social values and attitudes.

RESEARCH QUESTIONS:

- a. How do the ethnic Chinese parents maintain their children’s socio-cultural identity?
- b. How does family literacy influence the children’s bilingual levels?
- c. How is the extensive reading carried on in the home environment under parents’ guidance and instructions?

METHODOLOGY

Through a review of the literature and results from the findings of the last three decades of bilingual research, the present author contends that Chinese parents can play a positive role in the development of three aspects, namely, socio-cultural development, increasing language proficiency and reading ability. The family involvement is interpreted in words instead of numbers. Bryman (2012, p380) argues that qualitative research is a strategy that places emphasis on words rather than the collection or analysis of data. Methodologically, the paper has adopted the technique of in-depth interviewing and obtaining demographic information to achieve a more objective and overall understanding of these three aspects, keeping with the current general tendency of language education studies.

I have designed my consent form and the interview questions for each participant in order to explore how they improve their bilingual ability through the ER curriculum. I will discuss and explain my methodology in detail in the following sub-sections.

Participants /Subject

There are twelve participants involved in this research project, six parents, six young EFL learners from six to eleven-year-olds. The participant students are currently ethnic Chinese at primary school level, and they are from different regions of Mainland China and Hong Kong. Most of the learners were born in Belfast or have been living here for one or two years. The vast majority have been learning English as a foreign or second language in this country, and they have also had experience of taking English reading courses in the past. However, some of them have high Chinese proficiency, while others have very little Chinese. The interviews were guided by a set of questions set in an open-ended manner. The author understands two languages, Chinese and English. All of the student participants and parent participants were free to choose English and/or Chinese based on their preference in the interviews.

Instruments and Tools

Qualitative research data is collected through observation, interviews, questionnaires, documents or reviews (Wheeldon & Faubet, 2009). Interview questions were adopted as the method for this research in order to ascertain the extent of family influence on the children's bilingual proficiency.

A consent form is required with the participant's signature and has to be provided before answering the three types of interviews namely, I, II, and III which consists of questions designed, and used for collecting data or gathering information for this research. In order to ensure the authenticity of my research, I then applied my strategy by applying for a paid part-time waitress job in a local Chinese restaurant (I am from Mainland China, so I speak perfect Chinese). The job that I finally obtained gave me a great opportunity to gain familiarity with primary school children as well as with their parents after school hours. I worked there for two days a week from December 2014 until February 2015.

Procedures

Firstly, the author obtained permission from the participants and checked if they had signed the consent form. The participants were being interviewed to assist the researcher in gathering information. The researcher sits beside them while they answer the questions and fills out the form using a pen. It takes approximately ten minutes to complete, and the information gathered is kept confidentially. The author is conscious of the rights of the participants, and endeavours to protect the identity of the individual participants, the families, and teachers. The purpose and potential value of the study to language education was explained clearly to participants.

RESULTS

As mentioned in the previous section, parents, and students were interviewed in order to investigate family involvement in the bilingual development of the children. The following is an analysis of the group interview between the interviewer and interviewees. Three main subjects emerged from this research, and these are: how ethnic Chinese parents maintain their children's socio-cultural identity, the influence of family literacy on the children's bilingual proficiency and the extensive reading carried out in the home environment under parents' guidance and instructions.

Interview 1: Ethnic Chinese children are a special group separate from both British mainstream culture and Chinese marginal culture. They have to deal with different and even diametrically opposed attitudes, values and behavioral tendencies from the two cultures both at school and within the Chinese community. The children and occasionally their parents are at a loss while trying to find a balance between both cultures.

Interview 2: As the dialogue indicates, Tony is in the process of building up his English language vocabulary very actively but repeatedly, which is an indication of how Chinese parents enlarge their children's' vocabulary through rote learning. Many Chinese parents believe that repeating Chinese characters and phonetics is the best way to memorize them. To clarify further, the more repetition and recitation of words, the bigger the child's vocabulary. This unintegrated form of vocabulary learning between the family and classroom environment has obviously hampered normal English classroom teaching.

Interview 3: Wang *et al.* (2009) assert that children's books can help Chinese children learn about the culture of their newly adopted country. Picture books contribute uniquely to the language transition literacy of Chinese

children. For example, parent 1 commented in interview 3: "I think the children's books carry so much practical meaningful information. Children can learn the knowledge, the value of life, how to enjoy lives, and how to deal with others" (Sonia). Independent reading at home also plays an important part in making the children good readers, and is popular with them. For instance, parent 2 noted that: "My son usually does independent reading stuff both Chinese and English at home. I bought him piles of books. He reads what stories he can, not only what the teachers wants him to read" (James). The amount of Chinese reading material at home had the greatest impact on the implementation and evaluation of the Chinese language family literacy program. At home, the parents read to their children nearly every day until they considered them to be capable of reading independently, which demonstrates the parents' appreciation of books, and their concern regarding their child's literacy levels. As parent 3 reported: "I am willing to help him choose books in order to adjust his reading choices. Visits to libraries or reading online certainly expanded the range of books my son is exposed to" (Chris).

DISCUSSION AND ANALYSIS

Some Chinese parents are often confused about preserving their children's ethnic Chinese identity and developing their bilingualism in English and Chinese. This is because they are worried that such a development will generate an undue burden on the child or lead to logical confusion, and ultimately cognitive impairment of the brain (Ma, 2003). In short, several parents are confused about the need to prioritise the development of one language as opposed to two languages simultaneously. They believe that they can change their children's attitudes with regard to ethnic Chinese language and culture and this can help build their ethnic identity and self-confidence for the future. Conversely, when not handled properly, this has led to ethnic Chinese children indicating timid and sensitive psychological features that affect the formation of a wholesome identity, and results in them feeling that Chinese groups are not being respected by British mainstream society and are excluded by the UK. As far as developing their Chinese proficiency was concerned, the number of Chinese reading materials in the home had the greatest impact on children's Chinese receptive and expressive vocabularies. Conversely, the age at which the child was first read to in English had the greatest impact on the children's English expressive vocabularies, their letter-sound production knowledge, and their early reading ability.

Therefore, when Chinese parents encourage translation and interpretation on the home front, their children not only improve their English ability, but also ensure close and stable family relationships. Parents can also coordinate the relationship between children and schools as ethnic Chinese children play a role in the development of a bilingual bridge.

British-Chinese children are often exposed to Chinese audio-visual material brought into the UK from the domestic Chinese market for expatriate communities and families. These are usually Chinese story books, educational material and discs relating to daily life in China. There is very little cultural information in this material and it fails to arouse the interest of Chinese children to learn the language. In contrast, British-Chinese children come into contact with a wide range of English television programmes, films, novels, magazines, newspapers, flyers, e-mail and electronic games, through schools, the media and community. The information carried through the medium of English is available in large quantities and is rich in content. Therefore, the asymmetric quantity and quality of information in the two languages not only limits the development of the children's Chinese language level, but to some extent blocks their Chinese cultural ethnic identity (David, 2001).

CONCLUSION

It is worth mentioning that children are born ready to be bilingual. More than two thirds of children across the world are from bilingual background and learning more than one language. Several researchers have indicated that ER could beneficially develop language abilities, such as the reading skills, greater grammatical accuracy, rich vocabularies, enhanced writing strategies, higher levels of motivation, more positive attitudes towards FL, and so on (Mason and Krashen, 1997; Day, Omura and Hiramatsu, 1991; Nation, 1997; Nation and Ming-tzu, 1999; Wodinsky and Nation, 1988; Elley, 1991; Hafiz and Tudor, 1989; Tsang, 1996; Elley and Mangubhai, 1983; Lee, Krashen and Gribbons, 1996; Shin, 2001; Takase, 2002). However, Children of Asian immigrants who often have great expectations of life are depressed when they encounter poverty, generation gap crosscultural barrier, and loss. (Yeh, 2003; Yeh *et al.*, 2008). Many ethnic children and adolescents arrive in the UK with limited or no English language proficiency and are often faced with other problems to adjust in like the difficulty in assimilating into the peer culture (Kim & Choi, 1994; Yeh *et al.*, 2005). They are even burdened with balancing academic loads and family obligations such as translating for parents and caring for siblings (Fuligni, Yip, & Tseng, 2002; Yeh *et al.*, 2005). Furthermore, the language barrier interfere immigrant parents' communication with involvement in the school (Bhattacharya, 2000; Gougeon, 1993). Low-income immigrant adolescents often find themselves with limited knowledge regarding access to resources (Louie, 2001) which

would help them navigate the education system and make informed education and career choices (Ma & Yeh, 2005; Ma & Yeh, in press; Okubo, Yeh, Lin, Fujita, & Shea, 2007). These parents may be especially unable to participate actively in their children's education as they are intimidated by the linguistic barriers they face in the English-speaking school environment. Yet the lack of involvement of immigrant minority parents' is often misinterpreted by school staff as a lack of interest in their children's academic performance (Commins, 1992).

Government policy in the UK has for many years encouraged family involvement in their children's education. In response, most primary schools have developed a range of strategies assisting parents in supporting their children's learning at home, particularly in learning to read English. Nevertheless, it is commonly assumed that parents from some social and ethnic groups are more difficult to reach than others and some do even not care about their children's education

This study has shown that culturally related family instruction and the literacy impact of the children's beneficial to both English and Chinese, when adapted for use with Chinese pre-schoolers and their parents, can have a significant and positive impact on children's literacy development.

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APPENDIX I

Interview Question 1.

How would you describe your identity?

Kid 1: Some people call you names. That's really annoying.

Interviewer: Yes? What happened to you?

Kid 2: Well last time, on the Boxing Day, mum went shopping with us in London Oxford Street, meeting two ladies who called us chicks being very offensive and insulting because my younger sister by accident knocked into one of them from the back in the crowd.

I Interviewer: Really? What do you do then?

Kid 2: My mum was very angry, so she argued with them.

I Interviewer: Did you dare to chase after them?

Kid 1: When you're angry, you can't control your anger ...

Interviewer: I know. And some of the Chinese kids tell me that they don't really fit in here because of the racial discrimination or bullying at school.. What do you think?

Kid 2: Not really... but yes, we do get name-calling.

Kid 3: That's why we have to learn martial arts to defend ourselves. [Laughs]

[All laugh]

Interview Question 2. (Gregory,1993).

Tony: What is his name?

Teacher: Mr Fussy.

Tony: Mr Fussy, Mr Fussy, Mr Fussy. Mr Fussy is in the house.

Tony: What is that? It's a glass Oh, no; it's a jar of marmalade. Jar marmalade?

Teacher: Yes, to put on your bread you know, in the morning.

Tony: Marmalade, marmalade, marmalade.

Interview Question 3

1. Mother's highest level of education. Please tick one of the following:

- Completed secondary/high school
- Completed community college or technical college
- Completed undergraduate university degree
- Completed graduate/advanced university degree

2. Father's highest level of education. Please check tick of the following:

- Completed secondary/high school
- Completed community college or technical college
- Completed undergraduate university degree
- Completed graduate/advanced university degree

3. Which of the following items are used in your home? Please tick all that apply:

- Children's books/Magazines/Newspapers/ Novels
- Computer /Board games/card games
- Religious books
- How-to manuals like Address book/Cookbooks/ Calendar /or day-planner
- Reference materials/encyclopaedias
- Other kinds of books/written materials

(Please specify _____)

4. In total, how many hours do you spend each week providing assistance or instruction for your child in extensive reading?

5. What kinds of things do you do to help your child learn about reading and writing?

6. What do you think are the major benefits of ER to your children's bilingual proficiency?

TRANSLATION OF NIS EXPERIENCE TO THE MAINSTREAM SCHOOLS

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ABSTRACT: The purpose of qualitative study was to analyze the process of translating of NIS experience to the mainstream schools and to explore the perceptions of the mainstream school teachers from one pilot school co-operating with Nazarbayev Intellectual Schools (hereinafter NIS), the towards the process of translating of NIS experience to the mainstream schools. The researcher was interested to find out the perceptions of the mainstream school teachers toward the process of policy transfer from NIS.

The researcher utilized the qualitative single case study. The instrument of data collection was one-on-one interview: participants were asked to answer to 10 open-ended questions to provide insight on translation of NIS experience to the mainstream schools and teachers' perceptions of this process. The qualitative data were transcribed and analyzed by defining themes and codes.

The findings of the research revealed that most of the teachers showed the positive attitudes toward the process of translating of NIS experience to the mainstream schools. Notwithstanding the positive influence, most teachers highlight that more time to measure success of the adopted innovations. Human resources are also important new system different from traditional one adopted.

Key words: policy borrowing, policy transfer, teachers' perceptions

INTRODUCTION

Since Kazakhstan gained independence, one of the most important government's goal is modernization of the education system of Kazakhstan. Therefore, during the last two decades Kazakhstan has taken efforts to establish a new independent education system. The first steps toward this direction have already been taken to prioritize the establishment of the network of Nazarbayev Intellectual Schools (hereinafter NIS), under the direct control of the President's Administration. A new system was established to "combine the best traditions of Kazakhstani education and the international practice" is applied NIS-wide (Nazarbayev, 2008). Uteulina (2009, as cited in Bridges, 2014, p. 73) defines another unique characteristic of NIS which provides with autonomy which provides these educational institutions with the opportunity to "test modern educational programs, verify their effectiveness and develop technical solutions for their further integration into the national education system". NIS has made the international experience of such countries as Singapore, UK and the USA instrumental, seeking to identify the policy options and understand the process of change. Nowadays, NIS are implementing new programs, and students of this school demonstrate good results. However, NIS was established not only to develop to use innovative practice, but also to transfer its experience to the mainstream schools. The process of transfer started in 2011 and continues till 2020. Teachers from the mainstream schools are engaged in seminars and online lessons. However, the implementation of the new NIS-based curricula and assessment system to the mainstream schools will be launched only in 2015.

Communist crisis in the Soviet Union and changes in political systems in several countries in Eastern Europe, kindle social scientist's interest. Scholars from political and economic spheres also had a high demand to this topic what made it "cross-disciplinary" (McLeish & Phillips, 1998, p.49). As education is considered to be a policy making instrument and a prime mover to changes, it had been affirmed that it contradicted to main directions of social science (McLeish & Phillips, 1998). All this attract attention to the situation in other countries, therefore scholars began to compare the situation in developed countries with situation at "home".

It is difficult to define the origin of policy borrowing because its development went side by side with the development of comparative and international education. Also the policy borrowing process can be referred to the goals of comparative education considering that main objectives of borrowing process seek to understand the process of comparison and aftereffects of educational transfer.

According to Phillips and Ochs's observation and analyses of British interest in German education, policy borrowing passes through four stages "cross-national attraction, decision, implementation and internalization" (p. 451). (Figure 1)

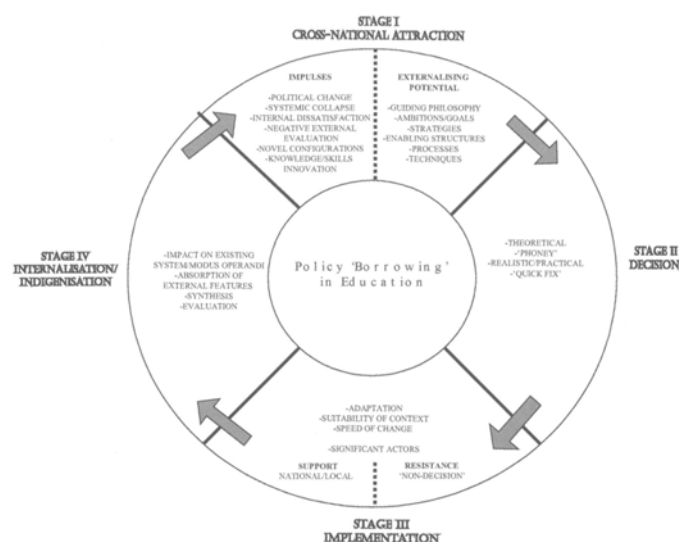


Figure 1. Policy Borrowing In Education: Composite Process (Phillips & Schweisfurth, 2014).

The first stage is cross-national attraction. Here authors talk about “impulses” by which they understand prerequisites of borrowing process. Steiner-Khamsi (2004) defines some trigger events which induce the “cross-national attraction” which can cause the policy borrowing process in developing countries: “political change; systematic collapse; internal dissatisfaction; negative external evaluation; new configurations and alliances; knowledge and skills innovation; the aftermath of extreme upheaval” (p.56). Some of them are valid for Kazakhstan. The independence was the significant “political change” in the recent history of Kazakhstan. “negative external results” of PISA 2008 were the driving force of changes. Within the process of globalization and joining to the Bologna Process, Kazakhstan entered the knowledge and skills innovation age (Kubow and Fossum, 2007). Thus, education reforms in the secondary level were one of the essential “tool” to correspond to the world standard and to educate the competitive Kazakhstani nation in the 21st century.

The process of educational policy borrowing also should be in the frame of process such as “guiding philosophy”. In case of Kazakhstan it is “increasing competitiveness of education and development of human capital through ensuring access to quality education for sustainable economic growth” (Nazarbayev, 2010). Next are “ambitions, goals”, for example, one of the goals is to bring up the citizen of Kazakhstan who will be “intellectually, physically and spiritually developed” (Nazarbayev, 2010). Accepted “strategies” are followed “enabling structures” for instance newish Nazarbayev Intellectual Schools. The last two stages are “processes” and “techniques” criteria-based assessment (which is applied in NIS) and new methodological based (that taught teachers on the base of Centers of Excellence) respectively (Phillips and Ochs, 2004).

One of the steps to reach these aims proposed by the president of Kazakhstan Nursultan Nazarbayev was national project “Intellectual Nation 2020”. The main aim of this project is “to bring up a new breed of Kazakhstani youth and the transformation of Kazakhstan into a country with competitive human capital” (Nazarbayev, 2008). As the result, the project “Twenty intellectual schools for gifted and talented children” was set out (Bridges, 2014, p.73). NIS have the autonomy to use the new programs and the assessment system. So, NIS pursuit the best international practices in education to adapt it in the national context. According to the Philips and Ochs (2004) this process is called “policy borrowing”.

Singapore education system was very attractive to the NIS. Analyzing the Singapore’s educational system NIS seeks to know what makes the Singapore’s educational system successful? Hogan (2014, para 4) discusses that Singapore has very strict classroom instruction, teaching is focused on the traditional curricula knowledge and high performance on the examination such as TIMSS and PISA, strict rules of “selection, training and professional development of principals and teachers”. Analyzing different data it evident that Singapore pays a lot of attention to the assessment system on the country, thus for the last two decades Cambridge International Examination (CIE) played the significant role in the development of the education system in Singapore. So Kazakhstan borrowed the practice of curricula and assessment system from the CIE and from the Netherlands’ Central Institute for the Test Development (CITO). Switzerland became a model of the International Baccalaureate, John Hopkins Centre for Talented Youth provided the approaches for identification and support of the talented children. Bases of trilingual policy were taken from Estonia, Quebec and University of Cambridge Faculty of Education played an essential part in teachers’ development program (Bridges, 2014).

NIS was established not only for development of the system within the network, but also to translate the experience to the mainstream schools. According to the NIS development strategy till 2020, existing NIS schools are supposed to work with 35 the mainstream schools, in order to share knowledge and experience. According to the development strategy NIS works in following directions “new teaching and learning approaches; learning to think critically, assessment for and of learning, using ICT in teaching, teaching talented and gifted children, responding to the age-related approaches, management and leadership of learning” (NIS, 2012 p.50).

From provided information above it is clear that borrowing process pass through the “development” and “implementation” stages. However, the policy borrowing process was only introduced within a framework of Autonomous Educational Organization of NIS. It implies that the last stage of the policy borrowing model “internationalization/indigenization” is not completed. The dominant idea of last stage is instill borrowed policy at home. This stage will be considered completed when the policy will be adopted in the mainstream schools in Kazakhstan by 2020. All NIS actively collaborate with three to seven partner schools, which also co-operate with three other mainstream schools. So, the process represents the embranchment.

By 2020 with the help of NIS schools and Centers of Excellence (hereinafter CoE) the mainstream schools will adopt the program for mainstream schools. The main directions in translation of NIS experience to the mainstream schools are the following: professional development of teachers; curriculum (content of education); educational work with children and support of educational process. NIS work in accordance to the main guidelines of the translation of experience. They are online lessons, materials uploaded to the website, workshops and seminars, international conferences, centers of the excellence, teachers` network communities, collaboration with basic schools. In order to translate the experience NIS give online lessons and seminars to the mainstream students and teachers. The aim of online lessons is to “enlarge and deepening knowledge, skills of students. In the frame of interactive lessons students do laboratory and practical works and solve higher complexity tasks” (NIS, 2012 para 1). Teachers conduct four online lessons and one seminar in a week on such subjects as Mathematics, Chemistry, Biology, English language, and Information technology. In total, in the period from 2011 till the first half of 2014 academic year 1583 online lessons and 140 online seminars were conducted by the NIS teachers. Online seminars hold to teach new pedagogical technology to the mainstream teachers. More than 800 online lessons we uploaded on the NIS website. Additionally, seminar materials presentations and videos are available to teachers on the websites. In addition to that, the mainstream schools were provided with 1780 CD with workshop materials on criteria bases assessment, work with gifted and talented children and critical thinking (“Online lessons and seminars”, n.d., para. 3).

The CoE were established to fulfill commission of the president about translation of NIS experience to the mainstream schools. The mission of CoE is to enhance the teachers` development, translation of NIS and international pedagogical experience to the the mainstream schools of Kazakhstan. Programs for professional development were developed together with foreign partners and divided on three main levels. The CoE were opened in 16 cities around Kazakhstan. Trainers who have certificate of Cambridge International Examinations (CIE) trained 7420 the mainstream teachers in 2012. By 2020 it is planned that all teachers will have passed through professional development courses held by trainers from CE and National Centre of Professional Development “ORLEU”. In order to support the mainstream teachers during 2013-2014 year there were developed and passed to schools 157 methodological books 2019 in total piece; 31 regional seminars for 1020 participants, 15 urban for 924 participants, 31 pilot schools for 877 participants, 33 sections on the international, republic and regional seminars; 4 forums, 240 workshop sessions 123 of which for teachers studying on the courses organized by CE; 17 training workshops; traineeship on the base of seven NIS in Astana, Aktobe, Kokshetay, Talduyorgan, Ust-Kamanagorsk and Uralsk for 52 teachers; publication of the “Pedagogical dialogue” magazine by the Centers with co-operation with faculty of education in the Cambridge University.

The literature shows that numerous researches were conducted on the borrowing process and teachers perceptions on this process in different countries. The main purpose of the studies discussed above was to analyze the borrowing process on the procedural level rather than conceptual. The process borrowing the experience is still poorly researched in Kazakhstan.

The purpose of this study is to analyze the borrowing process from the conceptual side by taking into consideration the cultural accepts borrowing process, thus filling in the gap in the literature in the Kazakhstani context. The findings from the research will beneficial for the school administrators, teachers, and parents who will be involved in this process.

Statement of The Problem

Are the schools ready to accept the experience of NIS? A lot of research has been done on the policy borrowing in other countries, though this sphere has not been widely researched in Kazakhstan. This study will contribute to the process of policy borrowing from NIS to the mainstream schools and teachers' perception of the process.

Purpose of The Study

This case study aims to analyze the process of "policy transfer" between NIS and the mainstream schools in Kazakhstan through examining the perceptions of the mainstream schools teachers.

Research Questions

The research questions that will guide your study.

1. How are the NIS practices transferred to the mainstream schools?
2. What are the perceptions of the mainstream school teachers' on learning from NIS experience?
3. What are the facilitating and obstructing factors during the process?

METHODS

Research Design

A qualitative research design was used in this study to explore and understand perceptions of the mainstream school teachers towards translation NIS experience to the mainstream schools. The researcher used single case study to explore and "to understand a real-life phenomenon in depth" (Yin, 2009, p. 32) namely policy transfer process from Nazarbayev Intellectual Schools (NIS) to its partner school. The qualitative method will enable researcher to work directly with research participants and explore their own attitudes, feelings and opinions related to translation of NIS experience to the mainstream schools.

As this study aims to analyze the process of policy transfer and teachers' perceptions on this process, the researcher used in-depth interviews as "one of the most important source of case study information" (Yin, 2009, p. 106). Limitation of the study is that the results of the study can not be generalized.

Sample

Purposeful and convenience sampling was used in this research. Purposeful sampling was used in this research, because researcher was interested in teachers who worked in particular school and was involved in process of policy transfer from NIS. Half of them are actively collaborating with NIS and the other half does not take active part in this process.

Then convenience sampling was also used in this study. According to Creswell (2014), in convenience sampling "the researcher selects participants because they are willing and available to be studied" (p.163).

Instrument

As this study aims to analyze the process of policy borrowing and teachers perceptions of this process, the researcher will use in-depth interviews as "one of the most important source of case study information" (Yin, 2009). During one-on-one interview participants were asked to answer asked to answer to 10 open-ended questions to provide useful information about the process of policy transfer from NIS and teachers' perceptions of this process. This approach facilitates faster interviews that can be more easily analyzed and compared. All interviewees and the answers were recorded.

Data Analysis

All data collected from the participants was transcribed, which in turn, was reviewed to get general understanding of the whole picture. Next, important statements and phrases concerning the central phenomenon was elicited from each transcript and coded. All similar codes were organized into themes or categories to form the main idea of the database. In order to illustrate the preliminary analysis the researcher used a color coded system to highlight specific themes or categories. The next stage is interpretation of the findings. According to

the Creswell (2014) interpretation “means that the researcher steps back and forms some larger meaning of the phenomenon based on personal views, comparison with past studies or both” (p. 281). Researcher reviewed important findings and analyses which result in assessment of the level of responses given.

The study incorporated a full description of the data analyzed. This description was presented in the findings. Then, the researcher wrote a rich and exhaustive description of the experience and lessons learned which entailed the formulation of essential structure of the phenomenon.

RESULTS AND FINDINGS

Thematic analysis of interview questions has elicited that most teachers have positive perspective to the process of translation of NIS experience to the mainstream schools; however, all of them mentioned that they were against of participation in the beginning this process. Anna Anatolievna mentions:

Honestly speaking, I was absolutely disagree, why we should change the way we teach. In what way our system is bad with the comparison to new one. During all my professional life I have worked with my children, using the methodology that I was taught. They are always ready to my lessons and never miss them. I feel myself comfortable. Children are satisfied with my work. So, I did not see the great necessity in changes at that time.

Her statement illustrates that some teachers are “old fashioned”. For them the main indicator for successful lesson is the attendance and readiness for the lesson. However, she is not interested in the students’ motivation and how the students comprehension of the lesson. Another participant, Arai Abayevna responds:

I am the person, who is always open to the changes. I do not want to stay in one place. I want to move to develop myself. Despite this fact I also had a twofold opinion on the collaboration with NIS. I was skeptic about the results, because I thought that NIS teachers were so experienced and more qualified, they had been already trained for using new methods.

So, teachers mentioned different reasons, why they have negative perspectives on the first stages of this process. During the period of transition from old to a new system teachers are forced to go out from “comfort zone”, because they have to be engaged in something new which makes them to show intransigence to some changes. Fullan and Miles (1992) call this “misunderstanding resistance” (p.748) as one of the factors that prevent the successful reform implementation. Authors explain this resistance claiming that each stakeholder involved in the education changes has personal understanding and view on how the process of changes should operate. Several international publications have appeared analyzing the perception of teachers toward the policy change, especially assessment system and curriculum. Tan (2014) defines two key implications that are needed for in cross-cultural educational research. The former is the “need for comparatives to acknowledge and explore further nature” and the latter is “appreciating the cultural scripts of locality to understand the complex processes of educational policy transfer” (Tan, 2014, p.206). Saule Sericovna mentions that:

You know! One of the factors of negative attitude toward the changes, apart from the fear of responsibility, can be the nature of our teachers. Some of teachers are used to sit in their classes and do not want to “go out”. They are not interested what is happening outside their classes. How other colleagues are dealing with the same work. It is very difficult process to turn teaches towards something new.

Also, the participant mentions the school enrolment. She emphasizes that her school is situated in remote from the city center region. Additionally, the housing is significantly cheaper and affordable in that district. It implies that a lot of students are from the vulnerable groups making teacher’s work harder.

Some of the teachers responded that they were under the pressure while implementation stage, because it was necessary to show high results. So, they are more comfortable with the old standards.

Despite the negative attitudes of the teachers toward the process of translation of NIS experience in 2011, by 2015 most teachers changes their perceptions. So, the data analysis allows to educe some categories, what teachers refer to beneficial ones: teacher professional development, Criteria – Based Assessment; leadership; school culture and teacher’s beliefs and perceptions and school promotion.

Teacher Professional Development.

The CoE provide the mainstream school teachers with the 3 level professional development courses. In the frame of this program 7 teachers passed this courses. Three of them were involved in my research. All these teachers emphasize the improvement of the quality of their lesson. Aizhan Amirovna replies:

What about me, I can see significant change in the way my lessons reversed. Before I worked according to an old scheme so, I was the script writer, and no one was able to change the way of the lesson and make mistake. But, I was under a delusion that I am the main person in the class. Now, I look on my students from another side and I it is more interesting for me prepare the lessons. I understood that any opinion of the child has the right to be.

By the old scheme teacher means the traditional lesson, where teacher explain the theme of the lesson, then students do some exercise for practice, which are graded and get the home work. Teacher centered approach shifted to the student centered one. Participants highlight that preparation to the lesson take more time than before, they start to plan more carefully trying taking into account the individual needs of the students. Likewise teachers apply different interactive methods to raise the students' motivation. Aizhan Amirovna continues:

Other teachers from our school, especially young teachers started interested in my lessons and observe them, they want to learn something new and apply it in their practice. They also try to invite me on their lessons and ask give them feedback.

It signals that the teachers understand the necessity of development and show the interest in own professional development. Teachers also visit the seminars, workshop, and open lessons prepared by the NIS teachers, which also conduce to their development as a teacher.

As one of principle of translation of NIS experience it is professional development of teachers, NIS together with the CoE exert a force on actualization of this principle.

Criteria-Based Assessment

In all the mainstreams schools in Kazakhstan students are assessed by five scale assessment system. Despite the fact it is called five scale assessment systems, teachers in Kazakhstan use only marks like five, four and three, where five stand satisfactory, four fir good, three for satisfactory. As, the system does not provide students with the clear picture of their achievements NIS started to apply Criteria-Based Assessment (CBA) and transfer their practice to the mainstream schools. All participants highlight the effectiveness of the CBA. Svetlana Ivanovna mentions:

Students sometimes are not satisfied with their marks and always asked me "Why I got three? Why my classmate have higher mark than me, we have similar works?". I tried to explain them providing the arguments showing the difference, some students were still disagree with my decision. When I started apply the elements of CBA number of such questions reduced, because students had the criterion of assessments rubrics that provide them with the clear explanation of the given mark.

All of the participants respond that use the elements of criteria-bases assessment yield the results both to students and teachers. Having the assessment rubrics and assessment criterion students know the requirements and demands of the subject. Meanwhile, teachers are manage to provide a fair assessment to all students in the class. The teachers using the criteria-based assessment give students constant constructive feedback according on the bases of assessment rubrics.

So, it is obvious that the criteria-based assessment leads to the improvement of the grading system in the school. However, data shows that teachers using few elements of new assessment system. Teachers explain that elaboration of assessment rubrics is a time consuming and complicated process. It allows to make an assumption hypothesis that despite the fact that teachers see real benefit of using the criteria-based assessment, they are not willing to apply this assessment system to all lessons with for each cycle of schooling

School Culture, Teacher's Beliefs and Perceptions

In the process of change the school environment and mission of the school are very important. As it was written by Hargreaves (1994) "missions also strengthen teachers' sense of efficacy, their believe that they can improve the achievement of their students" (p.163). So, if the teachers have an aspiration for realization of the school

mission, it will allow them to work collaboratively. Analysis of the interviews allows me to claim that the culture in the school changed completely from the time of adopting the NIS experience. Anna Anatolienva mentions:

There are changes in collaboration between teachers in our school. During the decades we used to work individually, hiding our own materials from other teachers. Now teachers become more open to each other. We started to prepare lessons together and share with our materials.

Almost all participants mentioned that they started to cooperate. Furthermore, they highlighted that teacher start to demonstrate interest to other teachers, their methodology, and experience. In addition they start to visit each other classes and provide feedback to one another. One of the participants called the changes as a “wind of change”.

I can say that after collaboration with NIS teachers, observation of their work, participation in numerous seminars, and workshops the ideology has changed. NIS teachers more are open in comparison with us. The collaboration with NIS teachers widens the mindset of the teachers.

According to the information provided by participant the changes in the school culture are apparent. Before the participation in the process of translation of NIS experience in school we can observe the elements of individualism in teachers' work which were replaced with collaborative culture.

School promotion

Since collaborative work with the NIS school the people's perceptions toward school have changes. In accordance with the interview responses other city schools are informed that this school is involved in this project and interested in the changes that happened. Moreover teachers mentioned that parents also more actively participate in the school live and interested in the students' achievements. One of the participants Gulnur Kairatovna tells:

I was involved in the seminar where I met teachers from different cities. And when I was introducing myself, they said “We now your school. It is in one project with NIS”. I was y surprised.

Leadership

In the period of change the role of the school principle plays a pivotal role as it was mentioned by Hord & Sommers, (2008) principle is “gatekeeper or a key to change and improvement” (p.6). Therefore the school principals should be able to turn teachers towards the changes and help them incorporate into new knowledge in their practice. Interviewed teachers say that distributional leadership system operates in their school of. Anna Anatolievna mentions:

I am a leader of the professional learning community in our school. In our team there are 7 teachers including me. We are responsible for the promotion of the development of teachers in our school who did not pass the level courses. We are trying to share our knowledge with other, on the other hand we also learn from our colleagues.

Other professional communities also exist in current school particularly department communities and communities are monitor pupils' academic progress. So, it means that teachers also have the opportunity to try themselves as leaders of different communities – it can facilitate positive results of implementation of the new practices. However, the principles should facilitate and control this process and

The findings of the current study underpin the findings of the research done by Rulison (2012). Rulison (2012) conducted in-depth interviews with the USA teachers to analyze their perception on the implementation of new curriculum. Rulison (2012) indicated that most of the interviewed teachers have a “blind faith” (p.92) to the administration during the period of change. It is also valid for teachers participated in research in Kazakhstan. The teachers follow the instructions from the side of administration and NIS teachers, because they do not know about the new standard, especially how this process should be realized. As example, the pilot school which gets the experience from NIS at the same time should work collaboratively work with three the mainstream schools in the city. However, the teachers are ignorant of the policy of further dissemination of the experience. Instead, they just hold the rare seminars for other city schools.

In May of 2014 our school held city seminar for other the mainstream school teachers, where we demonstrated what had we learned during the three year period.

In general, all teachers highlighted the lack of teacher professional development and preparation (Rulison, 2012; Antoniou, 2014). In contrast to the findings from the USA and Cyprus, the current study reveals that this issue is not salient for the teachers participated in the research project. Kuralai Abayevna highlights:

I can not say that we were left along on the way of exploring something new. From the beginning NIS teachers supported us. We can call them fancy time and ask advice. NIS teachers are open to share what they have learnt, with us and they show real interest.

Similarly with the outcomes of the research by Rulison (2012) and Antoniou (2014) most of the participants in this study point out that teachers are forced to use instructional strategies which downplay the role of the curriculum, so teachers face challenges, stress and tensed time line to prepare lesson plans. Furthermore, teachers were unsure about constancy of the reforms.

In conclusion, I want to highlight that analysis of the data allows me to find out that there are existence of such called “symbols” among the teachers. By symbols we mean catching and fashionable concepts widely used but not comprehended. For instance, such definitions as “Action research”, “Lesson study” or “Critical Thinking” used by the teachers, but they do not deeply understand the meaning of this words. The participants mention that they use these methods, but not their everyday practice. It can be caused with unwilling results of implantations of these methods. So, teachers should clearly understand of what they do and grasp the concrete purpose of their actions.

The NIS teachers provide the online seminars and lesson to three the mainstream schools as one way of translating of NIS experience. From the participants responses it is clear that teachers attend the seminars for teachers, but do not involve students into participation of the online lessons. Teachers refer to the absence of internet connection or discrepancy in the timetable. So, NIS should reconsider time of online lessons and try to make all conditions for comfortable for the mainstream school teachers.

According to the plan of transition of NIS experience, the schools which co-operated with the NIS should work with three schools and transfer knowledge that they get from NIS schools. Most of the teachers suggest expanding the co-operation of NIS schools with other schools of the city. Hence, it means that schools do not work intensively with other three the mainstream schools, only providing rare with seminars and workshops. So policy makers should control the process of new policy transfer outside the schools which intensively collaborate with NIS.

In general, the policy transfer from NIS to the mainstream schools flows in accordance of the plan, NIS teachers provide the mainstream schools’ teachers with essential support. However, the teacher’s willingness, aspiration, and deep understanding of importance and necessity in structural adjustments of national educational system will lead to the success. The process of changing is very complicated process which requires a lot of effort and takes a long period of time. So, to judge about successful implementation of the new system is too early.

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MIMO CONTROL FOR NONLINEAR SYSTEM

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ABSTRACT— Continuous processes in the plastics, textile paper and other industries, require several drives working in synchronism. The aim of this paper is to control speed of the winding system, and to maintain a constant mechanical tension between the rollers of the system. Several controllers are considered, including sliding-mode control (SMC) single input/single output (SISO) and SMC multi input/multi output (MIMO) and Proportional-integral (PI/MIMO). Since the PI control method can be applied easily and is widely known, it has an important place in control applications. But this method is insensitive to parameter changes. The advantage of an SMC is its robustness and ability to handle the non-linear behaviour of the system. The main contribution of this paper consists of designing MIMO sliding mode control law of a distributed parameter based on the original model for which the control variables are coupled. The performances of the control law are illustrated by means of simulations and compared to previous results obtained by SISO and (PI-MIMO) control laws.

Keywords: component; winding system, induction machine proportional-integral (PI), sliding mode control

INTRODUCTION

The systems handling web material such as textile, paper, polymer or metal are very common in the industry. The modelling and the control of web handling systems have been studied already for several decades [1]. The increasing requirement on control performance, however, and the handling of thinner web material led us to search for more sophisticated control strategies. One of the objectives in such systems is to increase web velocity as much as possible, while controlling web tension over the entire production line. This requires decoupling between web tension and speed, so that a constant tension can be maintained during speed changes [2] [3]. MIMO sliding control has been proposed for the denitrifying process in [4,5] but the control law was derived from the lumped model, not from the original model. SISO adaptive linearizing control law and SISO variable structure control have been also proposed for this type of system in [6] but in these cases the addition of a carbon source is not optimised and the ethanol concentration at the outlet of bioreactor remain too high.

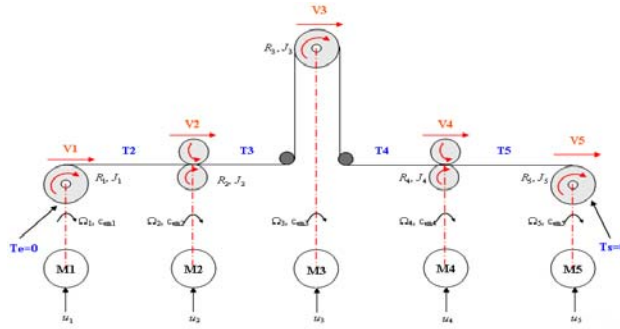
The main contribution of this paper consists of designing a multi-input/multi-output sliding control law for the distributed parameter system derived from the original distributed parameter system in order to control a linear speed winding system in order to improve the performances of the control system, which are coupled mechanically, and Synthesis of the robust control and their application to synchronize the five sequences and to maintain a constant mechanical tension between the rollers of the system.

The model of the winding system and in particular the model of the mechanical coupling are developed and presented in Section II. Section III shows the development of sliding mode controllers design for winding system. The SISO and MIMO sliding mode control is given in the section IV and section V respectively. Simulation results using MATLAB SIMULINK is shown in Section III. Finally, the conclusions are drawn in Section V.

INDIRECT FIELD-ORIENTED CONTROL OF THE SYSTEM MODELS

In the mechanical part, the motor M1 carries out unreeling, M3 drives the fabric by friction and M5 is used to carry out winding, each one of the motors M2 and M4 drives two rollers via gears “to grip” the band (Fig.1). Each one of M2 and M4 could be replaced by two motors, which each one would drive a roller of the stages of pinching off. The elements of control of pressure between the rollers are not represented and not even considered in the study. The stage of pinching off can make it possible to isolate two zones and to create a buffer zone. [8, 9].

The objective of these systems is to maintain the tape speed constant and to control the tension in the band.



Selecting a Template (Heading 2)

First, confirm that you have the correct template for your

The used motor is a three phase induction motor type (IM) supplied by an inverter voltage controlled with Pulse Modulation Width (PWM) techniques. A model based on circuit equivalent equations is generally sufficient in order to make control synthesis. The dynamic model of three-phase, Y-connected induction motor can be expressed in the d-q synchronously rotating frame as [13]:

$$\begin{cases} \frac{di_{ds}}{dt} = \frac{1}{\sigma \cdot L_s} \left(- \left(R_s + \left(\frac{L_m}{L_r} \right)^2 \cdot R_r \right) \cdot i_{ds} + \sigma L_s \omega_e i_{qs} + \frac{L_m \cdot R_r}{L_r^2} \cdot \phi_{dr} + \frac{L_m}{L_r} \cdot \phi_{qr} \cdot \omega_r + V_{ds} \right) \\ \frac{di_{qs}}{dt} = \frac{1}{\sigma \cdot L_s} \left(- \sigma L_s \omega_e i_{ds} - \left(R_s + \left(\frac{L_m}{L_r} \right)^2 \cdot R_r \right) \cdot i_{qs} - \frac{L_m}{L_r} \cdot \phi_{dr} \cdot \omega_r + \frac{L_m \cdot R_r}{L_r^2} \cdot \phi_{qr} + V_{qs} \right) \\ \frac{d\phi_{dr}}{dt} = \frac{L_m \cdot R_r}{L_r} \cdot i_{ds} - \frac{R_r}{L_r} \cdot \phi_{dr} + (\omega_e - \omega_r) \cdot \phi_{dr} \\ \frac{d\phi_{qr}}{dt} = \frac{L_m \cdot R_r}{L_r} \cdot i_{qs} - (\omega_e - \omega_r) \cdot \phi_{qr} - \frac{R_r}{L_r} \cdot \phi_{qr} \end{cases} \quad (1)$$

Where σ is the coefficient of dispersion and is given by: $\sigma = 1 - \frac{L_m^2}{L_s L_r}$

(2)

By using of Hooke's law, Coulomb's law, mass conservation law and the laws of motion for each rotating roll the mechanical part model of the system is given by the two following parts equations [8, 9]:

A. Tension model between two consecutive rolls

$$\begin{cases} L_1 \frac{dT_2}{dt} = ES (V_2 - V_1) - T_2 V_2 \\ L_2 \frac{dT_3}{dt} = ES (V_3 - V_2) + T_2 V_2 - T_3 V_3 \\ L_3 \frac{dT_4}{dt} = ES (V_4 - V_3) + T_3 V_3 - T_4 V_4 \\ L_4 \frac{dT_5}{dt} = ES (V_5 - V_4) + T_4 V_4 - T_5 V_5 \end{cases} \quad (3)$$

B. Roll velocity model

$$\left\{ \begin{array}{l} \frac{d(J_1(t)\Omega_1)}{dt} = R_1(t)T_2 + C_{em1} - f_1(t)\Omega_1 \\ \frac{d(J_2(t)\Omega_2)}{dt} = R_2(t)(T_3 - T_2) + C_{em2} - f_2(t)\Omega_2 \\ \frac{d(J_3(t)\Omega_3)}{dt} = R_3(t)(T_4 - T_3) + C_{em3} - f_3(t)\Omega_3 \\ \frac{d(J_4(t)\Omega_4)}{dt} = R_4(t)(T_5 - T_4) + C_{em4} - f_4(t)\Omega_4 \\ \frac{d(J_5(t)\Omega_5)}{dt} = R_5(t)(-T_5) + C_{em5} - f_5(t)\Omega_5 \end{array} \right. \quad (4)$$

k = 2, 3, 4, 5.

SLIDING MODE CONTROL

The sliding mode control consists in moving the state trajectory of the system toward a predetermined surface called sliding or switching surface and in maintaining it around this latter with an appropriate switching logic. In the case of the nth-order system, the sliding surface could be defined as [12]:

$$S(x) = \left(\frac{\partial}{\partial t} + \lambda \right)^{n-1} \cdot e(x) \quad (5)$$

Where $\lambda > 0$

The control law is divided into two parts, the equivalent control U_{eq} and the attractivity or reachability control U_n . The equivalent control is determined off-line with a model that represents the plant as accurately as possible. If the plant is exactly identical to the model used for determining U_{eq} and there are no disturbances, there would be no need to apply an additional control U_n . However, in practice there are a lot of differences between the model and the actual plant. Therefore, the control component U_n is necessary which will always guarantee that the state is attracted to the switching surface by satisfying the condition [12]:

$$\dot{S}(x) \cdot S(x) < 0$$

Therefore, the basic switching law is of the form:

$$U = U_{eq} + U_n \quad (6)$$

With

$$U_n = -M(\cdot) \cdot \text{sgn}(S(\cdot))$$

M(S): the magnitude of the attractively control law U_n , and sgn is the sign function

In a conventional variable structure control, U_n generates a high control activity. It was first taken as constant, a relay function, which is very harmful to the actuators and may excite the model dynamics of the System. This is known as a chattering phenomenon. Ideally, to reach the sliding surface, the chattering phenomenon should be eliminated [12, 13]. However, in practice, chattering can only be reduced.

SISO SLIDING MODE CONTROL

To control the speed of the induction machine, the sliding surface is defined as follows:

$$S(w_m) = w_m^* - w_m \quad (7)$$

The derivative of the sliding surface can be given as:

$$\dot{S}(w_m) = \dot{w}_m^* - \dot{w}_m \quad (8)$$

Taking into account the mechanical equation of the induction motor defined in the system of equations (Model), the derivative of sliding surface becomes

$$\dot{S}(w_m) = \dot{w}_m^* - \left(\frac{P^2 L_m \phi_{dr}^*}{J L_r} i_{qs} - \frac{f_c}{J} w_m - \frac{P}{J} C_r \right) \quad (9)$$

The current control is given by:

$$\dot{i}_{qs}^* = i_{qseq} + \dot{i}_{qs} \quad (10)$$

To avoid the chattering phenomenon produced by the *Sign* function we use the Saturation function *Sat* in the discontinuous control defined as follow:

$$sat\left(\frac{S}{\phi}\right) = \begin{cases} \frac{S}{\phi} & ; \text{ if } \left| \frac{S}{\phi} \right| < 1 \\ Sign\left(\frac{S}{\phi}\right) & ; \text{ if } \left| \frac{S}{\phi} \right| > 1 \end{cases} \quad (11)$$

Where ϕ is the boundary layer thickness

The discontinuous control action can be given as:

$$i_{qs}^n = k_{iqs} \cdot sat(s(\omega)/\phi_\omega) \quad (12)$$

k_{iqs} : Positive constant.

$$i_{qseq} = \frac{J L_r}{P^2 L_m \phi_{dr}^*} \left(\dot{w}_m^* + \frac{f_c}{J} w_m + \frac{P}{J} C_r \right) \quad (13)$$

The Fig.3 shows the SMC control strategy scheme for each induction motor.

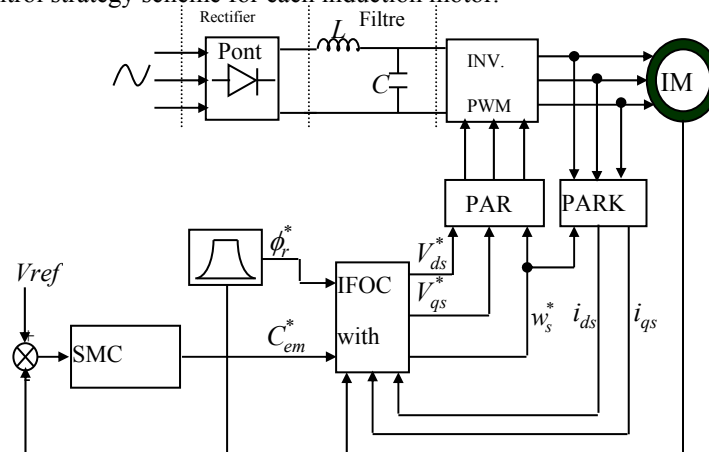


Fig. 1. Block Diagram For Each

$$S_1 = i_{ds}^* - i_{ds} \quad (14)$$

$$S_2 = i_{qs}^* - i_{qs} \quad (15)$$

The derivate of S_1 can be given as:

$$\dot{S}_1 = \dot{i}_{ds}^* - \dot{i}_{ds}$$

from equation (1) and (14) we can obtain :

$$\dot{S}_1 = \dot{i}_{ds}^* - \left(\frac{1}{\sigma L_s} \left(R_s + R_r \left(\frac{L_m}{L_r} \right)^2 \right) i_{ds} + w_s i_{qs} + \frac{L_m R_r}{\sigma L_s L_r^2} \phi_r^* + \frac{1}{\sigma L_s} V_{ds} \right) \quad (16)$$

The virtual voltage controller V_{ds} is given by:

$$V_{ds}^* = V_{dseq} + V_{dsn} \quad (17)$$

The voltage discontinuous control V_{dsn} is defined as:

$$V_{dsn} = k_1 \cdot \text{sat}(s_1 / \phi_1) \quad (18)$$

According to Lyapunov stability criteria [10], our speed loop system's stable if: $S_1 \dot{S}_1 < 0$ by means that K_1 is positive constant.

The equivalent control V_{dseq} is given as:

$$V_{dseq} = \sigma L_s \left(\dot{i}_{ds}^* + \frac{1}{\sigma L_s} \left(R_s + R_r \left(\frac{L_m}{L_r} \right)^2 \right) i_{ds} - w_s i_{qs} - \frac{L_m R_r}{\sigma L_s L_r^2} \phi_r^* \right) \quad (19)$$

The derivate of S_2 can be given as:

$$\dot{S}_2 = \dot{i}_{qs}^* - \dot{i}_{qs} \quad (20)$$

From equation (1) and (20) we can obtain:

$$\dot{S}_2 = \dot{i}_{qs}^* - \left(-w_s i_{ds} - \frac{1}{\sigma L_s} \left(R_s + R_r \left(\frac{L_m}{L_r} \right)^2 \right) i_{qs} - \frac{L_m}{\sigma L_s L_r} \phi_r^* w_m + \frac{1}{\sigma L_s} V_{qs} \right) \quad (21)$$

The voltage controller V_{qs} is given by:

$$V_{qs}^* = V_{qseq} + V_{qsn} \quad (22)$$

The V_{qseq} equivalent control actions defined as:

$$V_{qseq} = \sigma L_s \left(\dot{i}_{qs}^* + w_s i_{ds} + \frac{1}{\sigma L_s} \left(R_s + R_r \left(\frac{L_m}{L_r} \right)^2 \right) i_{qs} + \frac{L_m}{\sigma L_s L_r} \phi_r^* w_m \right) \quad (23)$$

The voltage discontinuous control V_{dsn} is defined as:

$$V_{qsn} = k_2 \cdot \text{sat}(s_2 / \phi_2) \quad (24)$$

For the same reason condition of K_1 :

K_2 Are positives constant.

MIMO SLIDING MODE CONTROL

We consider a system multi variable defines as follows:

$$\dot{X}_n = \Phi(X) + B(X).U \quad (25)$$

U Is a vector of dimension (r), ($U = [u_1 \ u_2 \ \dots \ u_r]^T$)

The vector of the surface is in the same way dimension that the vector of command:

$$S = [S_1 \ S_2 \ \dots \ S_r]$$

The derivative of the vector of the surfaces is also defines by:

$$\dot{S}(x) = \frac{\partial S}{\partial t} = \frac{\partial S}{\partial x} \cdot \frac{\partial x}{\partial S} = \frac{\partial x}{\partial S} (\Phi(X) + B(X).U) \quad (26)$$

It can be written under the following shape.

$$\dot{S}(x) = F(t, x) + D(t, x).U \quad (27)$$

In the sliding mode, the equivalent command U_{eq} defines as follows

$$U_{eq}(x, t) = -D(t, x)^{-1}.F(t, x) \quad (28)$$

We define the discontinuous command as follows

$$U_n(x, t) = -\alpha_i \cdot \text{sat}(S^*(x)) \quad (29)$$

Where $S^*(x) = D'(t, x).S(x)$

And $\text{sat}(S^*(x))$ designate the vector

$$[\text{sat}(S_1^*(x)) \ \text{sat}(S_2^*(x)) \ \dots \ \text{sat}(S_i^*(x))]$$

$$\alpha_i = \begin{bmatrix} \alpha_1 & 0 & 0 & \dots & 0 \\ 0 & \alpha_2 & 0 & 0 & \cdot \\ 0 & 0 & \alpha_3 & 0 & 0 \\ \cdot & 0 & 0 & \dots & 0 \\ \cdot & & & \dots & \\ 0 & 0 & 0 & 0 & \alpha_i \end{bmatrix} \quad \text{And} \quad \alpha_i > 0$$

$$\frac{\partial S_i}{\partial x} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

RESULTS AND DISCUSSION

The winding system we modeled is simulated using MATLAB SIMULINK software and the simulation is carried out on 10 s. To evaluate system performance we carried out numerical simulations under the following conditions:

- Start with the linear velocity of the web of 5m / s.
- The motor M1 has the role of Unwinder a roll radius R1 ($R1 = 2.25$ m).
- The motors M2, M3, M4 are the role is to pinch the tape.
- The motor M5 has the role of winding a roll of radius R5. The aims of the STOP block is to stop at the same time the different motors of the system when a radius adjust to a desired value (for example $R5 = 0.8$ m), by injecting a reference speed zero.

As shown in Fig (3-5). An improvement of the linear speed is registered, and has follows the reference speed for both PI controller and SMC control, but in case of PI controller, the overshoot in linear speed of Un winder is 25%. Fig (4) and Fig (5) show that with the SMC MIMO controller the system follows the reference speed after 0.8 sec, in all motors, however, in the SMC SIS0 and PI controller the system follows after 1.5 sec and 2 sec respectively.

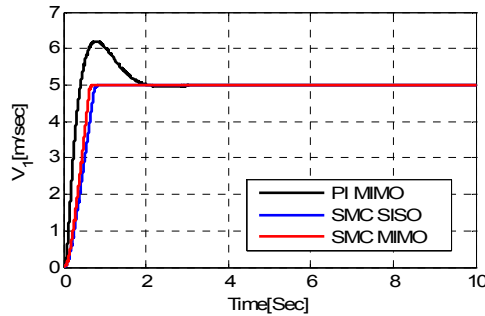


Fig. 3.The Linear Speed Of Unwinder M1

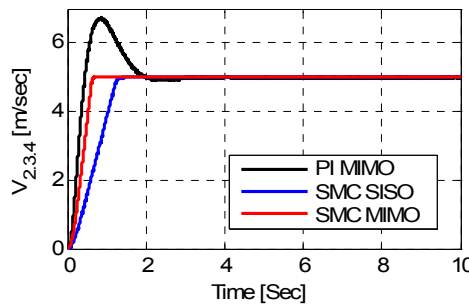


Fig. 4.The Linear Speed Of Motors M2, M3 And M4

From the figures (3-5), we can say that: the effect of the disturbance is neglected in the case of the SMC MIMO controller. It appears clearly that the classical control with PI controller is easy to apply. However the control with sliding mode MIMO controllers offers better performances in both of the overshoot control and the tracking error.

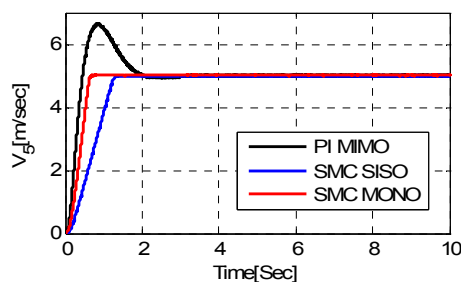


Fig. 5. The Linear Speed Of Winder M5

CONCLUSION

The objective of this paper consists in developing a model of a winding system constituted of five motors that is coupled mechanically by a strap whose tension is adjustable and to develop the methods of analysis and synthesis of the commands robust and their application to synchronize the five sequences and to maintain a constant mechanical tension between the rollers of the system.

The simulations results show the efficiency of the SMC-MIMO controller technique, however the strategy of SMC-MIMO Controller brings good performances, and she is more efficient than the SMC-SISO controller and classical PI-MIMO controller.

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OPTIMAL INJECTED CURRENT CONTROL FOR SHUNT ACTIVE POWER FILTER USING ARTIFICIAL INTELLIGENCE

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ABSTRACT: In this paper, a new particle swarm optimization (PSO) based method is proposed for the implantation of optimal harmonic power flow in power systems. In this algorithm approach, proportional integral controller for reference compensating currents of active power filter is performed in order to minimize the total harmonic distortion (THD). The simulation results show that the new control method using PSO approach is not only easy to be implanted, but also very effective in reducing the unwanted harmonics and compensating reactive power. The studies carried out have been accomplished using the MATLAB Simulink Power System Toolbox.

Keywords: shunt active power filter, power quality, current control, proportional integral controller, particle swarm optimization

INTRODUCTION

No-linear devices are applied to many kinds of fields with rapid development of power electronic technology. These non-linear loads cause power system seriously polluted. The active power filter technology gains attention from researchers since it is proposed. The rapidly growth in the field of semiconductor devices and the presentation of instantaneous reactive power theory, the technology of active power filter (APF) is promoted greatly. To develop transient characteristic of APF, researchers improved system construction, detection method of harmonic and reactive current and control strategy. As the important link influence steady and dynamic index, the optimization of PI regulator's parameters is crucial [1].

Dynamic and flexible solutions to the power quality problems have been examined by researchers and power system [2]. Usually, passive filters have been used to eliminate current harmonics and to increase the power factor. However, the use of passive filter has many disadvantages of large size resonance and fixed compensation behavior so this conventional solution becomes ineffective [8]. The shunt active with several topologies [3]-[4] is generally used instead of passive filters to improve the power quality by injecting compensating currents [5],[14] and also, a very great for the compensation not only of current harmonics produced by distorting loads, but also of reactive power of non-linear loads [8]. In order to determine the current reference signals a proposed theory based on instantaneous power (p-q theory) has been used this theory was introduced by Akagi, Kanazawa and Nabae in 1983 [6] in Japanese. The presented work spotlights on novel control method for compensating current which known as PI-PSO optimized PI controller using ant colony algorithm.

In this work, the problem of design current PI controller is formulated as an optimization problem. The problem formulation assumes in this study two performance indexes are the integral absolute error of step response and maximum overshoot as the objective function to determine the PI control parameters for getting a well performance under a given system. We propose an optimization method for SAPF in the aim to improve the compensation performances and reduce harmonic distortion through electrical lines distribution under all voltages conditions. These objectives are obtained by minimizing the fitness function.

In addition, PSO is inspired by the ability of flocks of birds, schools of fish, and herds of animals to adapt to their environment, find rich sources of food, and avoid predators by implementing an information sharing approach. PSO technique was invented in the mid 1990s while attempting to simulate the choreographed, graceful motion of swarms of birds as part of a sociocognitive study investigating the notion of collective intelligence in biological populations [9]. In PSO, a set of randomly generated solutions propagates in the design

space towards the optimal solution over a number of iterations based on large amount of information about the design space that is assimilated and shared by all members of the swarm [10].

PARTICLE SWARM OPTIMIZATION

Similar to evolutionary algorithms, the PSO technique conducts searches using a population of particles, corresponding to individuals. Each particle represents a candidate solution to the problem at hand. In a PSO system, particles change their positions by flying around in a multidimensional search space until a relatively unchanged position has been encountered, or until computational limitations are exceeded. In social science context, a PSO system combines a social-only model and a cognition-only model [16]. The social-only component suggests that individuals ignore their own experience and adjust their behavior according to the successful beliefs of individuals in the neighborhood. On the other hand, the cognition-only component treats individuals as isolated beings. A particle changes its position using these models. The advantages of PSO over other traditional optimization techniques can be summarized as follows [17]

- PSO is a population-based search algorithm (i.e., PSO has implicit parallelism). This property ensures PSO to be less susceptible to getting trapped on local minima.
- PSO uses payoff (performance index or objective function) information to guide the search in the problem space. Therefore, PSO can easily deal with non differentiable objective functions. Additionally, this property relieves PSO of assumptions and approximations, which are often required by traditional optimization methods.
- PSO uses probabilistic transition rules and not deterministic rules. Hence, PSO is a kind of stochastic optimization algorithm that can search a complicated and uncertain area. This makes PSO more flexible and robust than conventional methods.
- Unlike GA and other heuristic algorithms, PSO has the flexibility to control the balance between the global and local exploration of the search space. This unique feature of PSO overcomes the premature convergence problem and enhances the search capability.
- Unlike the traditional methods, the solution quality of the proposed approach does not rely on the initial population. Starting anywhere in the search space, the algorithm ensures the convergence to the optimal solution.

PSO is initialized with a group of random particles (solutions) and then searches for optima by updating generations. In each iteration, every particle is updated by following two "best" values. The first one is the best solution (fitness) it has achieved so far. (The fitness value is also stored.) This value is called P_{best} . Another "best" value that is tracked by the particle swarm optimizer is the best value, obtained so far by any particle in the population [11]. This best value is a global best and called g_{best} .

For example, the i th particle is represented as $X_i = (x_{i1}, x_{i2} \dots x_{id})$ in the d-dimensional space. The best previous position of the i th particle is recorded and represented as:

$$P_{best}_i = (P_{best}_{i1}, P_{best}_{i2}, \dots, P_{best}_{id}) \quad (1)$$

The index of best particle among all of the particles in the group is g_{best} . The velocity for particle i is represented as:

$$v_i = (v_{i1}, v_{i2}, \dots, v_{id})$$

The modified velocity and position of each particle can be calculated using the current velocity and the distance from P_{best}_i to g_{best} as shown in the following formulas [8]

$$v_{i,m}^{(t+1)} = wv_{i,m}^{(t)} + c_1 rand (P_{best}_{i,m} - x_{i,m}^{(t)}) + c_2 rand (g_{best}_m - x_{i,m}^{(t)}) \quad (2)$$

$$x_{i,m}^{(t+1)} = x_{i,m}^{(t)} + v_{i,m}^{(t+1)} \quad (3)$$

$$i = 1, 2, \dots, n;$$

$$m = 1, 2, \dots, d;$$

Where:

n - Number of particles in the group,

d - Dimension,

t - Pointer of iterations (generations),

$v_{i,m}^{(t)}$ - Velocity of particle i at iteration t ,

W - Inertia weight factor,

c_1, c_2 - Acceleration constant,

$rand(\)$ - Random number between 0 and 1,

$v_{i,d}^{(t)}$ - Current position of particle i at iterations,

$Pbest_i$ - Best previous position of the i .th particle,

$Gbest$ - Best particle among all the particles in the population.

APPROVED FITNESS FUNCTION

In this work, the optimized parameters objects are proportional gain k_p and integral gain k_i , the transfer function of PI controller is defined by:

$$G_c(s) = K_p + \frac{K_i}{s} \quad (4)$$

The gains k_p and k_i of PI controller are generated by the PSO algorithm for a given plant. As shown in fig.1.

The output $u(t)$ of PI controller is (equation 5): approved

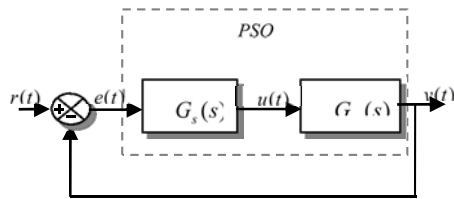


Fig.1 PI Control System

$$u(t) = K_p e(t) + K_i \int_0^t e(t) dt \quad (5)$$

For a given plant, the problem of designing a PI controller is to adjust the parameters k_p and k_i for getting a desired performance of the considered system. Both the amplitude and time duration of the transient response must be kept within tolerable or prescribed limits, for this condition, two key indexes performance of the transient response is utilized to characterize the performance of PI control system.

These key indexes are integral absolute control error and maximum overshoot that is adopted to create objective function which is defined as [7]:

$$F = f_{os} + f_{ias} \quad (6)$$

The maximum overshoot is defined as:

$$f_{os} = y_{max} - y_{ss} \quad (7)$$

y_{max} Characterize the maximum value of y and y_{ss} denote the steady-state value.

The integral of the absolute magnitude of control error is written as:

$$f_{ias} = \int_0^{\infty} |e(t)| dt \quad (8)$$

SYSTEM CONFIGURATION

The principal function of the shunt active power filter (SAPF) is to generate just enough reactive and harmonic current to compensate the nonlinear loads in the line. A multiplicity of methods is used for instantaneous current harmonics detection in active power filter such as FFT (fast Fourier technique) technique, instantaneous p-q theory, and synchronous d-q reference frame theory. The main circuit of the SAPF control is shown in fig.2

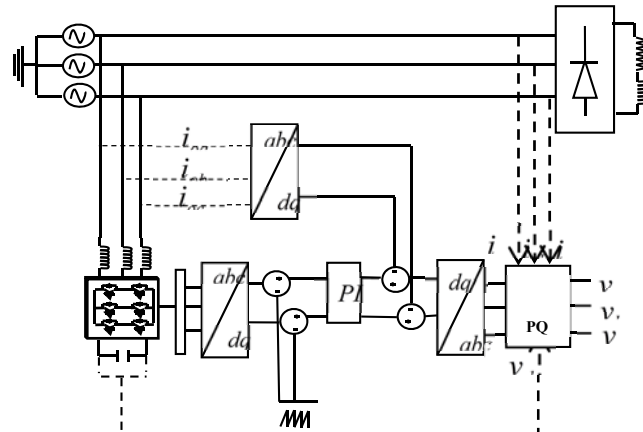


Fig.2 General Structure of the SAPF

The reference current consists of the harmonic components of the load current which the active filter must supply. This reference current is fed through a controller and then the switching signal is generated to switch the power switching devices of the active filter such that the active filter will indeed produce the harmonics required by the load. Finally, the AC supply will only need to provide the fundamental component for the load, resulting in a low harmonic sinusoidal supply.

INSTANTANEOUS ACTIVE AND REACTIVE P-Q POWER METHOD

The identification theory that we have used on shunt APF is known as instantaneous power theory, or PQ theory. It is based on instantaneous values in three-phase power systems with or without neutral wire, and is valid for steady-state or transitory operations, as well as for generic voltage and current waveforms. The PQ theory consists of an algebraic transformation (Clarke transformation) of the three phase voltages and current in the abc coordinates to the $\alpha\beta$ coordinates [6].

$$\begin{bmatrix} v_\alpha \\ v_\beta \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} v_a \\ v_b \\ v_c \end{bmatrix} \quad (9)$$

$$\begin{bmatrix} i_{c\alpha} \\ i_{c\beta} \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} 1 & -1/2 & -1/2 \\ 0 & \sqrt{3}/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} i_{ca} \\ i_{cb} \\ i_{cc} \end{bmatrix} \quad (10)$$

The instantaneous power is calculated as:

$$\begin{bmatrix} p \\ q \end{bmatrix} = \begin{bmatrix} v_\alpha & v_\beta \\ -v_\beta & v_\alpha \end{bmatrix} \begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} \quad (11)$$

The harmonic component of the total power can be extracted as:

$$p_L = \bar{p}_L + \tilde{p}_L \quad (12)$$

Where,

\bar{p}_L : The DC component

\tilde{p}_L : Harmonic component

Similarly,

$$q_L = \bar{q}_L + \tilde{q}_L \quad (13)$$

Finally, we can calculate reference current as:

$$\begin{bmatrix} i_{fa}^* \\ i_{fb}^* \\ i_{fc}^* \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} 1 & 0 \\ -1/2 & \sqrt{3}/2 \\ -1/2 & -\sqrt{3}/2 \end{bmatrix} \begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} \quad (14)$$

Here,

$$\begin{bmatrix} p \\ q \end{bmatrix} = \frac{1}{v_\alpha^2 + v_\beta^2} \begin{bmatrix} v_\alpha & -v_\beta \\ v_\beta & v_\alpha \end{bmatrix} \begin{bmatrix} \tilde{p} \\ \tilde{q} \end{bmatrix} \quad (15)$$

SHUNT ACTIVE FILTER CONTROL

Two control loops are studied, the internal loop responsible for the *ac* current control and the external loop responsible of *dc* voltage control with the consideration that the power is flowing from the capacitor source voltage to the grid.

A. Current Technique Control

The output currents of the inverter must track the reference currents produced by the current identification block. Consequently a regulation block is required and must be designed. In this work, the inverter is controlled using a *PI* regulator with a *PWM* modulator [12]–[13], the control circuit system is shown in Fig. 3.

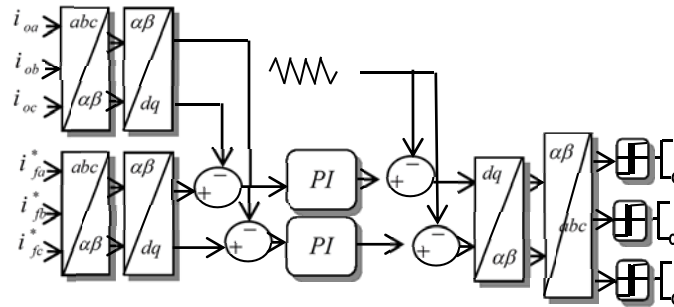


Fig.3 PI Inverter Controller Block

i_{on} and i_{fn}^* $n=(a,b,c)$ are correspondingly the active power filter output currents and reference currents.

B. dc Link Voltage control

The closed-loop transfer function of *dc* voltage regulation (Fig. 4) is given by:

$$\frac{v_{dc}}{v_{dcref}} = \frac{k_p}{c} \frac{s + k_i/k_p}{s^2 + (k_p/c)s + (k_i/c)} \quad (16)$$

k_p and k_i are respectively the proportional and integrator gains of the *PI* controller. The design of the *PI* controller is realized by identifying (17) to a prototype of second order system given by equation (18).

$$\frac{v_{dc}}{v_{dcref}} = 2\zeta\omega_n \frac{s + \omega_n/2\zeta}{s^2 + (2\zeta\omega_n)s + \omega_n^2} \quad (17)$$

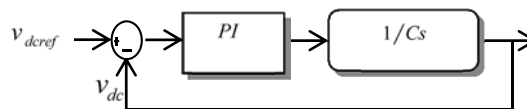


Fig.4 Dc Voltage Control Block

OPTIMIZED CURRENT CONTROLLER PI PARAMETERS USING PSO ALGORITHM

The inconvenience of the traditional PI controller is its incapability to improve the transient response of the system. The conventional PI controller has the form as follow:

$$y(t) = k_p * e(t) + k_i \int_0^t e(t) dt \quad (18)$$

Where:

y : The control output

k_p : Proportional gain

k_i : Integral gain

The control output is fed to inverter PWM signal generator. The difference between the injected current and the reference current [15] is known by error signal. The design of the conventional PI controller dependent on the knowledge of the expert, in this work the trial and error method has been used to determine the parameters K_p and K_i .

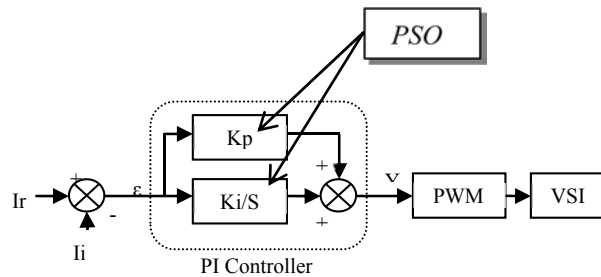


Fig.5. Control of the injected current using Optimized PI Controller

The key contribution in this paper is the proposed approach to find the optimal PI parameters fig.5 in order to ensure that the steady-state error of the system is reduced to minimum. The objective of an optimal design of currents PI controller for given plant is to find a best parameters K_p and K_i of PI control system such that the performance indexes on the transient response is minimum.

Particle Swarm Optimization technique is applied for optimization three-phase induction motor design. The following steps were followed in the implementation.

Algorithm

Step 1) Choose the population size & number of iterations.

Step 2) Specify the minimum limits and maximum limits value of independent variables.

Step 3) Set the time counter $t = 0$ and generate randomly n particles $\{X_i=0, i= 1,2,... 11\}$ where $X_i=0$ is the initial value for i th independent variable and is generated by random selecting a values with uniform probability over the k optimized parameter search space $[X_{min}, X_{max}]$. Similarly generate randomly initial velocities of all particles, $\{V_i, i= 1 \dots n\}$ where $V_i = [V_{i1}(0) v_{i2}(0), \dots, v_{in}(0)]$. V_{ik} is generated by randomly selecting a value with uniform probability over the k th dimension $[-V_{kmax}, V_{kmax}]$ evaluate objective function F (Eq.6). For each particle. Maximum velocity of a particular dimension is given by:

$$v_{k \max} = \left[\frac{x_{k \max} - x_{k \min}}{N_a} \right] \text{ where } N_a = N_0 \text{ of intervals} \quad \text{Step 4) Evaluate the fitness for each particle}$$

according to the objective function. (Including penalty functions)

Step 5) Set $G_{best_counter} = 1$.

Step 6) for each particle, as its best position, say it as P_{best} set and assign G_{best} that corresponds to the $X_i(0) = [X_{i1}(0) X_{i2}(0), \dots, X_{in}(0)]$. Particle shown by $G_{best_counter}$ from P_{best} .

Step 7) Update the time counter $t = t + 1$.

Step 8) Using the global best the individual best of each particle, the i th particle velocity in the dimension are updated. It is worth mentioning that the second term represents the cognitive part of PSO where the particle changes its velocity based on its own thinking and memory. The third term represents the social part of PSO where the particle changes its velocity based on the social-psychological adaptive of knowledge. If a particle violates the velocity limits, set its velocity equal to the limit.

Step 9) Based on the updated velocities, each particle changes its position. If a particle violates the position limits in any dimension, set its position at the proper limit.

Step 10) Personal best positions are updated.

Step 11) After first iteration the Gbest_counter Update itself according to the minimum value of the fitness function from the Pbest set.

Step 12) When the stopping criteria reaches 50(number of iteration), the procedure comes to end, else go to Step 7.

SIMULATION RESULTS

The idea of simulation is to show the effectiveness of the shunt active power filter in diminishing the harmonic pollution produced by nonlinear load, using particle swarm algorithm to design PI controller of current control, the initial values parameters of the proposed algorithm are presented in Table.1

The SAPF model parameters are shown in the following Table 2.

Table.1 Parameters of PSO

Population size	50
Number of iterations	100
W_{max}	0.5
W_{min}	0.1
$C_1=C_2$	1.5

Table.2 SAPF Parameters

Supply phase voltage U	220 V
Supply frequency fs	50 HZ
Filter inductor Lf	1mH
Dc link capacitor Cf	4.4 mF
Smoothing inductor	0.1 mH
Sample time Ts	4 μ s

A. First Case: Conventional current PI Controller

The SAPF is connected in parallel with nonlinear load, in this case the conventional PI controller is used to see the current regulation and its effect in damping harmonics current and reducing total harmonic distortion, the parameters K_p and K_i has been determined by trial and error method. The PI control design involves regulation of injected current for harmonic and reactive power compensation. Simulation results show the line currents and its spectrum before compensation Fig.7, Fig.8 and the line current and its spectrum after compensation Fig.9, Fig.10 using shunt active power filter based on conventional PI controller, the total harmonic distortion (THD) has been reduced from 26.87 % to 1.16 %.

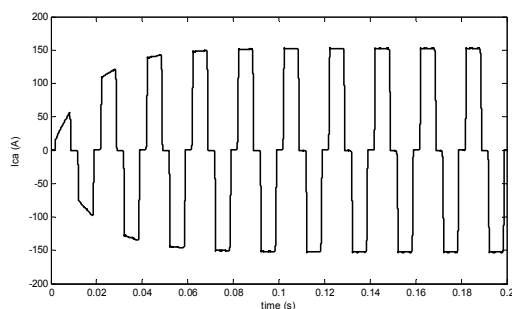


Fig.7 Supply Current Waveform Of Single Phase

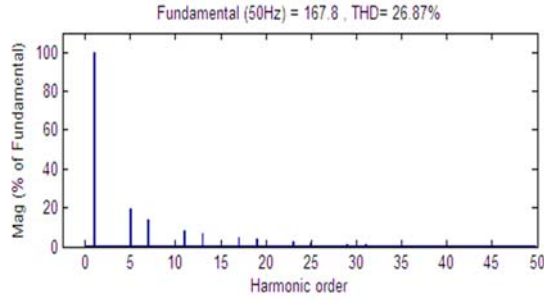


Fig.8 Harmonic Spectrum Of Supply Current

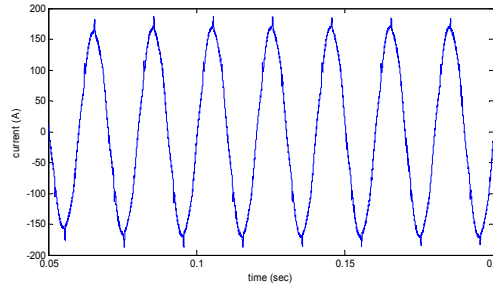


Fig.9 Supply Current Waveform Of Single Phase After Compensation Using Conventional PI Control

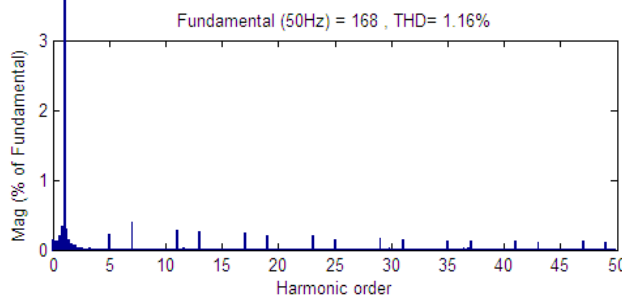


Fig.10 Harmonic Spectrum Of Supply Current After Compensation Using Conventional PI Control

Table 3 illustrates the individual amplitude of low-order harmonics in the supply current as a percentage of the fundamental component compared to individual harmonics given in *IEC 1000-3-4*.

Table.3 Harmonic Contents Of The Supply Currents

h	I_h/I_1 (%) Before compensation	I_h/I_1 (%) After compensation	IEC 1000-3-4 Ih/I1 (%)
5	19.58	0.22	9.5
7	13.55	0.39	6.5
11	8.04	0.29	3.1
13	6.46	0.26	2.0
17	4.36	0.24	1.2
19	3.61	0.21	1.1
23	2.48	0.20	0.9

B. Second Case: Optimal current PI Controller

The proposed idea is to improve the power quality using optimal shunt active power filter based on particle swarm optimization algorithm (PSO). The main objective for the system control hugged to minimization of fitness function which is defined by the following equation:

$$F = f_{os} + \alpha * f_{iae} \tag{20}$$

In this case, α value has been fixed have to 1.5 to give an importance for the integral error in formulation function.

The value of system indexes are compared in Tab4, in this novel contribution that has improved performance system, the optimal cost function reached employing ant algorithm after 100 iterations is presented in Fig .11

Tab .4 Comparisons Of Sapt Indexes Between Used And Unused Ant Colony Algorithm

Parameter and indexes	non optimized	Optimized PI
Proportional gain	295	380
Integral gain	35	48
Overshoot (%)	$8.7956e^{+003}$	$8.571e^{+003}$
Integral absolute error	$1.088e^{+003}$	$1.002e^{+003}$
Fitness function	$1.097e^{+004}$	$1.058385e^{+004}$

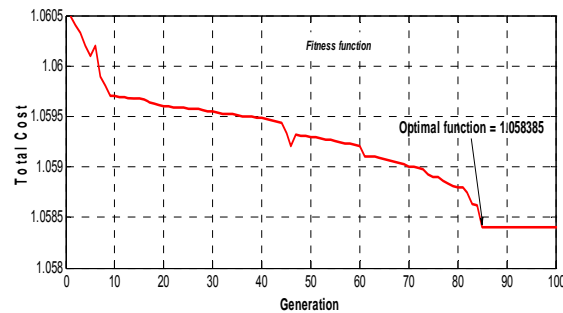


Fig: 11 The Evolution Of The Cost Function Of System

Simulation studies are carried out to predict performance of the proposed method.

Fig.12 shows the simulation results which have been obtained under the same pervious condition of the conventional PI controller.

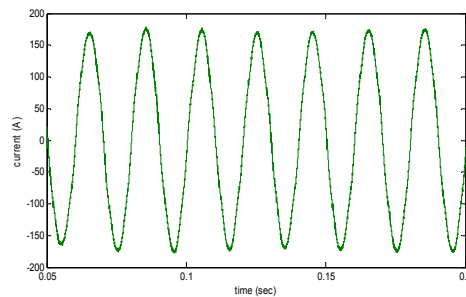


Fig.12.a Supply Current Waveform Of Single Phase After Compensation Using Optimal PI Control

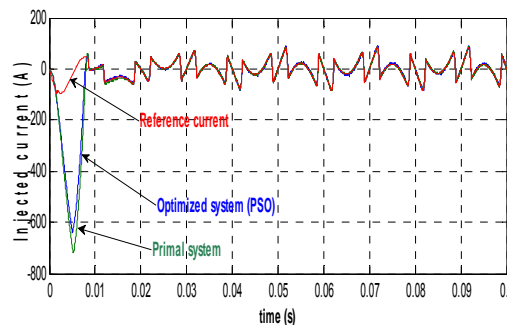


Fig.12.b Injected Current Waveform Of Single Phase Composed To Its Reference Current

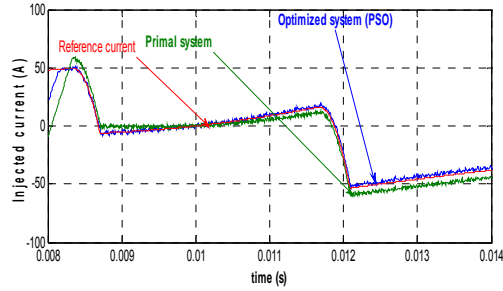


Fig.12.c Injected Current Waveform Of Single Phase (Taken Time Within 0.008 Sec-0.014 Sec)

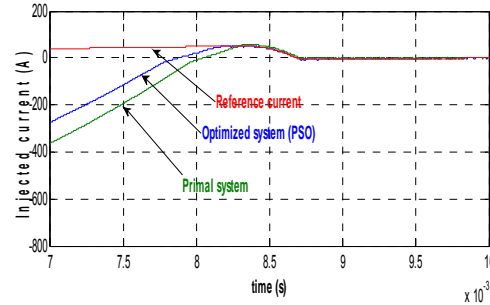


Fig.12.c Injected Current Waveform Of Single Phase With Two Methods (Taken Time Within 0.007 Sec-0.001 sec)

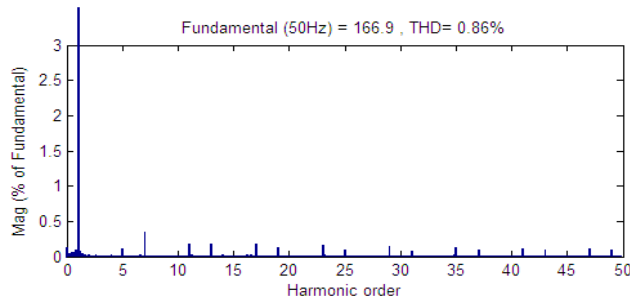


Fig.12.d Harmonic Spectrum Of Supply Current

Through the figures and calculation the THD of source current with SAPF, the THD is reduced from 1.16% value obtained by means of PI controller to 0.86% value obtained by proposed control algorithm. The harmonic contents repartition in the supply current before and after compensation using the two methods, under balanced voltage source conditions Fig.13, is resumed in Table.5.

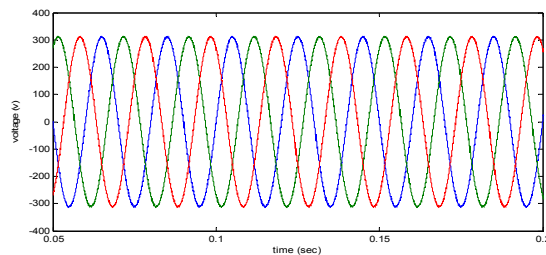


Fig.13. Source voltage waveform

Table.3 Harmonic Contents Of The Supply Currents

h	I_h/I_1 (%) without SAPF	I_h/I_1 (%) with SAPF (PI controller)	I_h/I_1 (%) with SAPF (PI_ACO)	IEC 1000-3-4 I_h/I_1 (%)
5	19.58	0.22	0.12	9.5
7	13.55	0.39	0.35	6.5
11	8.04	0.29	0.19	3.1

13	6.46	0.26	0.19	2.0
17	4.36	0.24	0.18	1.2
19	3.61	0.21	0.14	1.1
23	2.48	0.20	0.17	0.9

CONCLUSION

This paper exhibits the validity of the proposed optimal current controller by ant colony algorithm for shunt active power filter, the results of simulations of optimized SAPF control technique presented in this work is discovered quite effective in the harmonic compensation and improving the input power factor. PSO technique is inspired by nature, and has proved itself to be effective solution to optimization problems. The main objective of this study is to design the parameters of SAPF-based current controller.

Generally, the results presented indicate that the PSO has a good sharp for finding the optimal fitness function and has proved its effeteness in finding optimal parameters K_p and K_i for current-SAPF controller, it can be seen that after SAPF with PSO-PI controller runs, the current total harmonic distortion to 0.86% from 1.16% and the power factor to 0.92 from 0.87.

Tab.4 Source Current Total Harmonic Distortion: THD%

	Without SAPF	SAPF PI-Controller	SAPF PI-ACO controller	Robustness
THD _i (%)	26.87	1.16	0.86	3.22/PI
Power factor	0.63	0.87	0.92	4.34/PI-PSO

According to the previous results the proposed controller (PI-PSO) has better dynamic performance and robustness. The control method applied to SAPF has demonstrated good performance for harmonic elimination and reactive power compensation.

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THE INFLUENCE OF SALT AND FREE AMINO ACID CONTENT OF *TERASI* ON THE SENSORY CHARACTERISTICS OF CHILI SAUCE ADDED WITH *Terasi*

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ABSTRACT: *Terasi*, the traditional seafood fermented paste from Indonesia, varies greatly on the salt and free amino acids content. These variations probably not only influence the saltiness level but also other congruent tastes/flavors of *sambal terasi* (*ST*). *ST* is usually prepared with a high concentration of *terasi*, salt, and monosodium glutamate and also sometimes sugar is added to the hot/spicy sauce. The pungent flavor from *terasi* combined with the chili hotness might mask the *ST* saltiness, as a result people are not aware of its salt content, especially for people facing problems due to hypertension and cardiovascular disease. The salt reduction might also be challenging because people are used to the *ST* characteristics. This research explored the role of *terasi* salt content (either from the origin of *terasi* or by the salt adjustment) to the sensory characteristics perceived. Six types of *terasi* were characterized based on the moisture, salt, and 20 types of free amino acids (FFAs) content and prepared as *STs* by using the standard recipe obtained from experiments with and without salt adjustment at 6% *terasi*. The salt content was adjusted to a final concentration at 1.97% salt content for the adjustment ones. Ten panelists were trained for sweet, bitter, salty, sour, umami, fishy and *rebon* characteristics. Results showed that *STs* had significant impact on the sensory characteristics either with or without salt adjustment. Salt adjustment to 1.97% salt content tended to reduce the *STs* bitterness. Salt content not only affected the saltiness but also the umami, fishy, and sourness. Several correlations were found linking FAA with the taste/flavor, especially through the saltiness level of *STs*. Fishy, *rebon* and sourness also contributed to the correlations, however, the power of chili might mask the intensity of each taste/flavor in *STs*.

Key words: *terasi*, *sambal terasi*, sensory analysis, flavor, Free amino acids (FAA)

INTRODUCTION

Terasi, the traditional paste condiment made from fermented planktonic shrimp (*rebon*), is used as a flavor enhancer in many Indonesian dishes, especially as an ingredient for making *sambal terasi* (*ST*), the chili sauce containing *terasi* (Mantiri, 2012). *Terasi* is normally prepared by adding 5-25% of salt during consecutive drying, pounding and fermenting for several days or weeks, resulting in many specific tastes/flavors. This unique and complex flavor is caused by free amino acids, especially the glutamic acids which give *terasi* its characteristic of umami taste and pungent odor (Mizutani et.al., 1992; Park et.al., 2001). Its odor was stronger than soy sauce, and sometimes demotivates non-consumer to consume it, especially for Western people. The raw material(s) used may differ due to the harvesting season of *rebon*, or the creativity of producers to overcome the unavailability of *rebon*, by substituting *rebon* with other additional underutilized fish or crustacean. Moreover the environmental conditions may influence the process of drying, fermentation, aging/storage of *terasi* and as a result the overall quality of *terasi* varies from one location of other location. Especially its flavor may vary due to the weather/climate changes. Although varying in raw materials and production processes, similar products to *terasi* can be found in other countries for example *belacan* in Malaysia, *kapi* in Thailand and Cambodia, *bagoong-alamang* in Philippines, *Mam ruoc*, *Mam tom* in Vietnam, *jeotgal/jeot* in Korea, *ngapi seinsa* or *hmyinnga-pi* in Myanmar. We researched these products in Asian markets in Belgium and the Netherlands and it showed that *terasi* was drier than the seafood fermented pastes of other Southeast Asian countries. It was interesting that we also found during sampling that Indonesian people often associated the delicious *ST* to a specific *terasi* produced in specific regions in Indonesia. On the other hand, producers also preserve the specific recipes/preferences and production steps, generated from the family or processes which are commonly practiced in the community in the specific location; and practicing some techniques to deal

with the raw material shortage and handling process, climate changes and specific requests from the markets (Mantiri 2012).

ST is usually prepared by incorporating a high concentration of *terasi* (10-12.5%) in the hot/spicy chili sauce. Hotness together with a pronounced flavor and taste of food has become more popular, because hot-spiced foods contribute to a greater sensory variety and add extra dimension to different food, as well as giving a positive enjoying experience, especially in South East Asia and Latin American (Reinbach, 2008). The chili sauce is normally prepared by mixing chili (either the hot spicy or mild spicy chili) with other flavorful ingredients such as onion, garlic, ginger and other spices according to the preferences of consumers. The whole ingredients may interact and generate desirable tastes/flavors, hence, giving a nice/delicious *ST*. Therefore, there are many variations in *STs* in many restaurants and these are promoted as their specialties.

The extensive use of spice ingredients and *terasi* in the Indonesian dishes offers a very distinctive taste/flavor compared to other Southeast Asian dishes (Owen, 2008), as a result, the sensory attributes of *ST* might be different to *sambal belacan* (relatively similar to *ST*) as Jinap et al., (2010) have been explored. Due to the variation of salt content, it is suggested that other congruent tastes/flavors of *ST* also vary. The pungent flavor from chili and *terasi* or other ingredients might mask each other, especially to its saltiness. People might not be aware of its salt content, which could pose a potential risk especially for people facing problems with hypertension and cardiovascular disease. On the other hand, it is difficult to ascertain the factors influencing the *ST* quality, especially the role of *terasi* itself in *ST* because some commercial products contained other flavor/taste enhancer capacity such as monosodium glutamate, nucleotides, salt, and sugar. Integrating low concentration of *terasi* (6%, wet basis, WB) instead of 10-12.5% *terasi*, was possible although it depended on the salt content of *terasi*. An improvement of palatability was pronounced upon salt adjustment to 1.96% salt content (Damanik-Ambarita and De-Meulenaer, 2015). However this hedonic acceptance test was highly subjective to panelists preferences. It is very important to understand the sensory characteristics influencing the acceptance of *ST*. It is also necessary to explore the role of salt content, either from the origin of *terasi* or by salt adjustment, and the influence of free amino acid (FAAs) profile can be linked to each sensory characteristics of *ST*. Trained panelists can define the variation of taste/flavor in *STs*. This research aimed to study the effect of different types of *terasi* according to its FAAs and salt content on the taste/flavor characteristics at the reduced *terasi* concentration (6%) either with or without salt adjustment to 1.96% salt content.

METHODS

Terasi

Terasi samples were collected from six locations that famous for the *terasi* production or consumption of *ST* in Indonesia and were coded as A (from West Java), B (from DKI Jakarta), C (from North Sumatera), D (from Central Java), E (from West Kalimantan), and F (from East Java). Several *terasi* were taken from factories (A, D and F) and others were taken from markets. *Terasi* D and F were made from salt and *rebon*, *terasi* A contained also small fish, rice bran (the producers did not share their compositions data), while some products were void of any information. *Terasi*, were kept in a deep freezer until they were transported and further analyzed in the NutriFOODchem Laboratory, Ghent University, Belgium. Samples were analyzed triplicate for their chemical analyses. The moisture content was measured based on the Official Methods of Analysis, AOAC (William, 1984) while the NaCl (salt) content was measured by the determination of Cl⁻ ions by a precipitation titration using silver nitrate (Paul and Southgate, 1978). FAA determination was performed based on the method adopted in the laboratory (Kerkaert et al., 2011). FAAs were extracted from *terasi* by using trichloroacetic acid (TCA) 15% and filtered out of 0.45µm pore size HPLC filter. Phosphate buffer, adjusted at pH 7.8 (A) and a solution of methanol : acetonitrile : water of 45:45:10 (B) were used as the eluent for the HPLC, run with gradient pump (flow 2 mL/min) for 22.2 min. FAAs were derivatized with ortho-phthalaldehyde (OPA) 9-fluorenylmethyl chloroformate (FMOC) in the injector of an Agilent 1100 HPLC system (Agilent Technologies, Switzerland) and were separated on a Zorbax Eclipse AAA Rapid Resolution column (4.6x150mm, Agilent Technologies) and detected fluorometrically. Twenty amino acids for FAA determination (with IUPAC symbol) i.e. aspartic acid (asp), glutamic acid (glu), asparagine (asn), serine (ser), glutamine (gln), histidine (his), glycine (gly), threonine (thr), citrulline (cit), arginine (arg), alanine (ala), tyrosine (tyr), valine (val), methionine (met), tryptophan (trp), phenylalanine (phe), isoleucine (ile), leucine (leu), and lysine (lys), proline (pro) and internal standard (norvaline and sarcosine) were HPLC grade. The solvents used for the salt determination were of analytical reagent grades. Deionized water (Milli-Q, Millipore Corp.) of 18.0 MΩ cm⁻¹

resistivity, derivatized compounds and solvent for FAA determination (for example methanol, acetonitrile) were of HPLC grade. All chemicals used were obtained from Sigma Aldrich, Fluka, Acros, ChemLab, and Merck from distributors in Belgium.

ST Preparation

Six types of *terasi* were prepared as *STs* by using the standard recipe obtained from previous experiments after adjustment from several restaurants recipes, containing 6% (wet basis, WB) *terasi*. The chili sauce contained *Capsicum annuum* of the big, sweet and mild chili, also known as Taiwanese-chili (22.83%); the long, slim, curly, and hot chili (2.27%); and other ingredients such as shallot, garlic, onion, ginger, lemon grass, candle nut, tomato, palm sugar and palm frying oil. Ingredients were bought from a local supermarket located near the laboratory of the Food Technology Department, Universitas Pelita Harapan (UPH), Karawaci, Indonesia. Other set of five *STs*, with adjusted salt content at 1.97% (*terasi* A, the highest salt content among six different *terasi*, was excluded) were also prepared. *Terasi* was stirred fried until the aroma released before all blended ingredients were mixed during ten minutes of cooking.

Sensory Analyses

Nine trained panelists (8 females, age 21-41 years) were selected from 72 panelists who were regularly consuming *ST* or chili sauce and had experience in food and sensory evaluation techniques by using simple difference test. They agreed to participate for subsequent training sessions at Food Technology laboratory, UPH Karawaci. An hour prior to the training session and test, they abstained from eating strong tasting food and from using fragrances or medication. They developed sensory vocabularies and were trained to improve their understanding toward the *ST* taste/flavor attributes during two weeks of training (two hour sessions in three consecutive days). They practiced triangular tests, same different tests, and threshold tests. The vocabulary/terminology and its reference materials used were sweetness (sucrose), saltiness (NaCl), sourness (vinegar), bitterness (caffeine), umami (monosodium glutamate), *rebon* (dried *rebon*), and fish (dried anchovies). The reference material(s) were dissolved in water at the beginning of training; after the panelists were familiar with the taste/flavor, reference material(s) were dissolved in the chili sauce; later on, they were dissolved in *ST*. There was a masking effect from chili sauce or *ST* when the reference material was dissolved. For instance, the bitterness was not recognized at 0.03% caffeine in chili sauce, especially in *ST*, while the bitterness was prominent when this concentration was dissolved in water. After each sessions panelists discussed about the score and the taste/flavor attributes. Panelists plotted their responses in a scale of 0 to 15 (0 meant no taste and 15 meant the highest or most extreme intensity) for each respective taste of eleven *STs*. They were served individually with 10 grams of each *ST* on a small red plate, coded with a random three-digit numbers. They tasted 0.5-1 gram *ST*, in a sensory panel booth at 24°C with red lighting to disguise the interference of visual judgments among the samples. They rinsed the palate with plain crackers and water between samples. They had a break after testing six samples.

Data Analysis

SPSS 21 (IBM, New York, USA) was used for the statistical analyses with confidence level was set to 5%. Principle component analysis (PCA) were performed for each flavor. Spearman's correlation test was done to link the possible relationship of FAAs to the *STs* taste/flavor.

RESULTS AND FINDINGS

Terasi

Table 1. shows that *terasi* varies greatly in terms of moisture and salt content. These attributes will affect the shelf life of *terasi* especially the longer storage time. The moisture absorption and desorption of *terasi* will gradually happen during equilibrium condition in the storage room where normally without relative humidity control. As a result, *terasi* texture will change to either harder or softer and the size will be smaller or a little bit bigger during storage. This variation will also greatly influence the saltiness level perceived during the cooking process as the moisture will evaporate during cooking, and the salt remains in *ST*. Therefore during cooking it is very necessary to understand these two characteristics. The SNI 2716.1-3-2009 regulation sets the Indonesian standard for *terasi*

(National Standardization Agency of Indonesia, 2009). However, the government does not strongly control the production and storage, as a result, *terasi* quality is inconsistent and non-standardized.

FAAs of *terasi* showed greatly variation among the samples (Figure 1). The total FAAs ranged from 6.52 to 36.07 g/100 g (dry mater, DM), respectively. Ala was found as the most abundant and varied FAAs in each *terasi*, which consisting more than 10% of total FAAs, followed by glu, leu, asp, and lys. Kuda et al., (2009) found that ala and lys tended to be dominant in the long fermented fish products. Although Jinap et al., (2010) found that *belachan* varied greatly in glu (ranges 601-4207 mg/100g WB). These results are comparable to fish sauces produced in Southeast and East Asian countries, as asp, glu, ala, and lys are the most abundant FAAs (Park et al., 2001), meanwhile glu, ala and leu are predominantly found in shrimp sauce (Mizutani et al., 1992). Our finding showed that asn, gln, his, arg, and ser were found in a very small quantities, respectively, therefore the asn and gln, that are normally undetectable or found in trace amount were not displayed in Figure 1. The acidic FAAs were higher than the basic FAAs for almost all *terasi* except *terasi* C. Hydrophobic FAAs were greater than the hydrophilic FAAs. The reason for the FAAs variation in *terasi* is not clear. It is probably due to variations of the original raw material(s) and the rate of protein degradation during fermentation (autodigestion) which is difficult to determine because the majority of samples were collected without any information (or not shared by producers) regarding the production and storage, and only labeled with ingredients contents (*rebon* and salt, without concentration) and expiration date (except samples taken from the traditional factories and markets). During sampling, either producers or re-seller stated that the quantity and purity of *rebon* would determine the *terasi* quality as well as its price. The higher concentration of *rebon* was more appreciated and expensive than that of low concentration *rebon* or added with fish (either the entire body or only the muscle), wherein each raw material has typical FAAs profiles.

Table 1. *Terasi* Characteristics (g/100g;Wet Basis) and SNI 2716.1-2009 Standard for *Terasi*

Parameter	<i>Terasi-A</i>	<i>Terasi-B</i>	<i>Terasi-C</i>	<i>Terasi-D</i>	<i>Terasi-E</i>	<i>Terasi-F</i>	Standard
Moisture*	27.01±0.18 ^a	30.94±0.04 ^b	32.23±0.33 ^b	27.46±0.24 ^a	37.41±0.49 ^c	35.16±0.14 ^c	30-50
Salt	32.83±0.23 ^f	11.76±0.02 ^c	22.74±0.19 ^e	10.28±0.01 ^b	4.60±0.01 ^a	13.05±0.04 ^d	<10

*: Statistical analyse

s: $p = 0.05$; ^{a,b,c,d,e}: post hoc for each parameter (row)

The fresh *rebon* contained predominantly ala, pro, followed by gly, cit, and glu, while the fresh anchovies contained dominantly ala, followed by glu, leu, lys, and his (data not shown). Mizutani et al., (1992) found that glu is the most prominent FAA found in shrimp compared to fresh water and marine fish. In addition, glu, asp, ser, met, tyr, phe, arg are found in greater quantities in opossum shrimp than in other fish, while his, leu, ala, and pro are found much less. Corresponding to our findings, pro, ser, arg are found in small quantity or are undetected in shrimp sauce, shrimp paste, fish sauce and paste; although their presence in raw materials are abundant. The total FAAs and glu in shrimp sauce and paste were higher than that of fish sauce and paste. The total FAAs, glu, cit, and pro were higher in shrimp paste compared to fish paste, while ser, his, and arg were lower in shrimp paste.

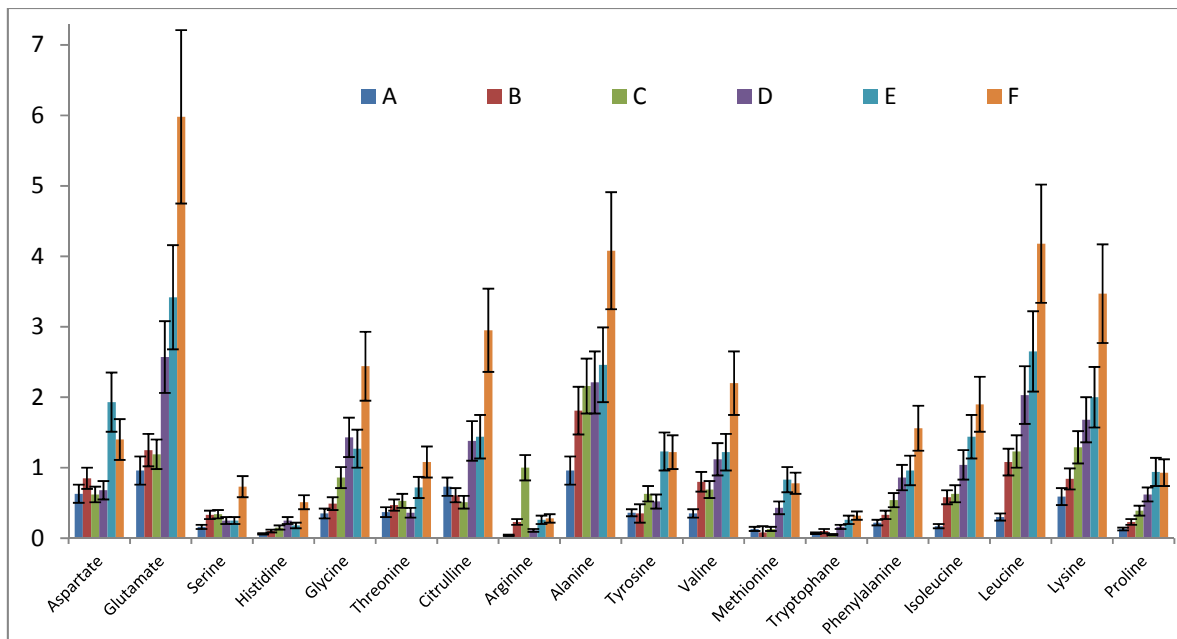


Figure 1. Free Amino Acid (FAA) Profile of Each Terasi (g/100 g dry matter, DM)

Due to the small size and soft shell of *rebon*, producers use the whole body of *rebon*, but sometimes during low season of *rebon*, several samples contained small fish or offal from the fish processing. Underutilized fish or crustacean (either the entire body or only the muscle) is sometimes added and this causes differentiation in the FAAs profiles and quality of *terasi*. Corresponding to this, Sarower et al., (2012) find that the squid meat taste tends to be sweet and savory, but when the squid liver is mixed with squid meat during cooking, the taste becomes more complex. In addition, head and tail possessed strong protease activities which can increase the total FAAs and give a stronger umami taste (higher glu) at three months of fermentation of shrimp sauces (Kim, Shahidi, & Heu, 2003). Shrimp head contains abundantly ala, gly and arg, while krill predominantly contains gly, ala, pro, and leu, although its flavor extract contains mostly gly, glu, and ala (Teerasuntonwat & Raksakulthai, 1995).

The *terasi* quality is also influenced by the fermentation time and salt concentration as producers have to adjust this problem when they face rainy season. Consistent with this, Kim et al., (2003) found that it takes two months of fermentation for shrimp paste made from 30% salt (wet basis) to reach the quality of a commercial product, while the paste made from 20% salt takes three months. The taste declines after six months of storage, although it is still considered better than the commercial product. However there is no information about the taste after longer fermentation since many Indonesian *terasi* have an expiration date of two years. We collected more samples and found that *terasi* salt content varied from 6% to 32%. In addition, *bagoong-alamang*, the Philippines' shrimp fermented paste mainly contains gly, ala, leu, lys, and arg at the first day of fermentation process, and they increase by prolonging the fermentation time (90 and 180 days). However by prolonging the fermentation time, asp, val, glu, and ile are also increased. But after longer fermentation time (360 days), the total FAAs declines due to the degradation of FAAs to amines, volatile acids, and other nitrogenous compounds (Peralta et al., 2008). Moreover, Abe et al., (1999) also show that ala, glu and asp increase over 8 months of fish sauce fermentation, and they decrease after 22 months of fermentation. Luten (2009) suggested that gln, pro, gly, and arg degrade faster in seafood through proteolysis and peptidolysis, especially by prolonging fermentation. The rate of hydrolysis of each amino acid is different, for example, val, leu and ile are released slowly, while serine and threonine, the labile amino acids, are continuously destroyed (Moughan, 2003).

Sensory Characteristics of STs

Result showed that salt adjustment increased not only the saltiness level but also all other taste/flavor attributes (Figure 2.). Previous findings showed that *terasi* variations gave significant differences in the STs acceptance, either with and without salt adjustment to a final 1.97% salt content. Panelists disliked STs without salt adjustment

especially *ST E*, except *ST A* and *C* which contained higher salt among *STs*. Almost all taste/ flavor attributes were in the lower score of hedonic acceptance. Panelists tended to like all *STs* after salt adjustment (Damanik-Ambarita and De Meulenaer, 2015). Figure 2 shows that *ST A* had a relatively balance of each taste/ flavor, without any dominant taste/ flavor and all tastes/ flavors were rated as medium in intensity. While *ST E* had the strongest bitterness and the least saltiness intensity. Probably the imbalance taste between saltiness and bitterness made panelists to dislike *ST E*. Hedonic sensory analysis also showed that bitterness was one of the limiting factor to naïve panelists to like *STs*. Almost all *STs* showed a bitterness reduction upon increasing (adjusting) of salt content. Corresponding to this, Breslin (1996) found that sodium salts generally suppresses the bitterness. In addition, umami reduces bitterness by sodium in the mixture of bitter and sweet (Liem et al., 2011).

Although salt content was adjusted to the same 1.97% salt, saltiness intensity was still varied. The type of salt used during production might differentiate the saltiness level and other congruent taste/ flavor of *terasi*. The sea salt has different umami and astringency intensity (Drake & Drake, 2011), as salt may contain different concentration of calcium, potassium, magnesium, iron, sodium, and zinc. NaCl might elicit sweet, sour, and bitterness, especially at higher concentration (Ossebaard & Smith, 1996). As a result, salt content not only affected the saltiness but also the umami, fishy, and sourness. Previous research showed that a strong *terasi* concentration (12.5%), described as fishy or *rebon*, caused difficulties for un-trained panelist to differentiate each taste/ flavor (data not shown) even the five basic tastes. After reducing the *terasi* concentration (6%), panelists could recognize some tastes/ flavors, however it is difficult to ascertain the intensity of each taste/ flavor without specific training. Moreover there was a masking effect when the reference material(s) were dissolved in the chili sauce as it showed different quality and intensity when dissolved in water. For example, monosodium glutamate, the reference for umami, when dissolved in water was perceived differently compared to that of mixed in chili sauce. Each chili type has its own taste, aftertaste and burning sensation, differentiated by Scoville Heat Units (SHU) (Reinbach, 2008). Regular chili consumers perceived burning sensation less intense than non-chili-eaters and chili can suppress the sweetness, saltiness and bitterness intensity (Prescott and Stevenson, 1995). Umami, sometimes linked to sweetness and saltiness (Bellisle, 1999), along with the actual aroma/ flavor of compatible foods, increases the body or mouthfulness of food, and it makes food taste more pleasant (Yamaguchi and Ninomiya, 2000). The nature olfactory, kinesthetic, and tactile attributes of natural and processed foods might complicate the taste stimuli (Pangborn & Trabue, 1963).

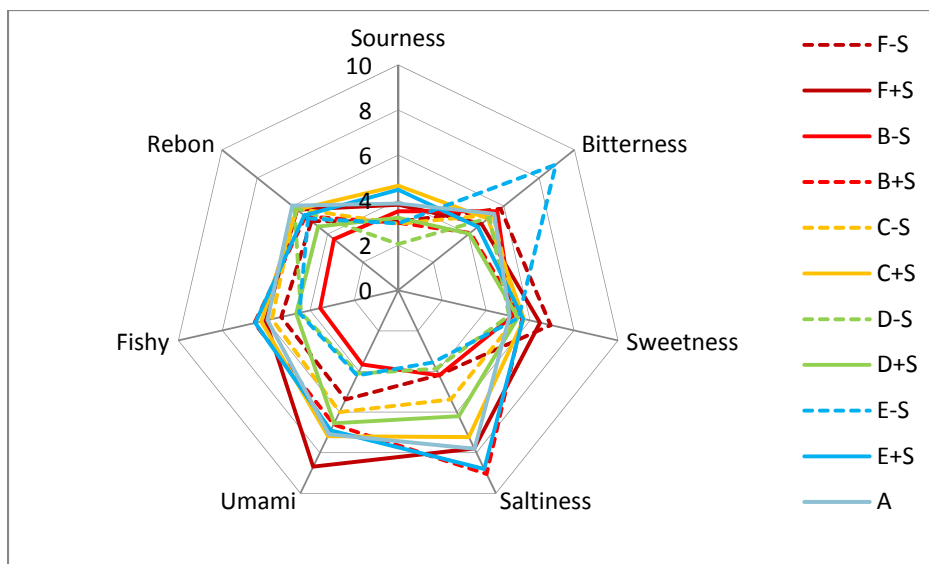


Figure 2. Effect of Different Type of *Terasi* Towards *ST* Taste/Flavor, With and Without Salt Adjustment (n=9 Trained Panelists; Score From 0 (Absence of Flavor) to 15 (Maximum Flavor Perceived),

Comparing to the FAA profile and salt content of *terasi*, it is implied that salt stood out more than the umami or other tastes/ flavors in *ST*, as also confirmed by Ikeda (2002) experiment which used the high concentration of NaCl and glutamic acid mixture. *ST* tended to be salt dependent, it is not necessary to add salt for *terasi* containing a high salt concentration. After salt adjustment, umami and fishy were enhanced, while sourness, sweetness and *rebon* were

also slightly enhanced. This strong influence of salt might also give a better balance among tastes/flavors in *STs*. Saltiness was normally perceived and remained longer together with umami and bitterness and imbalance of these tastes may provoke the dislikeliness for hedonic sensory test.

Table 2. Spearman Correlation Between FAA and Salt Content and Taste/Flavor Attributes

	Asp	Glu	Gly	Val	Met	Trp	Phe	Ile	Leu	Lys	Pro	Total
Salt Content	-,619**	-,428*	-0,294	-0,38	-,470*	-,470*	-0,31	-0,301	-0,315	-0,32	-,463*	-0,34
Bitterness	,521**	0,312	0,204	0,286	0,311	,509*	0,253	0,251	0,24	0,301	,465*	0,298
Saltiness	-,427*	-,491*	-,439*	-,440*	-,534**	-0,35	-,433*	-,415*	-,461*	-,414*	-0,39	-,436*
<i>Rebon</i>	-0,4	-,413*	-0,254	-,413*	-0,29	-0,22	-0,29	-0,264	-0,317	-0,3	-0,24	-0,31

* Correlation is significant at the 0.05 level and ** at the 0.01 level (2-tailed).

As can be seen in Table 2, asp, glu, gly, val, met, phe, ile, leu, lys, influence the saltiness, while asp, trp and pro correlated to the bitterness intensity, and glu and val were correlated to *rebon*. Other FAAs were not correlated to taste/flavor therefore in this paper they were not added into Table 2. The presence of these FAA strengthens other tastes/flavors that makes the whole tastes/flavors richer. For example the presence of asp and glu normally gives sour and umami, however due to the higher content of many bitter tasting FAAs such as lys, lue, ile, and phe in all *STs* makes the power of bitterness was stronger, as shown in *ST E* and *F* before salt adjustment.

CONCLUSION AND RECOMMENDATION

STs had significant variations on the sensory characteristics either with or without salt adjustment. Salt adjustment to 1.97% tended to reduce the bitterness. Salt content not only affected the saltiness but also the umami, fishy, and sourness. Some correlations were found to link between FAAs and bitterness, saltiness and *rebon* intensity. The chili still masked the intensity of each taste/flavor in *STs*. Due to the masking effect of chili and other spicy ingredients in the sauce, further studies need to be done to explore the role of *terasi* towards other food matrixes and to what extend the FAAs of *terasi* can be better linked to the taste/flavor of *terasi*.

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ASK A QUESTION. SAFE A LIFE: SUICIDE PREVENTION EFFORTS ON COLLEGE CAMPUS

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ABSTRACT: In the United States, suicide is the second leading cause of death among university students 18-24 year olds. Approximately 1100 college students die by suicide each year but only 20% of students reporting suicidal thoughts receive mental health treatment. Most college students communicate distress to friends or romantic partners rather than mental health professionals. Therefore, many universities across the US implement suicide prevention training as critical part of “safety net” on college campuses. In March 2012, Northwestern University Counseling and Psychological Services (CAPS) implemented the QPR (Question, Persuade, Refer) Suicide Prevention Gatekeeper Training Program followed shortly by a longitudinal, IRB-approved research project to examine the effectiveness of these efforts. 90 minute QPR training teaches suicide warning signs, myths and fact about suicide, how to effectively ask someone if they have suicidal thoughts, persuade them to get help, and refer them to appropriate resources. Over 2700 Northwestern students, faculty, and staff have completed QPR training to date, with more than 325 consenting to participate in the study. Data collected at pre-test, post-test, and 6-month follow-up indicate that overall, participants report being more accurate in their knowledge of suicide facts and warning signs, and more confident, willing, and likely to intervene with potentially suicidal persons after QPR training.

Key words: suicide prevention, gatekeeper training, QPR, college students.

INTRODUCTION

Every 2 hours and 7 minutes a young person (age 15-24) dies by suicide in the United States (McIntosh, 2013). Suicide is a third leading cause of death among 15-24 year olds (after accidental injury and homicide) and second leading cause of death among college students (Center for Disease Control and Prevention, 2010). A recent National College Health Assessment survey found that 11% of college students had seriously considered attempting suicide in the past year and 6% made suicide attempt (Center for Study of Collegiate Mental Health, 2014). Furthermore, 32% of students reported feeling so depressed it was difficult to function in the past 12 months yet only 12% of students had been diagnosed or treated for depression (American College Health Association, 2014). Approximately, 1100 students die by suicide each year and 1 in 10 students make a suicide plan and this number rises each year (Center for Study of Collegiate Mental Health, 2014). Despite these alarming statistics, only 20% of students who have suicidal thoughts seek mental health services even though most universities offer free psychological services for students on university campuses (Center for Study of Collegiate Mental Health, 2014).

The major motivation cited by college students who attempted suicide included depression, relationship trouble, academic failures, hopelessness, family problems, anxiety, financial stress, and social isolation (Westefeld et al., 2005). Other research on college students suggest that men, Asians, lesbian/gay/bisexual/transgender students, international students, veterans, and low socioeconomic status students may be especially at risk based on higher level of emotional distress, lower counseling center utilization pattern, and/or higher suicide completion rates (Eisenberg, Downs, Golberstein, & Zivin, 2009; Mitchell, Greenwood, & Guglielmi, 2007, Soet & Sevig, 2006).

Based on the 2013 survey conducted by National Association of Student Affairs Administration (NASPA) and the Center for Study of Collegiate Mental Health (CCMH) 64% of students who considered suicide told someone in their lives about their suicidal thoughts as opposed to going to seek help from mental health professional. Out of those in 64%, 71% told friend or romantic partner, some told trusted adult, professor or academic adviser. As a result, universities across the US recognize importance of approaching suicide as public health issue and engage community members as partners in suicide prevention building safety net for student at risk.

Suicide Gatekeeper Prevention Training

Gatekeeper training, a widely endorsed approach that has been identified as one of promising suicide prevention strategies (Suicide Prevention Resource Center, 2008) is designed to improve early identification of individuals in

the community who may be at risk of suicide and to facilitate timely referrals to mental health services. Identifying students at risk is one of the 7 pillars of comprehensive suicide prevention model (Jed Foundation, 2014). Others include: restricting access to potentially lethal means, following crisis management procedures, providing mental health services, increase help seeking behaviors, promote social connections, developing life skills.

Question, Persuade, Refer (QPR) is evidence-based gatekeeper training and has been implemented on more than 160 US colleges and universities. The intention is to create a tighter safety net and intervene with students who are at risk; guiding them to get the help they need (Quinnett, 2007). More than 2700 members of Northwestern University (large, private, Midwestern university) have completed QPR training since its inception in March 2012. During 90 minute workshop, participants learn how to recognize warning signs of suicide, how to ask someone if they are having suicidal thoughts, persuade them to get help, and offer them referrals to appropriate resources. The purpose of this study is to determine the immediate and long term effects of participation in QPR training on knowledge, attitudes, and behaviors skills related to suicide prevention.

METHOD

Participants

At Northwestern University, QPR is offered by request and has been integrated into training and/or curricula for multiple student populations. Specific campus community members trained include resident assistants in University Residential Life, first year medical students at the Feinberg School of Medicine, student who belong to Greek life, Campus Ministry, faculty from various departments, peer advisors, athletic staff and peer mentors, international student office staff, dean of students office staff. Overall, more than 2700 students, faculty, staff and administrators completed training.

Since September 2012, an IRB-approved research project has been conducted. All participants were asked to voluntarily take part in the study, which yielded 325 (out of 2700) who took pre-test and post-test, and from this group, 102 completed pre-test, post-test, and 6 month follow-up test. Out of 325 study participants 43% were undergraduate students, 35% were graduate/professional students, 20% were faculty/staff, 1% were other community members. 42% were male, 56% were female, 0.3% identified as transgender and 1% identified as other.

Procedures

The QPR gatekeeper training consisted of 90 minute didactic and experiential learning activities, co-facilitated by Northwestern Counseling and Psychological Services (CAPS) psychologists, psychiatrists, postdoctoral fellows, and/or doctoral psychology interns who all had completed a certification course through the QPR Institute (www.qprinstitute.com). Through lecture, discussion, modeling, and participant role-plays, participants acquired information and experiences related to: national and campus-specific statistics on college student suicide, myths and fact about suicide, suicide risk factors and warning signs, information about campus, local, and national mental health resources, strategies to ask someone about their potential suicidal thoughts, and ways to effectively persuade and refer them to appropriate services.

The research project included pre-and post-test measures of participants' basic knowledge related to suicide prevention, their confidence and willingness to intervene with person(s) who could be considering suicide, perception of their abilities to effectively ask someone about suicide and persuade him/her to get help, and their knowledge of national and Northwestern University referral resources. This information was collected at three intervals: a pre-test taken on-line at the time of registration for the training, an evaluation immediately following the training, and a six month post-test (follow-up questionnaire) sent via email. In all three intervals, participants were asked to respond to questions using Likert scale from 1 indicating "strongly disagree" to 6 indicating "strongly agree" about their knowledge, attitudes, and behaviors related to suicide prevention. Additional items on post-test measure given immediately after QPR training included open-ended questions asking what was most and least helpful about the training, how the training might be improved, and what was the most important thing they learned in training. Additionally, pre-test and six-month post-test measures assessed whether participants had come into contact with persons they thought could be suicidal in the previous six months. If endorsed, subsequent questions assessed whether they intervened with the individual(s), how confident they felt about intervening, their perception of their effectiveness of their interventions, what they believed most contributed to effective interventions, and any

other information, training, or experiences they felt they needed to be more effective in intervening. In summary, at 6 month follow-up, participants were asked whether they implemented what they learned in QPR training and how confident and effective they felt in using the intervention.

RESULTS AND FINDINGS

Preliminary analyses of the data have been completed using paired t-tests comparing participants' knowledge and attitudes about suicide prevention before, immediately after, and six months after QPR training. Descriptive data related to participants' implementation of QPR (i.e., questioning, persuading, and referring suicidal persons) before and after the training have been summarized. Additionally, open-ended responses regarding "the most important thing you learned in this training," "part(s) of the QPR training were 'most helpful' (or 'least helpful') to you," and "how might the training be improved," were also summarized.

The results showed significant short-term and long-term increases in suicide prevention knowledge, attitudes, and behaviors at $p < .05$ level from the pre-test to the post-test and from the pre-test to the 6 month follow-up. Participants were more accurate in their knowledge of suicide facts and warning signs after completing the training (see Figure 1). Additionally, participants reported significant increase in willingness to ask someone if he/she is thinking about suicide (with an average score of 4.63 at pre-test to 5.50 at post-test). The biggest difference appeared in increase in confidence in ability to intervene effectively with someone who may be having suicidal thoughts from mean responses of 3.4 (falling into "slightly disagree") to 5.19 (falling into "moderately agree" responses) (see Figure 2).

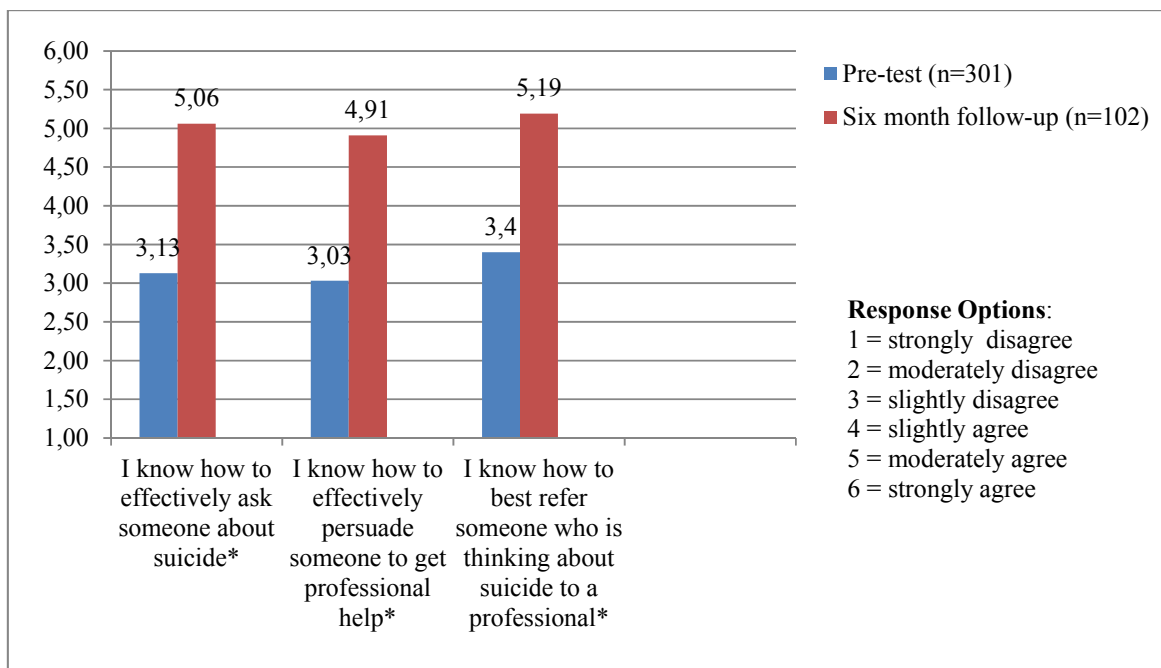


Figure 1. Knowledge About Intervening. Mean Score Before and Six Months After the Workshop * $p < .05$

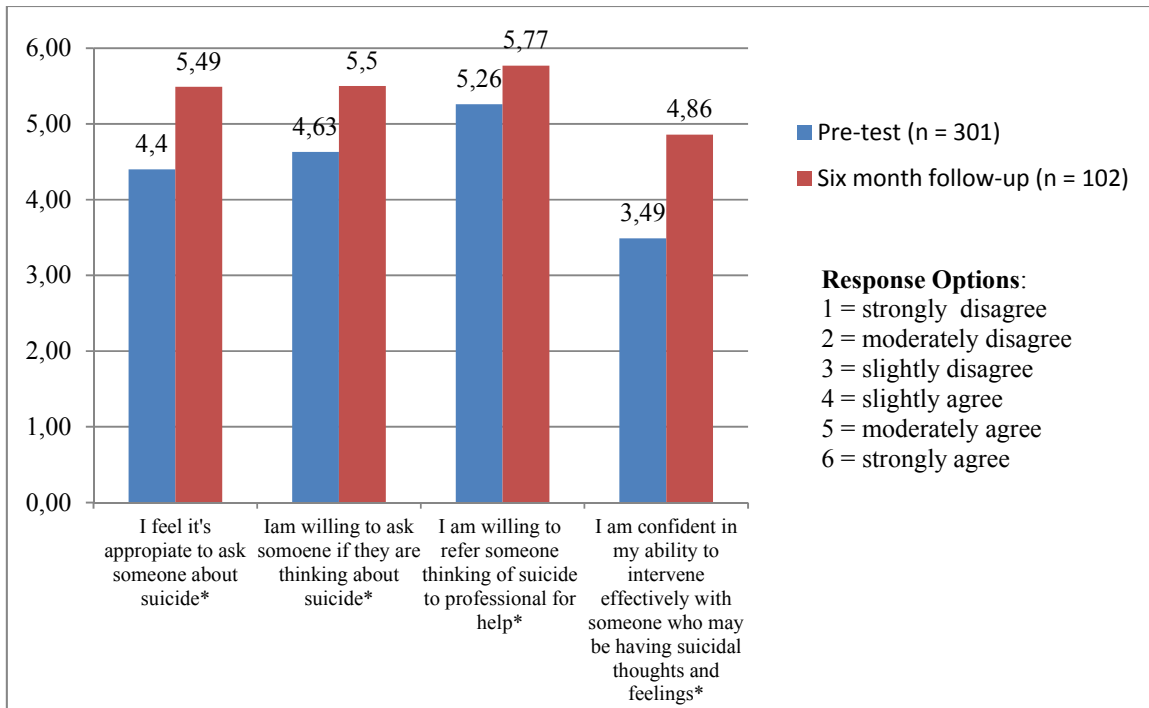


Figure 2. Attitudes About Intervening. Mean Score Before and Six Months After the Workshop *p<0.5

There was no significant difference between pre-and post-test in terms of number of participants indicating that they had come into contact with person(s) they thought might be suicidal (pre-test 35% 'yes', post-test 32% 'yes'). However, participants' behavior had changed, such that they were more likely to intervene with persons who could be contemplating suicide. For example, six months after QPR training, 70% of participants who endorsed coming into contact with person(s) who they thought could be suicidal reported that they directly asked the person(s) if they were thinking about suicide, compared to only 44% of participants at pre-test (see Figure 3). Furthermore, most felt "very" to "extremely" confident in their ability to respond (58%) and most felt "moderately" (46%) vs. "very" (27%) or "extremely" (12%) comfortable talking about suicide.

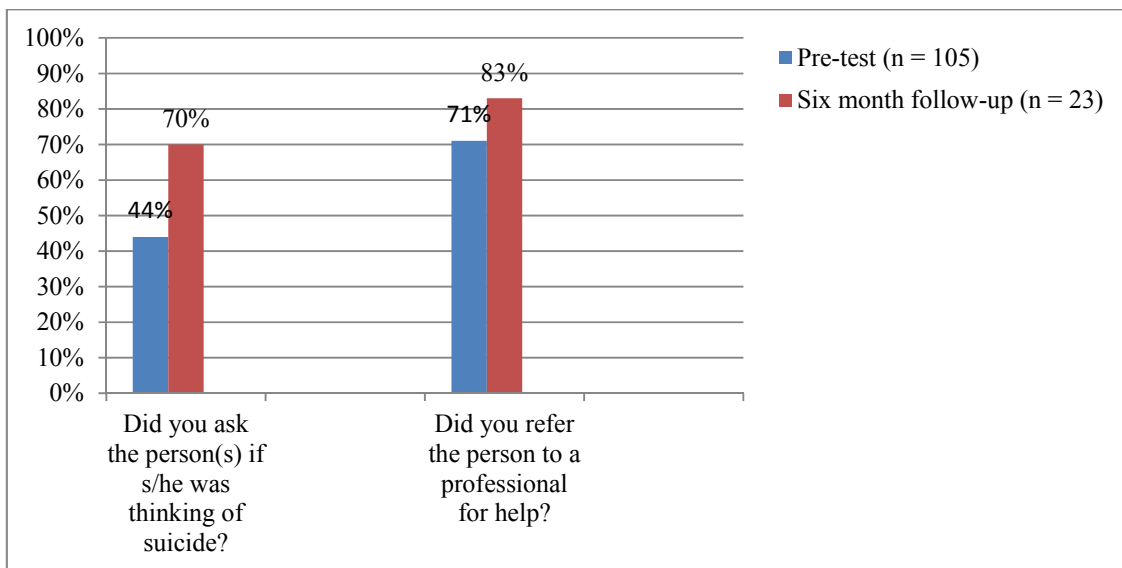


Figure 3. Response to Contact with Someone Who May Have Been Suicidal (Percent of "Yes"). Before and Six Months After the Workshop

The participants further indicated the out of people they come to contact who were suicidal, 48% were Northwestern students, 34% "Others" (usually non-NU friends), 13% NU graduate/professional students and 5% faculty/staff. When asked what contributed most to their effective intervention, they cited ability to listen and express concern, recognition of warning sign and clues for suicide, and knowledge what resources were available to help the person they were in contact with.

Open ended questions from participants immediate after the training revealed their desire for more opportunities to discuss and practice interventions related to suicide prevention. Even though their confidence increased, they still felt that they would like to know more about effectively asking about suicide and effectively persuading others to get help. This desire and lack of comfort in talking about suicide is understandable, as intervening with someone who is suicidal often raises anxiety that continues even with practice. Given this feedback, changes in the training structure are being considered such as modifying the training program to allow for more time for participants to role-play QPR and/or developing a QPR Training Part II to allow for consolidation of learning with continued discussion and practice.

CONCLUSION

QPR suicide prevention gatekeeper training had several positive learning outcomes. Knowledge of the warning signs of suicide, how to ask someone about suicide, persuading someone to get help, how to get help for someone, and local resources to help with suicide increased significantly in the short-term and those gains were maintained over long-term. More importantly, participants put those skills into practice and were able to intervene when met with suicidal person with more willingness to ask the question about suicidal thoughts and more confidence in their abilities to effectively intervene with someone who might be suicidal referring them to professional for help, despite not feeling fully comfortable with talking about suicide.

QPR Suicide Prevention Gatekeeper training is grounded in the belief that suicide prevention is a public health issue and that all members of our community have a role in saving lives to suicide. The primary goal of QPR training is to create community "safety net" for individuals considering suicide. QPR was initiated at Northwestern University to promote a safety net for students, offering guidance to campus community on how to best identify and intervene with students in distress. During the training, however, it is also emphasized that the acquired information and skills can be used with any individual in the participants' lives (e.g., family member, co-worker) and for other issues of concern (e.g., approaching someone who appears to struggle with unhealthy eating behaviors).

RECOMMENDATIONS

Although the results of this study are encouraging, several limitations must be noted. Participants were not asked to identify their ethnicity/race and it would be beneficial to conduct additional analysis with students' diversity characteristics in mind. Only 30% of the participants completed all three administration of test. There is no way to determine if these participants were different from those who chose not to participate. Further statistical analysis needs to be conducted to fully determine effect of QPR training. Replication of the study at colleges that are diverse in size, locale, and student characteristics would also be beneficial. Lastly, faculty and staff were underrepresented in this sample and it is vital that they will be involved in campus suicide prevention efforts because academic difficulties are one of the primary reasons students consider suicide. It may be more effective to incorporate gatekeeper training in orientation of new faculty and staff to raise awareness of students' mental health issues. Having this knowledge, they will be more equipped to notice warning signs of emotional distress and reach out to students to get them the help they need and save their lives.

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INNOVATION IN ASSESSMENT AND FEEDBACK: ENHANCING THE STUDENT EXPERIENCE

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ABSTRACT: This study utilised TESTA (Transforming the experience of students through assessment) to examine assessment and feedback processes and practices within nursing and midwifery under graduate programmes of study at Edinburgh Napier University (UK). TESTA is a tried and tested process that uses validated tools and has been widely accepted by Higher Education Institutes worldwide. Three triangulated methodologies are used to gather data related to current assessment and feedback practice through an audit and the student voice is heard by means of a questionnaire and focus groups. The results of our TESTA approach demonstrated that students experienced mainly summative assessments and a wide range of assessment type yet failed to see the value of some forms of assessment. The findings also demonstrated that students were unclear about goals and standards expected of them and were dissatisfied with the quality and quantity of feedback they received. The study initiated a dialogue amongst staff and served as a catalyst for appropriate changes in assessment and feedback practice within the current programmes. Groups of staff worked on specific priorities within the data and the outcomes of this informed the design and development of a new curriculum.

Key Words: assessment, feedback, student experience, enhancement, innovation

INTRODUCTION

Assessment is central to student learning and known to be a powerful driver in determining what approach students will take to their study (Ball, Bew & Boxham et al, 2012), what they will do and how (Beaumont, O'Doherty & Shannon, 2011). Modules have become the building blocks of curricula and tend to be regarded as isolated units to be completed in turn, making it difficult for students to see the programme as a whole. The adoption of a great programme focus to assessment has been suggested as a possible way forward (Gibbs & Dunbar-Goddet 2009; McDowell, 2012). Projects such as the PASS (Programme Assessment Strategies) project sought to focus assessment on programme level outcomes and aim for a more coherent design of assessment across different parts of a programme (Hartley & Whitfield, 2011).

Feedback is also a known concern with Higher Education (Beaumont, O'Doherty & Shannon 2011) receiving persistently low satisfaction scores in the National Student Survey (UK) despite increasing efforts by lecturers to respond to this. The modular system has brought with it an increase in summative assessments and feedback is often received post submission and accompanied by a mark. Students tend to associate this with the completed module particularly if it is focused on content and difficult to translate to future study.

Improving approaches to assessment and feedback is clearly a priority within Higher Education and a recent publication by the Higher Education Academy (UK) calls for a "radical reshaping" of assessment (Ball et al 2012, page 9). Within the School of Nursing, Midwifery and Social Care at Edinburgh Napier University a project was undertaken to uncover what students were seeking in terms of assessment and feedback, and evaluate the assessment and feedback strategies within the Under Graduate programmes. To enable this, the TESTA (Transforming the Expedience of Students Through Assessment) methodology, developed at the University of Winchester, was employed as a pilot study to gauge practice across the programmes within the School of Nursing, Midwifery and Social Care.

METHODS

Three under graduate nursing and midwifery programmes were included: Bachelor of Nursing, Bachelor of Midwifery & Bachelor (Hons) of Veterinary Nursing. The TESTA methodology is based on three triangulated

research methods including an audit of number, type, variety and timing of assessments. Quantity of feedback and proportion of exams is also calculated. The second method involves an Assessment Experience validated Questionnaire (AEQ) which uses a Likert scale and statements that relate to quality and distribution of effort, coverage of the syllabus, quality and quantity of feedback, use of feedback, appropriate of assessment, clear goals and standards, approach to assessment (deep and surface) and learning from exams, opportunities for assessment and feedback within clinical practice. 476 second and third year students participated. The third method used focus group interviews (n=7, sample = 36 students). A semi-structured interview guide with open-ended questions was used to allow for consistency of core questions (Jessop, El-Hakim & Gibbs, 2011). Focus groups with the students explored themes such as variety of assessment, understanding goals and standards and quality and quality of feedback. The discussions were recorded using digital equipment and professionally transcribed (Jessop, El-Hakim & Gibbs, 2011).

The project was subjected to ethical scrutiny by the Universities Ethics and Governance Committee

Analysis

Data from the programme audit and the AEQ were analysed using the Statistical Package for Social Sciences v 20. The researchers conducted descriptive tests including means, ranges and standard deviations for each variable, both split by programme and for the full data-set. Percentages were also calculated.

Appropriate statistical test were used to examine the relationships between different scales and the relationships between audit information (number of formative assessments, number of summative assessments, and variety of assessments) and AEQ.

Analysis was guided by Braun & Clerk's stages of thematic analysis (2006). An iterative approach was taken in which data and categories were systematically reviewed until the most commonly cited concepts were identified, and a logical and a clear pattern emerged. Categories and themes were validated by a second researcher.

Results and Findings

Demographic data

Age and gender

93% of participants were female. 43.1% were aged of 22-30 years, 28.4% were aged 17-21 and 31% were 31 years or older.

Audit results

TESTA defines formative assessment as assessment that is not marked but where feedback is given and is required by all students. Students experienced up to 28 mainly summative assessments over the 3 year programme which included a range of up to 17 different types of assessment. Nursing and midwifery students are also assessed in practice and the numbers of competencies varied across the programmes and field of practice. (See Table1).

Table 1 Assessment Practice

Programme	Assessment within University						Assessment in Practice	
	Number of Assessments			Variety of Assessments	Exam %	Academic writing %	Competencies to be achieved	Written tasks
Total	Summative	Formative						
BN Nursing (4 different fields of practice- FoP)								
Mean number of assessments	25	25	0	13	17%	56%	800	56
Range of number of assessments across FoP	20-28	19-28	0-1	11-16	11-35	52-64	513-997	15-153
Vet Nursing Programme	33	33	0	15	24%	60%	N/A	N/A
Midwifery Programme	23	23	0	11	35%	52%	1415	0
TESTA 8 Universities								
Mean	43	N/A	N/A	13	15%	N/A	N/A	N/A
Range	32-63			7-17	0-79%			

The audit results demonstrated that students are over assessed, that assessments are mainly summative and that the quantity of written feedback varied significantly (between 20 and 503 words per assignment). This in turn raised questions around the quality and appropriateness of feedback on the basis that feedback should be a meaningful and helpful tool for students.

Questionnaire data is displayed in table 2

Table 2 Quantitative Data Gathered Through EAQ

Questions related to	Percentages
Quantity of effort	79.8% students reported that it was necessary to work consistently hard to meet the assessment requirements
Clarity of goals and standards	50.5% reported that it was easy to know the standard of work expected.
Quantity & quality of feedback received	54% students agreed/strongly agreed that they received sufficient feedback on their work 46.8% students agreed/strongly agreed that they understood feedback on their work 55.1% students agreed/strongly agreed that feedback on their work was timely
Use of feedback students	The majority of students (84.7%) used the feedback they received to go

received	back over what they had done in their work
Appropriateness of assessment	62% students reported that staff seemed to be more interested in testing what they had understood than what they memorised
Coverage of syllabus	58.8% students reported they had to study the entire syllabus to do well in assessment
Learning from the examinations	84.5% students learnt new things while preparing for the exams
Taking a deep approach to learning	87.5% students reported that they usually set out to understand thoroughly the meaning of what they were asked to read
Taking a surface approach to learning	44.5% students often found they had to study things without having a chance to really understand them
Opportunities to demonstrate the competence in clinical placement	45.5% reported that they has sufficient opportunities to demonstrate the required competencies
Quality of feedback within clinical practice	32.8% students reported that they received sufficient feedback on their work in clinical placement
Overall course satisfaction	78.9% felt satisfied with the quality of the course

The questionnaire data provided valuable insight into student's views and perceptions about assessment and feedback, including clarity of goals and standards, whether they use the feedback they receive, and perceived quantity of effort required to succeed in their assessments. The data also demonstrated that the clearer that students are in terms of the goals and standards expected of them, the more likely that are to engage in deep learning the more productively they used their feedback and the more satisfied they were with their programme of study.

The focus group themes and subthemes were as follows:

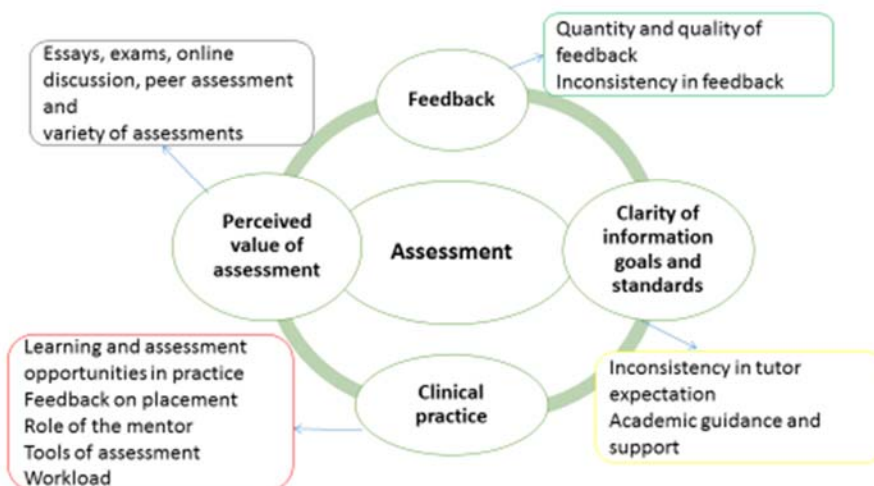


Diagram 1 Focus Groups Themes

The findings showed that students often struggled to understand what value specific types of assessment had in preparing them for professional practice

“I don’t know if the essays really prepare you to be a nurse” Student

Students indicated that they were dissatisfied with the quality and quality of feedback they received and found that it could be contradictory and therefore confusing in terms of what is expected of them.

“I got 40 per cent and my feedback was minimal. And I’m thinking how can my mark be so low without a decent amount of feedback?” Student

“you’re kind of like pulled and pushed. .. you’re getting told one thing from like the module leader and then you go to the academic supervisor and they say no, no,” Student

The students also emphasised the importance of feedback within clinical practice, the key role that the mentor played in this, and anxiety arising from opportunities to demonstrate clinical competence.

“They’re (mentors) are just trying to get their job done and sometimes forget that you want to have a learning opportunity” Student

“When I get feedback from my mentor. It kind of builds your confidence” Student

DISCUSSION

The purpose of this research approach was to have a deeper understanding of the *actual* approach to and detail of assessment and feedback currently in the 3 curricula explored, and to gain an insight into the student experience in relation to assessment and feedback. Together the research data uncovered some key elements of the pedagogical design and student experience in relation to this.

It was evident from the data that use of summative assessment was excessive – as identified in Table 1. The audit clearly identified a lack of formative assessment which is known to be a key to deeper learning and to enhance understanding of goals and standards expected (Gibbs & Dunbar-Goddet 2009). This lack of clarity was evident within the data (See student quote).

An over focus on a modular as opposed to a programme student experience was also evident in the data gathered. A consequence of this was that each module was seen in isolation and feedback received at the end of a module considered to be too late to be of value and irrelevant to subsequent modules. A finding shared by others (Jessop, El-Hakim & Gibbs 2014a).

Furthermore, the significant variation in volume of feedback from a student perspective was seen to be disappointing, potentially confusing and difficult to synthesise. (See student quote).

The collective data generated from the student survey and the focus groups, identified key areas for change. These included ensuring quality and quantity of feedback, clarifying expectations of learners and demonstrating the authenticity and purpose of assessment tasks within the learning process.

The data gathered initiated and facilitated a dialogue amongst academic staff with a view to working collaboratively to make significant and appropriate changes to the assessment strategies. The aim was to facilitate learning from the assessment process and to encourage an approach to feedback that enabled a deeper understanding and effective learning process. In addition, the data provided a level of detail, particularly from students, with regards to manage their expectations in an academic environment.

One of the key advantages to this study, not identified in the TESTA process, was the opportunity taken to gather additional information about assessment from a clinical practice perspective. Within all the programmes reviewed, students spend a significant percentage of their time outwith the university in clinical practice, supported by mentors and with a requirement to be assessed in practice. Within our study, specific data was gathered in relation to this element of the student experience and again demonstrated a significant variation in expectations, learning opportunities and feedback within clinical practice.

CONCLUSIONS

Using the TESTA methodology uncovered vital information and insights about assessment and feedback practice, started a dialogue amongst staff (Jessop, El-Hakim & Gibbs, 2014 b), and has served as a catalyst for change within the School of Nursing, Midwifery and Social Care at Edinburgh Napier University. Changes in practice are underway within module and programme teams to reduce the number of summative assessments, increase formative assignments and overall programme focus of assessment and work towards greater consistency in feedback for students. Groups of staff and students are working on priorities for change including, clarity of goals and standards, authenticity and communicating value of assessment and quality and quality of feedback. This work will be evaluated and learning used to inform the development of a new curriculum.

RECOMMENDATIONS

- Universities' should work towards a greater programme focus for assessment and feedback.
- Strategies should be put in place to increase consistency in practice in terms of marking, guidance and feedback on students work.
- Assessment type should be stream lined to enable students to build on their learning and assessment skills, and more formative assessment introduced.
- Feedback should be intensified in year one and lessened in subsequent years to facilitate increasingly independent and autonomous learning.

The process, challenges and outcomes of this project will be shared during the conference presentation

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A NEW TECHNIQUE FOR SHORT TERM SOLAR RADIATION PREDICTION

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ABSTRACT: Solar radiation data are significant for energy planning issues. There are a lot of studies in the literature about solar radiation prediction. Among them in this study first, hourly based forecasting models are reviewed. Then an alternative approach and model is proposed. In this approach it is assumed that the data repeats itself. From this initial assumption a new model is proposed. The model evaluates the history of the data and tries to find longest solar radiation array in past. The data observed after this longest array in history is chosen as the prediction. To test the prediction performance of proposed model the data recorded at Afyon Kocatepe University are employed. The results are presented and discussed.

Key words: solar radiation, prediction, forecasting, data, historical

INTRODUCTION

Planning has great importance in renewable energy systems as in many other engineering fields. Sizing to find the optimal values, calculations for minimum expenses are the process which is related with well-planning for a renewable energy system. During the planning of solar energy systems, solar radiation data is used as an important parameter. Using further data increase the accuracy of the planning. In this case, modeling and prediction plays a critical role in solar related engineering studies. However, since the data have random behavior, it is difficult to apply statistical approaches with apriori and deterministic parameters. On the other hand, solar radiation data have an important feature; extreme transitions from a solar radiation state to a far different one are rare. Therefore, behavioral modeling is possible (Hocaoğlu, Fidan, & Gerek, 2009). Although several studies focus on global parametrization of solar radiation data behavior, the literature in time-wise modeling and prediction is relatively small. In this study, a novel approach for solar radiation data modeling using the Mycielski algorithm is demonstrated. The algorithm predicts the time variations of solar radiation data in the sense of forecasting future values of radiation data by analyzing the repeatedness in the history of the data.

An accurate estimation of the energy production in solar energy systems involves the accurate prediction of solar radiation, depending on different atmospheric variables (Salcedo-Sanz, Casanova-Mateo, Pastor-Sánchez, & Sánchez-Girón, 2014) (Inman, Pedro, & Coimbra, 2013) (Khatib, Mohamed, & Sopian, 2012) (Sözen, Arcaklioğlu, & Özalp, 2004).

There are many studies about forecasting renewable energy data in the literature (Ouammi, Zejli, Dagdougui, & Benchrifa, 2012) (Pourmousavi Kani & Ardehali, 2011) (Gan, Ding, Huang, & Dong, 2012). Shamshad et al. have generated hourly wind speed data using first and second order Markov chains and compared the first and second order Markov chains using wind speed data measured from two different regions in Malaysia. In their study, it was concluded that the wind speed behavior slightly improves by increasing the Markov model order (SHAMSHAD, BAWADI, WANHUSSIN, MAJID, & SANUSI, 2005). Munoz et al. present a study describes a multiplicative ARMA models to generate instantaneous series of global irradiation. With high connection densities of PV system in the low voltage (LV) network, this might cause to degrade electric power quality. Their short term forecasting method is developed to predict 5 minutes later to control the electricity system (Moreno-Munoz, de la Rosa, Posadillo, & Pallares, 2008). Hammer et al. create a short term solar radiation forecasting method with the motion of the cloud structures from satellite images. They make a mathematical model cloud motion with formulas. Their study has fine accuracy. However this method predicts only 30 minutes up to 2 hours accurately (Hammer, Heinemann, Lorenz, & Lückehe, 1999).

the world, especially in those with more solar potential, such as mid-east and southern Europe countries (Kalogirou, 2014). Turkey has a good potential in terms of location in the world. In this study, Afyonkarahisar region is selected in terms of well solar potential and having a renewable energy laboratory which records global solar radiation data in Afyon Kocatepe University. Two-year long solar radiation data is used totally. First part of the total data, which is equal %75 of the whole, is used as a training data in the working algorithm and it is the history for the system. However, the second part of the data (%25) is tried to predict by the historical based prediction algorithm to compare the predicted values with the real radiation data.

Hourly recorded global solar radiation data of Afyonkarahisar region is illustrated in Figure 1 for two years. According to the nature of the forecasting algorithm, data in use must be integer. Otherwise, many values could be existed in the history and finding a match with them could be impossible. Therefore, as a first step solar radiation data is converted to integer states between “1” and “105”. These values are determined by the range of values in the sequence for solar radiation. Moreover, “0” values in the sequence are extracted from the data for accurate prediction. The history part and the second part which is separated from data for comparing with predicted part are shown in Figure 2.

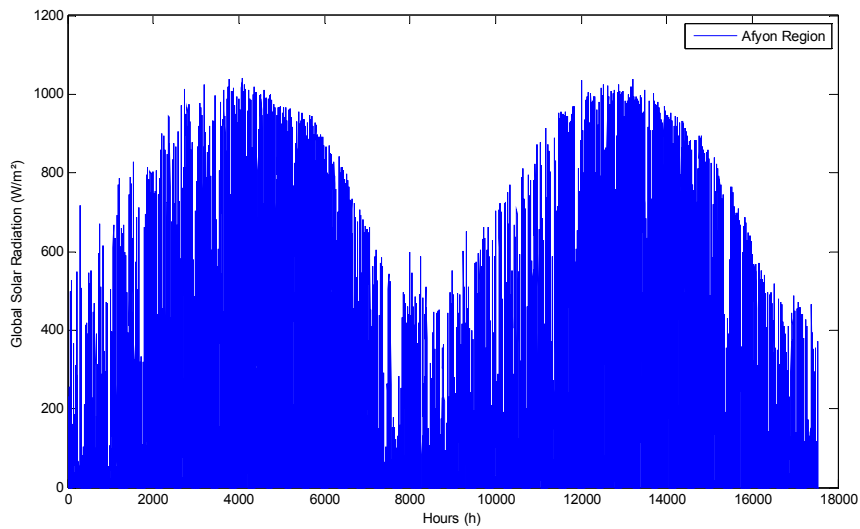
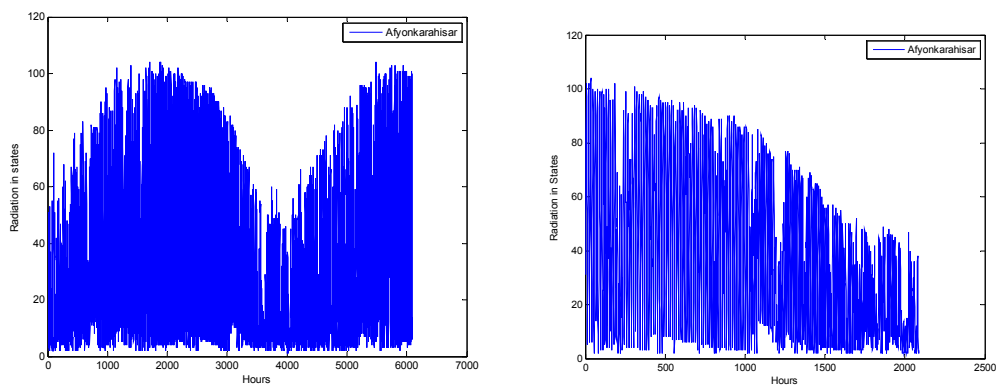


Figure 1. Two-Year Global Solar Radiation For Afyonkarahisar



a)

b)

Figure 2. a) First Part (History) Of The Data B) Second Part Of The Data Which Is Predicted

RESULTS AND FINDINGS

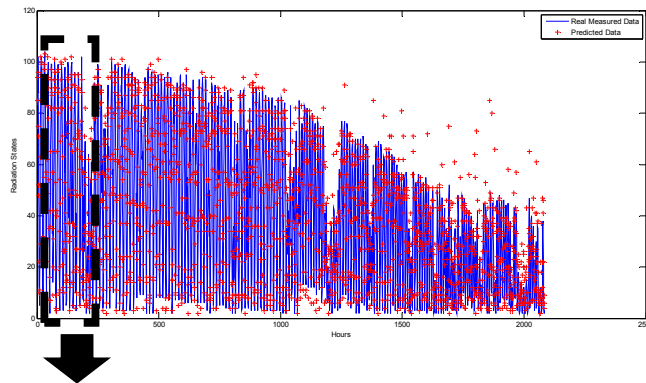
Hourly solar radiation data is predicted by the short term forecasting Mycielski algorithm. Data statistics are shown in Table 1. Range for the values in the prediction data and the actual data are shown in Table 2 for the comparison. In addition to this, in Figure 3 comparison between the measured and the predicted data is illustrated.

Table 1. Statistics For Actual And Predicted Data

Variables	Predicted	Actual
Minimum	2	2
Maximum	103	104
Mean	41,47	40,58
Standard Deviation	27,03	28,42

Table 2. Histogram Values For Actual And Predicted Data

State Intervals	Predicted	Actual
1-12	383	463
12-22	275	257
22-32	238	229
32-42	256	222
42-52	221	222
52-62	189	178
62-72	161	154
72-82	175	147
82-93	122	143
93-105	64	69



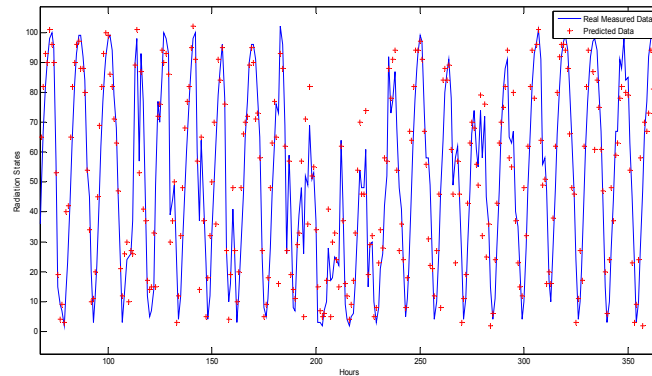


Figure 3. Comparing The Measured And Predicted Radiation Data

CONCLUSION

In this paper, a new short term solar radiation data forecasting algorithm is developed and initial results are presented. The general behavior of solar radiation data for Afyonkarahisar region shows that in winter, summer or autumn time, there is a similarity but not obviously seen. In the last part of the predicted data, a little difference could be seen comparing to other parts. However, the reason for the difference of the last part in the predicted results, is using only two-year solar radiation. It could be better if data in use as history is further. In view of the fact that, in this study, there is only one similar behavior for the prediction in the past and it is the previous half year. Meanwhile this algorithm is ready to develop with many years to forecast accurately for further studies.

RECOMMENDATIONS

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DETERMINING THE HETEROGENEITY OF STAKEHOLDERS PREFERENCES TOWARDS DESIRABLE KEY COMPETENCES OF JOB APPLICANTS: A CONJOINT ANALYSES APPROACH

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ABSTRACT: The competition in the labor market is severe, especially in times of economic crisis when a lot of candidates seeking for appropriate job position. The main question for applicants is how to obtain the position that suits them, or which abilities and skills they need to possess in order to best respond to the specific needs and requirements of HR managers. On the other hand, HR managers are looking for a good staff that will be loyal to the company. In this chain of "needs", teachers play a crucial role by listening to market demands and involving them in curricula developments. So the question is: what are the key competencies of candidates which all stakeholders (HR managers, teachers or students) consider as important. We propose conjoint analysis as an appropriate tool to determine the preferences of all stakeholders. Conjoint analysis is a multivariate technique that can be used to understand how an individual's preferences are developed. In particular, our approach accounts for different importance HR managers, teachers and students attach to various aspects of key competencies. The results show that most of HR managers consider the candidate's work experience as the most important. That means, the candidates should be highly specialized in the subject area or they should have the master degree. It is interesting that the students share the same opinions, while teachers believe that creativity and possess problem solving skills are more important. Understanding which competences of candidates are the most important for employers, allows teachers to make a right focus in designing a curricula, and also candidates to be focused on the development of specific skills and abilities.

Key words: key competences, job applicant, preferences, heterogeneity, conjoint analysis.

INTRODUCTION

Employees are the key to success of any company. Therefore, it is the personnel decisions that have most long lasting impact on work and business of companies. Those companies that are better equipped to select and retain quality employees will achieve competitive market advantage, thanks to that. Better quality should be reflected both in the manner of conducting of recruitment and selection, and in the end result that is reflected in the choice of quality employees, successful in their future work and loyal to the company.

Recruitment covers a series of technical procedures conducted with the aim of testing the working ability, personality, motivation and other competencies of a candidate for a certain job. Based on what is required of him/her, and what are the skills and abilities that would be desirable for each candidate, he/she will make an effort to meet the needs of his/her employer. On the other hands, with the job market becoming more competitive, it is imperative that teachers prepare students optimally to meet industry expectations. This begins with the interview process, where students seek to differentiate themselves from other candidates and recruiters gather information about applicants in order to make judgments about future work performance (Morgeston & Campion, 1997; Savage, 2009). Teachers help students in the job searching process by reviewing resumes, conducting mock interviews, and providing realistic guidance about industry expectations.

However, the question is whether and to what extent the perception of key competencies differs among HR managers, teachers and students. To what extent do recruiters weigh interview preparedness in evaluating candidates? Do other factors, such as GPA, work experience, or personality carry more weight? What differences exist between faculty and student opinions?

Several studies suggest that there are indeed differences of opinion distinguishing students, faculty, and industry representatives as to which traits are most important or valued. For example, Hall and Berardino (2006) found that

students view professional attire as being much less important than teachers members do (not a surprising result). In their comparison of accounting students, recruiters, and teachers, Baker and McGregor (2000) found that employers and teachers consider integrity paramount in terms of a job candidate's potential, yet students rate it as substantially less important. They also found that only faculty members believe that overall grade point average is important.

The aim of this study is manifold. Firstly, to determine which of the competencies of candidates who apply for a business manager job at graduation, are specially valued. Then, which competence the HR managers consider desirable, which are valued by teachers who "create" these candidates, and which are valued by students as potential job candidates. For this purpose, we used conjoint analysis.

Conjoint analysis is an experimental approach used for measuring customer preferences regarding the attributes of a product or service. Originally developed in the field of mathematical psychology, conjoint analysis has attracted considerable attention, especially in marketing research, as a method that portrays consumer decisions. However, few studies have used the conjoint analysis within the labor market. Using conjoint analysis Baker and McGregor (2000) determined the relative importance of seven criteria on hiring accountants and, at the same time, scrutinized whether these values differ among different groups of individuals. Biesma et al., 2007 applied conjoint analysis to estimate preferences of employers for key competencies during the transition from initial education to the labor market.

This paper is organized as follows. In Chapter 2, the problem of selection of candidates based on their skills and competences is presented. Chapter 3 describes Conjoint Analysis, a way of determining the significance of all criteria and selecting the most important ones. It also explains the empirical study, with the subject of selection of candidates for employment. A survey was conducted as a part of the study, analysis of the results was conducted, and the segmentation of the respondents on the basis of preferences and segmentation of pre-defined segments is given. In the last section, concluding remarks are given.

KEY COMPETENCES OF JOB CANDIDATES

In the conditions of unemployment and high pressure to rationalize production, as a result of increased competition causing an increase in labor productivity, it is crucial to hire the best people for the company. In other words, technological and organizational changes lead to an increased need for staff equipped with higher and better skills (Borghans, Green, & Mayhew, 2001; Elias, & McKnight 2001; Green, Ashton & Felstead, 2001; Stasz, 2001) which is primarily achieved through education and training (Borghans et al., 2001).

For an organization to respond to the demands of the modern age, it is necessary to perform quality and efficient recruitment, selecting the right people for the job, and efficiently using human resources, motivating employees, eliminating the leaves, introducing fair remuneration and promotion systems, and making decisions based on current information. Expert recruitment and orientation of employees enables assigning the employees on the basis of their skills, attitudes and work motivation.

Although there is no direct and linear relationship between the recruitment of personnel and organizational efficiency and performance, it is reasonable to assume that improved personnel selection will result in better performance (Kurtz & Bartram, 2002). In addition to potential benefits directly related to a good recruitment, there are lower costs of poor selection of candidates, as well as the risk of rejection of good candidates who can be hired by competitors (Robertson, Bartram & Callinan, 2002).

The question is what are the capabilities and skills and competencies, which a candidate should possess so he could be chosen. In addition, there is other potential problem also, that candidate's wishes and potentials sometimes are not aligned with demands of those who do the hiring.

In response to this question, numerous studies have been conducted. In terms of qualities and skills a candidate should possess, many authors distinguish between two types of competencies: field-specific and generic competencies. Generic competencies can be defined as the combination of learning, analytical and problem-solving abilities, applicable in various domains (Heijke, Meng & Ris, 2003). Several studies investigated the role of key competencies for the labor market (Borghans et al., 2001; Stasz, 2001; Heijke et al., 2003).

According to Ruetzler et al. (2010) there are seven criteria to evaluate a candidate: academic grade point average (GPA), interpersonal skills, interview preparedness, the ability to work with others, alignment with organizational culture, and work experience.

GPA. Since a student's primary "job" is to study academic materials, a student's GPA is often seen as the equivalent of an employer's performance evaluation. The use of the GPA as a selection variable is controversial; however, when a job candidate has limited work experience, the GPA provides an apparently objective criterion to which recruiters can turn in screening applicants and establishing a candidate's potential (Kuncel, Hezlett, & Ones, 2004). Although some studies suggest that overall GPA is not considered to be an important selection criterion (Baker & McGregor, 2000; Guo, Adams, & Price, 2009; McKinney, Carlson, Mecham, D'Angelo, & Connerley, 2003), there is support elsewhere for the proposition that GPA is used as a selection tool and may well be important when identifying a set of candidates to be interviewed (Roth & Bobko, 2000).

Interpersonal Skills, which include listening as well as oral and written communication abilities, are widely identified across the literature as important competencies. Interpersonal skills—sometimes referred to generically as communication skills—have been ranked among the five most important skills for entry-level managers by hospitality industry leaders (Fjelstul, 2007; Kay & Russette, 2000; Mayo & Thomas-Haysbert, 2005; Tesone & Ricci, 2005).

Interview Preparedness. Little research exists that directly examines the preparedness of a candidate for an interview or the impact of such preparation on job offers. A recent study addresses the effects of preparation for interviews that involves faculty members conducting mock interviews so that candidates can "rehearse" performing in the interview setting, concluding that mock interviews lead to increased confidence and enhanced interviewing skills (Hansen, Oliphant, Oliphant, & Hansen, 2009).

Ability to Work with Others. Having the ability to work with others involves being able to work as a team member as opposed to behaving as an individual who prefers to work alone or does not like to help others. Being team-oriented is a highly valued trait in the most industries. Tesone and Ricci (2005) found that the ability to work as part of a team was the number one skill identified by industry practitioners. In Fjelstul's (2007) research, teamwork ranked as the second most important skill. Baker and Harris (2000) discovered that students who specialize in technology or information systems felt that the ability to work with others was one of the two most important traits in the eyes of recruiters.

Alignment with an organization's culture and mission occurs when a candidate's values and beliefs are consistent with those espoused in the organization's internal literature, such as its mission statement. An employee's "emotional commitment" and sense of identity with a company lead to greater employee and firm performance (Hemp, 2002). A meta-analysis conducted by Kristof-Brown, Zimmerman, and Johnson (2005) found that person-organization fit, the compatibility between a person and an organization, correlated significantly with the intent to hire and with actual job offers.

CONJOINT ANALYSIS: MODELING OF CONSUMER PREFERENCES

Conjoint analysis is a multivariate technique used specifically to understand how respondents develop preferences for products or services. It is based on the simple premise that consumers evaluate the value of a product or service by combining the separate amounts of value provided by each attribute (Hair et al., 1998).

A conjoint analysis study includes the following key steps:

Attribute list formulation.

The first phase of the conjoint analysis dealt with the analysis of attributes. Having chosen the attributes, the levels must be assigned to them. Levels should be realistic, plausible and should span the range over which respondents are expected to have preferences for the good being valued.

Efficient experimental design construction.

Once attributes and their respective levels have been selected, the product profiles should be created. The profile represented various combinations of the attribute levels. A full replication of seven attributes, each having three levels would have necessitated the creation of 2187 profiles (3x3x3x3x3x3x3). We cannot consider this number of profiles as being a reasonable task that an interviewee can complete. That's why analysts often use fractional factorial design. Thus, fractional factorial designs, which assume no interactions between attributes and ensure the absence of multicollinearity, are used to reduce the number of profiles. In this reduction process, the goodness of the reduced designs is especially important (Kuzmanović, 2008).

Data collection.

Respondents are asked to express the trade-offs they are willing to make among product features by rating, sorting or choosing among hypothetical product concepts.

Utility calculation.

The simplest and most commonly used conjoint model assumes that the overall utility derived from any combination of attributes of a given good or service is obtained from the sum of the separate part-worths of the attributes (Kuzmanović et al., 2013). Thus, respondent i 's predicted conjoint utility for profile j can be specified as follows:

$$U_{ij} = \sum_{k=1}^K \sum_{l=1}^{L_k} \beta_{ikl} x_{jkl} + \varepsilon_{ij}, \quad i = 1, \dots, I, \quad j = 1, \dots, J \quad (1)$$

where: I is the number of respondents; J is the number of profiles; K is the number of attributes; L_k is the number of levels of attribute k ; β_{ikl} is respondent i 's utility with respect to level l of attribute k ; x_{jkl} is such a (0,1) variable that it equals 1 if profile j has attribute k at level l , otherwise it equals 0; ε_{ij} is a stochastic error term.

The parameters β_{ikl} (part-worth utilities), can be used to establish a number of things. Firstly, the value of these coefficients indicates the amount of any effect that an attribute has on overall utility – the larger the coefficient, the greater the impact. Secondly, part-worths can be used to calculate the relative importance of each of K attributes, which is known as an importance score or value. These values are calculated by taking the utility range for each attribute separately, and then dividing it by the sum of the utility ranges for all of the factors:

$$FI_{ik} = \frac{\max_l \{\beta_{ikl}\} - \min_l \{\beta_{ikl}\}}{\sum_{k=1}^K (\max_l \{\beta_{ikl}\} - \min_l \{\beta_{ikl}\})}, \quad i = 1, \dots, I, \quad k = 1, \dots, K, \quad l = 1, \dots, L_k \quad (2)$$

The calculations are done separately for each respondent, and the results are then averaged to include all of the respondents.

Market segmentation.

Given that part worth utilities are calculated at the individual level, if preference heterogeneity is present, the researcher can find it. Respondents who place similar value to the various attribute levels will be grouped together into a segment.

Market simulation.

The utility values (U_{ij}) are used to predict how buyers will choose among competing products and how their choices are expected to change as product features and/or price are varied. Market simulations make it possible to find out all hidden effects that could have influence on products' market share. The simplest simulation specifies several competitive products in terms of their attribute levels, and then predicts which of those products each respondent would prefer. Such results may be used to estimate market share for hypothetical new or modified products, as well as their potential revenue and likely profitability.

EMPIRICAL STUDY

The main objective of this study was to identify the key competencies of job candidates, but also to determine a most preferred candidate. On the other hand, the objective is also to determine whether there is difference in the preferences of HR managers, teachers and students, as well as to perform segmentation based on preferences of participants in the study.

The conjoint survey was fielded in Belgrade, Serbia, in May 2011. In total, 118 individuals completed the questionnaire. After the elimination of incomplete surveys and ineligible participants, 111 eligible surveys were collected.

Study design

The first stage in the design of a conjoint analysis study is the selection of the attributes. We have defined ten key attributes based on literature review (Biesma et al., 2007; Ruetzler et al., 2010), and opinions and views of HR managers (within conducted pilot study). Having chosen the attributes, levels must be assign to them. The attributes and levels assigned to them are shown in Table 1.

Table 1. Attributes And Their Levels

Attribute	Level 1	Level 2	Level 3
Education	Bachelor	Master, general	Master, specialized
Work Experience	None	Internship	Employment
Foreign languages	One language	More languages	/
Computer skills	Basic	Advanced	/
Communication skills	Fair	Good	/
Problem solving skills and creativity	Fair	Good	/
Team working skills	Team worker	Individualist	/
Organizational skills	Average	Good	/
Proactivity	Highly	Insufficient	/
Interview preparedness	Insufficient	Full	/

The first attribute "Education" refers to the fact that candidate entering the selection process must have at least the Bachelor degree. In addition to Bachelor degree, the candidate may have a "general" master degree, or may be specialized in a specific field. The attribute "work experience" is chosen because employers often emphasize its importance during the pilot research. In this study we distinguish work experience in terms of employment or internship. The internship most often refers to the three-month period of work during studies. The assumption is that all candidates are fluent in at least one foreign language (usually English language). Therefore, we define two levels for this attribute. The first level corresponds to excellent reading, writing and good conversation of one foreign language, while the second level assumes the same for more than one languages. Candidate's preparedness for the interview indicates his willingness and desire for a given position. This attribute refers not only to how the candidate is informed about the company but also his attitude, manners and outfit. Therefore, we define two levels of this attribute: full and insufficient prepared. All other attributes are described using two levels, where one of them refers to the fair level while the other refers to a higher level of a certain skill.

Although many previous studies stressed the GPA as an important factor, the results of the pilot research we conducted indicate that this attribute is of negligible importance for the position of business manager. Therefore, we excluded it from this study.

The attributes and levels in Table 1 gave rise to 2304 possible profiles ($3^2 \times 2^8$). In this study a component of the statistical package SPSS 16.0 (Orthoplan) was used to reduce this number of profiles to a manageable level. Thus the 2304 possible profiles were reduced to 16. Two control profiles (holdout tasks) were added to the given design. Control profiles were not used by the conjoint procedure for estimating the utilities. Instead, the conjoint procedure calculates correlations between the observed and predicted rank orders for these profiles, as a check of the validity of the utilities. The 18 hypothetical profiles considered are shown in Table 2.

In order to elicit the preferences for the various profiles a rating approach was utilized. The respondents expressed their preferences for a particular candidate on a scale of 1 to 9, where 1 stands for absolutely undesirable, and 9 stands for absolutely desirable. The survey was conducted using the traditional "paper and pencil" method.

Table 2. Generated List Of Profiles

ID	Education	Work Experience	Foreign languages	Computer skills	Commun. Skills	Problem solving and creativity	Team working skills	Organiz. Skills	Proactivity	Interview prepare.
1	Master G	None	One	Advanced	Good	Fair	teamwork	Good	insufficient	insufficient
2	Bachelor	None	More	Basic	Fair	Fair	individualist	Good	insufficient	full
3	Bachelor	Internship	More	Advanced	Good	Good	individualist	Average	insufficient	insufficient
4	Bachelor	employment	One	Advanced	Good	Good	teamwork	Good	Highly	full
5	Master S	Internship	More	Basic	Good	Fair	teamwork	Good	Highly	insufficient
6	Bachelor	employment	More	Advanced	Fair	Fair	teamwork	Average	insufficient	insufficient

7	Master G	employment	More	Basic	Fair	Good	individualist	Good	Highly	insufficient
8	Bachelor	None	More	Basic	Good	Good	teamwork	Good	insufficient	full
9	Master S	employment	One	Basic	Good	Fair	individualist	Average	insufficient	full
10	Bachelor	None	One	Basic	Good	Good	individualist	Average	Highly	insufficient
11	Master G	Internship	One	Basic	Fair	Good	teamwork	Average	insufficient	full
12	Bachelor	None	One	Basic	Fair	Fair	teamwork	Average	Highly	insufficient
13	Master G	None	More	Advanced	Good	Fair	individualist	Average	Highly	full
14	Master S	None	One	Advanced	Fair	Good	individualist	Good	insufficient	insufficient
15	Master S	None	More	Advanced	Fair	Good	teamwork	Average	Highly	full
16	Bachelor	Internship	One	Advanced	Fair	Fair	individualist	Good	Highly	full
17*	Bachelor	Internship	One	Advanced	Fair	Fair	teamwork	Average	insufficient	full
18*	Master S	Internship	One	Advanced	Fair	Good	teamwork	Good	insufficient	full

* holdout profiles

ANALYSIS AND RESULTS

In the total sample, there were 31 (27.9%) HR managers, 16 teachers (14.4%), and 64 students (57.7%). Table 3 provides detailed demographic data for segments of HR managers, teachers and students, respectively.

Table 3. Demographic Characteristics Of The Segment Of HR Managers, Teachers And Students

Characteristics	Description	(%)		
		HR managers	Teachers	Students
Gender	Male	45.2	56.3	54.7
	Female	54.8	43.7	45.3
Working experience	Less than five	54.8	43.7	
	From six to ten	32.3	25.0	
	More than ten	12.9	31.3	
The year of study	III			42.2
	IV			40.6
	Senior undergraduate			10.9
	Master			6.3

Results at the aggregate level (Averaged preferences)

Results from the analysis are shown in Table 4 and Figure 1. Table 4 presents the (averaged) part-worth of each level of the attributes, while Figure 1 is the graph description of the attributes importance.

Table 4. Averaged Part-Worth Utilities

Attribute	Attribute level	Part-worth utilities	Std. Error
Education	Bachelor	-0.272	0.121
	Master, general	-0.108	0.141
	Master, specialized	0.380	0.141
Work Experience	None	-0.452	0.121
	Internship	0.202	0.141
	Work	0.250	0.141
Foreign languages	One language	-0.062	0.090
	More languages	0.062	0.090
Computer skills	Basic	-0.257	0.090
	Advanced	0.257	0.090
Communication skills	Fair	-0.145	0.090
	Good	0.145	0.090
Problem solving skills and creativity	Fair	-0.261	0.090
	Good	0.261	0.090
Team working skills	Team work orientation	0.185	0.090
	Individual work orientation	-0.185	0.090
Organizational skills	Average	-0.051	0.090
	Good	0.051	0.090
Proactivity	Yes	0.417	0.090

	Insufficient	-0.417	0.090
Interview preparedness	Insufficient	-0.369	0.090
	Yes	0.369	0.090
Constant	6.010	0.095	
Correlations between observed and estimated preferences			
Pearson's R	0.983	Significance = 0.000	
Kendall's tau	0.946	Significance = 0.000	
Kendall's tau for 2 Holdouts	1.000		

As Table 4 shows, attributes are characterized by high levels of sensitivity. A high level of attribute sensitivity indicates that result of changes in the level of a given attribute to the overall usefulness of a candidate is great. The specific situation applies to attribute "Education", where it can be concluded there is high sensitivity of preferences between the level of "Specialized Master" and "Master General", while the sensitivity between levels of "Master General" and "Bachelor" is significantly lower.

The constant whose value is 6.010 (Table 4) represents a stochastic error obtained through regression analysis, and it is used to calculate the total utility of each profile. A high value of the Pearson coefficient, 0.983, confirms the high level of significance of the obtained results. Similarly, a high value of the Kendall correlation coefficient, 0.946, indicates a high level of correlation between the observed and estimated preferences. The Kendall coefficient for two holdout profiles has a value of 1.000, which is an additional indicator of the high quality of the obtained data.

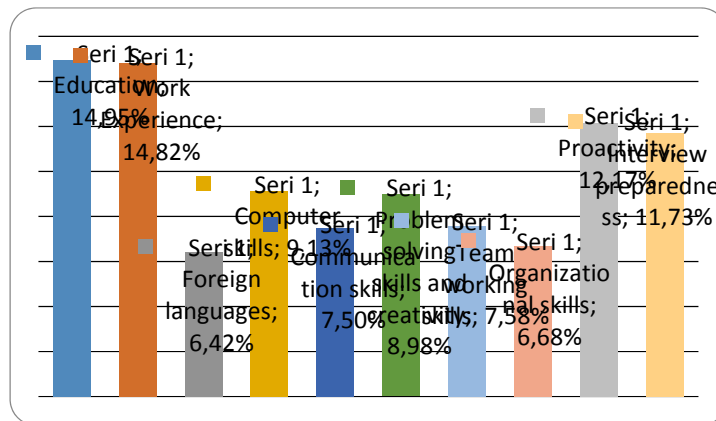


Figure 1. Averaged Attributes Importance Value

As Figure 1 shows, the most important attribute at the sample level is "Education", which average importance at the aggregate level is 14.95%. Somewhat lower importance at the aggregate level is attributed to "Work Experience" (14.82%). Attributes with a relatively greater importance are also "Proactivity" (12.17%) and "Interview preparedness" (11.73%). The least important attributes at the aggregate level are "Organizational skills" and "Foreign Language", whose importance have values of 6.68% and 6.42%, respectively (Figure 1).

Characteristics that describe the "best" candidate are: Specialized Master degree in education, has work experience, speaks two or more foreign languages, has advanced computer skills, has strong communication skills, he/she is very creative and skilled in problem solving, oriented to teamwork, possess good organizational skills, he/she is proactive and well prepared for the interview.

Preferences for pre-defined segments

In order to determine whether there are differences in preferences of certain groups of subjects, analysis was performed for each segments predefined. A priori segmentation was based on three groups of subjects who participated in the study: HR managers, teachers and students. In Figure 2 are given relative importance of attributes in total, for each of the previously defined segments.

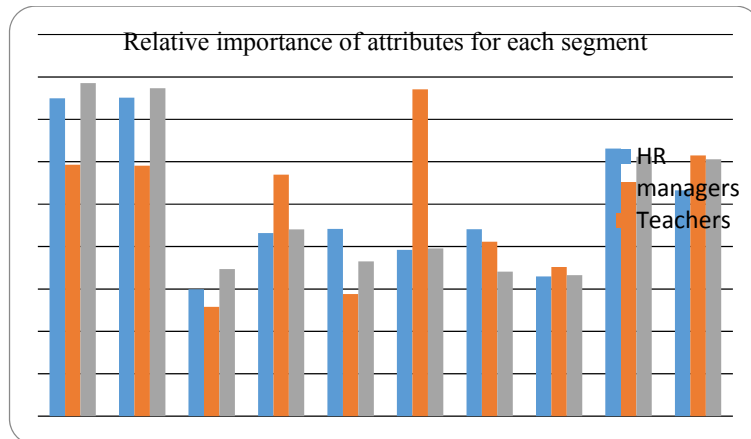


Figure 2. Relative Importance Of Attributes For Each Predefined Segments

In Table 5 are given part-worth utilities of attributes' levels for each of the previously defined segments.

Tabela 5. Summary Results For The Preferences Of HR Managers, Teachers And Students

Attribute	Attributes' levels	HR managers	Teachers	Students
		Part-worth utilities		
Education	Bachelor	-0.164	-0.193	-0.344
	Master, general	-0.188	-0.076	-0.078
	Master, specialized	0.352	0.268	0.422
Work Experience	None	-0.427	-0.370	-0.484
	Internship	0.109	0.115	0.270
	Work	0.319	0.255	0.215
Foreign languages	One language	-0.087	-0.074	-0.047
	More languages	0.087	0.074	0.047
Computer skills	Basic	-0.236	-0.402	-0.230
	Advanced	0.236	0.402	0.230
Communication skills	Fair	-0.236	-0.191	-0.090
	Good	0.236	0.191	0.090
Problem solving skills and creativity	Fair	-0.240	-0.504	-0.211
	Good	0.240	0.504	0.211
Team working skills	Team work orientation	0.236	0.293	0.133
	Individual work orientation	-0.236	-0.293	-0.133
Organizational skills	Average	-0.067	-0.207	-0.004
	Good	0.067	0.207	0.004
Proactivity	Yes	0.409	0.410	0.422
	Insufficient	-0.409	-0.410	-0.422
Interview preparedness	Insufficient	-0.296	-0.426	-0.391
	Yes	0.296	0.426	0.391
		Constant = 5.771	Constant = 5.855	Constant = 6.164
Significance = 0.000		Pearson's R = 0.983	Pearson's R = 0.983	Pearson's R = 0.983
Significance = 0.000		Kendall's tau = 0.899	Kendall's tau = 0.895	Kendall's tau = 0.946

As in the previous case, high values of statistical indicators (Pearson's and Kendall's coefficient) indicate the high importance and reliability of results (Table 5). Kendall coefficient for holdout profiles has a value of 1.000.

Segment made by HR managers. Research has shown that HR managers consider the work experience (work) and education (Master specialized only) as most important attributes, while foreign language and organizational skills are of least importance. They stressed they more often pick proactive candidates due to lack of time for the training of hired workers. Because of the shorter training, selected candidates must be skilled, resourceful and capable to quickly incorporate into the new work environment. It is interesting that teachers and students attribute more importance to good preparation for the interview than those who perform such an interviews.

Segment made by teachers. This segment is very different from the segment made of HR managers and segment made of students. Teachers highly favor problem-solving skills and creativity of the applicants, where knowledge of several foreign languages is least important to them also. After completing the questionnaire some of the teachers have declared that none of provided descriptions of candidates was ideal. They prefer candidates who have advanced computer skills, as opposed to decision-makers, and students, who believe that if a candidate has a basic knowledge of computer technology, he/she can easily improve him/herself, especially if it is required at a certain job position. Regardless of their job, or the transfer of knowledge in the discipline they specialized, teachers also emphasize that practical work can allow developing new skills and improving knowledge.

The segment made by students. It may be noted that importance of attributes and preferences of the respondents according to their levels in this segment have similar values as a segment that consists of decision makers. Students are well aware of decision-makers preferences, so they most often adjust to these. For the attribute of great importance to them - work experience, internship and work are equally important. For them, it is a single word - "experience", and they do not see a major difference between these levels. Some students have negative attitude towards teamwork, because of bad experiences when working in a team were they were being restrained and suppressed. They prefer to work independently and value hierarchy in the organization, which is interesting. For them, too, knowing several languages reflects the general culture: "A man is worth as much as many different languages he speaks."

Preference-based segmentation

Using the preferences of each individual subjects obtained by research, a post hoc segmentation was conducted, where preferences were used as the criterion of segmentation. K-means cluster analysis is used, from the SPSS 16.0. Three segments were defined, and relative importance of attributes for each of them are given in Figure 3.

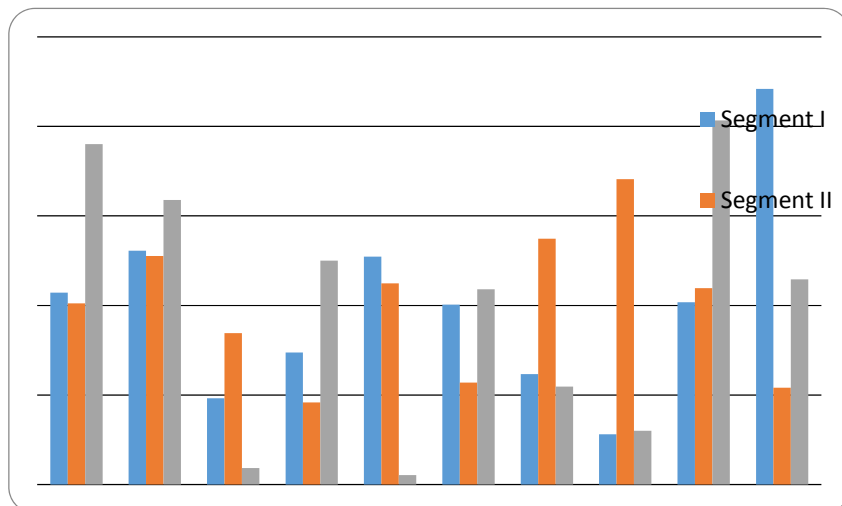


Figure 3. Relative Importance Of Attributes For Each Segment

The first segment covers almost a quarter (22.5%) of total respondents, and consists of those respondents who consider that most important thing for candidate is to be well prepared for the interview. According to them, this last step before employment can often cancel all the previous steps performed well, by the fault of a candidate him/herself. Respondents pointed out work experience of candidates (much preferring the work itself), and good communication skills. The cause of this is that respondents in this segment are mainly employed in service and retail sectors, while students belonging to this segment emphasized they would like to work in some of these sectors. Therefore, candidates who wish to be employed in the service or retail sector must make a good impression at the interview first.

The second segment is the smallest one (15.32%), and consists of respondents who value coordination and management of both resources and people as most important skills of candidates. In addition to organizational skills, highly valued are following skills: orientation towards teamwork and communication skills. Respondents in this segment, as in the first, pointed out work experience of candidates as well, however, unlike the first segment, much preferring the internship. Preferences of respondents in this segment may result to the fact that all students who belong to this segment are from the Faculty of Organizational Sciences, while a majority of employees have declared

that, based on past experience, prefer candidates who have graduated at the Faculty of Organizational Sciences. It is also interesting that respondents in this segment have more than 10 years of experience and they are mainly young people, of positive spirit and energy.

The largest segment, with as many as 62.16% of respondents, is the third segment. For the respondents belonging to this segment it is essential that candidates applying for the job be proactive and show readiness to independently take the initiative to perform a task. Negligible importance is shown by the attributes of foreign language and communication skills. It is interesting also that they prefer moderate or average communication and organizational skills, rather than pronounced. This group of respondents consists of students at third and fourth year of the study, who generally have a desire to work in the banking sector, whereas undergraduates at final year prefer the service sector. Specialized master degree is also very important, according to respondents of this group. They consider that overall average during studies is the most important thing for the employment, especially the higher degree and specialization.

CONCLUSIONS

The job candidates often ask themselves a questions like: "How would I able to get a proper job for myself?" "How do I find the right job for me?" or "What are the skills and competencies that I need to gain in order to fulfill specific requirements and needs of HR managers?". The similar questions are put in front of an almost all companies which are in searching for quality stuff. As a response to those questions, this paper introduces the conjoint analysis as an appropriate tool to determine HR managers, teachers or students' preferences towards the key competencies. Based on the results, the study suggests a strategy for HR managers as well as for teachers and students.

The most important attribute is "Education" at the sample level. It was expected since the preliminary ranking list of job candidates is usually formed based on this attribute. Based on the results of our study, "Education" doesn't have absolute predominant and it is followed by "Work experience". The companies often search candidates with work experience which assumes shorter time of training. Work experience is considered as attribute that gives clear picture of what a candidates want or do not want to do. In addition, the internship is considered as an excellent way to make a connection between acquired knowledge on studies and practical knowledge.

Post hoc segmentation, based on the stakeholders' preferences, showed substantial differences between the segments. Three different segments were identified, and we concluded that HR managers have the same preferences and opinions as students. Common characteristic for all three segments of stakeholders is that they mostly prefer work experience (internship and work). The reasons for this are numerous. Not only did the working experience contribute to expanding and gaining a better starting position of candidates, compared to others, but it means a great deal for candidates themselves, in choosing the job.

Since the goal of the research was to show the applicability of conjoint analysis to determine the stakeholders' preferences toward key competencies. The findings obtained and presented above confirm that our task is successfully accomplished. Using conjoint analysis may be able to reduces the time and costs of recruitment. On the other hand, job candidates should be focus on specific skills, abilities and knowledge needed to do the job.

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MHD FLOW OVER A PERMEABLE STRETCHING/SHRINKING SHEET OF A NANOFLUID IN POROUS MEDIUM WITH SUCTION/INJECTION

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ABSTRACT: We analyzed the effect of thermal radiation and chemical reaction on two dimensional steady magnetohydrodynamic flow of a nanofluid past a permeable stretching/shrinking sheet in a porous medium with suction/injection. We considered nanofluid volume fraction on the boundary is submissive controlled. Which makes the present study is entirely different from earlier studies and physically more veristic. Equations governing the flow are solved numerically. Effects of non dimensional parameters on velocity, temperature, concentration, coefficient of skin friction and local Nusselt number are thoroughly investigated for stretching and shrinking cases separately and presented through graphs and tables. Comparisons with the existed results are presented.

Key Words: MHD, nanofluid, stretching/shrinking, suction/injection, radiation.

INTRODUCTION

The development of nanotechnology is going to bring an unimaginable and multi dimensional changes in our way of life, in the coming years. Recently many researchers focused on this topic due to it prominent importance in engineering and its allied areas. The revolution of nanofluids started with Choi (1995) at ANL laboratory. Nanofluids are suspended particles of fluid. They have a nanometer sized particles and they have a less uniform dispersion in the rigid particles. Nano fluids are crucial applications in science and technology, marine engineering, industrial application such plastic, polymer industries, cancer homeotherapy and building sciences. Flows through moving vertical flat plate also having enormous applications in the aerosols engineering, aerodynamics and civil engineering because of this reason researchers likely to this field. The importance of heat, mass and momentum transfer over a stretching surface was explained by Atlatn et al. (1979). Laminar boundary layer flow of a nanofluid in the presence of flat surface was considered by Khan and Pop (2010). Free convection flow of a nanofluid over a vertical plate was discussed by Chamka and Aly (2010). Prasad et al. (2010) considered viscoelastic fluid over a stretching sheet and analyzed the momentum and heat transfer characteristics of electrically conducting fluid. Bachok et al. (2010) investigated the Nanofluid through a steady boundary layer flow of a semi-infinite uniform free stream. In this paper they are concluded that the plate and free stream are in opposite line. Mixed convective nanofluid flow of a vertical horizontal plate with a porous medium was discussed Ahmad and Pop (2011).

Enhanced characteristics of Nanofluid in a saturated porous medium with vertical plate in the presence of surface heat, solute and nanoparticle fluxes are considered by Khan and Aziz (2011). In this study they explained the enhanced characteristics of nanofluid along with power law of the surface fluxes. MHD convective flow of nanofluid through a linearly stretching layer illustrated by Hamad (2011). Sugunamma and Sandeep (2011) analyzed unsteady MHD raditive fluid flow in porous medium with constant heat flux. They used homotopy analysis method to solve the boundary layer approximations. Heat and mass transfer for stagnation point flow over a stretching sheet in a porous medium by considering heat source was studied by Hamad and Ferdows (2012). Sandeep et al. (2012) analyzed the effect of radiation and chemical reaction on transient MHD free convective flow over a vertical plate through porous media. The researchers Swati Mukhopadhyay (2013), Chandra Mandal, Swati Mukhopadhyay (2013), and Ramesh et al. (2014) explored their research on stretching sheet and they analyzed the heat transfer characteristics of a nanofluid. Radiation effect on MHD viscous fluid over exponentially stretching sheet with porous medium was analyzed by Ahmad et.al (2014). Stagnation point flow on shrinking sheet by considering suction effect was discussed by Rohni et al. (2014). Malvandi et al. (2014) considered slip effect for stagnation point flow and concluded that slip parameter enhances the heat transfer rate. The mixed convection flow with dual solutions over

exponentially stretching/shrinking sheet was analyzed by Subhashini et al. (2014). Ramana Reddy et al. (2014) discussed radiation and chemical reaction effects on unsteady dusty viscous flow with heat generation/absorption.

To the authors' knowledge no studies have been reported on two dimensional steady magnetohydrodynamic flow of a nanofluid past a permeable stretching/shrinking sheet in porous medium with suction/injection effects along with viscous dissipation. Here we considered nanofluid volume fraction on the boundary is submissive controlled rather than active controlled. Which makes the present study is entirely different from the past studies and it is physically more veristic. The governing partial differential equations are reduced in to ordinary differential equations by similarity transformation and then solved numerically by using bvp4c with MATLAB package. Effects of thermal radiation parameter, chemical reaction parameter, magneticfield parameter, Brownian motion parameter, thermophoresis parameter, viscous dissipation parameter and porosity parameter on velocity, temperature, concentration, skin friction and local Nusselt number are thoroughly investigated for stretching/shrinking, suction/injection cases separately and presented through graphs and tables. Comparisons with existed results are presented.

MATHEMATICAL FORMULATION

Consider a steady, incompressible, two dimensional MHD flow of a nanofluid past a permeable stretching/shrinking sheet in porous medium coinciding with the plane $y = 0$ and the flow is assumed to be confined to $y > 0$. The flow is along the x -axis where x is the coordinate measured along the stretching/shrinking sheet and y -axis is normal to the surface. A transverse magneticfield B_0 is applied in the y -direction and the stretching/shrinking sheet velocity is assumed as $u_w(x) = cx$, where $c > 0$ is a constant. The uniform temperature near the sheet assumed as T_w and the temperature, concentration far away from sheet assumed as T_∞, C_∞ respectively. The equations that governs the present flow with above assumptions subject to the Boussinesq approximations can be expressed as

$$\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = 0 \tag{1}$$

$$u \frac{\partial u}{\partial x} + v \frac{\partial u}{\partial y} = \nu \frac{\partial^2 u}{\partial y^2} - \frac{\sigma B_0^2}{\rho_f} u - \frac{\nu}{k'} u \tag{2}$$

$$u \frac{\partial T}{\partial x} + v \frac{\partial T}{\partial y} = \alpha \frac{\partial^2 T}{\partial y^2} - \frac{1}{(\rho c_p)_{eff}} \frac{\partial q_r}{\partial y} + \tau \left[D_B \frac{\partial C}{\partial y} \frac{\partial T}{\partial y} + \frac{D_T}{T_\infty} \left(\frac{\partial T}{\partial y} \right)^2 \right] + \frac{\nu}{c_p} \left(\frac{\partial u}{\partial y} \right)^2 \tag{3}$$

$$u \frac{\partial C}{\partial x} + v \frac{\partial C}{\partial y} = D_B \frac{\partial^2 C}{\partial y^2} + \frac{D_T}{T_\infty} \frac{\partial^2 T}{\partial y^2} - k_1 (C - C_\infty) \tag{4}$$

The boundary conditions of equations (1) to (4) are

$$u = \lambda U_w, v = v_w, T = T_w, D_B C' + (D_B / T_\infty) T' = 0 \text{ at } y = 0 \tag{5}$$

$$u \rightarrow 0, T \rightarrow T_\infty, C \rightarrow C_\infty \text{ as } y \rightarrow \infty$$

In equation (5) prime denotes differentiation with respect to y , where u and v are the velocity components in the x and y directions respectively, T is the temperature, C is the nanoparticles volume fraction, v_w is the suction or injection velocity with $v_w < 0$ for suction and $v_w > 0$ for injection, $\tau = (\rho c)_p / (\rho c)_f$, where $(\rho c)_p$ is the effective heat capacity of the nanoparticles, $(\rho c)_f$ is the heat capacity of the base fluid, $\alpha = k / (\rho c)_f$ is the thermal diffusivity of the fluid, ν is the kinematic viscosity, D_B is the Brownian diffusion coefficient, D_T is the thermophoretic diffusion coefficient, ρ_f is fluid density, σ is electrical conductivity, k' is the permeability of porous medium, k_1 is the chemical reaction parameter and λ is the stretching/shrinking parameter with $\lambda > 0$ for a stretching surface and $\lambda < 0$ for a shrinking surface.

By using Roseland approximation, the radiative heat flux q_r is given by

$$q_r = - \frac{4\sigma^*}{3k^*} \frac{\partial T^4}{\partial y} \tag{6}$$

where σ^* is the Steffen Boltzmann constant and k^* is the mean absorption coefficient. Considering the temperature differences within the flow sufficiently small such that T^4 may be expressed as the linear function of temperature. Then expanding T^4 in Taylor series about T_∞ and neglecting higher-order terms takes the form

$$T^4 \cong 4T_\infty^3 T - 3T_\infty^4 \tag{7}$$

In view of equations (6) & (7), equation (3) reduces to

$$u \frac{\partial T}{\partial x} + v \frac{\partial T}{\partial y} = \alpha \frac{\partial^2 T}{\partial y^2} + \tau \left[D_B \frac{\partial C}{\partial y} \frac{\partial T}{\partial y} + \frac{D_T}{T_\infty} \left(\frac{\partial T}{\partial y} \right)^2 \right] + \frac{1}{(\rho c_p)_{eff}} \frac{16T_\infty^3 \sigma^*}{3k^*} \frac{\partial^2 T}{\partial y^2} \tag{8}$$

By introducing the following similarity transforms

$$\psi = c^{1/2} \nu^{1/2} f(\eta), \eta = c^{1/2} \nu^{-1/2} y$$

$$\theta(\eta) = (T - T_\infty) / (T_w - T_\infty), \phi(\eta) = (C - C_\infty) / C_\infty \tag{9}$$

Where the stream function ψ is defined as $u = \partial \psi / \partial y$ and $v = -\partial \psi / \partial x$ which identically satisfies equation (1). Further $f(\eta)$, $\theta(\eta)$ and $\phi(\eta)$ are dimensionless stream, temperature and concentration functions respectively. Substituting equation (9) in to (2)-(4), we obtain

$$f''' + ff'' - f'^2 - (M + K)f' = 0 \tag{11}$$

$$(1+R)\theta'' + Nb\theta'\phi' + Nt\theta'^2 + Pr f\theta' + Ec f'' = 0 \tag{12}$$

$$\phi'' + (Nt/Nb)\theta'' + Le(f\phi' - K_1\phi) = 0 \tag{13}$$

The boundary conditions (5) reduce to

$$f(0) = f_w, f'(0) = \lambda, \theta(0) = 1, Nb\phi(0) + Nt\theta'(0) = 0 \tag{14}$$

$$f'(\eta) \rightarrow 0, \theta(\eta) \rightarrow 0, \phi(\eta) \rightarrow 0 \text{ as } \eta \rightarrow \infty$$

Here prime denotes differentiation with respect to η , where $Pr = \nu/\alpha$ the Prandtl number and $Le = \nu/D_B$ is the Lewis number, Nb is the Brownian motion parameter, Nt the Thermophoresis parameter, M is the magneticfield parameter, K is the porosity parameter, K_1 is the chemical reaction parameter, Ec is viscous dissipation parameter and f_w is the suction/injection parameter with $f_w > 0$ for suction, $f_w < 0$ for injection, which are defined as

$$f_w = v_w (cv)^{-1/2}, Nt = \tau D_T (T_w - T_\infty) / \alpha T_\infty, Nb = \tau D_B C_\infty / \alpha$$

$$R = \frac{16T_\infty^3 \sigma^*}{(\rho c_p)_{nf} 3\alpha k^*}, M = \frac{\sigma B_0^2}{c \rho_f}, K = \frac{\nu}{k'c}, K_1 = \frac{k_1 C_\infty \nu}{D_B} \tag{15}$$

The Coefficient of skin friction C_{fx} and local Nusselt Number Nu_x are given by

$$C_{fx} = \frac{x\mu_f}{\rho u_w^2} \left(\frac{\partial u}{\partial y} \right)_{y=0}, Nu_x = -\frac{x}{(T_w - T_\infty)} \left(\frac{\partial T}{\partial y} \right)_{y=0} \tag{16}$$

Using (9) and (16), we have

$$Re_x^{1/2} C_{fx} = f''(0), Re_x^{-1/2} Nu_x = -\theta'(0) \tag{17}$$

Where $Re_x = u_w x / \nu$ is the local Reynolds number.

RESULTS AND DISCUSSION

The system of nonlinear ordinary differential equations (11) to (13) with the boundary conditions (14) are solved numerically using bvp4c with MATLAB package. The results obtained shows the influences of the non dimensional governing parameters, namely thermal radiation parameter R , chemical reaction parameter K_1 , magneticfield parameter M , Brownian motion parameter Nb , viscous dissipation parameter Ec and thermophoresis parameter Nt on velocity, temperature, concentration, skin friction and local Nusselt numbers are thoroughly investigated for stretching and shrinking cases separately and presented through graphs and tables. For numerical results we considered $Pr = 6.2, Nb = Nt = K = 0.5, Le = R = M = 1, K_1 = 0.2, Ec = 0.1$.

In entire study these values kept as common except the varied values as displayed in figures.

Figures 1 and 2 depicts the effect of magneticfield parameter on velocity, temperature and concentration profiles for stretching and shrinking cases respectively. It is evident from figures that increase in magneticfield parameter decreases the velocity profiles and increases the temperature and concentration profiles of the fluid in stretching case. But we observed opposite results in shrinking case. Generally increase in magneticfield generates the opposite force to the flow, called Lorentz force. We observed that the Lorentz force helps to enhance the flow in shrinking case. The reason for increase in the temperature and concentration profiles in stretching case is the increase in magneticfield reduces the temperature and concentration boundary layer thicknesses. Figures 3 and 4 illustrate the influence of viscous dissipation parameter on velocity, temperature and concentration profiles. It is clear from figures that increase in viscous dissipation parameter enhances the temperature and concentration profiles over stretching surface. But in shrinking surface we have seen hike in temperature profiles and fall in concentration profile due to increase in Eckert number. Viscous dissipation parameter does not shown significant variation in velocity profiles in both cases. This may happen due to the fact that increase in dissipation parameter improves the thermal conductivity, which causes to reduce the thermal boundary layer thickness. The similar type of results observed from figures 5 and 6 for radiation parameter. These results occur due to the domination of Rosseland radiation.

Figures 7 and 8 displays the effect of Brownian motion parameter on velocity, temperature and concentration profiles for stretching and shrinking cases. It is clear from figures that increase in Brownian motion parameter enhances the temperature profiles and depreciates the concentration profiles for both cases. The reason behind this is different nano particles have different values of Brownian motion parameter which leads to enhance the heat transfer rate. The effects of thermophoresis parameter on velocity, temperature and concentration profiles for stretching and shrinking cases are presented in figures 9 and 10. It is observed that increases in thermophoresis parameter develops the temperature and concentration profiles of the flow and it does not shown any influence on the velocity profiles of the flow. It is due to the fact that enhancement in thermophoresis parameter increases the thermal and concentration boundary layer thickness. The effect of chemical reaction parameter on velocity, temperature and concentration profiles for stretching and shrinking cases are illustrated in figures 11 and 12. It is evident from figures that increases in chemical reaction parameter enhances the temperature profiles and depreciates the concentration profiles of the flow. This agrees the physical fact that chemical reaction parameter have tendency to reduce the concentration boundary layer thickness. We observed significant variation in temperature profiles due to increase in chemical reaction parameter in stretching case compared with shrinking case. It may happen due to the fact that chemical reaction helps to enhance the mass transfer and reduces the solutal boundary layer thickness. Figure 13 shows the influence of suction/injection parameter on velocity, temperature and concentration profiles for stretching sheet. It is clear that an increase in suction/injection parameter depreciates the velocity, temperature and concentration profiles. Initially we noticed hike in concentration profiles near the boundary afterwards it followed the temperature profiles.

Table 1 displays the comparisons of the present results with existed results. Table 2 shows the variation in skin friction coefficient and Nusselt number for different values of non dimensional governing parameters for stretching case. From the table at the given range of values we have seen fall in heat transfer rate by increase in magneticfield parameter, viscous dissipation parameter, Radiation parameter, Brownian motion parameter, Thermophoresis parameter and chemical reaction parameter. But increase in suction parameter helps to enhance the heat transfer rate and reduces the skin friction coefficient. Increase in magneticfield parameter also reduces the friction factor but viscous dissipation parameter, Radiation parameter, Brownian motion parameter, Thermophoresis parameter and chemical reaction parameter does not shown any influence on friction factor.

Table 1 Comparison of the values of $-\theta'(0)$ with published data when $M = R = K_1 = Nt = Nb = Ec = 0$ and $\lambda = 1$

Pr	0.72	1	3	7	10
Chen [28]	0.46315	0.58199	1.16523	1.89537	2.30796
Zaimi et al. [8]	0.463145	0.581977	1.165246	1.895403	2.308004
Present Study	0.463146	0.581979	1.165249	1.895406	2.308008

Table 2 Variation in $f''(0)$ and $-\theta'(0)$ for different values of non dimensional governing parameters.

M	Ec	R	Nb	Nt	K_1	f_w	$f''(0)$	$-\theta'(0)$
1	0.1	1	0.5	0.5	0.2	1	-2.158694	3.186929
2	0.1	1	0.5	0.5	0.2	1	-2.436572	3.164139
3	0.1	1	0.5	0.5	0.2	1	-2.679470	3.144700
1	0.0	1	0.5	0.5	0.2	1	-2.158694	3.231835
1	0.4	1	0.5	0.5	0.2	1	-2.158693	3.037465
1	0.8	1	0.5	0.5	0.2	1	-2.158693	2.843011
1	0.1	0.0	0.5	0.5	0.2	1	-2.158694	5.872773
1	0.1	0.5	0.5	0.5	0.2	1	-2.158693	4.097773
1	0.1	1.0	0.5	0.5	0.2	1	-2.158694	3.183250
1	0.1	1	0.5	0.5	0.2	1	-2.158694	3.183250
1	0.1	1	1.0	0.5	0.2	1	-2.158693	2.952785
1	0.1	1	1.5	0.5	0.2	1	-2.158693	2.731038
1	0.1	1	0.5	0.5	0.2	1	-2.158694	3.183250
1	0.1	1	0.5	1.0	0.2	1	-2.158693	3.049242
1	0.1	1	0.5	1.5	0.2	1	-2.158693	2.919658
1	0.1	1	0.5	0.5	0.5	1	-2.158693	3.149685
1	0.1	1	0.5	0.5	1.0	1	-2.158693	3.106339
1	0.1	1	0.5	0.5	1.5	1	-2.158693	3.072846
1	0.1	1	0.5	0.5	0.2	-0.5	-1.351490	0.186513

1	0.1	1	0.5	0.5	0.2	0.0	-1.581840	0.873046
1	0.1	1	0.5	0.5	0.2	0.5	-1.851350	1.947550

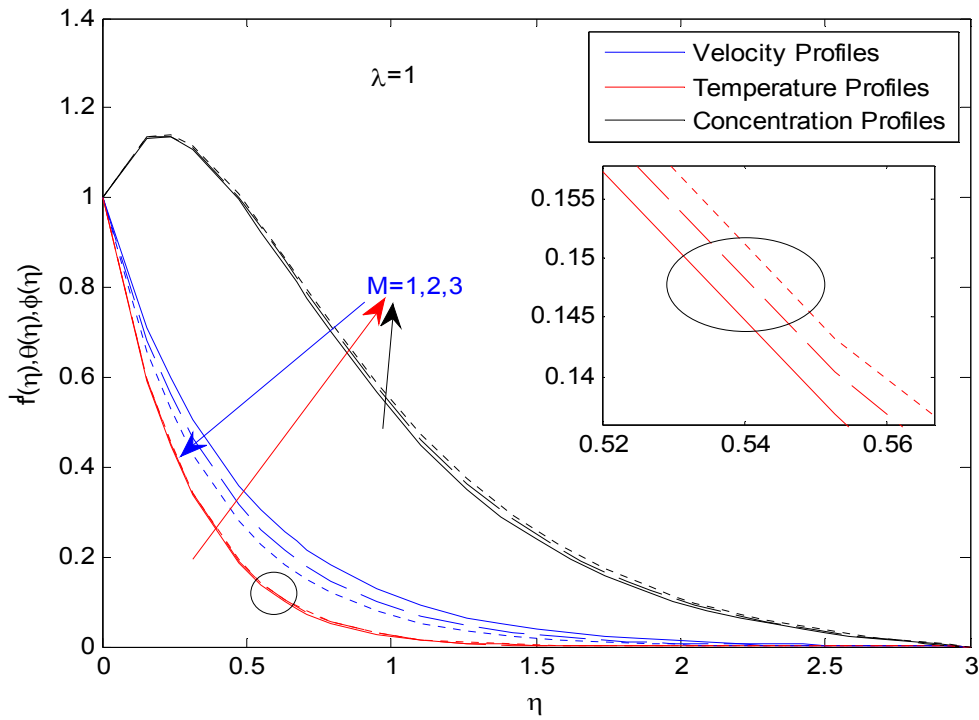


Figure 1 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of M

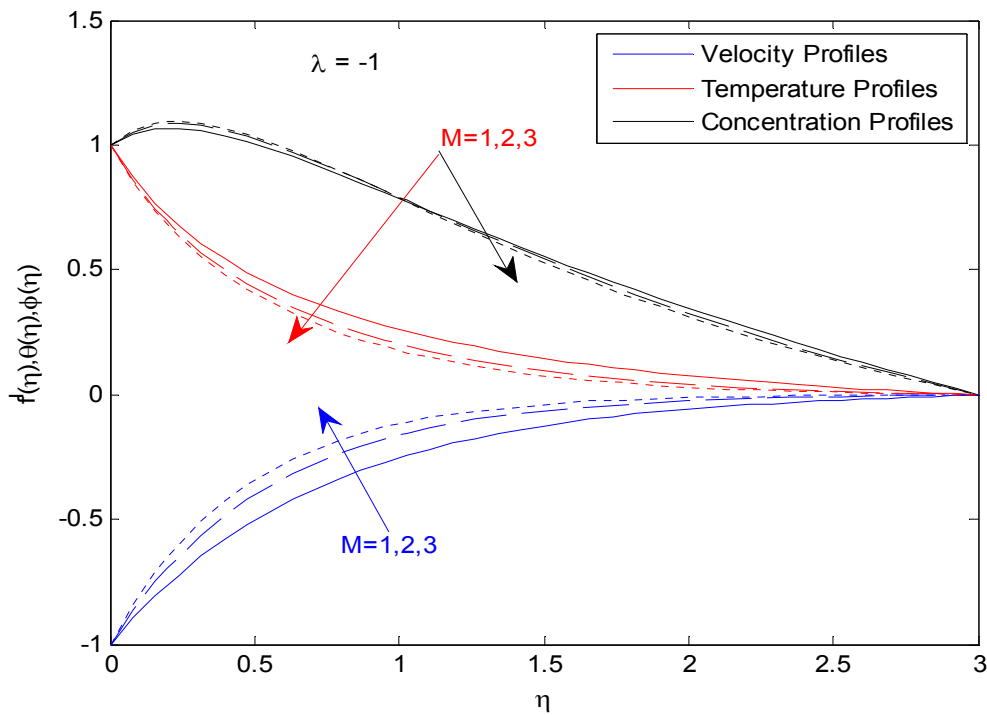


Figure 2 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of M

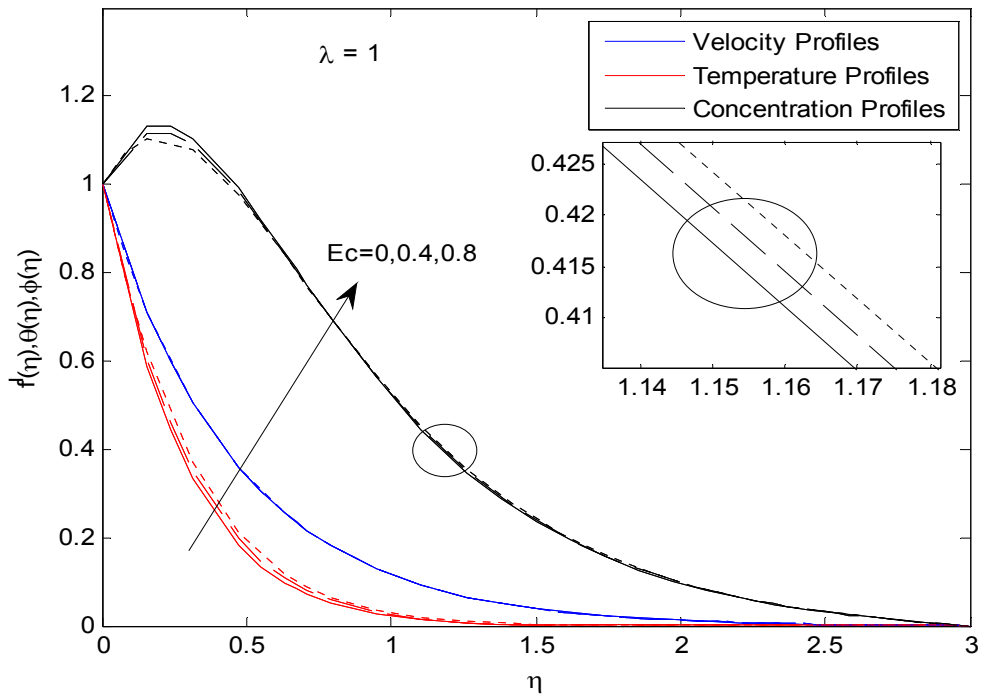


Figure 3 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of Ec

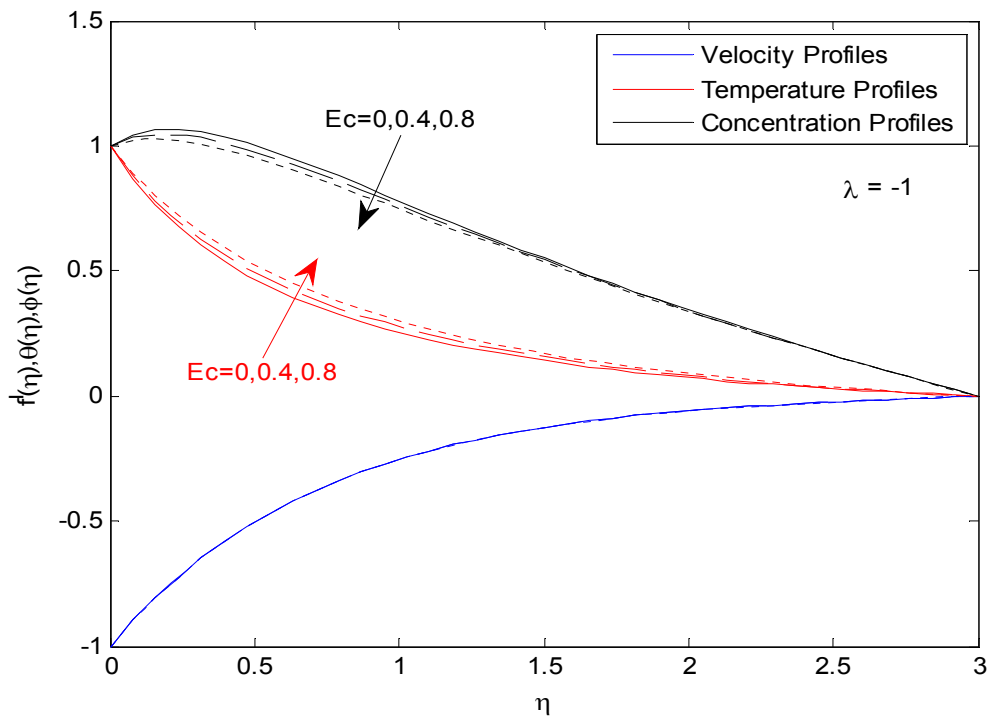


Figure 4 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of Ec

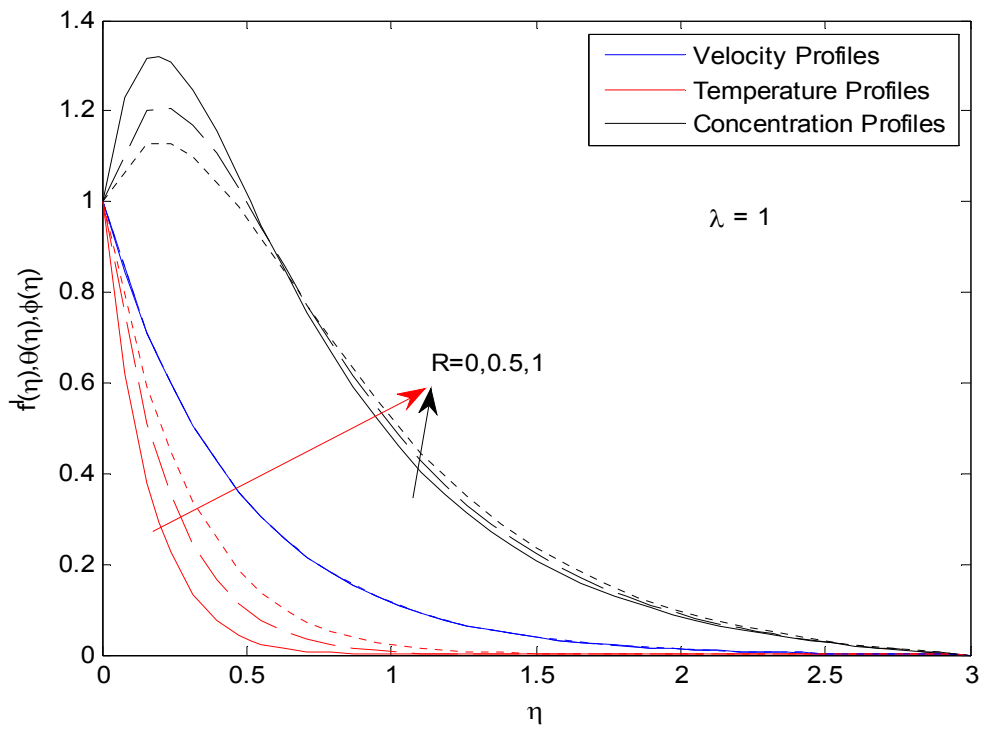


Figure 5 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of R

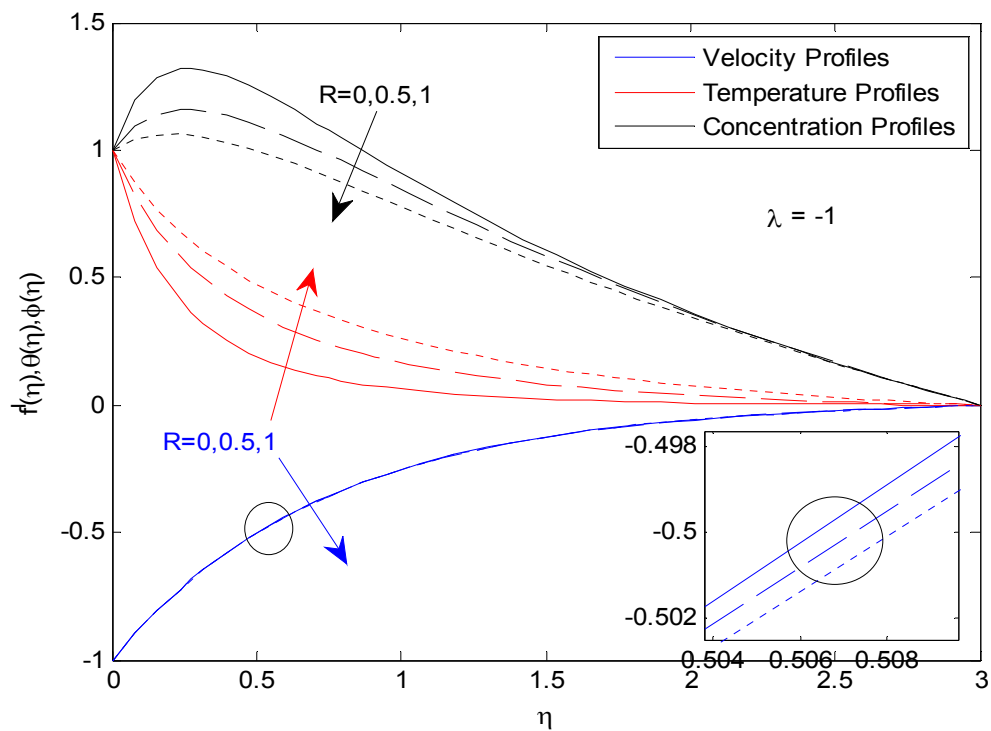


Figure 6 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of R

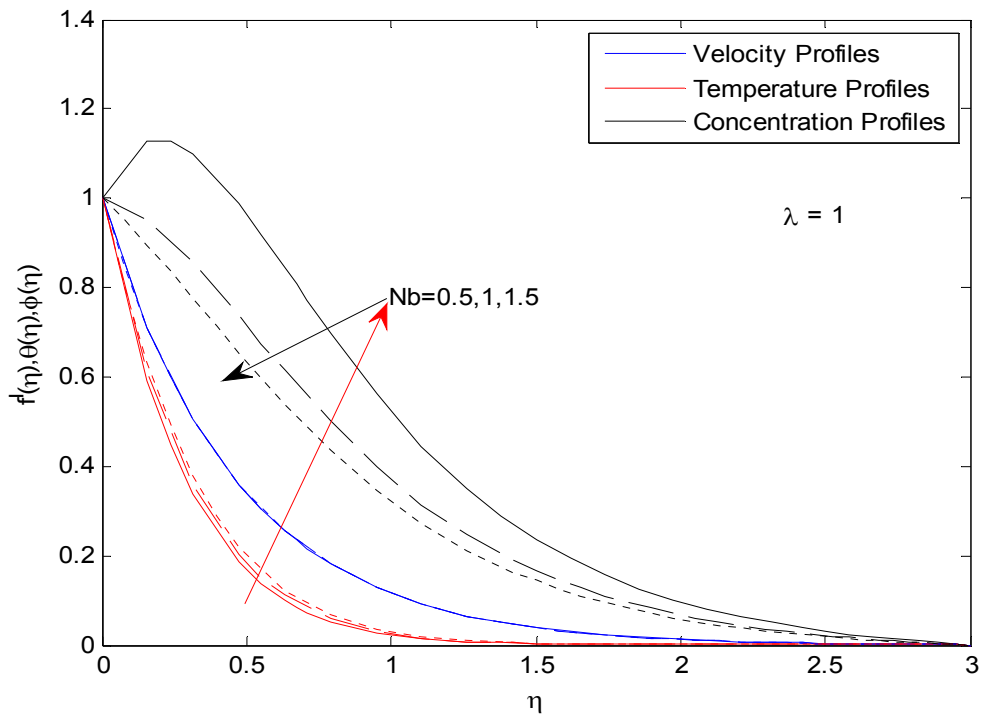


Figure 7 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of Nb

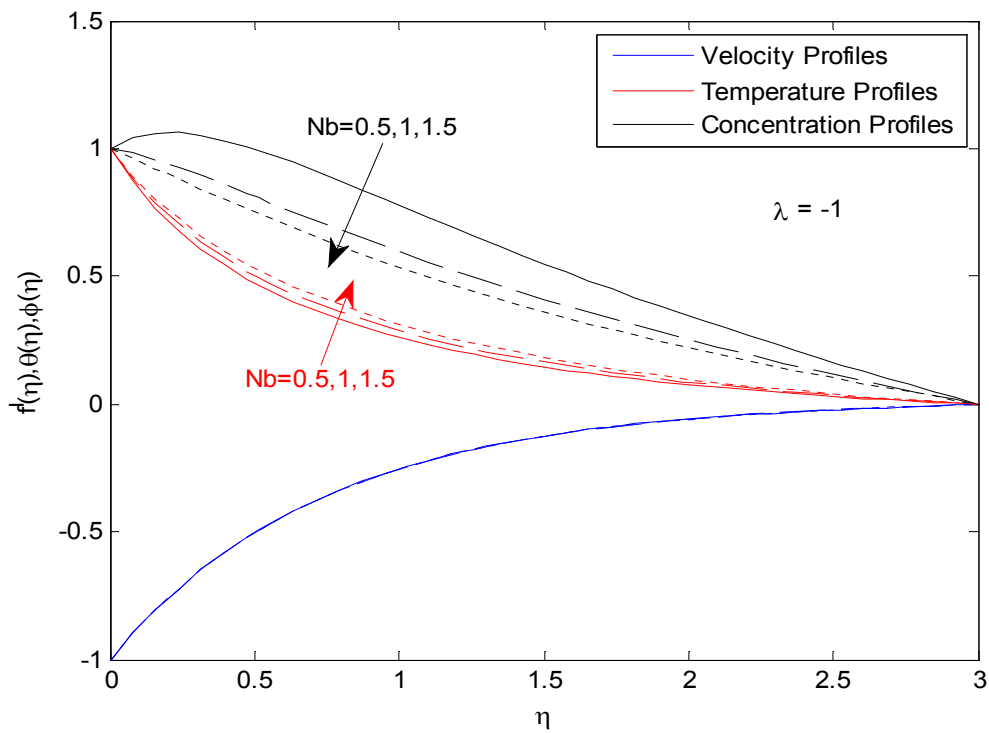


Figure 8 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of Nb

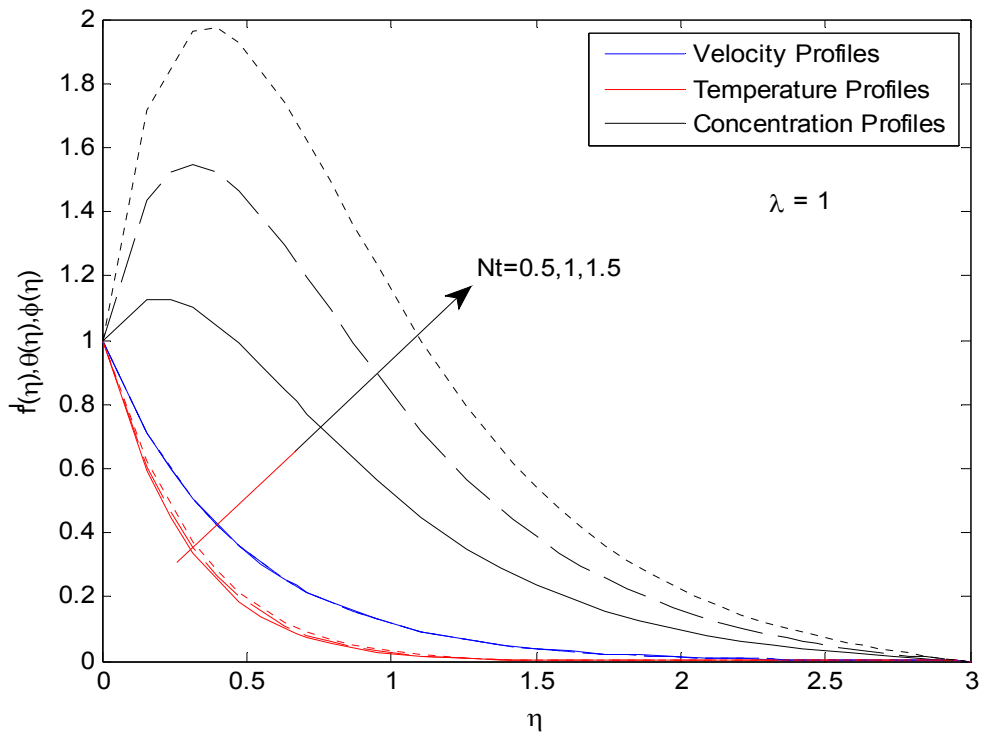


Figure 9 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of Nt

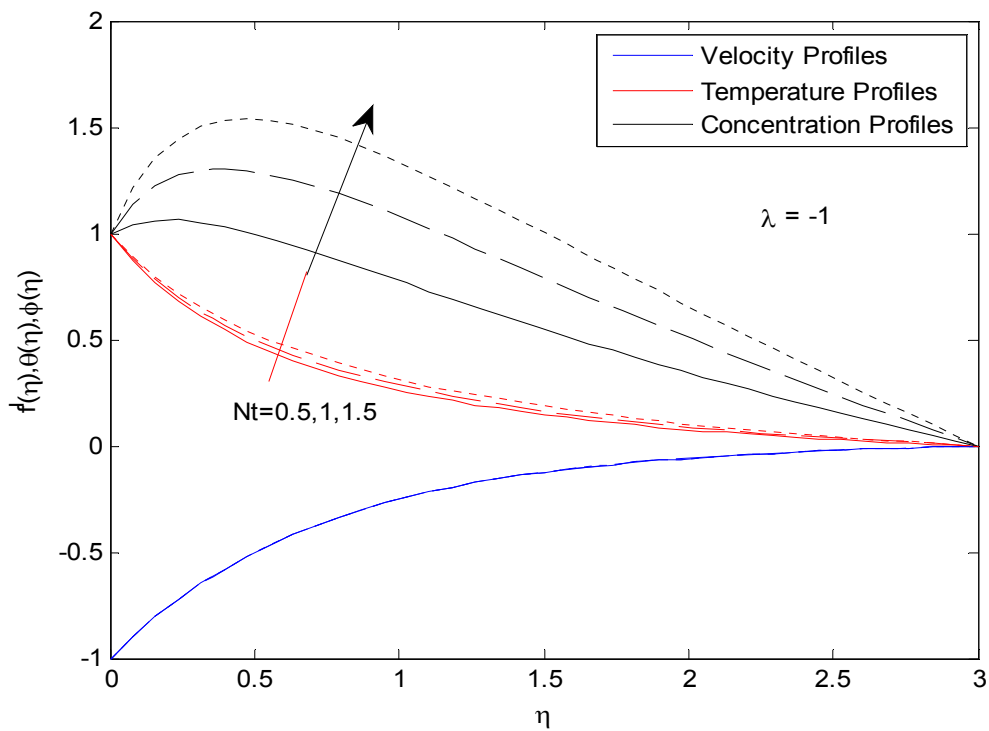


Figure 10 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of Nt

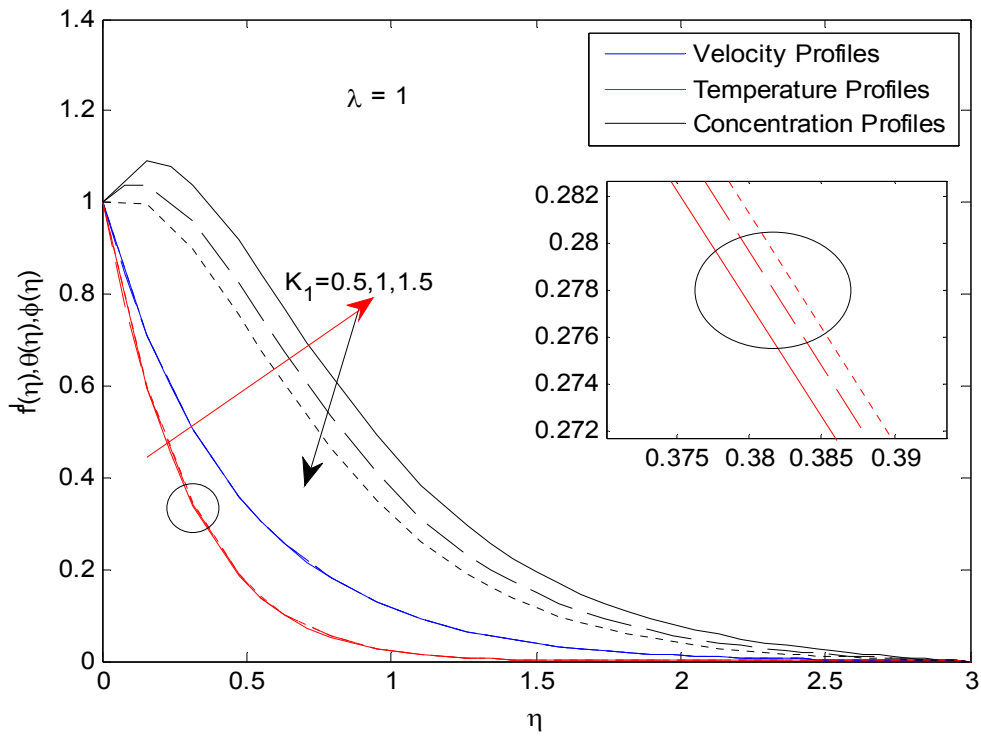


Figure 11 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of K_1

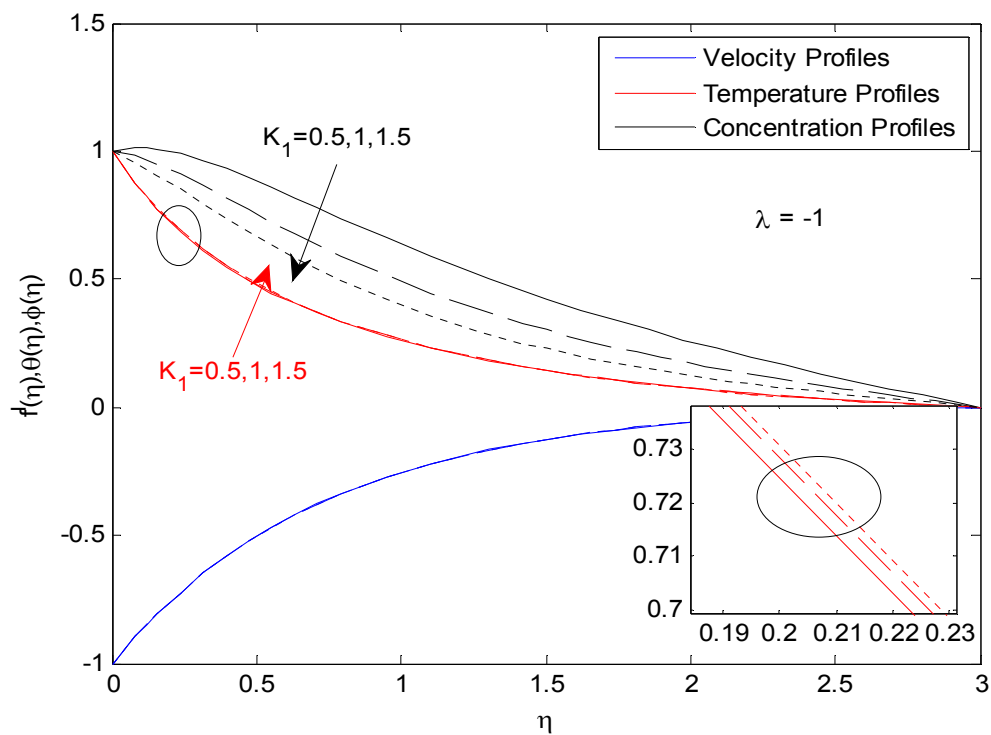


Figure 12 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of K_1

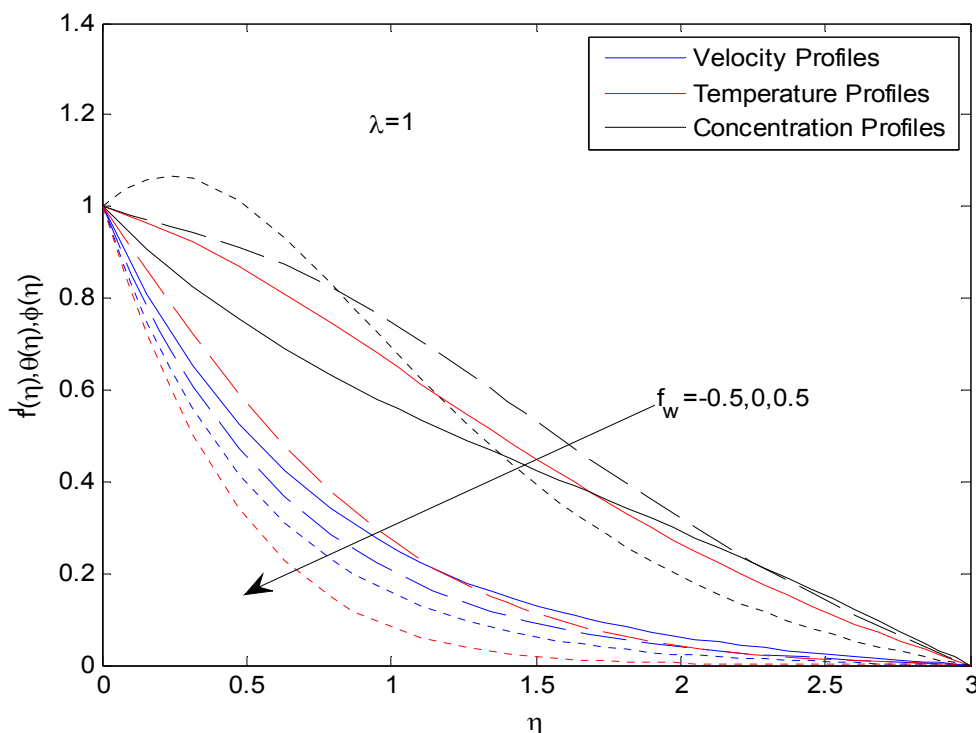


Figure 13 Variation In Velocity, Temperature And Concentration Profiles For Different Values Of F_w

CONCLUSIONS

This paper presents two dimensional steady magnetohydrodynamic flow of a nanofluid past a permeable stretching/shrinking sheet in a porous medium with suction/injection effects. Here we considered nanofluid volume fraction on the boundary is submissive controlled rather than active controlled. The governing partial differential equations are reduced in to ordinary differential equations by similarity transformation and then solved numerically by using bvp4c with MATLAB package. Effects of thermal radiation parameter, chemical reaction parameter, magneticfield parameter, Brownian motion parameter, thermophoresis parameter and porosity parameter on velocity, temperature, concentration, skin friction and local Nusselt number are thoroughly investigated for stretching and shrinking cases separately and presented through graphs and tables. Comparisons with existed results are presented.

The findings of the numerical results are summarized as follows:

- 1) Magneticfield parameter has capability to reduce the flow, friction factor and heat transfer rate in stretching surface.
- 2) Radiation parameter helps to enhance the temperature profiles and reduce the concentration profiles as well as heat transfer rate of the fluid.
- 3) Chemical reaction parameter does not show significant difference in friction coefficient but it reduces the heat transfer rate as well as concentration profiles.
- 4) Viscous dissipation parameter helps to enhance the temperature profiles for both stretching and shrinking cases.
- 5) Suction/injection parameter have tendency to increase the heat transfer rate and reduce the friction factor.

Acknowledgements

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INVESTIGATION OF FRACTURE PROPERTIES OF $\pm 55^\circ$ FILAMENT WINDING CNT REINFORCED CTP COMPOSITE PIPE

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ABSTRACT: In this study, fatigue life of glass fiber-epoxy material produced by the filament wounded composite pipes and matrix material reinforced with multi-walled carbon nanotube (CNT) nanocomposite filament winding tubes were determined experimentally under the influence of internal pressure. In the research results, combustion test was performed to determine the proportion of glass fiber and resin. Also void content test performed. Critical stress intensity factors were determined experimentally for several CNT reinforcements by tensile tests. Experimentally obtained graph of $\sigma_N - a/t$ compared with theoretical correlation for investigation composite and nanocomposite pipe by fabricated filament winding process. So, Newman-Raju (N-R) analytic approach was utilized. For all experiments the relevant standards and references were utilized. According to the experimental conditions, the suitability of 1% CNT reinforcement to the CTP pipes was determined.

Keywords: carbon nanotubes, composite pipe, filament winding, fracture.

INTRODUCTION

Since CNT discovered, research has focused on this area. CNTs can be the ideal reinforcement for composite materials due to high degree of hardness, strength, the resilience characteristics as well as superior electrical and thermal properties. In recent years, CNTs began to be preferred as additional reinforcement component in conventional fiber-reinforced composites to improve the fiber-matrix interface.

When epoxy based materials are used, distribution of defects in the fiber surface is less than the uncoated fibers. This is why; the nano-coated glass fiber material is very useful for polymer material. It is known that the improvement in the fibers' tensile stress due to polymer that delays fiber cracking by acting as a bridge on the damaged fiber edges is a result of the Carbon nanotubes (CNTs).

Gojny et al. [1], investigated the mechanical properties of CNTs in distributing epoxy matrix. Accordingly; they have investigated to fracture toughness (KIC) of epoxy-0,1% CNT. They have said that CNT ratio increases, the increased tensile strength and fracture toughness values but the elongation at break decreased. Kaynak et al.[2] have tested to filament wounded disk samples with the split disk method. Also, they emphasized the most appropriate method is split disk method to determine the tensile properties.

In their study, Ayatollahi et al, [3] investigated fracture resilience under bending and shear loading conditions by cutting open surface cracks on epoxy-CNT nano-composite specimens at certain intervals. The CNT additive was found to achieve a higher strength value. Moreover; the researchers studied Mod I and Mod II fracture states and found that with a 1% CNT reinforcement, an increase of 45 % in toughness was obtained. They have therefore concluded the presence of CNT imposes a profound effect in developing fracture toughness.

Tarakçioğlu [4] has performed to internal pressure and split disk test of GRP pipes. He said that it was partly parallels between experimental and theoretical tests. Avcı et al [5] stipulated that bending strength and modules of fiber reinforced and surface cracked CTP composites increase with the addition of polyester. They pointed out that, KIC and JIC are independent of the crack depth ratio.

The purpose of this study is to investigate the mechanical properties of glass fiber reinforced plastics reinforced with CNTs. Also the purpose is to improve the mechanical properties of the composite structure via transferring superior mechanical properties of CNT to the matrix. Thus the nanocomposite material with CNT is intended as alternative to the composites.

MATERIALS AND METHOD

Materials

Properties of E Glass and epoxy matrix are given in table 1. Also the properties of carbon nanotubes are given in table 2.

Table 1. The Properties Of Glass And Matrix Materials

Properties	E (GPa)	σ (MPa)	P (g/cm ³)	ϵ (%)
E Glass	73	2400	2,6	1,5-2
Epoxy	3,4	50-60	1,2	4-5

Table 2. Properties of MWCNT

Properties	Value
Outer Diameter	< 8 nm
Inner Diameter	2-5 nm
Purity	> % 95
Length	10-30 micron
Specific Surface Area	500 m ² /g
Volumetric Density	0.27 g/cm ³

Experimental Method

In this study, primarily combustion experiments of composite materials were performed according to ASTM D 2584 test standard [13]. Then theoretical density was calculated according to Standard Test Methods for Void Content of Reinforced Plastics ASTM D2734 [14]. Measured density was calculated based on the test procedure Method C.

Internal pressure test specimens 72 mm in diameter and 2.2 mm in average thickness were cut into and 300 mm length. Surface cracks were cut by milling machine. Specimens with axial surface cracks in the radial plane were exposed to open ended internal pressure tests according to ASTM D 1599 [12].

Filament wounded samples with and without CNT were tested according to ASTM D 2290 Split disk test method [7]. Temperature was 23 °C ± 2 °C, humidity was 50 ± 5%. Test speed of 0.1 inch/min. Dimensions and apparatus of the test sample was prepared in accordance with ASTM D2290. The calculation of the stress values for tests was performed to formula 1.

$$\sigma_a = P_b / 2A_m \quad (1)$$

σ_a is maximum tensile stress (MPa), P_b is maximum load (N) and A_m is width and length of the reduced section.

RESEARCH RESULT

Sample Preparation

The filament winding machine used for experimentation is a CNC controlled helical winding machine with traverse carriage motion. Winding speed is 600 mm/dk, resin temperature is 65 °C, the fiber band width is 12 mm. Pipes were cured for 2 h at 135 °C and for 2 h at 150 °C on a mandrel in a rotary oven. It was then cut to the required dimensions of the test specimen [6].

Experimental results

The fiber volume fraction of tubular specimen was produced by the wet filament winding method was determined by a resin burnout test. Then the void contents test of the samples was performed. In addition these experiments ring tensile test were carried out to determine the fracture toughness values under tensile load.

Volumetric ratio of fibers to GRP pipes was found to be 0.52 as a consequence of the tests. It was determined as 0.53 in the GRP pipes reinforced with 0.5 CNT and it was found 0.52 in the GRP pipes reinforced with %1 CNT. As a result of void content test; the void amount of samples has been identified 0.24%.

The maximum tangential stress are 489 MPa for epoxy tubes, 517 MPa for reinforcement 0,5% CNT and 534 MPa reinforcement 1% CNT at internal pressure tests.

One of the methods used to determine the material properties in the tangential direction of GRP pipes is split-disk method. KQ values for the maximum stress can be determined by applying the ring tensile test. In this way, σ_N N-R equation can theoretically calculated. When experimental fractured strength changes with N-R equation compared to the experimental values of σ_N -a/t, relevance of this relation will be investigated on the filament wounded CNT-GRP pipes. Tangential strains were measured and stress-strain curves were plotted. Stress-strain

graph is given in Fig. 2. The maximum tangential stress are 347 MPa for epoxy tubes, 470 MPa for reinforcement 0,5 % CNT and 502 MPa for reinforcement 1 % CNT at split-disk tests. Also elongation at break are 64 % for epoxy tubes, 85 % for reinforcement 0,5 % CNT and 103 % reinforcement 1 % CNT.

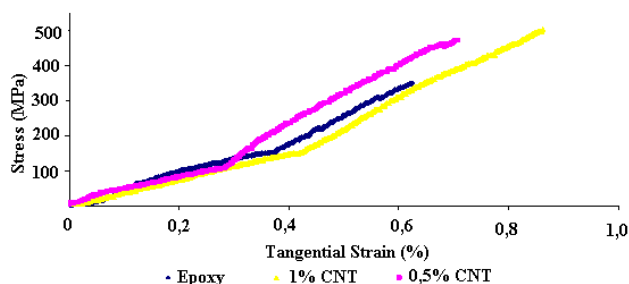


Figure 1. Split-Disk Test Stress-Strain Graph

CNT reinforcement has increased both tensile stress and elongation at break for split disk. These results showed lower values according to the internal pressure test. The reason for the difference between these results is the effect of the edge [4]. The size of the ring tensile test sample is shorter than the internal pressure test of the sample. So, the edges of the fiber ends can be more easily peeled off and stress limits are lowered by pulling effect.

Theoretical Cracked Strength Values

The linear elastic theory solution to the problem of surface cracking in isotropic materials was introduced by Newman and Raju. It is due to the fact that no relation that was found that offers stress intensity factor of the surface cracked composites that these expressions were used. Cracking strength values obtained experimentally were compared with the theoretical crack strength values by using equation N-R (eq. 2) [9].

In this study, axial ring-shaped tensile specimens were prepared for the purpose of determining K_Q values experimentally. By applying the tensile tests on these specimens, the K_Q values were calculated [8]. Based on this, the maximum stress obtained for the given K_Q values was 31,98 MPa $m^{1/2}$ for CTP specimens without nano-reinforcement, 43,24 MPa $m^{1/2}$ with CTP specimens having 0,5% CNT reinforcement and 46,16 MPa $m^{1/2}$ was obtained for the CTP specimens having 1% CNT addition. When CNTs uniformly distribute into the epoxy matrix, they lead to the increase in the strength of inter-layer in layered composite via creating secondary cracks at the crack tip or via reducing the stress concentration at the crack tip through the mechanism of crack bridging [1,11].

Because the expression $F(\pi a/Q)^{1/2}$ depends on variables a/c , a/t , $c/2b$ and Φ , the cracked strength value in the N-R equation that corresponds to these values was theoretically calculated by using the following formula:

$$\sigma_N = \frac{K_Q}{F \sqrt{\frac{\pi a}{Q}}} \quad (2)$$

It is in this way that the relationship between the experimental and theoretical graphic data can be obtained. With these values, variation of $\sigma_N - a/t$ can be plotted too. Beside this, by making use of the experimental results on the $\sigma_N - a/t$ graph, comparison with the theoretical expression can be made to indicate suitability of the filament winding and nano-composites on the CTP tubes.

When the cracked strength value calculated from the N-R equation applied for isotropic materials is compared with the strength value of the cracked surface specimen measured experimentally as a result of static bursting test, close correlation is found to exist between the two. When Fig. 2 (a)-(b) are studied, it is found that surface cracking has significantly affected the strength value. Strength value is reduced by the effect of surface cracks. The curves of the graphs showing theoretical and experimental results exhibit some partial parallelism. As surface crack depth decreases the difference between theoretical and experimental data increases. This applies to both composite and the nano-composite CTP tube specimens. With the CNT reinforcement, fracture toughness has increased leading to improved theoretical strength and thereby resulting into greatly differing outcomes between theoretical and experimental data. Accordingly, we can say that N-R correlation can not be applied to filament wounded CNT-GRP pipes.

Tarakçıoğlu; presented a study where the N-R theoretical approach was applied to experimental works. He has said that; the theoretical and experimental cracked strength results on CTP tubes with $\pm 55^\circ$ angle filament wounded exhibited partial parallelism.

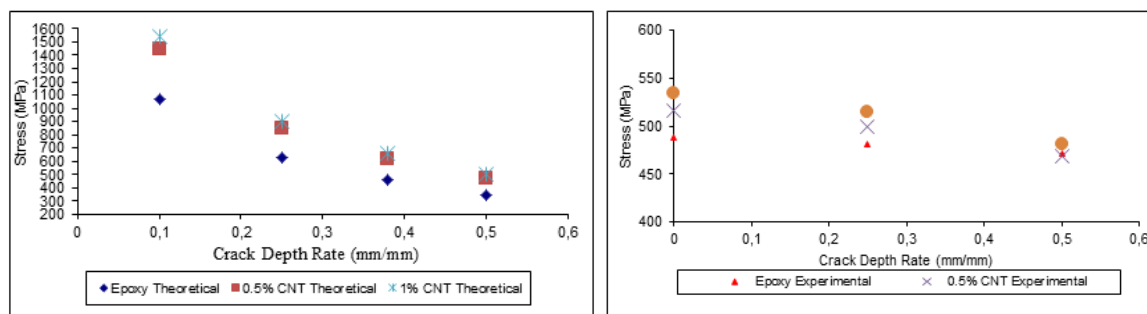


Figure 2. (a) Theoretical σ_N - a/t values (b) Experimental σ_N - a/t values

The theoretical and experimental stress results for all the composite and nano-composite specimens are presented on Fig. 2. Consequently, this approves the comparison of the theoretical and experimental data.

CONCLUSIONS

In this study, theoretical and experimental values of strength of GRP pipes with CNT were examined. According to the results and recommendations are summarized below:

With the increase of crack depth fractured strength values of all pipes are reduced.

KQ values were determined by applying the ring tensile test. Accordingly, the fracture toughness was 31.98 MPam^{1/2} for GRP samples, 43,24 MPa m^{1/2} for 0.5% CNT-reinforced nanocomposite samples and 46,16 MPa m^{1/2} for 1% CNT-reinforced nanocomposite samples.

When the cracked strength values calculated from the N-R equations are compared with those obtained from the tests, it is found that in all the composite and nano-composite specimens there exists a partial closeness at the crack depth ratios of $a/t=0,25$ and $a/t=0,50$.

However, this correlation can not be adapted to all types of filament winding CNT reinforced GRP and GRP pipes.

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COMMUNICATIONS MANAGEMENT IN SCHOOL

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ABSTRACT: The report presents the results of multifactorial analysis of problems of communication management in school in the modern world and the role of the School principal as their manager. The paper brings out the specifics, events and trends and the analysis is done through the prism of school management and communication management. Some regulations are analyzed and techniques and tools to improve the quality of communication processes are proposed.

In the XXI century we recognize the school: as a mediator between the individual and his/her own future (not as a special closed environment designed just for itself and only in the abstract future for something else); as a mediator in an attempt to reconcile the interests of its various users (children, parents, society) and to organize the dialogue between them; as an intermediary who tries to organize the transitions between school and non-school periods (family, school, profession) as organic moments of age and social maturation of the individual. School is an institution that has its historical and national circumstances, but now must be reformed very quickly in order to adapt to new realities and to meet the expectations of students and their parents. We considered various communication channels from the perspective of communication management and the influence of cultural factors on their effective use. Special emphasis is put on the use of new information and communication technologies and the opportunities they provide to enrich the communication. Finally we give recommendations for improving communications management in school, working definitions are given in an attempt to update the conceptual apparatus.

Key words: communication management, school

INTRODUCTION

The theme of the management of communication in school nowadays is interesting but difficult to analyze in terms of different theories, disciplines and practices, including school management or communication theory. To observe the problem in its entirety, it is necessary to use an interdisciplinary approach. On one hand, the school should be seen from the perspective of educational management, but on the other hand we must take into account the specificities of communication processes in which the school is involved.

We accept that the school is a childcare institution that has its historical and national circumstances, but in this it must quickly be reformed in order to adapt to new realities and to meet the expectations of students and their parents. School in the XXI century is increasingly acknowledged as a mediator:

- Between the individual and its own future (not as a special closed environment designed just for itself and only in the abstract future for something else);
- In an attempt to reconcile the interests of its various users (children, parents, society) and to facilitate the dialogue between them;
- Which is trying to realize the transitions between school and non-school periods (family, school, profession) as organic moments of age and social maturation of the individual.

The communication in school occurs through the exchange of information from the outside in and the inside out. The dynamics of the times in which we live inevitably affect the intensity of the communication processes. The school as a public institution has opened its doors to ensure transparency and enable the public to know what is happening with the younger generation being trained in its framework. Requirements to the school increased in relation to the needs of acquiring not only new knowledge, skills and competencies ensuring success on the labor market, but also new civic responsibilities and competencies to deal with the rapid dynamics of change in the XXI century.

The objectives of the study are to analyze the nature of the process of managing communications in school and to make recommendations for its improvement.

Main tasks:

- To examine the legal basis in terms of requirements to principals related to communications management of the school;
- To analyze the current state of communication processes in Bulgarian schools;

- To identify the main factors that determines the success of the internal and external communications in the school;
- To identify trends and make recommendations for improving the management of communication in school and between the school and its partners.

Research methods: theoretical analysis of the legislation prescribing the professional activities of the principal as educational management; interdisciplinary approach towards the description of the process of managing internal and external communications of the school.

THE PRINCIPAL AS A MANAGER OF COMMUNICATIONS

The principal as a manager bears the main responsibility for ensuring the effective communication policy of the school. The principal is the one who sets the style and tone of communication in school. His management style determines his communicative style. The more flexible the management style is, the more likely is for the principal to carry out effective and satisfactory communication with representatives of the school community and external institutions.

The principal is the one who sets and monitors compliance with the principles of good communication: democracy, tolerance, trust, control, humanity, responsibility, legality, propriety.

According to the job description among the special skills and competencies that a principal must have there are three especially important to us to point out:

- Ability to work in a team;
- Ability to analyze, synthesize and make decisions;
- Communication skills and ability to solve non-standard problems and situations. (Framework, 2003: 4)

In the project for creating a Standardized description for the position of a principal, the section describing the personal competencies defines "communication" as skills and attitudes that refer to:

- "- Ability to present ideas and to listen carefully to the ideas of others;
- Ability to understanding the dynamics of communication and to track its content;
- Ability to construct a sustainable relationship with the participants in the communication process;
- Ability to assess the specific context in connection with other, more comprehensive conditions and causes (formal and informal norms and expectations);
- Ability to identify the direct and indirect consequences of his/her actions and to manage the possible response / actions to them;
- Ability clearly and reasonably to defend opinions and positions;
- Ability to negotiate;
- Ability to define goals in the communication process, to perform self-monitoring and self-correction. "(Standard, 2012: 9)

The principal must work in a team and must be able to:

- "- Encourage each team member to participate in activities according to their abilities and skills;
- Make decisions that synthesize different viewpoints. "(Standard, 2012: 9)

Some of the other personal qualities that a principal should have are "a competence to adopt criticism and conflict resolution", which is described by the following skills and attitudes:

- Ability to analyze the causes of the different positions;
- Ability to identify the aspects of agreement and disagreement;
- Ability to reformulate the problem prioritizing needs and objectives;
- Ability to accept criticism and deal constructively with it;
- Ability to effectively manage emotions - has self-reflection as a basis for understanding of "the other". (Standard, 2012: 9-10)

These are above all skills related to the implementation of effective interpersonal and business communication – ability to present and justify theses and also to perform active listening followed by analysis, assessment and response to the statements of the partners in the communicative act. The professional responsibilities and commitments of the school principal, who is above all manager of the connections between all the participants in the educational process on the one hand and manager of all external communications on the other can be successfully implemented only with a good knowledge of these communication skills.

According to Art. 147. (amend. and suppl. - SG. 53 of 2001, in force from 15.09.2001; SG. 33 of 2003; amend. SG. 48 of 2003 .; No. 7 2009)

Para. (1) (amend. - SG. 7 of 2009) of the Rules for the implementation of the Education Act "the principal, as managing body of the kindergarten and the school:

1. organizes, controls and is responsible for the overall activities;
3. ensures safe conditions for education, training and labor;
4. represents the institution before the authorities, organizations and persons and enters contracts with legal entities and individuals on the subject of business in accordance with its powers;

.....

6. employs and terminates the employment contracts of the assistant principals, teachers, educators, employees in state and municipal kindergartens and schools under the Labor Code;
7. (amend. - SG. 7 of 2009) announces vacancies at labor offices and regional education inspectorates within 3 days of the vacancy - or their state and municipal kindergartens, schools;
8. rewards and sanctions students, teachers and staff in accordance with the Labor Code, the Education Act and these Rules;
9. organizes the admittance of children and students and their training and education in accordance with the state educational requirements;
10. (amend. - SG. 53 of 2001, in force from 09.15.2001) signs and stamps the documents for moving of students, the certificates of class completion, the degrees of education and vocational training and keeps safe the seal school with the state coat of arms;
11. assists the competent authorities in investigating infringements of Art. 47 and 48 of the Education Act;
12. controls and is responsible for the proper keeping and storage of mandatory documentation and keeps the academic records;
13. provides conditions for health prevention in the kindergarten or school;
14. (new - SG. 53 of 2001, in force from 09.15.2001) prepares the official staff schedule and approves the list of the positions and salaries;
15. (new - SG. 33 of 2003, corr., No. 48 of 2003) prepares and approves the official staff schedule.

(2) The principal of the kindergarten or school is also a chairman of the Pedagogical Council and ensures the implementation of its decisions. "(Rules, 2014: 55)

The spectrum of rights and obligations of the principal shows that he or she uses and control channels for business communication – both within the school and between the school and other state bodies and institutions with which it has contacts, and also with parents, guardians and other interested members of the public.

During the implementation of the main part of his duties, he or she performs a wide range of communications – oral and written, interpersonal and business, official and unofficial.

MANAGEMENT OF INTERNAL COMMUNICATIONS AT SCHOOL

Every principal enters daily internal communication with the teaching staff, students, assistant directors and non-teaching staff – written (preparation and signing of orders, reports, decisions, etc.) and oral (interpersonal and business). Exchange of information and feelings is rich and intense. Without constant communication the school could not function normally.

The job description of the principal states that:

'1. The principal implements internal organizational relations with:

- 1.1. Assistant directors;
- 1.2. Teaching and non-teaching staff;
- 1.3. Students;
- 1.4. Trade unions in the school. "(Framework, 2003: 3)

These four groups are practically more.

Assistant directors need to work as a team and to assist the principal, but each of them has his/her personal characteristics and professional experience, which define his/her communicative style, and hence the nature of the communications that occur within the group and between the group and the principal.

Following the basic principles of management, delegation is supported by the grant of rights, the principal favors the development of the abilities of subordinates and multiplies their knowledge, which in turn has a positive impact on their direct manager activity, and also on the communicative climate of the school as a whole. The delegation of powers allows the distribution of tasks according to the capacities of the participants in the team. It is also essential for things to be done systematically to achieve the objectives, to solve motivational problems, to create trust, to promote positive thinking, not running away from problems and also to draw attention to the possibilities of achieving excellent results.

Ability to delegate powers is a management skill, but it is combined with the communication skills to offer, discuss, defend and justify different theses. The delegation of powers is based upon good knowledge of the

strengths of the team members, and it could not happen if people do not maintain an open and confidential communication.

Teaching and non-teaching staff, which is referred to as the second group are also different and in fact they are two different occupational groups, which have different objectives and motives for participation or non-participation in the communication process. They usually belong to one, two or more trade unions, making this group variable.

Teaching staff includes teachers, educators, school counselors, school psychologists, accompanists, choreographers, speech therapists, resource teachers.

Non-teaching staff are: administrative assistants, accountant, cashiers, maintenance workers, security officers, cleaners and others.

The main topics in the internal communication between the principal and teaching staff are directly related to the process of training and education on one hand and the relationship with the students who are participating in this process on the other. The principal draws the attention of teachers to achievable learning objectives and creates opportunities for them to feel satisfied with the results of their work and communication with students.

Official channels of communication include both pedagogical advice and workshops to discuss current issues as well as personal communication between the teacher and the principal.

Teachers in larger schools have their methodical groups around the subjects they teach and within them their internal communication is carried out according to their methodological qualification. These associations have their own leaders who can put issues to the principal for discussion and decision. This is another level of internal communication. These subject departments can carry out external communications with similar ones from other schools to exchange experiences or joint appearances and work on projects.

Pedagogical staff in turn is in constant communication with students. Oral communication usually prevails in the intensive verbal and nonverbal channel, but also they carry out written communication. Every teacher examines and evaluates homework and tests, essays, papers, reports on the implementation of projects and others. The teacher is a role model with its communicative style and teaches students how to communicate effectively and efficiently. Rules of verbal communication are set by the teacher, and those for writing are taught in a separate subject. The teacher is a specific speaker who has a regular audience - students, who he/she teaches for one or more school years. These features largely determine the success of pedagogical communication. The teacher as a speaker is limited by the time in which communicating with their students (one lesson is 40-45 minutes), the number of hours a week, which is meeting with them, educational content taught, the age of the students.

These variables influence the management of communication between the teacher and the students. Primary school teachers who teach their students every day have the most time to understand one another and comply with individual characteristics influencing the communication process. Teachers who teach individual subjects in junior high and high school enter one or two times a week in contact with students and sometimes the number of classes and students in their hampers attempts to achieve effective communication. The more frequent the meetings, the greater the time in which teachers and students are together, the more likely it is for the communication to be mutually rewarding.

Teachers carry out business communication within the lessons when they teach, test, evaluate, organize independent work of students, ask for or check homework, provide guidance, fix errors, support or criticize the students in connection with their school work. Along with this formal or business communication, teachers carry out on their own initiative or on the initiative of students an informal interpersonal communication during breaks, consultation time or during extracurricular activities. The teacher is a sought after adviser, assistant, consultant, not only on issues related to training and learning, but also topics related to personal development, development of special skills, gifts, talents, hobbies, career guidance, personal and / or family problems, health problems, difficulties in communicating with classmates, teachers or other non-teaching staff in schools. The teacher is a responsible adult who is important to the students and they are therefore looking for advice and help in individual meetings and conversations.

The group of students is heterogeneous as age, as well as and a socio-cultural characteristics. The type of school (elementary, secondary or high school) and the number of students are factors that significantly affect the

intensity and efficiency of communication. The presence of one or more buildings, studying of one or two shifts are other factors having an impact on the internal communication at school.

Between students, in turn, there is also a variety of communication processes – group and interpersonal. At group level we can distinguish communication between students from the same class and between students from different classes. In the first case they are of the same age, and the groups are conventional, while in the second there are differences in age, affecting communication, depending on whether it is communicating with larger or smaller.

Interpersonal communication is most intense between the students in the same class because of the length of time that they spend together. This, however, is valid only for official communication within the hours during breaks everyone has the freedom to choose their partners.

As in the course of business, but often in informal interpersonal communication between students misunderstandings and conflicts can arise. The reasons may be various, but from the perspective of managing communication they can be connected with insufficient knowledge of the active listening skills, reasoning, negotiating, reading non-verbal signals, recognize and properly respond to cultural differences in communication process, etc.

Non-teaching staff communicate primarily with the management team, from where they receives guidelines for work, but they are also in direct contact with the teaching staff and the students. In the course of formal and informal communication in bad climate and mismanagement conflicts and negative consequences can occur. Control of this internal communication is carried out by the principal and his/her assistants, as well as teaching staff.

MANAGEMENT OF EXTERNAL COMMUNICATIONS OF SCHOOL

According to the job description the principal should "carry out external organizational links with: the Ministry of Education and Science; Regional Inspectorate of Education; bodies of state and local government; parents of students and the public; legal non-profit organizations, companies and others; with the media; alliances of employers in the public education system; with trade unions; and universities. "(Framework, 2003: 4)

In this list we can find several ways of communication. First come the management bodies of education - Regional Inspectorate and the Ministry of Education and Science. Any principal is appointed by the Head of the Regional Inspectorate of Education, which acts as a representative of the Ministry of Education and Science at local level. Logically, this is the first and most significant external organizational link which takes place by means of oral and written business communication.

Communication is two-way. From the Ministry of Education and Science and the Regional Inspectorate to the school and back. The school is informed of decisions of the governing bodies, receives recommendations, guidelines, information on opportunities for training and participation in projects. It provides back reports, fact sheets, statements, and opinions, evaluations and recommendations on discussed regulations, suggestions on ideas coming from the Ministry of Education and Science. In Bulgaria the written communication prevails in electronic or physical way. The official communication is supported with formal documentation and is always signed and stamped.

Second come the bodies of state and local government - regional government and the municipality. In the current system the schools in Bulgaria are either state or municipal. Their budgets are determined by the Ministry of Education and Science, but are redistributed in the municipalities (for municipal schools) and the relevant ministries (for the state schools). The principal also acts as a financial manager, because he/she has the right to allocate the budget of the school, and is accountable to higher authorities on it. Each municipality has a directorate or department, which deals with municipal schools and municipal advisory boards - education committee.

The principal is the official figure, which represents the interests of the school and maintains contacts with these units in the municipality. The communication is written (letters, reports, orders, recommendations, complaints, etc.) and oral - participation in meetings and by phone. Written communication involves the use of paper and electronic media or both. Electronic communication with local and state authorities is still not fully implemented and this allows for choice, but sometimes creates difficulties and misunderstandings.

The third group consists of the pupils' parents and the public. We think they are different stakeholder groups and will therefore analyze them together and separately.

The school has a public responsibility to parents and taxpayers, who want to know how the money is spent on education. The public has a right to know what is happening in school. This requires for information to be transmitted, so that there is clarity about how the school works to achieve the educational goals. The school should have clear PR strategy and program so it can benefit from positive public attitudes and to identify and assist the process of creating policies and procedures. Through them, the school can successfully manage its external communications with external audiences, which include practically the entire society, because everyone is a student and learned the system from the inside, which then gives him reason to be considered as an interested parent and / or member of the civil society .

The following audiences are important to the school as a social organization:

- Students (former and potential);
- Parents (former, current and potential);
- Teachers - (former and potential);
- Suppliers of resources (including direct funding organizations, representatives of the executive);
- Foundations, agencies, centers, donors providing grants for projects;
- Publishing houses, advertising agencies and resource centers;
- Very closely related to the school management structures or substructures (trustees, founders, boards, community councils);
- Competitor schools;
- Non-governmental organizations, associations of citizens;
- National and local bodies which combat hooliganism and child crime; Child Counselling Services, homes for temporary accommodation of minors; orphanages, homes for temporary accommodation, sheltered housing, socio-educational boarding schools, educators boarding schools, etc.
- Various social groups.

Each of these groups has its own interests and attitudes toward school. Former students and former teachers were part of the school community and are involved in internal communications. Prospective students and teachers in the future will be joining them. Other groups have economic or moral interest in the work of the school.

Most important among them are parents, because they are directly involved in the process of personal growth of their children.

To inform parents and the local community the school can use the following tools:

- Newsletter for parents;
- Exhibitions, open days, solemn meetings with alumni and / or parents;
- Days or presentation of programs and activities that are specific to the school;
- Pedagogical councils with representatives of different audiences;
- Creation of lobbies at different levels - assistance in the implementation of projects, advising how to achieve support.
- Contacts with potential donors.

Several major approaches help the school to build positive public opinion, social attitudes and desired image: focused information; supporting communication; reaction to unfavorable opinion; design and maintenance of the environment. They all have more favorable impact on the desired mechanisms of behavior and attitude.

Through its communication policy the school may:

- Create its image in front of the other structures of society, especially in front of the public, which is interested in the school;
- Inform about the school activities on request from the interested audiences or senior management bodies;
- Provoke and interest in new types of services (programs, projects, complete transformation of the way we work, etc.)
- Preserve the popularity of services that exist and are popular in the market of educational services (centers, preparatory groups, specialties, summer schools, laboratories);
- Amend its image, which was formed as a result of a specific situation from previous ineffective communication or previous bad management and actions within the organization itself;
- Provide assistance to users, informing them of rational courses of action for participation in competitions, subscription to various programs, participation in events and more.
- Answer questions from internal and external audiences (students directly through a system of internal feedback and potential students by type connections "Forum", open doors, etc.).
- Enhance the organizational culture as a whole;

- Not only inform but also persuade, argue and justify views on various trends of change in the education system and legislation;

- Conduct lobbying in political parties, trade unions, government institutions, government organizations via links with members of parliament, government officials, representatives of specific organizations, etc. .;

- Appear not only as a professional structure, but also as part of civil society and contribute to the fight against antisocial behavior such as drug dealing, tying minors with criminal groups, discrimination on various grounds, as well as natural disasters, etc.

Prospective functions of the school PR program may include:

- Ensuring good relations with the public, distributing accurate and timely information about school policies, programs, procedures, performance, decisions and critical issues;

- Disclosure of the achievements of students and teachers;

- Interpretation of decisions and actions of school management;

- Removal of rumors and misinformation;

- Development of programs and promotion of practices which aim to ensure a climate that will bring ideas, suggestions, and reactions from the school community and external audiences.

Other actions and techniques that can be used in the school PR are:

- Press conferences by which the school informs the media about its activities. Success and fair coverage is important preparation related to the choice of location, time, theme selection and visualization.

- Press releases, which are used in the preparation of the conference and, if necessary, are submitted to the media before the event.

- Pseudo-events are initiated to cause the interest of the audience. They are created exclusively to be communicated. (Stoykov, Pacheva, 2001: 81). What pseudo-events may be included in the PR program depends on the specifics of the work in school, the available financial resources and the number of situational factors, but among them are: special days, weeks, months, themed evenings; exhibitions and fairs; presentations; dinners; seminars, "round table" discussions, conferences, symposiums, congresses; anniversaries, celebrations of important dates; Awards and honor school holidays; open days; competitions, quizzes, games; events organized for specific audiences; awarding scholarships, awards or special grants from donors and sponsors; establishment of charitable funds; receptions, parties, cocktails; performances, concerts, theater tours; opening ceremonies of something new - reconstructed building, new playgrounds, environmental actions, etc.; demonstration of new educational products, mobile exhibitions; visits of prominent personalities - special guests or former students; meetings with celebrities committed to the work of the school; progress reports; opening ceremonies of festivals, competitions; public statements of the director or the teachers; school celebrations, concerts, competitions; hiking, picnics, sports events; collective visits to museums, exhibitions, concerts, theater productions; participation in public events - share cleaning, environmental campaigns; charity events for children and adults; public lectures; Special education campaigns.

Within the external communications the school maintains relationships with its suppliers of resources – electricity, water, materials, stationary supplies, etc. With them the school performs business communication and the relations are based on the principle of mutual financial benefit.

Another type is the communication with various foundations, agencies, centers, donors providing grants for projects. The prosperity of a school today is judged also by the number of implemented national and international projects, which is why the principal assumes the management of this type of activity, and hence communications.

A third group is formed by publishers, advertising agencies and resource centers, which supply the school with textbooks and manuals, promotional materials and other resources. As with the first group of suppliers of resources there are also contractual relations which are economically justified.

Communication with the school board deserves special attention because it is on one hand "independent voluntary association for development, assistance and financial support of the school," according to Article 46a of the Education Act, and on the other a legal public non-profit entity, which organizes its activities under the terms and procedure of the non-profit purpose and in accordance with the provisions of the Education Act and its statute. It must be registered under the Law for non-profit entities but also it is regulated in the Education Act. Members of the school board may be all parents who have students in school or only those who are interested. Experience shows that the principal and teachers are usually members of the school board as well. In Article 46c of the Education Act stipulates that "To achieve its objectives the school board should:

1. Discuss and make proposals to the relevant authorities for the development and resolution of current problems of the school, kindergarten or servicing unit;

2. Assist in providing additional financial and material resources for the school, kindergarten or servicing unit and control their spending;
3. Support the development and maintenance of the equipment of the school, kindergarten or servicing unit;
4. Participate in the selection of textbooks by the Staff Council, which will train students from the school and, where possible provide their purchasing;
5. Assist in the organization of student nutrition, providing transport and solving other social problems of children, students, teachers, school, kindergarten or servicing unit;
6. Support the development and implementation of educational programs related to the problems of children and students;
7. Support school and municipal authorities for the implementation of compulsory schooling;
8. Contribute to the implementation of extracurricular forms of organized recreation, tourism and sports with children and students;
9. Promote the involvement of parents in the organization of leisure of children and students;
10. Propose measures to improve the operation of the school, kindergarten or servicing unit;
11. Organize public support of the school, kindergarten or servicing unit;
12. Alert the competent authorities for violations in the public education system;
13. Organize and support the training of parents on the upbringing and development of their children;
14. Support the work of the school in its campaigns against drugs and other harmful substances and their effects on children and students;
15. Assist disadvantaged children and students;
16. Assist the Commission for Combating Juvenile Delinquency. "(Education Act, 2014: 19-20)

The school board, which in the XIX century played an extremely important role in the management of Bulgarian school, in the XXI century unfortunately seems highly formalized and fails to establish itself as an effective form of citizen interest and control. Boyan Zahariev and Ilko Yordanov based on the results of empirical research conducted in 2010, claim that: "According to surveyed principals in 29% of schools there are no functioning school boards. Activities of the boards were defined as "pro forma" by another 7% of the principals. Principals admit that in schools where boards act, only 34% of the places designated for parents the Rules are occupied at the time of the survey respondents ... principals and parents identify lack of time as one of the leading factors for non-participation. Almost 42% of principals recognize the importance of factors like the lack of parental time, but still put it in third place - behind disinterest (62%) and lack of skills to interact with teachers (49%). The largest share of parents (38%) say they lack the time to communicate with teachers. 35% admit that they themselves - the parents are not interested and about $\frac{1}{4}$ reported that both teachers and parents do not have the skills to maintain interaction with one another. "(Zahariev, Yordanov, 2010: 15-16). Although this study included only 30 schools in medium and small cities with ethnically mixed population, the results for the whole country would hardly be much different.

Communication with other schools, which can be a partner or competitor relations is also part of the external communications of the school, which can be made by the principal or authorized representative of the school community.

Competitive relationships are caused mostly by the demographic crisis and the pursuit of any schools to attract more students. During the campaign for recruiting students good image and good PR are the key factors that affect the decisions of parents and their children.

Peer relations are established on the basis of common interests, goals and activities. Bulgaria's accession to the European Union has created new opportunities for the exchange of good pedagogical practices between schools in Member States. The new Erasmus + program continues this trend and allows schools to set up networks within the country and the European Union.

This is also the direction of the communication with NGOs and associations of citizens, which jointly work on projects, activities and campaigns.

Next are communications with the institutions that have the care of children and students with deviant behavior and/or special educational needs: national and municipal committees to combat child crime; Child Counselling Services, homes for temporary accommodation of minors; orphanages, homes for temporary accommodation, sheltered housing, socio-educational boarding schools, educators, boarding schools, etc. This communication principals often delegate to the pedagogical advisors and/or school psychologists.

Principals of schools in Bulgaria can be members of two unions - the Union of Employers in the public education system in Bulgaria and the Association of Directors of secondary education in Bulgaria.

Teachers may be members of three unions: Syndicate of Bulgarian Teachers part of the Confederation of Independent Trade Unions in Bulgaria, Syndicate "Education" part of the Confederation of Labor "Podkrepa" and Independent teachers' union to the Confederation of Independent Trade Unions in Bulgaria.

The collective agreement with the Ministry of Education and Science is signed by two unions representing employers and three trade unions of teachers. In practice, each principal has the need to communicate with various trade union organizations and their leaders.

All graduates of secondary schools in Bulgaria can continue to study in higher education. This implies new group communication partners of the school, namely universities. Within its candidate student campaigns they visit schools or invite students to fairs, exhibitions, festivals, visits, presentations and other public appearances. The principal decides on the admission of representatives of universities and colleges on the school or for a guided tour or other activities.

All presented here are direct external communications and therefore can be controlled by the principal and his assistants. Nowadays an increasing role in creating the image of an institution, however is played by the media, including press, magazines, cable and other TV stations.

To strengthen relations with the media, schools may use different techniques:

- Create a list of the names and numbers of working in the media who write in the field of education;
- When there are national news concerning the school or the region, the principal can always contact the media and present the position of the school and share how the events affect the school, because journalists are always looking for ways to put local flavor in a story with a national importance;
- When there are results of studies related to areas relating to your school, send them to journalists from the list and include examples of how this is happening in your school.

INFLUENCE OF CULTURAL FACTORS FOR EFFECTIVE MANAGEMENT OF INTERNAL AND EXTERNAL COMMUNICATIONS IN SCHOOL

Bulgarian school can be defined as a multi-ethnic and multicultural in its composition, because, on one hand, it trains and educates children and students from different ethnic and cultural backgrounds, and on the other - the management, teaching and non-teaching staff also has its diversity. The three largest ethnic groups in the country - Bulgarians, Turks and Roma are represented at school and in all of the groups mentioned above. Teachers and principals of Turkish origin dominate the regions with compact masses of population of this ethnic group. There are an even smaller and statistically insignificant number of Roma teachers, and even less of principals of schools in this ethnic group. Among the non-teaching staff ethnic picture is often similar to that in the settlement, but in some schools of ethnic minorities have a greater share or majority.

The school is an institution that not only can, but must contribute to the formation of positive attitudes for intercultural understanding between students and teachers from different ethnic groups. School management (the principal and his assistants) with its model of intercultural sensitivity can create favorable conditions for the formation of ethnic tolerance and mutually enriching i.e. intercultural communication. To achieve positive results, it should focus its work on the study of the principles of:

- Formation of multicultural classes as the basis for daily mutual influence of children and students with different ethnic and cultural backgrounds;
- Formation of understanding that society is composed of different ethnic groups and cultures, each of which is valuable in itself, but all together represent the national culture;
- Developing a dialogue between different cultures without underestimating or assimilation, establishing cultural understanding and acceptance of the differences based on mutual understanding and enrichment.

The strategic management decisions are related to the development and application of a philosophy of adoption of the values of intercultural education, understood as movement in school to obtain information about the merger of cultures, formation of respect and harmony in order to create an environment in which all students feel patronized, valued, respected and at the same time identified with its own identity and culture. Thus teachers and students from the majority form positive attitudes, tolerance and respect for otherness, and students, teachers and non-teaching staff from minorities gain confidence and strengthen their identity.

COMMUNICATION MANAGEMENT IN SCHOOL AND USE OF NEW TECHNOLOGIES

Communication through the use of new information and communication technologies can be implemented within internal or external communications.

In internal communications school the electronic platform - intranet would allow:

- Teachers to record class attendance / absence and keep a diary automatically a smartphone/tablet or a computer with special software on it;
- Lessons or presentations of students to be recorded with a touch of a button;
- Principal to send a message to all teachers at the same time;
- Principals or his authorized assistant-principal to monitor who is on time or late (which is registered in the system and when);
- The broadcasting of messages to everyone in the system as a communication channel or in case of emergency.
- Sending SMS to a particular group or all students;
- Using the voice mail to schedule a consultation for a group of students or a message to be sent to the whole class at once;

The utilization of these opportunities would allow students to feel more comfortable in an environment similar to that in real life, where networks, communications and technology associated with them, occupy a significant part of their lives.

For management of external communications the Internet could be used for:

- Communication and cooperation between teachers of different schools and sharing best practices;
- Conference calls between students and their peers from other schools on projects and learning activities;
- Communication with parents - for example, a teacher can leave a message to a parent or to be sent a message to the parents of the entire class simultaneously using voice mail;
- Automatically send SMS to parents with information about absences, infractions, success or assessments;
- Inform parents when a test is due the next day;
- Automatically send information about parent meetings, events and shares;
- Implementation of virtual meetings between the schools for the exchange of information, teachers can invite an expert in hours on telephone or videoconference, to conduct a brief consultation, or to answer questions of students.

An example of good practice is the "Bell program" (Nikolova, Kalapish, 2014: 57) - a system that informs parents via SMS about pupil's absence from school, parent meetings and meetings with teachers. The principal can use the system to quickly inform teachers in all subjects about the operational work of the school. The program was implemented in Secondary school number 144 in Sofia.

And last but not least the creation of the website allows the school to be represented by means of multimedia, to be easily and quickly discovered and to deliver timely updates on the school activities. In the system of education, access to this type of information enjoys great popularity among the young, as well as among the more experienced. The benefits of controlled means of information and communication are undeniable and they are used in the present, and probably will enrich with new opportunities in the future. Among the most significant is the ability to promote the educational institution to build relationships of trust and openness. Good web design requires the content, along with basic information to include sections like News, Press releases, Contacts that would facilitate the user experience. The contact with students and parents can be made via special forums in which they can share their opinions and attitudes.

CONCLUSION

Before delivering some recommendations, we would like to give a working definition for school communications management without a pretense for exhaustiveness. Under *school communication management* we will understand the management of communications with internal and external audiences by the principal and the teaching staff with educational, communication and management techniques, tools and instruments to achieve the educational goals of the school, high quality of communication and personal satisfaction of the participants.

The main *factors that determine the success of internal communication* in school are:

- The existence of a communication strategy and program of the school;
- Flexible and democratic management style of the principal;
- Positive style of communication of the teachers;
- Optimal number of students in a class and the whole school;
- Training in a school building, allowing daily direct contacts;

- The use of more communication channels;
- The use of electronic means of communication;

Following are some basic principles such as:

- Clear planning of internal communication.
- Professional attitude and prevention of ineffective communication.
- Implementation of control.
- Use of positive approach in communication.
- Finding balance in volume between the oral and written form in order to minimize the possibility of false interpretation of messages.
- Timeliness, honesty and confidence in the relationship between the participants in communication.

The main *factors that determine the success of external communications* of school are:

- The presence of PR strategy and program for its implementation;
- Maintenance of a constant positive communication with parents as the primary external public;
- Attracting public opinion through good media coverage;
- The use of pseudo-events, promotion of the activities of the school and improving of the image;
- Implementation of regular business communication with the management bodies of education and those of local and state authorities;
- Active participation in public affairs;
- Promotion of work with partners in national and international projects;
- Intensification of the school board as an ally and assistant in communication activities.

RECOMMENDATIONS

Trends and recommendations for improving the management of communication in school and between the school and its partners:

- The principal to bring new meaning to their responsibilities as manager of communications at school;
- Schools to develop communication strategies and annual plans and programs for their implementation;
- To enhance the qualifications of teaching staff in the field of communication management;
- To increase the knowledge and skills of teachers to work in terms of socio-cultural diversity;
- To optimize the communication with parents and the school board;
- To increase the share of electronic communication in working with students;
- To plan and implement systematic training of staff to enrich the technological tools for the implementation of internal and external communications.

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THE ROLE OF TEACHERS' ATTITUDES TOWARD TECHNOLOGY INTEGRATION IN SCHOOL

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ABSTRACT: Under the increasing pressure of globalization epoch, which dictated the need of adopting informatization reform, the government of the Republic of Kazakhstan from 1997 started operating a systematic state policy for informatization of education. Many scholarly papers show that the success of the educational reform efforts depend not only on the ability of the government to supply all schools with ICT, but also on the ability to make teachers possess positive attitudes toward ICT integration. This study will contribute to the existing knowledge by providing a real picture of the process of ICT integration in Kazakhstani secondary schools through the lens of the main facilitators of this process – teachers. Most of previous studies pointed out that ICT's successful integration in school is supposed to have a positive impact on students' academic motivation. However, these topics received little attention in the literature. In order to fill up the gap in our knowledge, the purpose of this paper is to gain insight into the teachers' attitudes toward ICT, examining the relationship between their attitudes and students' academic motivation. The study applies the Mixed Methods (a combination of quantitative and qualitative methods) Explanatory Sequential Design, which aims to provide a better understanding of the research problem and questions than either method used by itself.

Key words: ICT, teachers' attitudes, technology integration.

INTRODUCTION

The introduction of ICT in the 20th century forced many countries to transform into information-oriented societies (Kozma, 2004; Law, Pelgrum & Plomp, 2008; Lewis, 2003). In this new millennium, school, as a social institution and an important element in the structure of any society where knowledge and skills are developed (Roeser et al, 2000), also fell under deformations (Kozma, 2004; Law, Pelgrum & Plomp, 2008; Lewis, 2003; Pelgrum, 2001; Sicilia, 2005). Under this digital epoch, the government of the Republic of Kazakhstan from 1997 started operating a systematic state policy for informatization of education (National Center of Informatization, 2010). According to the National Reports, in 2009 internetization and computerization had already covered – 98% of urban and 97% of rural schools (Damitov et al, 2009); which is considered to be a great progress within a short period of time. However, Kozma (2003) states that availability of ICT does not necessarily guarantee the teachers' "likelihood" to use this technology for educational purposes in their classrooms. Van Braak (2001) supports this idea confirming that teachers' attitudes toward ICT influence their acceptance of the technology predicting whether teachers will integrate ICT into their classrooms or not. These could be the reasons for the "impromptness" of ICT integration process in Kazakhstan.

In the literature, many scholars tried to determine factors (variables) that might have an influence on teachers' attitudes. According to the common views, among the most influential factors (variables) are: *confidence*, *knowledge*, *gender* and *age*. Taking into consideration the existing assumptions, the researcher constructed the framework which included all the factors mentioned above for this particular study (see Figure 1).

Confidence

Bandura (1991) refers confidence to an individual's ability to perform better in a particular situation. Perceived self-confidence in ICT is an important predictor of teacher's future or present performance quality. Novitzki's (1991) findings had shown that perceived degree of self-confidence in using ICT influenced the teachers' learning as well as their performance. Glasser (1981) explained this phenomenon in this way: teachers continually filter their behaviors and performance through their confidence to the extent that they try to change the "outside" world making it more consistent with the "inner" world. The psychological aspect of human mind – the balance between self-confidence and actual performance - can predict the teachers' further actions regarding technology integration in the classroom.

Knowledge

Watt (1980) states that ICT knowledge allows "a person to function comfortably as a productive citizen in a computer-oriented society" (p.3); which according to Woodrow (1994) is considered to be the basic requirement of a modern world. In this way, the knowledge of ICT helps a person not only climb career ladder, as it is quite

commonly believed to be, but also just to survive in the contemporary living conditions. Preston and Cox (2000) in their study explained that teachers' attitudes were limited by teachers' understanding of the advanced technology. Webb (2002) also mentioned in his study that the lack of knowledge about the concepts of technology was a significant limitation for teachers to design the curriculum activities to make appropriate use of ICT in the classroom.

Gender

The previous research largely ignored the complex systematic nature of gender as a core factor that influence ICT integration in school. Only few scholars reported about the dependence between these two variables. However, the assumption that info-communicational technologies are more important for male teachers than for females still exists (Spear, 1985). Sheffield (1996), who studied the attitudes of male teachers toward technology in education, found out that males are frequently more experienced with ICT than females. Shapka and Ferrari (2003) state: "Teachers may collectively be exacerbating gender biases simply by the patterns they exhibit in their own use of ICT" (p.329). These biases can impact negatively on students' perceptions of ICT, and what is more dangerous, can cause the later technological discomfort (Weil et al, 1990).

Age

Loyd and Gressard (1984) suggested that socialization and developmental characteristics of different age groups play an essential role in the perception of ICT. The interesting fact is that most of the scholars who were able to prove the correlation between two variables were not educators, but sociologists. For example, Morris (1988) studied the social influence of age on attitudes toward ICT. He conducted quantitative survey selecting 380 subjects with age ranging from seventeen to ninety. Both, Alpha and Spearman-Brown coefficient were .73, which was a perfect demonstration that age and computer attitudes were related in a significant manner.

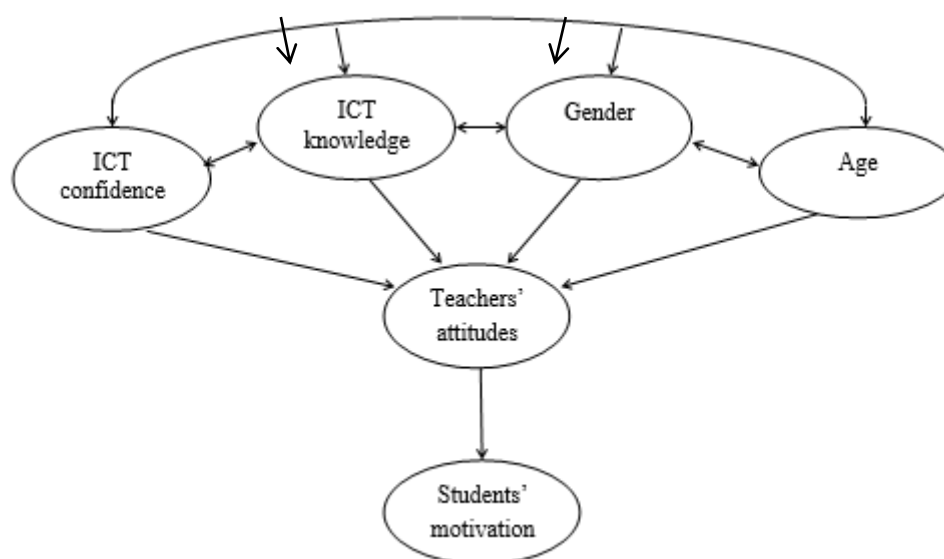


Figure 1. Factors that influence teachers' attitudes toward technology integration

The purpose of this study is to explore the role of teachers' attitudes toward technology integration in school through examining the factors that influence teachers' ICT attitudes (self-confidence, knowledge, gender and age) and analyzing the relationship between teachers' attitudes and their students' academic motivation. Three research questions are addressed:

1. *What are the teachers' attitudes toward ICT integration in school?*
2. *Do such factors as self-confidence, ICT knowledge, age and gender influence the teachers' attitudes?*
3. *What is the relationship between the teachers' attitudes toward ICT and their students academic motivation toward school subjects?*

METHODS

This study used a combination of two methods (quantitative and qualitative) which is called the mixed method - Explanatory Sequential Design. The quantitative data and results provided numeric data for building a general picture of the research problem giving an opportunity to find “statistical relationship between variables” (Keller, 2009). Through in-depth qualitative data collection, the researcher “collected the true stories about teachers’ experiences” in using ICT in the classrooms (Creswell, 2013, p.240). The focus group interview with students helped to compare the students’ perceptions with the information presented by teachers. The research was conducted in one particular school in Astana, which means that it was an in-depth exploration of a bounded system in terms of place (Stake, 1995) - an instrumental case study (Creswell, 2014).

Four research instruments were used in the study to help address the research questions:

1. Survey: “Teachers’ attitudes toward technology integration”;
2. Survey: “Academic motivation of students”;
3. One-on-one interview with teachers;
4. Focus group interview with students.

Sampling

During the quantitative stage of the study, simple random sampling among secondary school teachers and their students was used for selecting the participants. All the individuals had the equal probability to participate in the study (Creswell, 2009). The researcher had 29 teachers and 39 students. In this way the bias in the population was equally distributed among the participants (Creswell, 2014). The sample size was identified with the help of Sample Size formula (2014) according to which these numbers of participants were enough to have confidence that the survey results would be representative, with the Margin of Error less than 20% (see Formula 1, 2 and 3).

However, taking into account that the researcher will conduct a case study (one particular school in Astana), the sample needed corrections for the finite population (see Formula 3, 4 and 5) (Sample size formula, 2014).

Formula 1.

$\text{new ss} = \frac{\text{ss}}{1 + \frac{\text{ss}-1}{\text{pop}}}$	Where: pop = population (the total number of teachers = 93; the total number of students = 1323)
--	--

Formula 2.

$\frac{38}{1 + \frac{(38-1)}{93}} = 27 \text{ (teachers)}$
--

Formula 3.

$\frac{38}{1 + \frac{(38-1)}{1323}} = 36 \text{ (students)}$
--

During the qualitative stage the researcher used purposeful sampling strategy to choose the participants. Among 29 school teachers and 39 students, the researcher select 5 school teachers of different subjects with diverse backgrounds in using ICT for face-to-face interviews and 3 the most active ICT user-students for a focus group interview.

Limitations

This research was oriented only on one particular secondary school in Kazakhstan which could be considered as a limitation due to the fact that the conclusions drawn from this particular case hardly could be applied elsewhere. The results were not generalizable because the researcher can never know whether the case is representative of the wider body of "similar" instances or not (Creswell, 2014).

Taking into account that the analysis of qualitative data fully depended on the researcher’s own interpretation, there is always a possibility of being biased or subjective which could intrude the assessment of what the data really meant (Creswell, 2009).

PRELIMINARY RESULTS AND FINDINGS

RQ1: What are the teachers' attitudes toward ICT integration in school?

In order to answer the first research question, the researcher ran a frequency distribution analysis. The teachers' attitudes toward ICT survey included a series of statements where respondents indicated the extent to which they agreed or disagreed with the statement using a five-point scale (1-strongly agree, 2-agree, 3-neither agree nor disagree, 4-disagree, 5-strongly disagree). The results showed that all the participants filled the questionnaire, so there were no missing data. Almost half of the participants gained scores less than the average (=30) which represent that most of the respondents were closely to the group of teachers who possessed more positive attitudes toward technology integration in school. The mean is 24.03 (out of 60 possible) and standard deviation is 6.450 which meant that the frequency area was between 17.58 (very positive) and 30.48 scores (positive) (see Table 1). However, teachers argue that this desire was more imposed by the time rather than by their curiosity or willingness:

"We have to step in tune with the time. For example, when it was only the beginning of this process, special courses how to work with computers were organized... Because we had to work with this technology, even with a computer... we do not use it only here, at school, thanks God, we have some schools where there are computers in every classroom; plus, all of us have our own private life, for example - cell phones, because it is a demand of time. And also, our children are good at this technology... and we should not be left behind... elementary, in this case. And I also have to mention that it makes our life and work easier".

Table 1. Frequency Distribution - Teachers' Attitudes

Statistics	
Mean	24.03
Std. Deviation	6.450
TOTAL	29

RQ2: Do such factors as self-confidence, ICT knowledge, age and gender influence the teachers' attitudes?

The next step was to find the answer to the second research question. The researchers' null hypothesis (H_0) was: Such factors as self-confidence, ICT knowledge, gender and age of teachers do not affect their attitudes toward technology integration in school, and alternative hypothesis (H_1) stated the opposite: Self-confidence, ICT knowledge, gender and age of teachers do affect their attitudes toward technology integration in school.

Gender

An independent-samples t-test was supposed to be conducted to compare teachers' attitudes toward technology integration scores for male and female groups. The survey was answered by 29 randomly selected teachers: 1-male and 28 – females (see Table 2). This fact can be explained in the following way: the shortage of male teachers in Kazakhstan has always been a great problem due to the low remuneration and status of the profession which deterred men from teaching (Mpokosa et al, 2008). One of the participants pointed out:

"There is no need to mention the salary, which is miserable... that's why I understand the male teachers who don't go to work in school... because they are males, they are supposed to earn for a living... not for a surviving... but we are talking about the fact that we NEED males".

Table 2. Demographic Information

Variables		N	X
Gender	F	28	96.6
	M	1	3.4
TOTAL		29	100

Due to the fact that there was only one male teacher among the whole sample, the analysis was impossible. However, the interviewees' responses showed that none of teachers noticed any difference in attitudes between the representatives of different genders:

"(Is there any difference between the male's and female's attitudes toward ICT?)... We have 14 male teachers... And we think that we have enough males... But, no, I have never noticed something..."

ICT knowledge

An independent-samples t-test also was conducted to compare teachers' attitudes toward technology integration scores for those whose ICT knowledge was limited by observation only and those who were experienced with Microsoft Office (means possess ICT knowledge). The majority of teachers (75,9%) were able to work with Microsoft Office. The reason for such need of Microsoft Office traced in the responses of almost every interviewee was the amount of paper work teachers are required to do/type every day:

"The work became harder because of the paper work... Many people talk about this but nothing changes... Who needs all these papers? Who reads them? Nobody!"

"We still have a plenty of papers... For example, according to my personal experience, I can say that in the rural area, we used only one box of paper, and it was enough till the end of the semester. Now we spend 6-7 boxes of papers... I would say approximately 10. I compare... And after the lesson we are still sitting and writing these papers..."

while 10,3% of teachers were little more than observers. Despite this fact, the evidences from the interviews showed that teachers were willing to become advanced users but the lack time prevented them from this:

"... because PowerPoint is here and teachers are tired of the presentations format. Photoshop is also of a great need. Because we have to create portfolio and e-version of this portfolio. Everything is needed. Many people think that teachers do not need the knowledge how to use Photoshop, but they are mistaken. But it is necessary. Very necessary".

There was a significant difference in the scores for observers (M =33.67, SD =10.693) and knowledgeable (Microsoft Office) teachers (M =23.41, SD =5.058) (see Table 3);

Table 3. Teachers' Attitudes And ICT Knowledge

Variables		N	Mean	Std. Deviation
Teachers' attitudes	Observation only	3	33.67	10.693
	Microsoft Office	22	23.41	5.058

(t (23) = 2.888, p = .008, d =.651) (see Table 4). These results suggest that ICT knowledge of teachers has a moderate effect on their attitudes toward technology integration in school. The results can be generalized to the whole population.

Table 4. Independent Samples Test

Variables	Sig.	t	df	Sig. (2-tailed)
Teachers' attitudes	.028	2.888	23	.008

Self-confidence

The relationship between self-confidence (independent variable) and teachers' attitudes toward technology integration in school (dependent variable) was investigated with the help of a one-way between-groups ANOVA analysis. It compared the effect of self-confidence on teachers' attitudes toward technology integration for confident, average and non-confident teachers. There was a significant effect of confidence on teachers' attitudes toward technology integration at the p < .05 level for the 3 groups [F (3, 29) = 5.081, p = .007] (see Table 5).

Table 5. Teachers' Attitudes And Self-Confidence

Variables	df	F	Sig.
Teachers' attitudes and confidence	3	5.081	.007
TOTAL	29		

Post hoc comparisons using the **Scheffe** test indicated that the mean score obtained by confident teachers (M = 7.733) was not absolutely different from the mean score obtained by non-confident teachers (M = 7.733) (see Table 6). Taken together, these results suggest that self-confidence affects teachers' attitudes toward technology integration in school. So, the researcher can reject H₀. The results can be generalized to the whole population.

Table 6. Multiple Comparisons

Variables		Mean Difference	Sig.
Teachers' attitudes	Confident	-7.733*	.037
	Average confident	7.983	.100
	Non-confident	7.733	.188

However, the interviews responses showed that most of the teachers did not consider themselves to be confident in technology:

“Mmmmm... May be I have not learned everything I need to call myself confident ... I can do slides, presentations, other works... I can do... e-mail, send - not send... all these things I am familiar with... But, nevertheless, I think that there are still a lot of thing I should learn. A lot... It is an endless learning... I would say...”

“I would say that I am somewhere in the middle. Average. Because I know people who can do this better than me. We all know the basis, elementary level. For example, how to make presentations, animations... I, personally, cannot do these animations! I would say that I am average. At least I can find the information I need. Or download this information, copy – paste... etc. Print it out. Show on the screen... what else? Make it full screen or small screen. Because, sometimes I notice, that people cannot do even such simple things”.

Age

The same a one-way between-groups ANOVA (see Figure 2) was conducted to compare the effect of age on teachers' attitudes toward technology integration for 22-30, 31-40, 41-50 and 51 or more age groups. There was no significant effect at the $p < .05$ level for 4 groups [$F(3, 29) = .337, p = .799$] (see Table 7). So, the researcher cannot reject H_0 and results cannot be generalized to the whole population.

Table 7. Teachers' Attitudes And Age

Variables	df	F	Sig.
Teachers' attitudes and age	3	.337	.799
TOTAL	29		

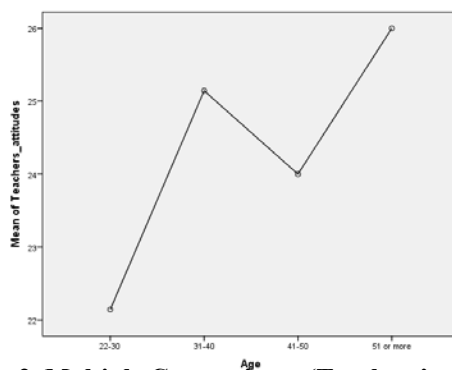


Figure 2. Multiple Comparisons (Teachers' attitudes and age)

Surprisingly, this results strongly contradicted with teachers' opinion. Many of the interviewees stressed that there was a great influence of age on teachers'attitudes toward technology integration. They also explained the reasons for such interrelations:

“For example, the older teachers are not willing to go to courses and learn how to use ICT. They will go only if they have something from this... for example - money... because they are going to retire in the near future... They do not need it! Also, I have heard that older teachers are not accepted as potential users... for example, our older teachers are good at ICT, even better than we (young teachers) are... But the instructors (in courses) think that older generation cannot think like young people... and old teachers are ignored”.

“Young teachers learn how to use ICT faster because they meet with it starting from their school years. In our time it was not so... of course, the provision with technology now is better. This is the reason. And it is right. It is not because they are cleverer or younger... because they are already familiar with this technology... from school years...”

“The younger generation, those who were born in the 90s, completed the higher education in the 21st century. I mean that the higher education institutions have already started using ICT. That is why I think that young teachers are closer to technology... Definitely... That is why they got used to use ICT. And we, the older generation, are used to write everything down, then to read it, and only then, to type something... You see, we need all these stages... The people who have Soviet mentality, work in this way... first read, research, and only then do”.

“I think that young teachers are better. For example, I, personally, when have problems go to ask for help... and these young teachers are always ready to help me. I think that I cannot know everything or be sure about something on 100%... May be 50-60%... no more... I can judge because I have two daughters... they are more confident... and young teachers here (in school) are the same...”

However, the students’ opinion about this issue varied. The majority did not notice any difference between young and old teachers’ attitudes:

“I think that they are equal and use technology equally”.

“I think that both (young and old teachers) use technology equally. No difference because we have an opportunity to observe the old and the young teachers. I haven’t notice... Maybe because they do not use ICT very often”.

Other pointed out that the difference exists but it is not so gross and obvious:

“Yes, there is a difference but not so big. Young teachers are more developed and modern. They are confident and experienced users of technology”.

“I also think that young teachers use interactive board more often”.

RQ 3: What is the relationship between the teachers’ attitudes toward ICT and their students academic motivation toward school subjects?

Frequency distribution analysis was run in order to get general information whether teachers’ attitudes toward ICT influence their students’ academic motivation toward school subjects. The questionnaire was answered by 39 students (19- males and 20 - females) (see Table 8).

Table 8. Demographic Information

Variables		N	X
Gender	F	20	51.3
	M	19	48.7
TOTAL		39	100

There were no missing data. Almost half of the participants gained scores less than average (=25) which represented that most of the respondents had academic motivation toward school subjects due to the fact that teachers possessed positive attitudes toward ICT. The mean is 24.36 (out of 50 possible) and standard deviation is 4.992 which mean that the frequency area will be between 19.368 (motivated) and 29.352 (neither motivated nor unmotivated) scores (see Table 9).

Table 9. Students’ motivation

Statistics	
Mean	24.36
Std. Deviation	4.992
TOTAL	39

During the focus group, all the students unanimously answered that the teachers’ favorable attitudes toward ICT positively affected their motivation toward school subjects. However, it was hard for them to remember any examples. But their general opinion was that something they used every day wastefully was finally beneficially utilized. Moreover, teachers during the interviews proved this by giving several examples:

“I have noticed the student's interest. They are attracted by all these notions, innovations, pictures, movements, animations... they grab students’ attention raising their motivation toward subject. Every single teacher knows that if you present the information creatively, students will remember this information anyway... they do this unconsciously... The knowledge will be kept in their memory for longer...”

“For example, let's imagine that we have a teacher who does not use ICT at all... This teacher uses traditional methods of teaching... posters, pictures, etc... There is a possibility that he or she can explain the material... but again, students will not be motivated because everything that is connected with the traditional methods of teaching is boring for them...”

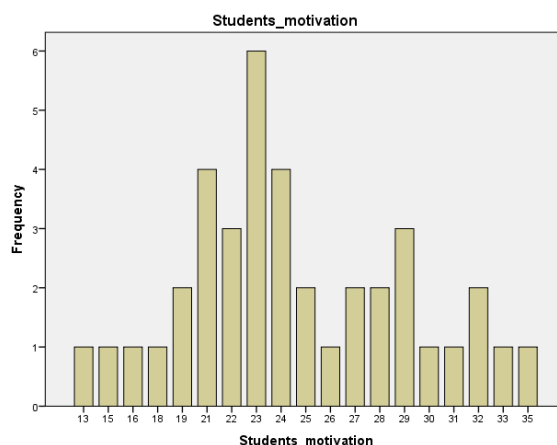


Figure 3. Students' motivation

“Well, I had a student – Sasha. He made the presentation with the use of ICT about Anna Akhmatova. First of all, he did it very responsibly... and not only because of the mark. He was not so very good at my subject... I cannot say that he was an underachievement student, but still... But, he worked hard, really hard... he liked technology and was able to prepare the great presentation where he presented the different periods of Anna Akhmatova's life... He had chosen wonderful background music... students and I cried... You know that children, they do not lie... their reaction is natural... There were some moments where children applauded Sasha...”

“I really like organizing the “reading evenings”... where we prepare poems and musical compositions... performances... Some people can say that it is old-fashioned... We dedicated it to Yessenin... There was one girl who liked the Russian language and literature, and she created an admirable film about Yessenin's life... his family... The whole life and work of Yessenin were presented in this film... Moreover, we turned on the audiotape with Yessenin's real voice. And that was the most interesting thing for students... After, they asked whether it was his real voice... After the concert one of the teachers came to me and said she cried... The atmosphere was great: everything was so... especially the background music... the film... That girl, she volunteered to create this film... I can say that this is the real motivation”.

CONCLUSION

In this way it can be concluded that teachers' attitudes toward technology had a great influence on ICT integration in one of secondary schools in Kazakhstan. The results showed that mostly, the teachers of that particular school were very positive regarding ICT in education, which means that the informatization of secondary education in the country has all changes to be successfully implemented because the main facilitators of this process (teachers) see the necessity to promote it. The mutual relationships between influential variables (ICT knowledge, self-confidence, age and gender) and teachers' attitudes could be interpreted as in Figure 3. According to the data analysis, most of the teachers were knowledgeable enough to conduct the lessons appropriately using ICT in the classrooms, and students noticed positive changes in the teachers' practice. This fact was supported by the statistics, which showed that ICT knowledge and teachers' attitudes were positively correlated. As for the self-confidence, the numeric data demonstrated the significant influence ($p = .007$) of confidence on teachers' attitudes. Another interesting fact was that the age factor, which was commonly believed to have a huge influence, had no effect on teachers' attitudes: the assumption that young teachers were better at ICT and thus possessed more positive attitudes toward its integration than their older colleagues was not proved ($p = .799$). Unfortunately, it was impossible to analyze the relationship between teachers' attitudes and gender variables because of the lack of male teachers participated in the survey; this was counted as an additional limitation for this study. Lastly, it should be stressed that teachers truly believed that ICT facilitated the study process positively affecting their students' academic motivation, and the students' interview responses supported this belief. However, even technology, with all the advantages, is dependent on human factor; still only people decide whether something will take place in their lives or not.

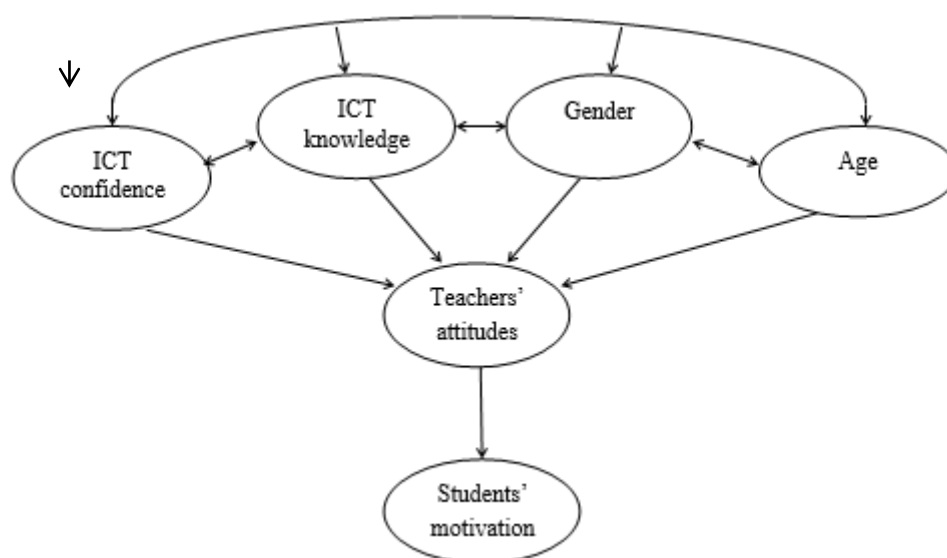


Figure 3. The relationships between influential factors, teachers' attitudes and students' academic motivation

RECOMMENDATIONS

The shortage of male participants in this study caused the infeasibility of analytical calculations in SPSS program. In further research, it will be useful to choose purposeful sampling in order to have an opportunity to control the proportion of male and female participants.

This research was based on survey and interview instruments. The next studies could improve the study by building a classroom observation. In addition, a longitudinal study will be recommended which might be helpful to trace changes in teachers' attitudes with and without technology.

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COMPARISON OF SOME EXECUTION TIME MEASUREMENT CODES ON UBUNTU

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ABSTRACT: With the growth of information technology, the processing of data requires high computer performance. The performance measurement is an important part in the design of applications for high performance computing environments found in research and industry (Al-Hashami). Especially, execution time is very important for some applications. But some operating systems or programming languages do not support current time (nanoseconds or microseconds) measurement. Therefore, we aimed compare of some execution time measurement codes in C++ programming language on Ubuntu Operating System. We coded them by Qt Creator using C++ language and Linux GCC used as a compiler.

Key words: comparison, execution time, time measurement, ubuntu

INTRODUCTION

Computer programmers have multiple ways for programming in programming languages. Many programmers want to execute of programs within the shortest possible time. Execution time depending on algorithm of the program. Programming languages are support or not support to excellent execution time measurement of programs. For example, in C/C++ programs could measure execution time of some computer programs with Miliseconds or Nanoseconds. C/C++ languages have a lot of time measurement codes.

We worked on various algorithms. Short execution time is important for a computer program. In this paper, we tried to some measurement codes to identify which code is the best to measure of execution time.

In this work, we wanted to work on Linux. Therefore, we used to Ubuntu operating system. We coded execution measurement codes by Qt Creator using C++ language and Linux GCC used as a compiler.

TIMING METHODS IN C++ UNDER THE UBUNTU

Measurement of the execution time can be done in multiple ways in C++. Except for the time resolution issue, different timing methods works relatively the same in single processor environment. Nowadays, multi-core processors become more prevalent. However, we need to be careful at choosing the correct timing mechanism. In this section, we will examine a few commonly used method in measuring time intervals under the Ubuntu operating system. The methods (codes); Time(), Clock(), GetTimeOfDay(), RDTSC(), Clock_Gettime(). We explained these codes shortly.

Time(): This function returns time with the accuracy to a second. The function is generally useful for measuring long-running processes. Pointer to an object of type time_t, where the time value is stored (Function time). Fig. 1 illustrates the Time() function.

```
void Time() {
    time_t t1, t2;
    time(&t1);
    Do_it(); //measure of time execuiton func.
    time(&t2);
    cout << "time() |: " << t2 - t1 << " s" << endl;}
```

Figure 1. Codes of Time Function

Clock(): The clock function returns the processor time consumed by the program. The value returned is expressed in clock ticks. The resolution of this timer is determined by CLOCKS_PER_SEC. It determines the number of CPU clock cycles elapsed. The function often uses for time measurements in a single core systems (Function clock). The Clock() function shown in Fig. 2.

```
void Clock() {
    clock_t t1 = clock();
    Do_it(); //measure of time execuion func.
    clock_t t2 = clock();
    cout << "clock() : " << (float) (t2 - t1) / (float) CLOCKS_PER_SEC << " s" << endl;}

```

Figure 2. Codes of Clock Function

GetTimeOfDay(): This function gets the time of day in the <sys/time.h> header. The function suggests measures the wall time and thus is suitable for time measurement in multi core systems(Function gettimeofday). The GetTimeOfDay() function shown in Fig. 3.

```
void GetTimeOfDay() {
    timeval t1, t2, t;
    gettimeofday(&t1, NULL);
    Do_it(); //measure of time execuion func.
    gettimeofday(&t2, NULL);
    timersub(&t2, &t1, &t);
    cout << "gettimeofday() : " << t.tv_sec + t.tv_usec / 1000000.0 << " s" << endl;}

```

Figure 3. Codes of GetTimeOfDay Function

RDTSC(): The time stamp counter is excellent high resolution low overhead way of getting CPU timing information. This function is available since Pentium CPU. Fig. 4 elucidates the RDTSC() function.

```
unsigned long long rdtsc() {
    unsigned a, d;
    __asm__ volatile("rdtsc" : "=a" (a), "=d" (d));
    return (((unsigned long long) a) | (((unsigned long long) d) << 32));
}
void RDTSC() {
    unsigned long long t1, t2;
    t1 = rdtsc();
    Do_it(); //measure of time execuion func.
    t2 = rdtsc();
}

```

Figure 4. Codes of RDTSC Function

Clock_GetTime(): This function gets the current time of the clock specified by clock_id, and puts it into the buffer. The only supported clock ID is CLOCK_REALTIME(C Tutorial). The Clock_GetTime() function shown in Fig. 5.

```
void ClockGettime() {
    timespec gres, t1, t2;
    clock_getres(CLOCK_REALTIME, &gres);
    clock_gettime(CLOCK_REALTIME, &t1);
    Do_it(); //measure of time execuion func.
    clock_gettime(CLOCK_REALTIME, &t2);
    cout << "clock_gettime() : " << (t2.tv_sec - t1.tv_sec)
    + (float) (t2.tv_nsec - t1.tv_nsec) / 1000000000.0 << " s" << endl;}

```

Figure 5. Codes of RDTSC Function

TIME MEASUREMENT

We coded the all codes by Qt Creator using C++ language and Linux GCC used as a compiler under Ubuntu operating system. The qualifications of the operating computer on which the time is measured are shown in Table 1.

Table 1. Qualifications Of Computer	
Qualifications	
Processor	Intel Core i5-2400 CPU - 3.10Ghz
Operating System	Ubuntu 12.04 LTS
Memory	4Gb DDR3 - PC3-10700 (667Mhz)
Main Board	Acer Veriton X4610G

All of the timing routines are timed against the same OpenMP parallel for loop. To see which time measuring method accomplishes the best time measurement, we tested the execution time of the loop codes in Figure 6.

```
for (long i = 0; i < 70000; i++)
    for (long j = 0; j < 30000; j++);
```

Figure 6. Codes of Loops

The time measurement results are shown in Fig. 7.

```
time() : 5 s
clock() : 4.75000 s
gettimeofday() : 4.74758 s
rdtsc() : 4.59176 s
clock_gettime() : 4.75132 s
```

Figure 7. Time Measurement Results

Then, we used the following loop codes (in Fig. 8) and the time measurement results are shown in Fig. 9.

```
for (long i = 0; i < 700; i++)
    for (long j = 0; j < 300; j++);
```

Figure 8. Codes of Loops

```
time() : 0 s
clock() : 0.00000 s
gettimeofday() : 0.00041 s
rdtsc() : 0.00040 s
clock_gettime() : 0.00044 s
```

Figure 9. Time Measurement Results

Also, we measured an encryption algorithm of execution time. The time measurement results of the algorithm are shown in Figure 10.

```
time() : 0 s
clock() : 0.00000 s
gettimeofday() : 12 µs
rdtsc() : 0.01121 ms
clock_gettime() : 11767.00000 ns
```

Figure 10. Time Measurement Results Of An Encryption Algorithm

CONCLUSION

In this work, we used the five measurement methods for three implementations. Time measurement results are shown in Fig. 7, Fig. 9 and Fig. 10.

The examination of figure 7 that makes measurement of seconds indicates that the best method to measure execution time is RDTSC. Then GetTimeOfDay, Clock (rounding off), Clock_Gettime, Time methods follow it respectively. The other hand, examination of figure 9 that makes measurement of milliseconds indicates that the best method to measure execution time is RDTSC. Then GetTimeOfDay, Clock_Gettime methods follow it

respectively. However, it is found out that Clock and Time methods results in 0. In the last one examination of figure 10 that makes measurement of microseconds indicates that the best method to measure execution time is RDTSC. Then Clock_Gettime, GetTimeOfDay(rounding up) methods follow it respectively. However, it is found out that Clock and Time methods results in 0 same as figure 9.

Consequently, it is obviously seen that by far the best execution time measurement method is RDTSC for all three implementations.

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ATTITUDES OF BIOENGINEERING AND MECHANICAL ENGINEERING STUDENTS TOWARDS ENGLISH : A CASE OF KAFKAS UNIVERSITY

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ABSTRACT: English language teaching and learning has been among one of the most heated issues in Turkish educational system, the intended level hasn't been reached, though. In literature it is generally accepted that positive attitudes are important factors in language learning. In this respect, the aim of this study is to determine the attitudes of Bioengineering and Mechanical Engineering students towards English. In order to carry out the study an attitude scale prepared by Ambarlı-Kırkız (2010) was administered to 65 Mechanical engineering and 36 Bioengineering students studying at Kafkas University, Kars. For the data analysis, SPSS 20 program was used and for the assessment of the results independent Sample t-test and descriptive statistics were used. According to the result of the study, the majority of the participants had negative attitudes towards English. The results of the study showed that there was no significant difference between the attitudes of male students and female ones $t(247)=2,45$, $p>0,05$ and that there was no significant difference between the attitudes of Mechanical Engineering students and Bioengineering students in relation to their departments $t(99)=0,264$, $p>0,05$.

Key words: attitudes, bioengineering, mechanical engineering, Kafkas University, language learning.

INTRODUCTION

Background of the Study

In the language teaching and learning process, the success and failure of the learners have been the focus of the researchers for a long time. In some research success and failure in language learning, namely English, have been studied in relation to affective factors (Gardner, 1980; MacIntyre&Charos, 1996). These factors are acculturation, personality, ego, beliefs, emotion, motivation, and attitude. According to Noels, et.al., (2000) affective variables such as attitude, orientations, anxiety, and motivation are at least as important as language aptitude for predicting L2 achievement (cited in Darabad, 2013, p.117).

Some of the researchers in the field attempted to define attitudes (Crystal, 1997; Eveyik, 1999, and İnal, et al. , 2003) some focused on the relationship between on the attitudes and achievement or failure (Gardner, 1985; Brown, 1994; Starks &Paltridge, 1996; Lafaye and Tsuda, 2002; Csizér and Dörnyei, 2005; Kara, 2009; Kiptui and Mbugua, 2009; Fakeye, 2010, and Darabad, 2013).

For example Crystal (1997, p. 215) defines attitudes as the feelings people have about their own language or the languages of others. In general terms Eveyik (1999) defines attitude as the state of readiness to respond to a situation and an inclination to behave in a consistent manner towards an object. And also, İnal, et al. , (2003, p. 41) state that "attitude refers to our feelings and shapes our behaviors towards learning".

In another related study, Gardner (1985) stated that the learners' attitudes towards learning play a key role in enhancing and motivating them to learn that language. Besides, Brown (1994, p. 168) says that attitudes, like all aspects of the development of cognition and affect in human beings, develop early in childhood and are the result of parents' and peers' attitudes, contact with people who are different in any number of ways, and interacting affective factors in the human experience.

According to Starks &Paltridge (1996) learning a language is closely related to the attitudes towards the languages (p.218) and this idea is supported by Csizér and Dörnyei (2005) as they maintain that attitude is an important factor in language learning.

Similarly, Kara (2009) suggests that positive attitudes lead to the demonstration of positive behavior towards fields of study with the participants being interested in courses determining to learn and study more, which is

backed by a study carried out by Fakeye (2010) as he states that the matter of learner's attitude is accepted as one of the most important factors that impact on learning language

In another study, Kiptui and Mbugua (2009) determined that negative attitude towards English was the most effective and psychological factor causing poor performance in English. In parallel with the field research mentioned above, Darabad (2013) states that student's attitude is an integral part of learning and that it should, therefore, become an essential component of second language learning pedagogy (p.117).

Problem

Although so much effort and budget has been spent on language learning and teaching, the expected level cannot be reached.

Purpose of the Study

As the field study maintains, achievement or failure in language learning may stem from the positive or negative attitudes of the learners, the purpose of this study is to determine the attitudes of Bioengineering and Mechanical Engineering students towards English.

Research Questions

1. What are the attitudes of the students at Kafkas University, Faculty of Engineering and Architecture, in the departments of Mechanical engineering and Bioengineering towards English?
2. Is there any significant difference between Mechanical Engineering and Bioengineering Students in relation to attitudes towards English classes?
3. Is there any significant difference between First year and Second year students in relation to their attitudes towards English classes?
4. Is there a significant difference in the attitudes of students in relation to their gender?

METHODS

Participants

Subjects of the study were 65 Mechanical engineering and 36 Bioengineering students studying at Kafkas University, Kars.

Data Collection Instrument

In this study a survey method was used to determine the attitude of the students towards English. In order to collect the intended data, an attitude scale prepared by Ambarlı-Kırkız (2010) was used. Cronbach Alpha for the scale was 0,93. The attitude scale consisted of two parts. Part one (A), elicited demographic data related to the participants. Part two (B), containing 20 items of a 5-likert Type scale, and elicited information in relation to the students' attitudes towards English. 10 of the statements were positive attitude statements and 10 negative ones. During the evaluation process positive attitude statements were accepted as 5-4-3-2-1, whereas negative ones were as 1-2-3-4-5.

Data Collection Procedure

The survey started on 5th March 2015 and finished on 2nd April. Before the survey questionnaire was administered, the students' willingness as well as the school authorities consent was taken by the researcher, ensuring data anonymity and confidentiality. The survey was administered during the regular class hours. On an average, it took twenty minutes to complete the questionnaires. The data were analyzed using SPSS 20. The results of the analysis have been given in results and findings.

Data Analysis

For the data analysis SPSS 20 for windows was used and significance level was set as 0, 05. For the statistics, descriptive statistics and independent simple t-test were used.

RESULTS AND FINDINGS

Demographic data related with the participants genders, departments and classes have been given in Table 1.

Table 1. Genders, Departments and Classes of the Participants

Department	Gender		Class					
	F. (N) %	%	M.(N)		1 st Y. N		2 nd Y. N	
Mechanical Engineering	14	21,5	51	78,5	40	61,5	25	38,5
Bioengineering	15	42,0	21	58,0	13	36,0	23	64,0
Total	29	27,0	72	73	53 52,0		48	48,0

Note: F= female, M=Male, 1st Y= First Year, 2nd Y= Second Year

As can be seen, in the study, there are 72 (73 %) male students and 29 (23 %) female students, 65 (65%), 36 (36 %), and 53 (52 %) of them are first year students and 48 (48 %) are second year students.

Answers to the Research Questions

Research Question 1: What are the attitudes of the students at Kafkas University, Faculty of Engineering and Architecture, in the departments of Mechanical engineering and Bioengineering towards English?

Table 2. Participants' Attitudes Towards English Classes

Attitude Towards English	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	f	%	f	%	F	%	f	%	f	%
1. I think English is boring.	37	36,6	31	30,7	15	14,9	7	6,9	11	10,9
2. I think English is more enjoyable than other classes.	22	21,8	28	27,7	12	11,9	25	24,8	13	12,9
3. English teacher's criticizing me makes me bored.	40	39,6	25	24,8	18	17,8	7	6,9	10	9,9
4. Even though I study hard, I get low marks in English class.	31	30,7	31	30,7	16	15,8	13	12,9	10	9,9
5. English class satisfies me.	21	20,8	20	19,8	18	17,8	20	19,8	18	17,8
6. As I forget the topics in English easily, I don't want study English.	18	17,8	24	23,8	19	18,8	20	19,8	18	17,8
7. As I believe English is beneficial for me, I like it .	37	36,6	28	27,7	18	17,8	10	9,9	7	6,9
8. As I have to study English, I study it	19	18,8	36	35,6	8	7,9	13	12,9	23	22,8

9. I like sharing the information I have learnt in English class with others.	14	13,9	26	25,7	13	12,9	33	32,7	14	13,9
10. I don't like the way English is taught.	21	20,8	33	32,7	16	15,8	9	8,9	18	17,8
11. When English class contains current information, I like it.	37	36,6	33	32,7	12	11,9	16	15,8	2	2,0
12. I have difficulty in understanding the topics in English.	18	17,8	32	31,7	21	20,8	19	18,8	10	9,9
13. My English teacher's friendly manners make me enjoy the class.	21	20,8	21	20,8	27	28	18	18	13	12,9
14. During the day when there is an English class, I don't want to go to school.	37	36,6	28	27,7	17	16,8	7	6,9	11	10,9
15. I like English as I have the ability to learn it.	20	19,8	24	23,8	23	22,8	18	17,8	15	14,9
16. I think English is nonsense, so we do not need it.	43	42,6	28	27,7	14	13,9	8	7,9	7	6,9
17. I love studying English.	21	20,8	18	17,8	30	29,7	17	16,8	13	12,9
18. English is not among the most important lessons for me.	23	22,8	31	30,7	23	22,8	23	22,8	15	14,9
19. I like English as it is easy and understandable.	19	18,8	22	21,8	28	27,7	19	18,8	12	11,9
20. I look forward to having English classes.	10	9,9	24	23,8	25	24,8	21	20,8	20	19,8

Table 2. shows that the majority of the participants have negative attitudes towards English as they strongly agree 37 (36,6%) and 31 (30,7%) agree that English is boring. Similarly they believe that even though they study hard, they get low marks in English classes as 31 (30,7%) strongly agree and 31 (30,7%) agree. Also, they are mostly of the opinion that English teacher's criticizing them makes them bored as 40 (39,6%) strongly agree and 25 (24,8%) agree.

However, 37 (36,6%) of the participants strongly agree and 33 (32,7%) agree that when English class contains current information, they like it.

On the other hand, 10 (9,9%) strongly agree and 24 (23,8%) disagree that they look forward to have English classes 10 (9,9%). Likewise, 19 (18,8%) of them strongly agree and 22 (21,8%) agree that they like English as it is easy and understandable.

Research Question 2: Is there any significant difference between Mechanical Engineering and Bioengineering students in relation to attitudes towards English Classes?

Table 3. Students' Departments And Their Attitudes Towards English Classes

Department	N	\bar{X}	S	t	sd	p
Mechanical Engineering	65	51,72	14,60	,264	99	,79

Bioengineering	36	50,91	14,88
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It is apparent in Table 3 that there isn't any significant difference between the attitudes of Mechanical Engineering students and Bioengineering students $t(99) = 0,264, p > 0,05$.

Research Question 3: Is there any significant difference between first year and second year students in relation to their attitudes towards English Classes?

Table 4. Students' Classes And Their Attitudes Towards English Classes

Class	N	\bar{X}	S	t	sd	p
First year	77	50,50	14,53			
Second year	24	54,41	14,86	-1,14	99	,25

It is clearly seen in Table 4, there isn't any significant difference between the attitudes of the first year students and second year students $t(99) = -1,14, p > 0,05$.

Research Question 4: Is there any significant difference in the attitudes of students in relation to their genders?

Table 5. Students' Genders And Their Attitudes Towards English Classes

Gender	N	\bar{X}	S	t	sd	p
Female	29	49,72	15,29	-,744	99	,45
Male	72	52,12	14,41			

It is apparent in Table 5, there isn't any significant difference between the attitudes of the female and male students $t(99) = -,744, p > 0,05$.

CONCLUSION AND DISCUSSION

In a study carried out by Abidin et. al (2012) in relation to the three aspects of attitudes such as cognitive, behavioral, and emotional, the participants showed negative attitudes towards learning English. Similarly, Elkılıç et. al., (2010) in a study on the attitudes of Education Faculty Students towards Compulsory English Courses: The Case of Ağrı Ibrahim Çeçen University found out that 54, 2% of the students had a negative attitude towards compulsory English courses, whereas 45, 8% of them had positive attitude. In a study carried out by Lafaye and Tsuda (2002) on Japanese students' studying at Tokai Gakuen University it was determined that two thirds of the 1st year and 2nd year students do not like studying English.

However in a study carried out in Iran on 40 medical students Soleimani and Hanafi (2013) found out that Iranian medical students held highly positive overall attitude regarding English language learning. In the same way a study by Alkaff (2013) on 47 female students at the English Language Institute (ELI) of King Abdulaziz University (KAU) in Jeddah, Saudi Arabia, showed that most students had a positive attitude towards learning English and that they tried to improve their English. In another study on 190 eighth grade students of a private primary school in Adana, Turkey, Karahan (2007) found out that much as the participants were exposed to English in a school environment more frequently than other students at public schools, they had only mildly positive attitudes.

The present study is in parallel with Abidin et. al (2012), Elkılıç et. al., and Lafaye and Tsuda (2002) as the majority of the participants have negative attitudes towards English.

As for the genders, Shoaib and Dornyei (2005) showed that female second language learners show more positive attitudes and performances compared with the male learners. And also Elkılıç et. al., (2010) in the same study discovered that there was a significant difference between the attitudes of male students and female ones on behalf of females. In another study, Soku, et al. (2011, p.22) determined that gender had a significant effect on students attitudes to the study of English and that especially female students had higher rates.

On the other hand, in Karahan's (2007) study male students had higher rates than those of females. However, in the current study, there isn't any significant difference between the attitudes of the female and male students.

Gardner and Smythe (1975) found that 13- through 18-year-old students' attitudes Toward the French Canadian community became more positive when the students spent more time studying French. Similarly, Kraemer and Zizenwine (1989) found that South African students' attitude toward Hebrew, when enrolled in a Hebrew foreign language class, became less positive after grade nine. Tucker and Donato (2001) similarly found that students' attitudes toward learning Japanese increased from grades four to six, but dropped sharply in grade seven. However, in the present study there isn't any significant difference between the attitudes of the first year students and second year students.

The study also revealed that there is no significant difference between the attitudes of Mechanical Engineering students and Bioengineering students in relation to their departments.

RECOMMENDATIONS

1.As is clear from the results of the study, it is necessary to raise students' awareness toward English that English is not only used by native speakers but it is extensively used among second and foreign language speakers as communicative tools.

2.Teachers should bring authentic material to the class to make the lesson enjoyable.

3.English language teachers at the faculty of Engineering and Architecture, in the departments of bioengineering and mechanical engineering should encourage students to participate in the classroom activities.

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A STUDY TO ANALAYSE THE MAIN FACTORS ON THE SUCCESS OF WOMEN ENTREPRENEURS IN NORTH CYPRUS

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ABSTRACT: There are many factors which contributes to the success of women entrepreneurs. Skills are one of these. Thus the purpose of this study is to investigate the skills that have contributed to the success of women entrepreneurs in North Cyprus. The data of the study are collected through questionnaire. The questionnaire has three sections. Section one includes personal questions related to the participants, section two includes questions about the companies and in section three, there is a list of skills that were mostly accepted as the skills of successful entrepreneurs. Also an open-ended question is added to the questionnaire. Nineteen women entrepreneurs from different sectors are selected as the population of this research. The paper is important as it investigates the skills that lead to success of a group of women entrepreneurs in North Cyprus. Moreover it is aimed to be a base for the related researches and a route for the future entrepreneurship education programs and entrepreneurial activities for women in North Cyprus.

Key words: entrepreneurship, skills, women entrepreneurs, entrepreneurship education.

INTRODUCTION

Entrepreneurship plays a significant role for the countries. Considering its feature of creating job opportunities, it is accepted as the key driver of the economies. In this respect, countries should take some steps to increase the awareness of entrepreneurship and make it part of their culture.

The aim of this article is to analyse the skills of the women entrepreneurs in North Cyprus as a success factor. It is believed that, the findings of this study will give a route to future studies related and make suggestions for the entrepreneurship education programs.

Many researches are done about the success of women entrepreneurship (Jean Lee, (1997), Ove C. Hansemark, (1998), Robert D. Hisrich, Sevgi Ayse Öztürk, (1999), Spinder Dhaliwal, (2000), Ruth McKay, (2001)). When we look at North Cyprus studies about the women entrepreneurship, the study of Katircioglu, S. and Jenkins, H. P. (2007) appears as an important study which focuses on the social and business factors affecting the success of women entrepreneurs. The recent studies about the field appears as the studies of Dorothy Perrin Moore Jamie L. Moore Jamie W. Moore, (2011), Golshan Javadian Robert P. Singh, (2012), Siwan Mitchelmore Jennifer Rowley, (2013), Njoku O. Ama Kagiso T. Mangadi Helen A. Ama , (2014). This paper addresses the extraction of key skills that plays important roles in the successes of women entrepreneurs, specifically in North Cyprus.

The outline of this article is as follows. Firstly, the information provided about researches for women entrepreneurship. Next, the methodology for this research is described, including the design of the questionnaire, data collection method and data analysis. The Findings section presents the results of the analysis. Finally, the article concludes with a summary addressing the aims of the study, a contribution of the research to the future researches in that area.

METHODOLOGY

The aim of this study is to investigate the skills that lead to success of women entrepreneurs in North Cyprus. Participants were identified through associations like Turkish Cypriot Women Entrepreneurs. At the beginning of the questionnaire, information about the title and aim of the study were explained clearly to the participants. Questionnaires include three sections. First section includes questions about personal information. Questions like age, education, living places and marital status are asked to the participants. Second section includes questions about companies. Questions regarding the number of years in business, the sectors, legal status of the companies and the number of employees in company are asked to the participants. The last sections include tick boxes about skills and an open-ended question provided for the respondents to give them opportunity to share their thoughts about the skills that put contribution to their success in their business life. In this section, skills like leadership, communication, decision-making, projecting, creativity, teamwork, seeing opportunity, self-confidence, and realism are given as a list. The participants are asked to rate the degree of the skills. Five degrees, ranging from 'very low' to the 'very high' are given below each skill. Then, the participant scores are transformed into numerical values ranging from 1 to 5 where 1 means 'very low' and 5 means 'very high' degree.

RESULTS

The results of the questionnaire are considered in two parts. The first part provides the statistics about the participants and their business. The second part provides the scores for the entrepreneurship skills that are evaluated by the participants. The results of the first part is given in Table I.

Table I. Personal and Business Information of Participants.

Variables	Ranges	Count
Age	20-30	1
	31-40	10
	41-50	3
	51-70	5
Education Level	High School	5
	University	9
	Higher Degree	5
Entrepreneurship Education	Present	5
	Absent	14
City	İskele	4
	Gazimağusa	6
	Lefkoşa	9
Marital Status	Single	3
	Married	14
	Divorced	2
No. of years in business	0-5	3
	6-10	5
	11-15	3
	16-20	1
	21-25	4
	>26	3
Number of Employees	1-5	14
	6-10	1
	11-20	1
	30-40	1
	>50	2

We can see from Table I that, the majority of the participants are between the ages of 31 and 40. The educational level of all the participants are in at least high school level. Moreover, the majority of the participants did not study any entrepreneurship related coursework in their educational life. Additionally, it is seen from Table I that most of the participants are married. The distribution of the participants according to the selected cities of North Cyprus, number of years the entrepreneurs spent in business and the number of employees are also presented in Table I.

In Table II, some of the business sectors of the companies for the participants are listed. We see that the variety of sectors are involved in the analyses.

Table II. Some of the Business Sectors Involved in the Analyses.

Business Sectors	
Education	Consultancy
Textile	Finance
Food	Stationary

Table III. Average Participant Scores for the Entrepreneurship Skills.

Skill	Average Score
Leadership	3.94
Communication	4.47
Decision-making	4.26
Projecting	3.89
Creativity	4.31
Teamwork	4.31
Seeing opportunity	4.05
Self-confidence	4.26
Realism	4.21
Maximum	4.47
Minimum	3.89
Mean	4.20

The average participant scores are given in Table III. When we analyze Table III, we see that the mean score for all the skills is around 4.2 which means that the included entrepreneurship skills are significantly contributing to the successes of the women entrepreneurs. The communication skill has the highest score as 4.47. The lowest score is obtained from projecting. Therefore, besides all the skills significantly contributing to the success, the test results show that the communication skill has more significance. On the other hand, the test results show that the projecting has the least significant effect on the success.

When we analyze the scores according to the mean score, that is 4.20, we see that decision-making, creativity, teamwork, self-confidence and realism are above the mean score meaning that they have more effect on success. Among these skills, teamwork and creativity are the second highest scores. On the other hand, leadership, projecting and seeing opportunity skills are scored less than the mean score meaning that compared to the other skills, these are having less effect on the success.

CONCLUSION

This study is about the skills that have contributed to the success of women entrepreneurs in North Cyprus. A group of women entrepreneurs are selected and a questionnaire has been conducted in order to extract the contribution of entrepreneurial skills. The test results show that the selected skills are significantly contributing to the success with a mean score of 4.20 out of 5. Moreover, the test results show that the communication skill has the most significant effect, followed by creativity and teamwork. This study is aimed to be a base for the further entrepreneurship researches and gives a direction to entrepreneurship education programs in North Cyprus.

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IMPROVED PERMUTATION OPTIMIZATION TECHNIQUE FOR SOLVING QUADRATIC ASSIGNMENT BASED PROBLEM

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ABSTRACT: The particle swarm optimization (PSO) is a new optimization technique inspired by the social behavior of animals such as movement of ants and flying phenomena of birds. In this paper, PSO has been used to solve the quadratic assignment problem (QAP), the results shows that the PSO is an efficient algorithm to solve QAP. Matlab is used as simulative tool to solve some of the standard benchmarks. Then the results will be compared from the standard Quadratic Assignment Problem library (QAPLIB), which is used as a reference by various mathematicians. Finally the effect of initial weight on Swarm Optimization is assessed.

Keywords: quadratic assignment problem, particle swarm optimization, matlab

INTRODUCTION

The quadratic assignment problem (QAP) has been one of crucial combinatorial optimization problems. The people behind the introduction, discovery and main development of QAP are Koopmans and Beckmann [1]. In the recent year the interest among the people in solving QAP with their improved version has been increased exponentially due to its vast application in fields like mathematics, computer sciences etc.. Still till date QAP is considered one of the most likely fields of interest among the scientist due to the on-going development in the combinatorial optimization problems [2].

In general in QAP system we have n facilities which have to be allocated to n locations. Were we know that the distance and the flow among these facilities. The main purpose of QAP is to allocate each of these facilities to the respective location in such a way that the total cost is minimized were cost is said to be the summation of all the possible product of distance and the flow among the facilities. Here in this report we have used discrete Particle Swarm Optimization (PSO) to achieve our purpose. Further we have explained PSO in detail with its working algorithm and then compared ten standard benchmarks with our final result obtained.

PSO has been applied successfully in many continues domain optimization problems but seldom applications in discrete domain such as QAP. The structure of the reminder this report is as follows: Section 2 is an introduction to QAP. In section 3, the mathematical formulations of QAP will be described. Section 4 is an introduction to PSO. Sections 5 and 6 are dedicated to describe the results and the project conclusion.

INTRODUCTION TO QAP

As in QAP there are n facilities and they are to be placed in n locations with objective of minimizing the cost which is sum of product of flow and distance among them. So here we considered matrices: [1]. Mathematically, QAP can be defined by three matrices of dimensions $n \times n$ [3]:

$A = [a_{ij}]$ = matrix of distances between locations i and j .

$B = [b_{kl}]$ = matrix of flows between facilities k and l .

$C = [c_{ij}]$ = matrix of assignment cost of facility i to location j .

Normally, A and B are integer-valued matrices. On the other hand, the assignment cost matrix C is usually ignored because it doesn't make any significant contribution on solving the problem. The QAP with matrices A and B is known as QAP(A,B). The cost of transferring materials between two facilities can be expressed as a product of the distance by the flow between these two facilities, $b_{ij} \times a_{\pi(i)\pi(j)}$, where $\pi(i)$ is the location assigned to facility i , and $\pi(j)$ is the location assigned to facility j [3]. Thus, the total cost of all facilities assignments will be the sum of each $b_{ij} \times a_{\pi(i)\pi(j)}$ over all i and j . The optimal solution will be the one in which the total cost is minimal.

Koopmans-Beckman Formulation

Let A and B are two $n \times n$ matrices such that $A = [a_{ij}]$ and $B = [b_{ij}]$. Then QAP (A,B) can be defined as in equation (1,4):

$$\min_{\pi \in P_n} \sum_{i=0}^n \sum_{j=0}^n b_{ij} \times a_{\pi(i)\pi(j)} \quad (1)$$

Where $P(n)$ is the set of all permutations of the set of integers .

Quadratic 0-1 Formulation

Let $X = [x_{ij}]$ is an n matrix. X is called the permutation matrix and it satisfies the following conditions:

$$\sum_{i=1}^n x_{ij} = 1, j = 1, 2, \dots, n \quad (2)$$

$$\sum_{j=1}^n x_{ij} = 1, i = 1, 2, \dots, n \quad (3)$$

$$x_{ij} \in \{0,1\}, \quad i, j = 1, 2, \dots, n \quad (4)$$

If the above conditions are met, then QAP(A,B) can be formulated as following:

$$\min \sum_{i=0}^n \sum_{j=0}^n \sum_{k=0}^n \sum_{l=0}^n a_{ik} b_{jl} x_{ij} x_{kl} \quad (5)$$

Trace Formulation

Another formulation of QAP which is based on the traces of the matrices A and B . The trace of a square matrix is the sum of the diagonal elements [4]: e.g. $trace(A) = \sum_{i=1}^n a_{ii}$.

Given A, B and X as previously defined, then QAP(A,B) can be formulated as following:

$$\min trace (AXB^t X^t) \quad (6)$$

Where t is the transpose.

To simplify the code we can represent the permutation matrix as an equivalent vector where column number of the vector indicates the i and the corresponding entry indicates the j . As shown an example, the permutation vector

[2 4 3 1] is equivalent to the following permutation matrix:

$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$$

PARTICAL SWARM OPTIMIZATION

Particle swarm optimization (PSO) is a population based stochastic optimization technique developed by Dr. Eberhart and Dr. Kennedy in 1995 [5]. The PSO was originally inspired by behavioral models of fish schooling and bird flocking also known as swarm intelligence. It could be implemented and applied easily in many fields such as the function optimization, the neural network training, the fuzzy system control, etc [6].

PSO is initialized with random set of solutions. These solutions are referred to as particles. These particles that constitute a swarm are moving around in the search space looking for the best solution. Each particle has two operators: Velocity update and position update.

In PSO, the typical single objective bound constrained optimization problems can be expressed as:

$$\begin{aligned} \text{Min } f(x), \quad x &= [x_1, x_2, x_3, \dots, x_D] \\ x &\in [x_{min} \quad x_{max}] \end{aligned} \quad (7)$$

Where D is the number of parameters to be optimized. The x_{max} and x_{min} are the upper and lower bounds of the search space. Each particle is accelerated toward the particles previous best position and the global best position.

The position of particle i at iteration t is:

$$X_i^t = \{X_{i1}, X_{i2}, \dots, X_{iD}\} \quad (8)$$

And its velocity is:

$$V_i^t = \{V_{i1}, V_{i2}, \dots, V_{iD}\} \quad (9)$$

In iteration process, each particle keeps the best position $pbest$ found by itself and the global best position $gbest$ found by the group particles, and changes its velocity according two best positions. Figure 1 shows the movement of each particle [7] and it is based on equations 10 and 11.

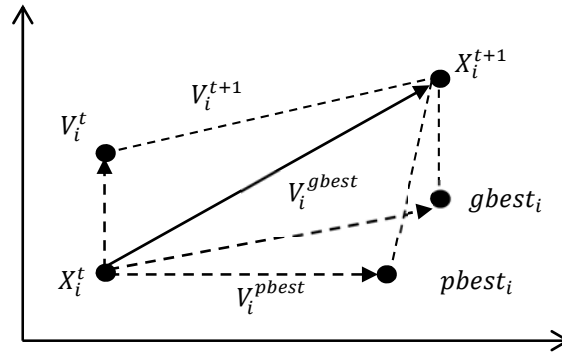


Figure 1. Each particle movement

The standard formula of PSO is [6]:

$$V_i^{t+1} = wV_i^t + C_1 * rand1(t) * (P_i^t - X_i^t) + C_2 * rand2(t) * (P_g^t - X_i^t) \quad (10)$$

$$X_i^{t+1} = X_i^t + V_i^{t+1} \quad (11)$$

$$X \in [X_{min}, X_{max}]$$

where, V_i^t is the velocity of the particle i at iteration t , X_i^t is the current position of the particle i at iteration t , C_1 and C_2 are the acceleration constants, $rand1$ and $rand2$ are two uniformly distributed random numbers between 0 and 1, $P_i = (P_{i1}, P_{i2}, \dots, P_{iD})$ is the best previous position of particle i , $P_g = (P_{g1}, P_{g2}, \dots, P_{gD})$ is the global best position and w is the inertia weight.

The Effects of C_1 , C_2 and w

Choosing the parameters C_1 , C_2 and w can have a large impact on PSO performance and the optimum solution. In order to get on good solutions, these parameters must be chosen carefully.

Following are the individual effect of the parameters C_1 , C_2 and w [8]:

- Increasing C_1 makes the particles follow their own instincts and move toward their best personal positions. •
- Increasing C_2 makes the particles move toward the global best position. •
- The inertia weight w controls the impact of the previous velocities on the current velocity. The global search ability becomes better when w is relatively large, while the local search ability becomes better when w is small. •

PSO algorithms for the QAP

In summary, the PSO scheme for QAP can be described in Table 1. Algorithm.

Table 1. PSO scheme for QAP

Algorithm: PSO scheme for QAP	
initialize the parameters;	.1
for all particle i do	.2
initialize X_i and V_i ;	.3
$P_i \leftarrow X_i$;	.4
find the fitness $f(X_i)$ using equation (6);	.5
endfor	.6
for all the iterations k do	.7
$fg = \min(f)$;	.8
set P_g to the fitness value which gives fg	.9
for all the particles i do	.10
update X_i and V_i using equations 10 and 11 ;	.11
find the $f(X_i)$ using equation (6) ;	.12
If $f(X_i) < f(P_i)$ then	.13
$P_i \leftarrow X_i$;	.14
endfor	.15
endfor	.16

Standard PSO Algorithm Flowchart

In the Figure 2 a proper algorithms flowchart is shown for PSO [9].

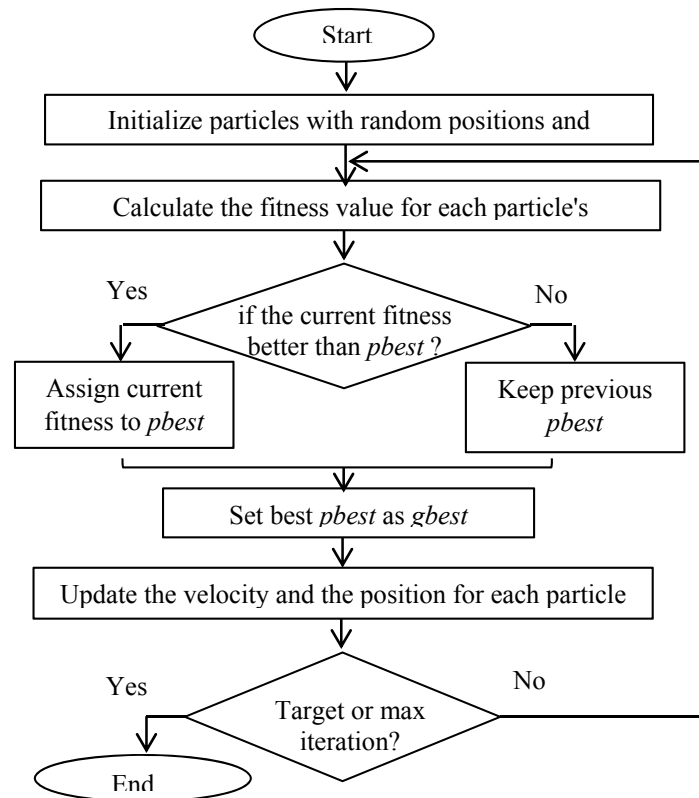


Figure 2. Standard PSO algorithm

RESULTS AND DISUSSION

In this section, the results of the implementation of PSO algorithm to solve the QAP are described. Matlab code in appendix A will be used to find the optimal solution for the given 5 benchmarks. Then, the results will be

compared to that ones from QAPLIB [10]. As well as solving the problems, we were interesting in finding the impact of the inertia weight factor on the convergence speed, and the impact of the swarm size on the solution.

Solving Standard Benchmarks Problems

The best solution for each benchmark was obtained after running the code in appendix A 100 times. The following parameters were used for PSO:

Table 2. Initial Parameters for PSO

Parameter	Value
C_1	2
C_2	2
W	0.729
Iteration	100
Swarm size	50

Benchmark Had12

The first matrix in Had12 represents Manhattan distances of a connected cellular complex in the plane and the entries in the flow matrix are drawn uniformly from the interval [1, n]. Moreover, Table 3 shows results obtained for Had12.

Table 3. Results for Had12

My Code			QAPLIB
Worst cost	Mean	Best cost	
1780	1520	1513	1652

Whereas Figure 3 shows the cost in each iteration.

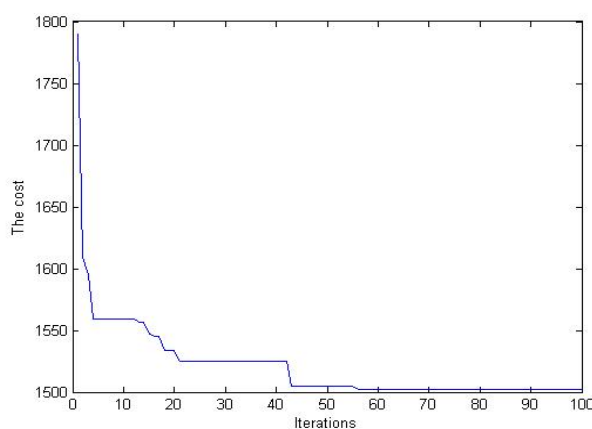


Figure 3: Had12 cost vs iteration

Benchmark Had14

The first matrix in Had14 represents Manhattan distances of a connected cellular complex in the plane and the entries in the flow matrix are drawn uniformly from the interval [1,n].Table 4 shows results obtained for Had14.

Table 4. Results for Had14

My Code			QAPLIB
Worst cost	Mean	Best cost	
2964	2644	2624	2724

Whereas Figure 4 shows the cost in each iteration.

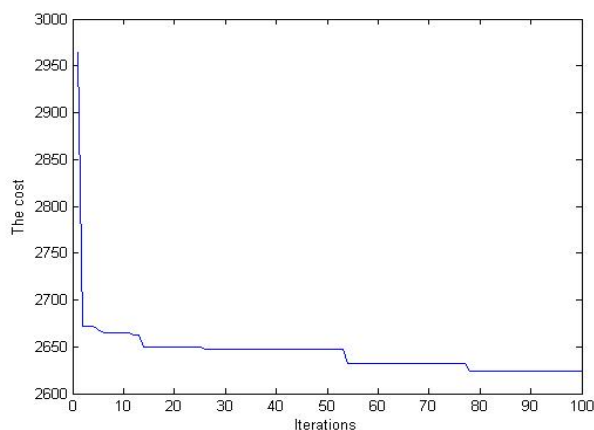


Figure 4. Had14 Cost Vs Iteration

Benchmark Had16

The first matrix in Had16 represents Manhattan distances of a connected cellular complex in the plane and the entries in the flow matrix are drawn uniformly from the interval [1,n]. Table 5 shows the results obtained for Had16.

Table 5. Results for Had16			
My Code			QAPLIB
Worst cost	Mean	Best cost	
4012	3652	3634	3720

Whereas Figure 5 shows the cost in each iteration.

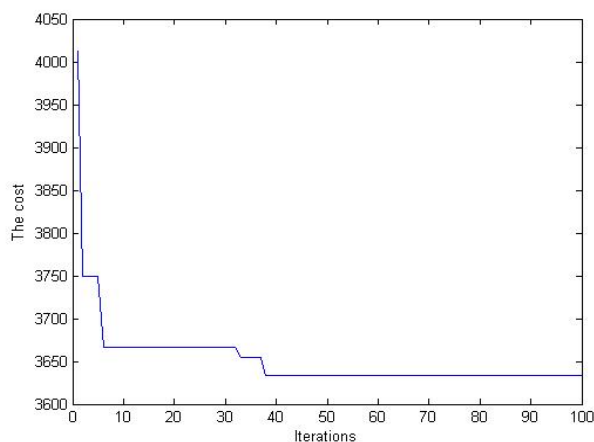


Figure 5. Had16 Cost Vs Iteration

Benchmark Esc16a

Esc16a stems from an application in computer science, from the testing of self-testable sequential circuits. The amount of additional hardware for the testing should be minimized

Table 6 shows the results obtained for Esc16.

Table 6. Results for Esc16			
My Code			QAPLIB
Worst cost	Mean	Best cost	
92	74	70	68

Whereas Figure 6 shows the cost in each iteration.

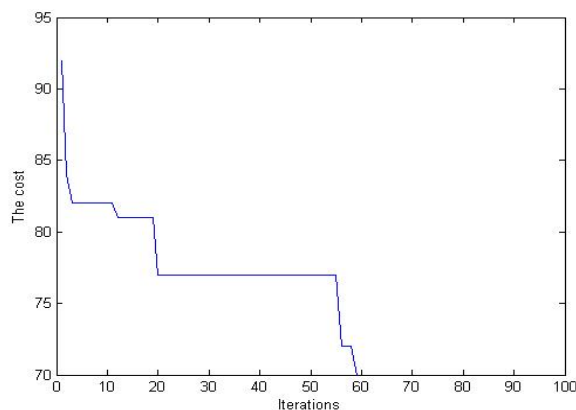


Figure 6. Esc16a Cost Vs Iteration

Benchmark Els19

The data in Els19 describe the distances 19 facilities of a hospital and the flows of the patients between these locations. Table 7 shows the results obtained for Els19.

Table 7. Result for Els19

My Code			QAPLIB
Worst cost	Mean	Best cost	17212548
28304432	20746064	19640008	

Whereas Figure 7 shows the cost in each iteration.

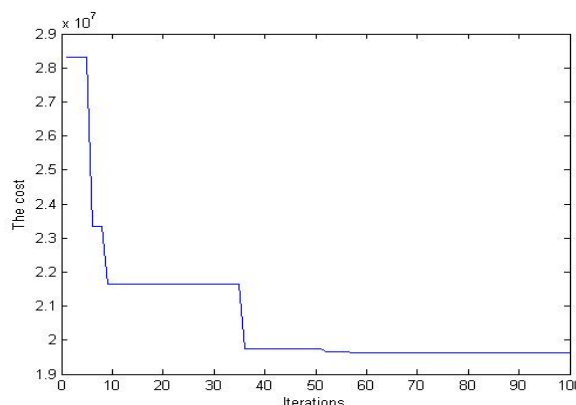


Figure 7. Els19 cost vs iteration

The Effect of the Swarm Size

The Els19 benchmark was used to test the effect of the swarm size on the performance of PSO. The results in table12 were obtained for the same parameters in table 8.

Table 8. Swarm size vs Solution

Swarm Size	Solution
20	20618469
50	19354700
70	19130102
100	18947155
130	18715394

The Effect of The inertia Weight Factor

The Els19 benchmark was used to test the effect of the inertia weight factor on the convergence speed. Figure 8 shows the convergence speed when: Swarm size = 50 particles, iterations=50, runs=50 times, $C_1=C_2=2$ and $w = [0.2 \ 0.5 \ 1]$.

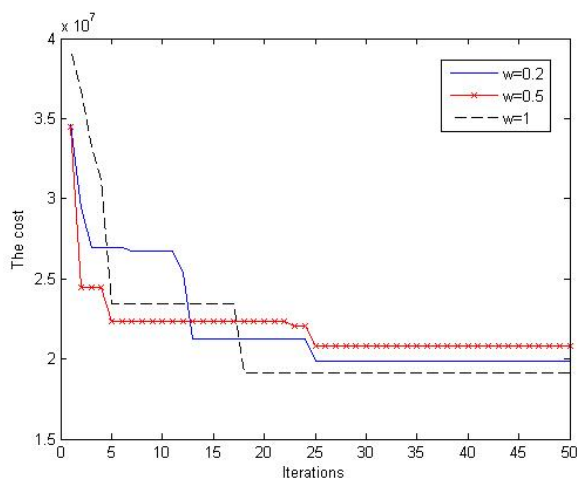


Figure 8. Convergence speed for different values of w

CONCLUSION

In this paper, PSO algorithm was proposed to solve the QAP. The obtained results for the 5 benchmarks were very close to that ones from QAPLIP. Better results can be obtained by increasing the swarm size. Increasing the swarm size means that there are more particles searching for the solution. In addition, increasing the swarm size will make the function take a longer time to finish a run, which will affect the performance of the algorithm. The inertia weight w affects the performance of PSO as well. Increasing w will increase the particles convergence speed toward the best solution and vice versa.

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CONCEPTIONS OF PUBLIC SCHOOL TEACHERS ON INDISCIPLINE

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ABSTRACT: The objective of this paper is to verify public school teachers' conceptions about indiscipline and to investigate behaviors and/or events that occur in the classroom and are considered indiscipline, their possible causes and ways of dealing with the problem. The literature points out that several factors help in the configuration of frame of indiscipline in schools, but it can't be ignored as a problem to be resolved fundamentally in the teacher-student relationship, and the educational-school psychologist is therefore an important mediator in this relationship. Forty-eight public school teachers participated in this study in Parnaíba, Brazil, applying semi-structured questionnaires and accomplishing content analysis using the program ATLAS.ti 7. In general, teachers understand indiscipline as aggressiveness, restlessness, inattentiveness, talking, disrespect to peers and teachers, lack of zeal with material, degradation of the heritage school, lateness, delays, emotional problems, etc. About the causes, the analysis shows the categories: "stand out familiar problems" and "personal problems", "social problems", "difficulties in the school-family partnership" and, in a smaller proportion, "didactic and pedagogical questions" and "absence of religiousness". The majority confront the problem by talking with the students and communicates to the family, trying to improve the methodology of the lessons, and just a few teachers share the situation with a director.

Key words: indiscipline, teacher and student relationship, public education.

INTRODUCTION

This paper aims to verify conceptions that public school teachers have on indiscipline and to investigate behaviours and/or events that occur in the classroom that are considered to be indiscipline, their possible causes and ways of dealing with the problem. This work integrates the larger actions that involve research and intervention activity development by researchers and undergraduates of the "Group of Studies and Research in Educational Psychology and School Grievance" (PSIQUED - "Núcleo de Estudos e Pesquisa em Psicologia Educacional e Queixa Escolar"). The research and intervention actions are conducted in the public school of the Piauí, which is located in the Northeast Region of Brazil, known for social and economic problems that complicate the educational process of children and teens.

Indiscipline as a research subject has been understood from an interdisciplinary perspective, considering that several factors are involved, including sociological, historical, pedagogical and psychological aspects (Ronco, Paula, Silva & Gonçalves, 2011). Research on the educational process and school grievances in the above-mentioned region show that indiscipline stands out among the main problems faced by educators at the school (Ferreira et al., 2011; Negreiros & Bezerra, 2007; Negreiros, Oliveira & Silva, 2013; Negreiros, Santos, Costa & Santos, 2013; Negreiros & Silva, 2014; Silva, Oliveira & Fontenele 2012; Silva, Luz & Ferreira, 2012; Silva, Silva & Sousa, 2012).

Thus, we want to be clear that this specific research focuses on indiscipline from its psychological aspects, situated in the elements of the social and cultural context, considering that the way the students manage the rules is dependent on socialization processes in groups such as the family (Camino, Camino, & Moraes, 2003), the school community and the society in general (Godoy et al., 2010; Martins & Branco, 2001; Moraes et al., 2007).

Beyond this, we think that the actions of students with respect to obeying the rules are influenced by learning and developmental processes, among them construction of meanings on the issue, as well as feelings and emotional aspects related to their relationships with their teachers and peers.

So, we consider that knowing teachers' conceptions of indiscipline will help us to propose actions of intervention in the public schools in order to bring support to the educators, the families and the students. From the sociohistorical approach (Davydov & Zinchenko, 1994; Van der Veer & Valsiner, 1996; Vygotsky, 1991a;

Vygotsky, 1991b), we consider that the school should be seen as a place to develop the superior mental process, as well as a place where ethical values are thought of, discussed and shared by educators and students.

The construction of a view able to understand indiscipline in schools from the psychological perspective should recapitulate the classic studies done on moral development by Piaget (1994) and Kohlberg (1971) that offer important contributions to the development of educational actions.

In addition to the stages proposed by the two authors (Blatt, Kohlberg, 1975; Kohlberg, 1971; Kohlberg, 1982; Piaget, 1994), ideas referring to the importance of educative actions in promoting moral development and supporting the management of indiscipline by educators also seemed relevant to our work (Biaggio, 1994; Martins & Branco, 2001; Oliveira, 2008). In general, educative actions should be conducted considering aspects such as: promoting cognitive development to amplify the representation of the rules; helping children and teens to develop the progressive control of their own actions; supporting the management of emotions in relationships in and out of home.

From the social constructivist perspective (Coll, 1996; Coll, 2010; Coll, Colomina, Onrubia & Rochera, 1992; Colomina, Onrubia & Rochera, 2001), we consider that the educational-school psychologist is an important mediator in the relationships among the various actors that integrate the school community and can support the development of educational projects that aim to improve problems of indiscipline in schools (Mauri & Badia, 2004).

METHODS

Participants

Forty-eight public school teachers participated in this study in Parnaíba, Brazil. The participants work in various teaching levels, ranging from pre-school education up to the ninth year of basic education. All of the participants are women and, at the time of the collection of the data, were studying education degrees at a Brazilian public university.

Instrument

The instrument of data collection is a semi-structured questionnaire made up of 15 questions covering social demographic data and the three dimensions analysed: the description of the students' behaviours or daily situations in the classroom which they consider to be indiscipline; the motives attributed to them in the scholarly context; and the intervention strategies used by the educators in the school to manage the problems.

Data analysis

The analysis of the data was carried out with the qualitative analysis *software* ATLAS.ti (v. 7), that is a computer tool that manages data and improves the source to amplify the qualitative analysis process (Muñoz & Sahagún, 2010).

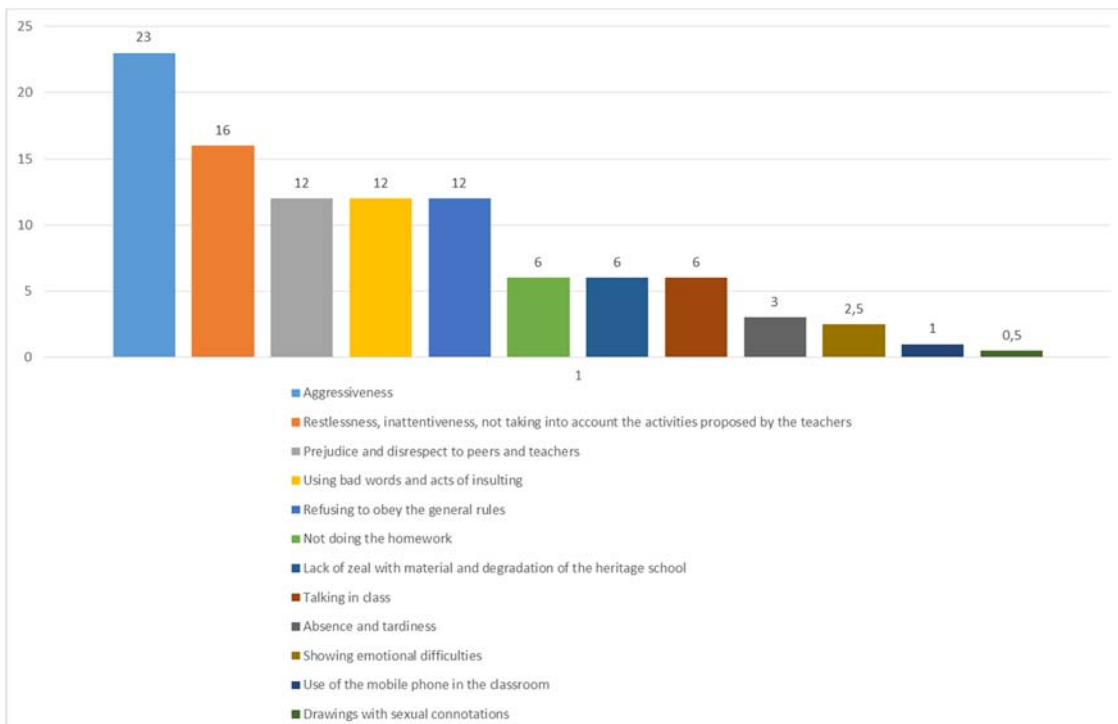
First, a thematic analysis was done to identify units of meaning from the data collected, and it then proceeded to elaboration and refinement. After that, the themes identified were divided into significative groups composing categories of analysis, considering each case separately and all of the data from all of the participants (Willig, 2013). Each category has been formulated from the narratives from the participants' responses to the questions.

RESULTS AND FINDINGS

In this work, we use categories of analysis that seem to be important in meeting our research goals, studying conceptions of teachers on indiscipline focusing on: behaviours and/or events that occurring in the classroom that are considered as indiscipline, the causes attributed to them and the ways of dealing with the problem. With this in mind, we will present the categories studied and will discuss the data collected through the semi-structured questionnaire. The qualitative analysis has been made considering the relative frequency of the categories which followed the explanations of some elements mentioned by the teachers and that led us to identify them as important points with theoretical meanings (Rego, 1996).

Behaviours and/or events considered as indiscipline

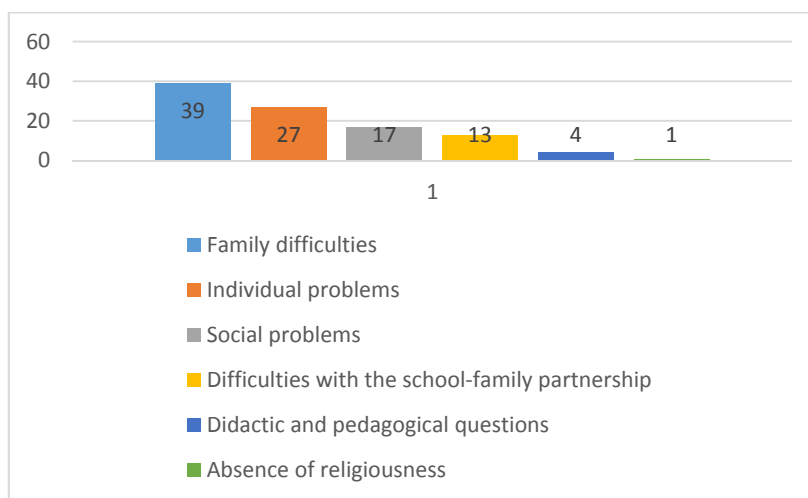
In general, the teachers understand indiscipline as: aggressiveness (23%); restlessness, inattentiveness, not taking into account the activities proposed by the teachers (16%); prejudice and disrespect to peers and teachers (12%); using bad words and acts of insulting (12%); refusing to obey the general rules (12%). In addition, from the data, we can verify other conceptions of the teachers on indiscipline which were identified through less frequent categories: not doing the homework (6%); lack of zeal with material and degradation of the heritage school (6%); talking in class (6%); absence and tardiness (3%); showing emotional difficulties (2,5%); use of the mobile phone in the classroom (1%); drawings with sexual connotations (0,5%). The graph below shows the frequency of the categories identified.



Graph 1 - Behaviour and/or Event Considered as Indiscipline

Causes attributed to indiscipline at school

About the causes attributed to indiscipline at school, in the teacher conceptions, issues that stand out are “family difficulties” (39%) and “individual problems” (27%). These were followed by “social problems” (17%), “difficulties with the school-family partnership” (13%) and, in smaller proportions, “didactic and pedagogical questions” (4%) and “absence of religiousness” (1%).



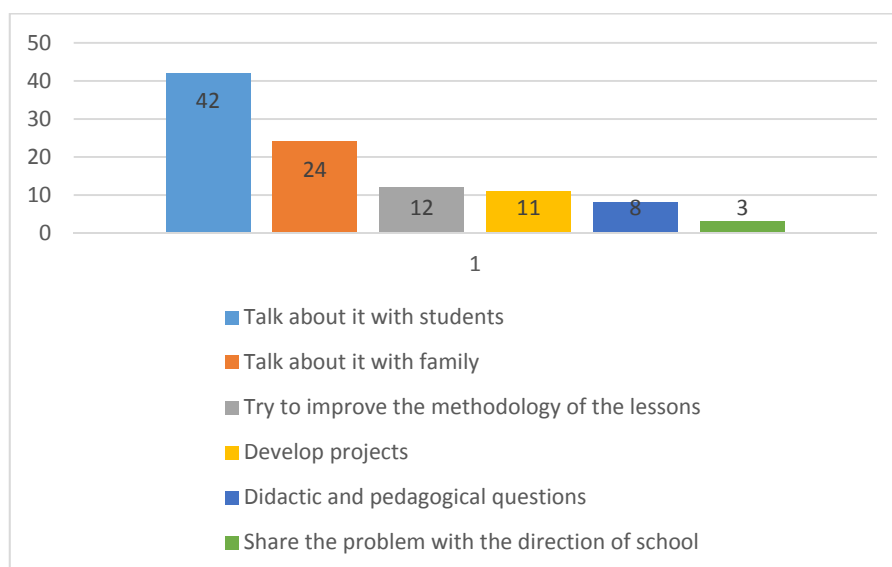
Graph 2 - Causes Attributed to Indiscipline at School

Among the “family problems” mentioned by teachers and attributed as causes of indiscipline at school, the following were mentioned: lack of guidance from the family; bad attitudes and behaviours learned at home; absence of clear and stable rules; conflict of roles; meddling of grandparents and domestic violence. With regard to the “individual problems” mentioned by the participants, the following were among those listed: emotional and affective difficulties presented by the students; lack of attention, concentration, disinterest, sloth, not understanding the curricular content, personality characteristics, development stage, innate impulse and necessity to defend herself. On the social factors attributed as causes of indiscipline, the teachers made few specific comments, they merely mentioned expressions such as “social economic problems”.

From the data analysis, we verified that the categories referred to as “family problems” and “individual problems” together correspond to 66% of the total of the categories computed. In addition, the data analysis showed that around 17% of the categories refer to social factors, making it clear that the participating teachers of the research believe the causes of indiscipline in the classroom to be largely situated outside the school. We think that this way of seeing the causes of indiscipline demonstrates the difficulties of teachers in seeing their responsibility and the other participants of the school community, which leads to the culpability of the student and his/her family with respect to indiscipline as a daily problem in the school (Rego, 1996). This can also point out the difficulties and tensions that characterize relationships between the schools and families (Nunes & Vilarinho, 2001).

Intervention in situations of indiscipline

The teachers described how they manage the situations of indiscipline daily in school. Among the categories mentioned, the following were identified: 42% “talk about it with students”; 24% “talk about it with family”; 12% “try to improve the methodology of the lessons”; 11% “develop projects”; 8% “try to improve the relationship with students”; 3% “share the problem with the direction of school”.



Graph 3 - Intervention in situations of indiscipline

The strategies employed by the teachers to manage situations of indiscipline, as well as the frequency of the categories, are compatible with the results previously presented on the causes attributed to indiscipline. Trying to improve the methodology of the classes and the relationships with the students are strategies recommended in the literature as ways of managing daily problems in the school with regards to learning (Aquino, 1996; Tulesk et al., 2005; Vasconcellos & Valsiner, 1995), and it highlights the educational psychologist as a professional that can offer support to educators in an educational context (Gomes & Meireles 2007). In this way, it is fundamental that the various participants see the school as a setting to construct scientific knowledge, as well as a place where beliefs, ethical and moral values can be discussed (Brasil, 1998; Brasil, 2001).

In general, we think that the way the participants manage the problem seems to be adjusted, but in order to know if the strategies are effective, we need more information regarding the meanings of all of the above-mentioned categories: what, how, where, in what conditions the teachers talk with the students and their parents; how the methodologic changes are characterized in the educational proposal, the aims, the theoretical and philosophical

perspectives about learning and the social goals of education; what exactly is meant by “try to improve the relationship with students”, what attitudes, actions, conceptions and specific people are involved; how the direction of school reacts to the problems shared by the teachers, how the kind of support given to them is characterized and what real alternatives can help educators at school. The data analysis isn't able to answer all of these questions or to deepen the discussion on what we recommend for further qualitative research, which the interviews use in depth as an instrument to approach the subject of study.

CONCLUSION

The difficulties in managing indiscipline are verified among parents, educators and people in general as problems that follow children and young people throughout the process of scholarization. Different social groups influence the way people view indiscipline inside and out of the school context, their motives and the best way to manage instances of indiscipline. In this research, we have only focused on the conceptions of educators of indiscipline, but we consider that it is also very important to research the beliefs of parents and students as well as to analyse factors of the educational context that can offer more information for interventive action and help to manage indiscipline. We mention again that this research has been done in the context of a project on the development of actions of intervention in public schools focused on the factors that make the teaching and learning process more difficult.

RECOMMENDATIONS

In accordance with Brazil's educational context characteristics, we recommend that more research be done from qualitative and quantitative perspectives in order to identify several factors that influence the behavior of indiscipline presented by students and to describe how the situation of indiscipline can affect the various participants in the school community and produce experiences of academic failure. In this way, the ethnography can consist of a potential type of research that can offer relevant data on scholar community practices on the subject.

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SCIENCE EDUCATION: BEYOND A LIMINAL UNDERSTANDING OF KNOWLEDGE PRODUCTION/DISSEMINATION

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ABSTRACT: The present paper is based on a first year BA Education Studies module that explores a number of important questions about the relationship between technology, knowledge and society and begins to think about how our ideas about each of these contribute to an understanding of what education means. Following a Foucauldian perspective on discourse, truth and power, we look with our students at science – and science education – to explore the production of knowledge in a context where many initiatives promote scientific literacy for children and young people. The present paper argues that it is important to reflect with students on these forms of knowledge production and dissemination so as not to see – and teach – science from a consumerist perspective but rather to embrace the idea of science education as a discourse that shapes our understanding of the world and ourselves.

Key words: science education, knowledge production, discourse, power, foucault

INTRODUCTION: SCIENCE AND SCIENCE EDUCATION

Science, in one form or another, has been “a subject” at school level in many countries for centuries. However, in recent years, science education for children and young people has become increasingly important, with the subject being an essential part of school curricula and as a result new guidance has been developed. For example, in England a revision of the subject has led to developments in the National Curriculum – which come into effect for all Key Stage 1 and Key Stage 2 pupils from September 2015 – and for pupils in Year 11 from September 2016 (Department for Education, July 2013). This means, from September 2015, all Key Stage 1 and 2 pupils will study the new National Curriculum science programmes of study – which is issued to schools by law and therefore must be taught by all local-authority-maintained schools in England.

The new ‘National curriculum in England: Science programmes of study’ states that ‘...all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science’ (Department for Education, December 2014). This means, pupils should learn to understand the world through the specific disciplines of biology, chemistry and physics. ‘They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes’ (Department for Education, December 2014). The aim is to ensure that all pupils:

- ‘develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics;
 - develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them;
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future’ (Department for Education, December 2014).

For children in Key Stage 1 – the two years of schooling in maintained schools in England normally known as Year 1 and Year 2, when pupils are aged between 5 and 7 – this means to experience and observe phenomena by looking more closely at the natural and humanly constructed world around them. They are encouraged ‘to be curious and ask questions about what they notice’ (Department for Education, December 2014). Older children – upper Key Stage 2, Year 5 and 6 – are encouraged to develop a deeper understanding of scientific ideas. ‘...they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates’ (Department for Education, December 2014). In Key Stage 3 – the three years of schooling in maintained schools in England normally known as Year 7, Year 8 and Year 9, when pupils are aged between 11 and 14 – pupils are encouraged ‘to relate scientific explanations to phenomena in the world around them and start to use modelling and abstract ideas to develop and evaluate explanations’ (Department for Education, December 2014). They should learn to pay attention to objectivity and develop concern for accuracy, precision, repeatability and reproducibility.

Although the Government – with the new curriculum – envisages schools and teachers to take greater control over what is taught in schools and how it is taught, using their professional skills and experience to provide the best educational experience for all their pupils, the new ‘National curriculum in England: Science programmes of study’ provides quite detailed guidance on the topics to be covered by schools. For example, in the Year 1 programme of study children should learn to:

- ‘identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals;
- identify and name a variety of common animals that are carnivores, herbivores and omnivores;
- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)’ (Department for Education, December 2014).

Hence, many feel that with the new science curriculum there is ‘a shift towards hard facts and “scientific knowledge”’ (BBC News, September 2014). Others argue that the new science curriculum is ‘a “two-tier curriculum” favouring the core subjects of English and maths at the expense of the arts and humanities’ (The Independent, September 2013).

However, in general it seems as if the new curriculum follows what Hodson (1993) has pointed out as the three main purposes of science education, that is, to come ‘to understand the major achievements of science’, the concepts, the models and the theories, ‘to learn about science’, to develop an understanding of the nature and methods of science, and ‘to learn to do science’, involving modelling and model testing – although some argue that the main purpose of science education in schools should be ‘to increase the flow of specialist scientists, technologists and engineers’ (The Association for Science Education, The Economic & Social Research Council & The Teaching and Learning Research Programme, 2006); a sort of sensitization and pre-professional training.

The purpose of this paper is to critically reflect on current science education with the help of a case study example in order to develop a more critical understanding of what science education might mean for “future educators”. The paper argues that – in the light of the new English National Curriculum – the teaching of scientific knowledge should be more than the presentation of facts and figures, in the sense of Millar and Osborne (1999, para 4.2), who argue that ‘The science curriculum from 5 to 16 [years] should be seen primarily as a course to enhance general “scientific literacy”’. This means that educators need to be able not only to teach scientific facts and figures, but also to raise questions of truth, power and the subject itself in order for their pupils to recognise that scientific ideas change and develop over time. We use the Foucauldian theoretical positions of discourse and its power to produce “truths” as heuristic tools that future educators can use to diversify the teaching, learning and public understanding of scientific knowledges. We argue that it is therefore important to introduce prospective educators not only to science as subject, but also to make them aware of the importance of discourse in shaping our understanding of the world and ourselves – in the sense of Foucault, who pointed out that our society is being shaped (or constructed) by discourse, and in modern societies scientific discourse is highly valued and authoritative, which in turn reflects existing power relations – so they are able to provide a high-quality science education.

FOUCAULT: DISCOURSE, TRUTH AND POWER

With reference to discourse, in this paper we follow a Foucauldian perspective because of the implicit power the creation of discourse carries. Foucault (1981, p. 52) argues that:

‘In every society the production of discourse is at once controlled, selected, organised and redistributed by a certain number of procedures whose role is to ward off its powers and dangers, to gain mastery over its chance events, to evade its ponderous, awesome materiality’.

Poignantly, science as discourse is one of the angles which we use in our module in order to re-pose questions about science education with students. Discourse, as argued by Foucault, transcends desire and institutions. Desire in relation to discourse is then understood as that subjective (circumstantial and often contextualised) position that we might find ourselves in; in any given moment we are juxtaposed with discourse(s). The institution, as Foucault (1981, p. 52) points out, is ontologically dependent on the production of a particular discourse; it replies to the individual by saying:

‘You should not be afraid of beginnings, we are all here in order to show you that discourse belongs to the order of laws, that we have long been looking after its appearances; that a place has been made ready for it ... and that if discourse may sometimes have power ... it is from us and us alone that it gets it’.

In this way, the institution tries to control discourse, and its production and distribution (or dissemination), yet, discourse has a more subversive and insidious power, which permeates desire (subjectivity) and institution (objectivity). Discourse in itself could then be understood as symbolically, representationally, semantically and concretely forming and constructing the objects of which it speaks and in doing so it finds itself outside subjective and objective positions. The study of discourse as explored by Foucault is strung to the historical institutions that embrace it, give it a voice, silence it or disregard it; discourse then forms not only the objects of a particular reality, but also determines how that reality is formed. Discourse creates knowledges and “truth”; it creates “a world” that is both palpable but also transformative.

For instance, if we take Foucault’s example of the historical opposition between reason and madness as represented by the ‘madman’ and his speech, we can appreciate how the scientific knowledges of psychiatry and psychoanalysis have emerged as a result of the continuous decoding of the evolving discourses around madness. But in these decoding there is still a very definite oppositional production of the conditions and characteristics associated with states of reason and madness. Foucault (1981, p.53) points to how:

‘Since the depths of the Middle Ages the madman has been one whose discourse cannot have the same currency as others. His word may be considered null and void, having neither truth nor importance ... It was through his words that his madness was recognised, they were the place where the division between reason and madness was exercised, but they were never recorded or listened to. No doctor before the end of the eighteenth had ever thought of finding out what was said, or how and why it was said ... He [the madman] was only symbolically allowed to speak, in the theatre, because there he played the role of truth in a mask’.

This extract is pointing to how although the madman’s speech was discredited it still held a credited position within the institution of the theatre, there on the stage, was the madman’s place of worth, where his madness became mysticism and curse but still in its most rational form. Yet, it could be argued that this discourse is understood and decoded very differently now that the madman’s speech is no longer sitting easily on one side of the divide between reason and madness. This is because this discourse is now decoded by other modern knowledge-institutions which no longer appraise his speech as immediately discredited, but rather ‘...that it puts us on the alert; that we now look for a meaning in it...’ (Foucault, 1981, p. 53). Further referring to the development of a whole system of knowledge, knowledge-institutions and knowing-subjects (individuals) who are now responsible not only for articulating, the ‘madman’s speech’ but also for diagnosing and treating it. Of these knowledge frameworks we only need to think ‘...of the whole network of institutions which permit someone – a doctor or a psychoanalyst – to listen to it, and which at the same time permit the patient to bring along his poor words or, in desperation, to withhold them’ (Foucault, 1981, p. 53).

As part of this paper – and with reference to our case study – we use this Foucauldian understanding of discourse to critically analyse and re-pose questions about specific parts of scientific knowledge, and what the acquisition of these knowledges have allowed us to make of ourselves as part of a changing society, underpinned by varying and changing discourses. The problem that we present to students is not to do with drawing the line between truth and something else; in fact, the notion of discourse is pointing beyond this long-standing true-false opposition. Foucault (1994, p. 119) asserts that:

‘...the problem does not consist in drawing the line between that which, in a discourse, falls under the category or scientificity or truth, and that which comes under some other category; rather it consists in seeing historically how effects of truth are produced within discourses that, in themselves, are neither true nor false’.

Within this understanding we can open up possibilities to discuss scientific knowledge as discourse that is – amongst other things – pervaded by power relations. We, the authors of this paper, believe that discourse and power relations are important theoretical tools for students to understand how we are in a state of flux – societally and culturally – and that the examining of discourses is a powerful indication as to how societal and cultural change is created and effected. Therefore, in the module ‘Culture, Curriculum and Technics’, we are moving students beyond what is normally covered in a first year undergraduate course by introducing them to evaluative, theoretical tools that help them understand that all systems of knowledge are subject to debate. They are, as Foucault (1994, p.131) states, neither outside of power nor ‘lacking in power’. Following this view, we argue that systems of knowledge are systems of power because of the types of discourses that they are formed by; implicitly exerting exclusion over others. Consequently, science education needs to have a strong and discernible criticality looking at the very

‘...mechanisms and instances that enable one to distinguish true and false statements; the means by which each is sanctioned; the techniques and procedures accorded value in the acquisition of truth; and the status of those who are charged with saying what counts as true (Foucault, 1994, p. 131).

Science education is a particular discourse of science and its truths, but ultimately, and following a Foucauldian perspective, is neither true nor static; it is incited by economic, political, social and ideological traits of our time.

CASE STUDY: EDUCATION STUDIES

We, the authors of this paper, both teach on the BA Hons Education Studies at London Metropolitan University (UK). The BA Hons Education Studies takes education as a study object. This means, the course tackles big questions concerning the place of education in the modern world as well as the detail of everyday professional practice in schools and other educational institutions. Hence, it addresses philosophical, sociological, epistemological and historical aspects of learning and teaching against the backdrop of education as part of changing societies. Through that, it prepares students for a range of socially responsible professional roles in a variety of settings – including primary, secondary and adult education; youth and community work; and health and social care.

Students on the course traditionally come from a broad range of backgrounds, with many students choosing the course as a second pathway into professional teaching. As Blagburn and Cloutterbuck (April 2011) point out, London Metropolitan University (UK) is made up of almost 50 per cent of non-traditional students. This is confirmed by internal statistics that show that the majority of students on the course come from a working-class and/or ethnic minority background. This means, students on the course have mixed abilities and interests – with many being unfamiliar with the theoretical frameworks used in academia – and science. They are ‘outsiders’ compared to ‘those who know how the system works’ (Pratt-Adams et al., 2010). Despite this, we have very high expectations of our students – and like to challenge and develop their personal learning and understanding.

One of the first modules student on the course need to undertake is ‘Culture, Curriculum and Technics’ – a 30 Credit Level 4 core module that runs over 30 weeks, from September until May. The module was introduced in 2012 as part of a broader restructuring of the BA Hons Education Studies. The aim of the module is to present a range of theoretical perspectives and tools, to students, which they can use to describe and analyse a curriculum as socio-cultural construction – and which also enable them to identify ways in which knowledge is produced, reproduced and transmitted. It is hoped that this enables students to move beyond a simplistic understanding of a curriculum as a set of subjects that need to be covered in a certain period of time towards a critical appreciation of knowledge and knowledge production in educational settings – including schools.

The module content is organised in blocks, six in total, which all address a specific question. These blocks are as follows:

- Block 1: What do we mean by culture?
- Block 2: What counts as knowledge and why do we educate?
- Block 3: How does representation construct knowledge?
- Block 4: How will new media technologies transform knowledge and education?
- Block 5: workshop project (Wiki workshop)
- Block 6: Does the Anthropocene have a future?

This means, the module does not introduce students to educational subjects, but rather encourages students to critically think about records and information; objects, evidence and interpretation; and stories, narratives and meaning. Students – in the sense of Vivianne Burr (2003) – are encouraged to ‘take a critical stance toward our taken-for-granted ways of understanding the world, including ourselves’. This means, students are encouraged to see science as a ‘set of practices’ – following Stuart Hall’s (1997) approach to culture. As Hall (1997, p.2) in relation to culture states: ‘Primarily, culture is concerned with the production and exchange of meanings - the “giving and taking of meaning” – between the members of a society or group’. Equally science – and science education – could be seen as driving force for the creation and representation of our knowledge about the world we live in and ourselves.

It is in this context that students are introduced to the notion of discourse, which we define in a Foucauldian sense as ‘...a group of statements which provide the language for talking a way representing the knowledge about – a particular topic at a particular historical moment ...’ (Hall 1992 cited in Hall 2004, p.72). This leads to

the argument that knowledge might not be absolute but rather provisional and that what is presented in a curriculum represents selections from the knowledge available in any particular culture at a given point in time. The module therefore moves beyond seeing science as a pure subject to be mastered by prospective students and educators; rather, that the subject itself opens up questions to think more holistically about knowledge creation and dissemination. Crucially, this approach envisages science education as needing to be creative and innovative – and challenging current perceptions and approaches by students as well as teachers.

CONCLUSION AND RECOMMENDATIONS

In this paper by looking at science and education in the context of an Education Studies module we, the authors of this paper, have evaluated practically, the objectives and some of the new developments in science education curricula and theoretically explored, the possible contributions of using the concept of discourse to approach the emergence and prevalence of scientific systems of knowledge. Similarly, we have argued that these scientific knowledge-systems are producers of reality and do not occur disentangled from power relations. Following a Foucauldian perspective we have also alluded to how these discourse-based producers of reality are not inherently producing truths, but rather, effects of truths. As a result of these explorations we argued that the education of prospective educators needs to move beyond fact-bounded pedagogy and approximate towards a more constructivist understanding of the subject.

In practice this means, to encourage students to de-essentialise curricula in order to become holistic pedagogues; to 'provisionalise' knowledge in order to be critically aware of its effects; and to understand the changeable, shifting, fluctuating and dynamic nature of societies. These myriad effects, changes and moves – within the module have been discussed – as occurring as part of a wider culturally, technologically and ideologically changing paradigm. The approach we have taken with our students is to critically question traditional concepts and pedagogies, by presenting to them conceptual tools, such as, discourse, power relations and constructivism that afford them the opportunity to flowingly reflect on these macro and micro level topics.

Consequently, as Wellington (2005, p. 107) states: 'The essential bridge that needs to be built [is] between the world of experiences (the phenomenal) and the world of explanation (the conceptual or theoretical)...'. We propose that to bridge this suggested gap students need to be given the opportunity to deal with metaphor, theory and the abstract but similarly, they also need to deal with the concrete, experiential and practical but not in an atomised and disjointed manner but rather understanding them as all-inclusive, harnessed, inseparable and unfolding continuum.

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TRANSFORMATION MANAGEMENT IN INFORMATICS AND ITS EDUCATION

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ABSTRACT: Education is a fact that continuing process from birth to death for individual person. Therefore, it is not easy to define the education with articulation, because of this, it needs to explain the subject about education all of whole worths that to exist in society for individual person. Education is a distinction process of maturity for society values. It earns personel development, impression, conception, trog, to live up to one's conviction.

Education starts in family, it continues from preschool to the end of university, and subsequently it goes to end of life smoothly for person. In any in the domain of science whatsoever, education is continuously existent, to increase in importance more and more, matured with communication and technological innovations, and it works through fact with developing and varying.

Famous manufacturer Sakıp Sabancı said that "Production is not increasing without investment, investment is not only money, it is education, knowledge, experience, power of enterprice, and education is important than money". Definetly, with this statement, he pulls ahead the education to set in front of the many values.

Invited speaker of 5th, International Computer and Instructional Technologies symposium, organized in Fırat University, in Elazığ, in 2011, Professor LAW, Nancy W. Y., Deputy Director, Centre for Information Technology in Education (CITE) and Faculty of Education the University of Honk Kong, stateded that "it is difficult to sanctify the transformation, it is possible to be up against severly opposition about transformation, for all that it is possible to implement systematical model of transformation. Therefore, it is necessary that to nip wit in the bud, make a change, institutionalize, and promote.

Transformation is the total of variation in a process. It emerges quiet flourishing, and appears a differences, sum of aggregation in time. With the transformation, discovers new requirements, and, in case of not responded requirements about transformation, it works through fact obsolescence, hereafter, integration to transformation is not possible or to be implemented will be very hard. In this regard, with the transformation, and requirement about composition of transformation have to be determined and, using scientific method, necessary current operation have to be implemented. As can be seen, education is not stationary process, it is varying and show dynamic configuration process progressively. In order to take general information about education, students who are only one input for education, should be observed, measure up of their knowledge level, evaluate those present levels, and compare them in regular time periods.

Essentials for education are teacher, student, educational ambience, educational materials, and educational systems. Ineffectiveness of essentials, threat factor for educational proceses. Therefore, every essential or stage have to be interrogated and once again explicated, if it necessary, it is improved and updated.

Briefly, in this study, varying educational proceses and usage about informatics has been planned and investigated, in this context, accepted for educational. Essentials; teacher, student educational ambience, educational materials, educational system, informatics technologies and technological usage have been investigating and necessities for transformation will be discussed.

Key words: informatics education, transformation management, informatics technologies, technological usage.

BİLİŞİMDE VE EĞİTİMİNDE DEĞİŞİM YÖNETİMİ

ÖZET: Eğitim, bireyin doğduğu günden ölünceye kadar süren bir olgudur. Dolayısıyla eğitimi, kelimelerle tanımlamak pek kolay değildir. Kişiyi yaşadığı toplum içinde var eden değerlerin tamamını bu kapsamda incelemek gerekir. Eğitim; kişisel yetenek, duygu, düşünce, gelenekler, inançlar ve bir bireyi toplum içerisinde var eden bir eylem ve bütün bu değerleri olgunlaştıran bir temayüz işlemidir. Eğitim; aileden başlar, okul öncesi eğitimden üniversite eğitiminin sonuna kadar ve devamında hayatın son bulduğu güne kadar kesintisiz olarak devam eder. Hangi bilim alanında yapılırsa yapılsın eğitim; sürekli var olan, gün geçtikçe önemi artan,

teknolojik yenilikler ve iletişim yetenekleri ile olgunlaşan, gelişen ve değişen olduğunu hissettiren bir gerekliliktir.

Ünlü sanayicilerden Sakıp Sabancı, “Üretim yatırım olmadan artmıyor. Yatırım sadece para değil, eğitim; bilgi, tecrübe, teşebbüs gücü ve paradan önemlidir.” demiştir. Bu ifadesi ile sabancı, kuşkusuz, eğitimin önemine net bir vurgu yapmış ve O’nu, önem bakımından birçok değer önüne koymuştur.

2011 yılında Elazığ Fırat Üniversitesi, Bilgisayar ve Öğretim Teknolojileri kongresinde çağrılı konuşmacı olarak davet edilen Hong Kong Üniversitesi Eğitim Fakültesi Dekan Yardımcısı Nancy Law, konuşmasında; “Değişimi kabul ettirmek zordur. Değişim karşısında ciddi dirençlerle karşılaşmak mümkündür. Her şeye rağmen, değişimin sistematik modelini hayata geçirmek gerekir. Bunun için; öncü olmak, yenilik yapmak, uygulamak, kurumsallaştırmak ve yükseltmek gerekir.” vurgusunu dile getirmiştir.

Değişim; Bir süreçte meydana gelen değişkenliğin toplamıdır. Değişim, yavaş gelişen ve zaman içerisinde bir birikimin toplamı şeklinde ortaya çıkan bir farklılıktır. Değişimle birlikte, yeni gereksinimler ortaya çıkar ve bu gereksinimlerin karşılanmaması durumunda eskime olgusu kendini hissettirir. Bu aşamadan sonra değişime adaptasyon mümkün değildir. Bu bakımdan değişimle birlikte değişimi meydana getiren gereksinimlerin tespit edilmesi ve bilimsel bir yaklaşım içerisinde zorunlu güncellemelerin hayata geçirilmesi gerekir. Görüldüğü üzere eğitim, durağan olmayıp, sürekli değişen ve devingen bir yapı gösteren bir süreçtir. Bu bakımdan, eğitimin tek bir girdisi olan öğrencileri gözlemek, bilgi düzeylerini ölçmek, değerlendirmek ve belli aralıklarla elde edilen sonuçları karşılaştırmak suretiyle genel hakkında bilgi sahibi olmak gerekir.

Eğitimin unsurları; öğretici, öğrenci, eğitim ortamı, eğitim materyalleri ve eğitim sistemidir. Bu unsurlardan birinin etkisizliği, süreci tehdit edebilmektedir. Bu bakımdan her bir unsur, sürekli bilimsel ölçütlerle sorgulanmalı ve yeniden irdelenmeli, eğer gerekiyorsa geliştirilerek güncellenmelidir.

Bu bilimsel çalışma, bilişimde ve eğitiminde değişim yönetimini araştırmak amacıyla planlanmıştır. Bu planlama çerçevesinde, eğitimin unsurları olarak kabul edilen öğretici, öğrenci, eğitim ortamı, eğitim materyalleri, eğitim sistemi, bilişim teknolojileri ve teknolojik kullanım ele alınarak incelenecek ve ortaya çıkan değişimin gerekleri tartışılacaktır.

Anahtar sözcükler: bilişim eğitimi, değişim yönetimi, bilişim teknolojileri, teknolojik kullanım

GİRİŞ

Hızla değişen teknoloji, bilişim eğitiminde sürekli bir değişimi ve gelişimi söz konusu etmektedir. Bununla birlikte; değişim, bilişim sektöründe görev yapan bütün bireylerin takip etmesini zorlaştıran bir ivme ile gelişmekte ve yaşanmaktadır. Donanım ve yazılım araçlarının sürekli değişmesi, eğitim teknolojilerinin, materyallerinin ve yazılım araçlarının değişimini zorunlu kılmaktadır. Bilgisayarlarda geçmişte kullanılan MS-DOS işletim sistemlerinden, günümüzün akıllı cihazlarında kullanılan Android işletim sistemine yolculuk hep bu hızlı değişimin sonucudur. Dünya’da hiçbir sektörde bu kadar büyük değişimin görüldüğü ve yaşandığı düşünülmektedir. 10 yıl önce öğrettiği bilgilerle bilgisayar öğretmeni hüviyeti taşıyan bir birey, bu hızlı değişim karşısında kendini yenilememiş ve değişime ayak uydurmamış ise, bu gün artık bilgisayar öğretmeni değildir. Tıpkı 10 yıl evvel kullanılan bilgisayarların günümüz gereksinimlerini karşılama özelliğinden uzaklaşıp, kullanılamaması gibi. Bu bakımdan bilişim alanında değişime direnme, silinip gitme ve kaybolma biçiminde değerlendirilebilir.

Fransızların “Bir şey ne kadar değişirse o kadar aynı kalır.” deyimini bu bakımdan önemlidir. Bu ifadeye göre, bir şey nasıl hem değişip, hem de aynı kalabilir. Başlangıçta bir çelişki gibi görünen bu deyim; değişimi doğal ve olması gereken bir yenilenme çabası olarak kabul etmektedir (Taşkın 2001).

Değişim; doğal ve olması gereken bir şey ise, değişimi araştırmaya konu haline getiren neden, değişimin hangi hızda gerçekleşmiş olduğudur. Bilişim alanında meydana gelen bu baş döndürücü değişim, bazı güçlüklerle birlikte bazı kişi veya firmalar için önemli fırsatları ve avantajları da beraberinde getirmiştir.

Microsoft yazılım şirketinin kurucusu ve sahibi, Bill Gates; bilişim sektörünü, düşünce hızında çalışan bir arena olarak tanımlamış, değişimi öngörmenin ve değişimi ilk karşılayanlardan olmanın önemini belirtmiştir. Her yeni değişimin esasında yeni fırsatlar ve cazip karlar sunduğunu ve bunu değerlendirenlerin bir adım öne geçeceğini

vurgulamıştır (Gates, 1999). Bu durumda bu söylemi gerçekleştiren ve her bir değişimi fırsata dönüştürmeyi bilen Gates'in Dünya'nın en zengini olması bir tesadüfün ötesinde bir gerçeği yansıttığını kabul etmek gerekir. Bill Gates, 2000'li yılların başlarında "önümüzdeki on yılda iş hayatı geçmiş elli yılda değiştiğinden daha fazla değişecek", demiştir. Teknolojik yeniliklerin son yıllarda çok daha fazla değiştiğini düşünürsek, önümüzdeki her on yıllık değişimlerin geometrik hızla çok daha büyük değişimleri ortaya çıkaracağını söylemek zor değildir.

Kişisel gelişim uzmanı Dr. Gary Mckay, yazmış olduğu kitabın başlığını, "Cesur ol ve değişime ayak uydur." başlığı ile satışa sunmuştur. Böylece esasında Mckay, değişime ve yeniliğe açık olmanın bir cesaret ve özgüven meselesi olduğu vurgulamıştır. Bununla birlikte değişimin, bazı sorumluluk ve fedakarlıkları gerektirdiğini, değişimin zorlukları ile karşılaşmak istemeyenlerin cesur olmadıklarını belirtmek istemektedir (Mckay, 2010). Değişimin önündeki en önemli risklerden birisi, kişilerin değişime ayak uyduramaması ve başarısız olma endişesidir (Law, 2011). Ancak değişime direnç, asla bir yöntem değildir.

Değişimin karşısındaki bu amansız direnci kırmanın yollarından biri güçlü bir iletişim ve ikna etme yeteneğidir (Kotter ve Schlesinger, 1991:s.70-72). Unutulmamalıdır ki, değişim kaçınılmaz ve herkesin yüzleşmek durumunda kalacağı bir gerçektir. Değişim, önceki durum ve yöntemin yetersizliği ve etkinsizliği durumunda hayata geçen bir olgu olduğuna göre, beklenen ve olması gereken biçimde değerlendirilmeli, değişimin bir unsuru olarak yeni fikirler ve görüşler zaman kaybedilmeden değerlendirilmelidir.

Değişim; bir durum, düşünce ve olguda meydana gelen farklılığın tespiti biçiminde de tanımlanabilir. Değişim ve değişimin sebep olduğu bir dizi faktör bulunmaktadır. Bu faktörlerin ayrı ayrı etkilerini tespit etmek amacıyla bazı yöntemler ve bir bilim bulunmaktadır.

Motorola Başkanı, Robert W. Galvin, bir süreç boyunca değişkenliğin ve değişimin tanımlanabildiği ve kontrol edilebildiği ölçüde süreç başarısının mümkün olduğunu ifade etmiştir (Altı Sigma, 2003:s.15).

Özellikle deneysel çalışmalarda değişim, deneysel gözlemlerin göz ardı edilemeyen, doğal bir özelliğidir. Değişimin nedenlerinin belirlenmesi istatistik biliminin görevlerindedir (İkiz vd. 1996:s.2-3).

Görüldüğü gibi değişim bilimi istatistik'tir. Dünya'da değişim olmazsa istatistiğin bir bilim olarak ortaya çıkmayacağı vurgulanmaktadır. İstatistik bilimi, başlı başına değişimin etkilerini tespit etme amaçlı kullanılan ve bütün bilim alanlarının vazgeçilmez analiz aracıdır. İstatistik analiz süreçlerine tabi tutulmayan bilimsel araştırma çalışmaları, eksik bile kabul edilebilmektedir.

Değişimi tespit edebilmek için, fikirleri ortaya çıkarmak gerekir. Fikirleri ortaya çıkarmak için de beyin fırtınası yapmak gerekir. Beyin fırtınası, herhangi bir konu hakkında fikir edinme ve yapılanma sürecidir. Bu yöntem 1930'lu yılların sonunda bir reklam yöneticisi olan Alex Osborn tarafından ortaya konmuştur (Barker, 1997:s.11-12).

Beyin fırtınası yaparken osborn tarafından belirlenmiş dört kural şu şekildedir:

- Eleştiri yasaktır: Karşıt görüş veya fikirler sergilenmelidir: Doğal olarak bazı yeni "bakış önerileri" saçma ve olanaksız olabilir ama eğer dinleyip, ilgilenmeye ve geçerliliğini sorgulamaya açık ortaktığınız varsa çöplerin içinden elmaslar da bulunabilir (Şenocak, M. 2015:s.5-6). Bununla birlikte, karşımızdaki bireyleri dinleyerek var ettiğimizi bilmemiz lazım (Cüceloğlu, D., 2002:s.135).
- Serbest hareket etmek hoş görülür: Bir düşünce ne kadar özgür ise o kadar iyidir.
- Nicelik istenir: Fikirlerin sayısı ne kadar fazla olursa kazanma olasılığı o kadar fazla olur.
- Gelişim aranır: Fikirlerde meydana gelen gelişimin iyileşmesi beklenir

Bundan hareketle değişimi belirlemek ve gerçekleştirmek için aşağıda belirlenen adımların atılması gerekir:

1. Beyin fırtınası ile görüşler almak,
2. Çok iyi gözlem yapmak,
3. Gözlemleri veriye dönüştürmek,
4. Verilerden modeller elde etmek,
5. Değişimi öngörmek,
6. Değişim için harekete geçmek gerekir.

DEĞİŞİMİN BOYUTLARI

Yaşamda değişimin; toplumsal, örgütsel ve teknolojik olmak üzere üç boyutu bulunmaktadır (Taşkın, 2001:s.62-63).

Toplumsal değişim; özellikle bilgi çağında yaşadığımız bu dönemde teknolojik değişimin bir sonucu olarak ortaya çıkmakta ve çok hızlı gerçekleşen bir olgu olarak kendini göstermektedir. İnternetin teknolojik bir bilgi aracı olarak yaşamın her alanına girmesi ve herkes için önemli bir gereksinim olduğunu hissettirmesi sayesinde akıllı cihaz teknolojisi, baş döndürücü bir hızla yaşamın vazgeçilmez araçlarını üretmeye ve sürekli güncellenmeye devam etmektedir. Teknolojik değişim, medya platformlarının değişmesine, elektronik ürünlerin gelişmesine, eğitim faaliyetlerinin daha nitelikli hale gelmesine, iletişimin daha hızlı ve daha kolay bir şekilde yapılmasına önemli katkılar sağlamaktadır. Bununla birlikte, sosyal platformların yaygınlaşması ve herkes tarafından kullanılması nedeniyle bireyler arası sosyalleşme ve yardımlaşma azalmakta, öğrencilerin öğrenme zamanını bitiren aktiviteler ortaya çıkmakta, toplumsal hedefler etrafında bir araya gelme anlayışı ortadan kalkmakta ve bütün bunlar sportif terörle etkileşerek ülke sorunlarına duyarsız bir gençliğin doğmasına neden olmaktadır. Özetle, teknolojik değişimin baş döndürücü hızı, bireyleri sosyal bir varlık olmaktan çıkarmakta ve onları makineleştiren bir sürecin başlangıcı meydana gelmektedir. Görüldüğü üzere teknolojik değişim, bir dizi avantajın yanı sıra, çok sayıda dezavantajın yaşamı değiştirmesine ve yozlaştırmasına neden olmaktadır. Bilgisayar ve bilişim araçları da özellikle internetin yaşamsal öneme sahip bir araç olmasının sağladığı ivme ile sürekli gelişmekte ve değişmektedir.

Bu kadar büyük ve hızlı değişim karşısındaki en büyük risk, ciddi bir maliyet, sürekli yenilenme gereksinimi ve bunu gerçekleştirmeye yeterli öz güven ve dinamizmdir. Bu nitelikler kuşkusuz bir eğitim kurumunun başarısı için vazgeçilmezdir ve bu niteliklerin toplandığı bireylerin sayısı arttıkça, değişim karşısındaki direnç daha kolay aşılabılır ve toplumsal değişim daha doğru bir sağlanmış olabilir. Değişime karşı davranışlar konusunun araştırmacılarından Dr. Taşkın, değişim karşısındaki 5 önemli engeli şu şekilde sınıflandırmaktadır:

1. Bilinmeyenden korkmak,
2. Kendinden şüphelenmek,
3. Alay edilmekten korkmak,
4. Olumsuz motivasyon,
5. Başarısızlık korkusu ve eleştirilmek (Taşkın, 2001:s.64-65).

BİLİŞİM VE EĞİTİMİ

Türkiye’de bilişim eğitimi, 1970’li yıllarda başlamıştır. Lisans düzeyin ilk eğitim, 1977 yılında Hacettepe ve Ortadoğu Teknik Üniversitesi’nde yapılmıştır. İTÜ’de 1980’de, Ege ve Yıldız Teknik Üniversitelerinde 1982 yılında mühendislik fakültesi bünyesinde bilgisayar mühendisliği veya bilgisayar bilimleri mühendisliği adıyla lisans eğitimi vermeye başlanmıştır. 2015 yılı itibari ile 100’ü aşkın üniversitede bilgisayar mühendisliği ve/veya yazılım mühendisliği alanında eğitim ve öğretim faaliyetleri yapılmaktadır. Bilgisayar mühendisliği bölümleri dışında iktisadi ve idari bilimler fakülteleri veya işletme fakülteleri bünyesinde yönetim bilişim sistemleri ve işletme enformatiği bölümleri, lisans eğitimleri vermektedir. Yönetim bilişim sistemleri alanında ilk lisans eğitimi Boğaziçi Üniversitesi’nde, işletme enformatiği alanında ilk lisans eğitimi Marmara Üniversitesi’nde yapılmaya başlanmıştır. Eğitim fakülteleri bünyesinde bilgisayar ve öğretim teknolojileri eğitimi (BÖTE) adıyla bilgisayar öğretmenliği lisans eğitimi verilmektedir. Bu alanda verilen mezunların tamamının öğretmenlik mesleğini yapmadıkları düşünüldüğünde bilişim piyasasında lisans mezunu olarak, ciddi sayıda mezun bulunduğunu öngörmek zor değildir. Ön lisans düzeyinde ise sayıları her geçen gün artan ve her bir üniversite bünyesinde bile birkaç meslek yüksekokulunda, bilgisayar programcılığı adı altında ön lisans düzeyinde mezunlar verilmektedir. Son yıllarda o kadar çok meslek yüksekokulu kurulmuştur ki, bu durumu ifade eden makale başlıklarından bir tanesi Prof. Dr. Kemal Çelik tarafından “Meslek Yüksekokullarını S-açma Politikaları” başlığı ile gereğinden fazla s-açılan ve saçma bir durumu ifade eden içerikte ele alınarak irdelenmiştir. Sözü edilen bölüm veya programlar dışında, bu alana ilgi duyan diğer lisans veya ön lisans mezunlarının da bilgisayar alanında istihdam edildikleri düşünüldüğünde nicelik bakımından talebin bir hayli üzerinde mezunların yetiştirildiğini söylemek olanaklıdır. 1970’li yılların sonunda bir elin parmakları kadar lisans ya da ön lisans programı bulunmakta iken, günümüzde bir üniversite bünyesinde çok sayıda bölüm ve program bulunmaktadır. Lisans ve ön lisans eğitimleri dışında, yüksek lisans ve doktora öğretimleri de yapılmaktadır. Bu anlamda ciddi ve plansız bir değişimin söz konusu olduğunu kabul etmek gerekir. 2014 yılı itibari ile Ege Üniversitesi’nde aşağıda belirtilen sayıda lisans ve ön lisans öğrencisi kabul edilmiştir:

Tablo 1. Ege Üniversitesi, Lisans, Ön Lisans Öğrenci Kontenjanları

Bölüm veya Program	Süresi	Öğr. Adedi
Ege Üniversitesi, Mühendislik Fakültesi Bilgisayar Mühendisliği	Lisans	108

Ege Üniversitesi Eğitim Fakültesi Bilgisayar ve Öğretim Teknolojileri Eğitimi	Lisans	62
Ege Üniversitesi, Ege Meslek Yüksekokulu Bilgisayar Programcılığı (Örgün+İÖ)	Ön Lisans	40+40
Ege Üniversitesi, Tire Kutsan Meslek Yüksekokulu Bilgisayar Programcılığı (Örgün)	Ön Lisans	40
Ege Üniversitesi, Bergama Meslek Yüksekokulu Bilgisayar Programcılığı (Örgün+İÖ)	Ön Lisans	30+30

Tablo 1.'den görüldüğü üzere, Ege Üniversitesi'ne 2014 ÖSYM tercih ve yerleştirme kılavuzu bilgilerine göre, 170 lisans, 180 ön lisans öğrencisi kayıt hakkı kazanmış bulunmaktadır. Birçok büyük üniversitemizde benzer durumların söz konusu olduğu göz önünde bulundurulduğunda, bilişim meslek elemanlarına olan talebin çok ötesinde bir arzın söz konusu olduğunu ifade etmek yanlış olmaz. Bilişim eğitimi alanında nicelik bakımından tatmin edici bir noktaya gelmesine rağmen nitelik bakımından aynı şeyleri ifade etmek mümkün değildir. Bu anlamda Yüksek Öğretim Kurulu (YÖK)'ün üç öğretim üyesi ile bir lisans bölümü açılması yönetmeliğinin yeniden gözden geçirilmesi gerektiği düşünülmektedir. Bilişim ve bilişim eğitiminde meydana gelen değişimler dört ana kategoride incelenmektedir.

Bunlar;

1. Yazılım araçları alanında değişimler,
2. Donanım alanında değişimler,
3. Bilişim eğitimi alanında değişimler,
4. Bilgi toplumu alanında değişimler. Biçiminde değerlendirilmektedir.

Yazılım Araçları Alanında Değişim

Bilgisayar yazılım araçları alanında büyük değişimler olmuştur. Fortran, Algol, RPG, Basic, Pascal ve PL/1 ile başlayan ve C dili ile devam eden, programlama dilleri kullanım sürecinde sürekli ve hızlı bir değişim görülmüştür. Programlama dillerinde, görsel programlama yaklaşımına tam bir geçişin sağlandığı görülmektedir. Basic temeli üzerine Visual Basic, Pascal temeli üzerine Delphi, C temeli üzerine kurulu Visual C, C Sharp ve Java programlama dilleri ile değişimin sürdüğü görülmektedir. Görsel programlama yaklaşımı ile birlikte HTML ve XML'den ASP ve PHP'ye uzanan internet yazılım araçlarına geçiş, diğer önemli bir değişim olarak karşımıza çıkmaktadır. İşletim sistemi alanında da özellikle Microsoft yazılım firması tarafından ortalama iki yılda bir yeni versiyonu ile Windows sürümlerinin piyasaya sürüldüğü gözlenmektedir. Bununla birlikte açık kaynak kodlu işletim sistemleri başlığı altında Linux ve türevi çok sayıda işletim sisteminin varlığını ve Android mucizesini görmek gerekir. Akıllı cep telefonları ve internet, sosyal paylaşım platformlarının yüksek kullanımı sayesinde baş döndürücü hızla yaygınlaşmakta ve kullanıcı sayıları inanılmaz düzeylere ulaşmaktadır. Bu değişim karşısında, bilişim eğitiminin de hızlı bir adaptasyon gereksinimi ve zorunluluğu bulunmaktadır. Bu dönüşümü gerçekleştirmek o kadar da kolay değildir. Bu durumda bilişim eğitimi yapılan bütün bölüm ve programların ortalama 3 veya 5 yılda bir değişim yaşaması ve uygun güncel programlama araçlarının gelişimini ve öğretimini yapmak amacıyla, bilişim piyasasından mobil öğretici tedarikinin sağlanması gerekmektedir. Bu kadar hızla değişen yazılım araçları için kağıda basılı kitap üretiminin gereksiz olduğu, bir kitabın baskısı sona ermeden güncelleştirilmesi gereken kitap bölümlerinin olabileceği akıldan çıkarılmamalıdır. Bu nedenle kağıda basılı kitap üretimi yerine elektronik kitap (E-kitap) uygulamasının yaygınlaştırılması gerektiği düşünülmektedir. Böylece sürekli güncellenme gereksinimi gösteren yazılım araçları ile ilgili uygulamaları gerçekleştirme olanağı elde edilmiş olmaktadır. Bunun yanı sıra, gereksiz kitapların raflarda yer almasının önüne geçmek ve tonlarca kağıt israfının ortadan kaldırılması mümkün hale gelebilecektir.

Donanım Alanında Değişim

Türkiye'de ilk bilgisayar sistemi, Türkiye Cumhuriyet Karayolları Genel Müdürlüğü bünyesinde 1960 yılında kurulmuş ve 12 yıl süre ile kullanılmıştır. Kurulan bilgisayar sistemi, bu kurumda özellikle maliyetli yol yapımı hesaplamalarında kullanılmak üzere satın alınmıştır. IBM 650 adı verilen 167 metre karelik bir alana sığan bu makine'nin ağırlığı 30 ton civarında idi. Bu sistem, ilk bilgisayar ENIAC'tan tam 15 yıl sonra edinilmiştir. İkinci bilgisayar ise, İstanbul Teknik Üniversitesi'nin (İ.T.Ü) Taşkışla binasına akademik amaçlarla kullanılmak üzere getirilmiştir. İTÜ'den sonra Orta Doğru Teknik Üniversitesi (ODTU), Devlet Planlama Teşkilatı (DPT) ve Ege Üniversite'ne IBM markalı Mainframe özellikli sistemlerin alındığı görülmüştür. Ege Üniversitesi'ne kiralama yoluyla getirilen IBM VM/SP 370, IBM 4341 ve IBM 3090 sistemleri, 1980'li yılların en donanımlı ve özellikli bilgisayarları olarak kayda geçmiştir. Günün koşullarında aylık kira bedelleri milyon dolarlar düzeyinde bulunan donanım birimleri, günümüz bilgisayarları ile karşılaştırıldığında olağanüstü pahalı, yavaş ve hacimsiz olarak değerlendirilebilir. Günümüzün en basit özellikli bilgisayarları bile bu sistemlerle kıyaslanmayacak düzeyde hızlı ve ucuzdur. Ege Üniversitesi'nde kullanılan ilk bilgisayarın sadece 8 Kb.

kapasiteli belleği bulunmakta idi ve bu sistemler üzerinde sadece RPG-II (Report Program Generator) adı verilen yine IBM tarafından geliştirilen ve piyasaya sunulan programlama dili kullanılabilmekte idi. Bu anlamda günümüzde ulaşılan nokta inanılmaz olarak değerlendirilmektedir. Günümüzde bilgisayar donanım araçları büyük bir hızla ve sürekli gelişmekte ve değişmektedir. İşlemci, disk ve bellek kapasiteleri hızla büyümekte ve hızlanmakta, fiyatlarda aynı oranlarda ucuzlamaktadır. Cep telefonu olarak kullanılan her bir akıllı telefonun aynı zamanda birer bilgisayar olduğu düşünüldüğünde, gelinen nokta geçmişle kıyaslanmayacak boyutlardadır.

Bilişim Eğitimi Alanında Değişim

Türkiye, genç nüfus potansiyeli ile kalkınmayı hedefleyen bir ülke durumundadır. Türkiye’de yükseköğretim öncesi ilk, orta ve lise eğitimi alan 18 milyon öğrenci ve 900 bin öğretmen bulunmaktadır. Sadece bu rakamlar birçok ülkenin nüfusundan fazladır.

2014 yılı mart ayı verilerine göre yükseköğretimde eğitim görmekte olan öğrenci sayısında 5.5 milyon rakamına ulaşılmıştır. Bu rakamlar da Dünya’da 128, Avrupa’da 11 ülkenin nüfusundan daha büyük bir niceliği ifade etmektedir (Çetinsaya, 2014). Görüldüğü üzere eğitilebilir 25 milyona yaklaşan bir büyüklükten söz edilmektedir. Türkiye’de nicelik bakımından oldukça tatmin edici bir noktada olduğunu söylemek mümkündür. Nitelik bakımından bilişim eğitiminin gereksinim duyduğu yeteneklerle teçhiz edilmiş öğrencilerin bilişim bölümlerini tercih etmede hızlı bir düşüş gözlemlenmektedir. Boğaziçi, Bilkent, ODTÜ ve İTÜ dışında hemen bütün üniversitelerde bilişim bölüm veya programlarına kayıt olan öğrencilerin daha az nitelikli dilimlerden üniversiteler kayıtlı oldukları görülmektedir. Her geçen yıl, tedrici olarak yüzdelik dilimlerin düşüş göstermesi endişe vericidir. Bu kadar hızlı gelişen teknolojiyi, niteliği düşük meslek elemanları ile yakalamak çok zordur. Bazı vakıf üniversitelerinde bilgisayar mühendisliği bölümlerinin kontenjanlarını dolduramıyor noktalara gelmesi, önemli bir sorun ve ciddi bir plansızlığın ipuçlarıdır. Öğrenci talebi bakımından bu ilgisizliğin en büyük nedeni, başlangıçta önemli bir vizyona sahip olan bölümlerin, bütün üniversitelerin bünyelerinde görmek istemelerinden kaynaklanmaktadır. Hatta bazı üniversitelerde, mesela Celal Bayar Üniversitesi’nde, hem mühendislik fakültesi, hem de teknoloji fakültesi bünyesinde iki aynı bölüme ve bu bölümlerin ikinci öğretim programlarına rastlanmaktadır. Bununla birlikte; bilgisayar mühendisliği ile birlikte yazılım mühendisliği bölümlerinin kurulmuş olması bir gereksinimin sonucu değildir. İşletme ve/veya iktisadi ve idari bilimler fakültesi bünyesinde yönetim bilişim sistemleri veya işletme enformatiği bölümlerinin varlığı mezun arzını artıran diğer bir faktördür. Ayrıca, 1998 yılından beri eğitim fakülteleri bünyesinde çok sayıda bilgisayar ve öğretim teknolojileri eğitimi (BÖTE) veren bölümün kurulmuş olması, mesleğin geleceği bakımından, öğrencilerin bu bölümleri tercih etme isteklerini aşağıya çeken bir unsur olarak değerlendirilmektedir.

Bilişim Eğitiminde İçeriksel Değişim

Bilişim eğitimi bakımından en önemli risk, hızla değişen teknolojik yeniliklere paralel, yazılım araçlarında meydana gelen değişimi karşılayamamaktır. Ortalama olarak, işletim sistemlerinin iki yılda, uygulama programlarının 3 yılda, programlama dillerinin 4 yılda bir değiştiği düşünülürse, bu alanda eğitim ve öğretim faaliyeti yürüten çok sayıda öğretmen ve öğretim elemanının bu değişime ayak uydurma zorunluluğu bulunmaktadır. Kabul etmek gerekir ki, bu değişim, çok hızlıdır ve değişime adaptasyon zordur. Bunu sağlamak için dinamik ve yenilenme potansiyeli yüksek personelin istihdamını sağlamak ve bu personeli yükseköğretim kurumları bünyesinde, kurulacak sürekli eğitim merkezlerinde hızlandırılmış kurs programlarından geçirmek gerekir. Her bir bölüm, programın ve sürekli eğitim merkezlerinin sanayi ile işbirliğini tesis etmek gerekir. Böylece bilişim piyasasında hayata geçen değişimlerin eşanlı olarak üniversitelere yansması mümkün hale gelebilir. Bununla birlikte, öğrencilerin staj yapma konusundaki güçlükleri ortadan kaldıran ve iş bulmalarına zemin hazırlayan ortamları oluşturmak mümkün hale gelebilir. Bilişim alanında meydana gelen sürekli değişimin ortaya çıkardığı ekonomik ve yönetsel sorunları şunlardır:

1. Basılı yayınların kısa sürede güncelliğini kaybetmesi ve kağıt israfı,
2. Donanım birimlerinin sürekli yenilenme gereksinimi,
3. Yazılım araçlarında uzmanlaşmama zorluğu,
4. Sürekli personel eğitiminin doğurduğu güçlükler,
5. Öğrencilerde internet ve sosyal platformlara bağımlılık,
6. Güncel olmayan eğitim programlarının doğurduğu sorunlar,
7. Değişime karşı direncin gelişmesi,
8. Algı düzeyi düşük öğrencileri eğitime zorluğu.

Sürekli değişimin ortaya çıkardığı dezavantajları ortadan kaldırmak ve basılı kaynak tedariki için, kitap yerine elektronik kitap (E-Kitap) uygulamalarının hayata geçirilmesi, donanım birimlerini satın almak yerine daha

düşük maliyetli kiralama yöntemlerinin tercih edilmesi, disk, bellek ve diğer donanım birimlerini güncelleme anlaşmalarının hayata geçirilmesi gerekir. Üniversite-sanayi işbirliğinin etkin bir şekilde tesis edilmesi ile piyasada gereksinim haline gelen yazılım araçlarının eşanlı bir biçimde üniversitelerde öğretilmesi mümkün hale gelir ve hızlı değişimi yönetmek olanaklı olur. Bununla birlikte değişimin ortaya çıkardığı bir dizi avantaj da bulunmaktadır. Bunlar:

1. Dinamik ve etkin öğretim teknolojilerine erişim,
2. Sürekli ucuzlayan donanım birimleri,
3. Daha etkin ve hızlı yazılım araçları,
4. Sürekli eğitim ve dinamizm,
5. Üniversite-Sanayi işbirliğinin zorunluluk haline gelmesi,
6. Uluslar arası personel rejimine uyum zorunluluğu,
7. Sürekli güncellenme ve yenilenme olanağı,
8. Öğreticilerde yenilenme güdüsü ve gereksinimi.

Bilgi Toplumu Alanında Değişim

Bilgi toplumu alanında değişimi görmek amacıyla Türkiye İstatistik Kurumu (TÜİK) tarafından yayımlanan 2004-2014 yılları arasında yapılan araştırmalarla elde edilen istatistiklere bakmak gerekmektedir. TÜİK bu amaçla girişimlerde ve hanelerde bilişim teknolojilerinin kullanımı bakımından yıllık yüzde bazda istatistikleri elde etmiş ve yayımlamıştır. Hanelerde bilgi teknolojilerinin kullanımı verileri 16-74 yaş grubu bireyler esas alınarak elde edilmiştir. Oysa, günümüzde bilişim alanında teknolojilerin kullanımı çocuklarda ilkökul çağında hatta okul öncesi çağlarda başlayabilmektedir. Araştırmanın 16-74 yaş aralığında incelenmesi, elde edilen kullanım oranlarını aşağı çeken bir faktör olarak değerlendirilmektedir. Bu veriler, TÜİK resmi web sitesinden elde edilmiştir (TÜİK, 2015).

Tablo 2., Girişimlerde (Firmalarda) Bilişim Teknolojilerini Kullanım Verileri

Girişimlerde Bilişim Teknolojileri Kul.	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Bilgisayar Kullanımı	87.8	*	88.7	90.6	90.7	92.3	94.0	93.5	92.0	94.4
İnternet Erişimi	80.4	*	85.4	89.2	88.8	90.9	92.4	92.5	90.8	89.9
Web sitesi sahipliği	48.2	*	63.1	62.4	58.7	52.5	55.4	58.0	53.8	56.6

Tablo 2. incelendiğinde girişimlerde yani firmalarda bilgisayar kullanımının % 95 düzeylerine ulaştığını görmek mümkündür. Ayrıca, internet erişiminin yüzde 90'lar düzeyinde olduğu görülmektedir. Bu oranlar firmaların yoğun bir şekilde bilgisayar kullandıklarını ve internet erişimi ile iç içe olduklarını göstermektedir. Firmaların web sitesi sahipliğinde % 60'lar düzeyinde buldukları ve 10 yıllık bir süreçte bu oranın artmadığı görülmektedir. Firmalarda bilgisayar kullanımı değerlerini regresyon analizine tabi tuttuğunuzda, aşağıdaki sonuçlara ulaşıldığı görülmüştür.

Regresyon eşitliğinin $Y = -1429 + 0.757X$ biçiminde elde edildiği görülür. %5 yanılma payı ile istatistik bakımdan önemli bulunan bu eşitliğe göre, 2015 sonu itibari ile firmaların bilgisayar kullanımı % 96 düzeyinde, 2020 yılında bu oranların % 100 düzeyine yaklaşmış olacağı tahmin edilmiştir.

Tablo 3., Hanelerde Bilişim Teknolojileri Kullanım Verileri

Hanelerde Bilişim Teknolojileri Kul.	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Bilgisayar Kullanımı (Toplam)	22.9	*	33.4	38.0	40.1	43.2	46.4	48.7	49.9	53.5
Erkek	30.0	*	42.7	47.8	50.5	53.4	56.1	59.0	60.2	62.7
Kadın	15.9	*	23.7	28.5	30.0	33.2	36.9	38.5	39.8	44.3
İnternet Kullanımı (Toplam)	17.6	*	30.1	35.9	38.1	41.6	45.0	47.4	48.9	53.8
Erkek	24.0	*	39.2	45.4	48.6	51.8	54.9	58.1	59.3	63.5
Kadın	11.1	*	20.7	26.6	28.0	31.7	35.3	37.0	38.7	44.1
Hanelerde İnternet Erişimi	8.7	*	19.7	25.4	30.0	41.6	42.9	47.2	49.1	60.2

Tablo 3. Verileri incelendiğinde; hanelerde 2005 yılında % 22.9 düzeyinde bilgisayar kullanımı söz konusu iken, 2014 yılında bu oran % 53.5 düzeyine erişmiştir. Aynı dönemde, internet kullanımının da % 17.6 düzeyinden % 53.8 oranına yükseldiği görülmektedir. Gerek bilgisayar kullanımı, gerek internet kullanımı bakımından erkeklerin kadınlara göre daha yüksek oranlarda kullanım yaptıkları görülmüş, bu fark, istatistik bakımından da önemli bulunmuştur.

2013 yılında, yılın belli bir periyodunun üç ayında (ocak, şubat ve mart), 16-74 yaşlar arası kullanıcılar arasında TÜİK tarafından yapılan bir araştırmada bireylerin interneti kişisel kullanma amaçları aşağıdaki gibi elde edilmiştir (TÜİK, 2015):

Tablo 4., Türkiye’de Şehir ve Köy Yerlerinde Kullanım Amaçlarına Göre İnterneti Kullanım Oranları

İnterneti Kullanım Amaçları	Türkiye	Şehir	Köy
e-posta gönderme/alma-Sending/receiving e-mails	62.5	63.8	56.1
İnternet üzerindeki sosyal gruplara katılma-Participating in social Networks	73.2	72.1	78.3
Online haber, gazete ya da dergi okuma-Reading or downloading online news/news magazines	75.6	76.4	71.8
Düzenli olarak bilgi almak için haber servis ya da ürünlerine abone olma-Subscribe to news service or products to receive them regularly	21.3	21.8	18.7
Sağlıkla ilgili bilgi arama (yaralanma, hastalık, beslenme, vb.)-Seeking health-related information (e.g. injury, disease, nutrition, etc.)	59.6	62.4	46.2
Eğitim ve kurslarla ilgili bilgi arama-Looking for information about education, training or course offers	45.9	47.7	37.5
Mal ve hizmetler hakkında bilgi arama-Finding information about goods or services.	59.9	62.7	46.3
Yazılım indirme (oyun yazılımları hariç)-Downloading software (other than games software)	19.1	20.0	14.7
Web siteleri aracılığıyla toplumsal veya siyasal konular ile ilgili görüşleri okuma ve paylaşma-Posting opinions on civic or political issues via websites (e.g blogs, social Networks, etc.)	28.7	28.9	28.0
Toplumsal veya siyasal bir konuda online bir oylamaya katılmak- Taking part in online consultations or voting to define civic or political issues	12.8	13.6	9.1
Herhangi bir konuda çevrimiçi eğitim alma (yabancı dil, bilgisayar vb.)- Doing an online course(in any subject)	8.4	9.0	5.5
Herhangi bir konu ile ilgili bilgi almak için Wikipedia, Online ansiklopedi vb. kullanma- Consulting wikis to obtain knowledge on any subject	32.6	33.8	26.2
İş arama ya da iş başvurusu yapma-Looking for a job or sending a job application	12.9	13.8	8.4
Profesyonel bir gruba katılma-Participating in professional networks (create user profile, posting messages, or other contributions to linkedin, Xing etc.)	4.2	4.7	1.7
Seyahat veya seyahat ile ilgili konaklama için online hizmetleri kullanma-Using services related to travel or travel related accomodation	26.6	27.4	25.5
Mal veya hizmet satışı-Selling of goods or services, e.g via auctions	9.3	10.0	6.0
İnternet üzerinden telefonla görüşme/video görüşmesi (webcam ile)-Telephoning over the internet/video calls (via webcam) over the internet	55.1	56.6	47.4
İnternet bankacılığı-internet banking	24.8	26.8	15.4

TÜİK kaynaklı verilerle, internet kullanım amaçları bakımından Şehir ve köy kullanım yerleri bakımından verilere fark istatistiği (ortalamalar arası fark: t-testi) uygulandığında sonuç önemli bulunmuştur. İstatistiksel sonuçları Tablo 5’ten görülebilir.

Tablo 5., Şehir-Köy İnternet Kullanım Amaçları İstatistik Test Tablosu

Değişken	N	Ortalama	Standart Sapma	St. Hata Ortalaması	T	P
Şehir	18	36.19	23.92	5.64	6.42	0.000
Köy	18	30.13	23.19	5.47		

Tablo 5’te elde edilen fark testi sonuçlarına göre, şehir-köy internet kullanım amaçları arasında farkın anlamlı olduğu istatistik bakımından da doğrulanmış bulunmaktadır. Tablo 4. incelendiğinde şehirlerin, interneti daha amacına uygun bir içerikte kullandığı sonucuna varılabilir. Şehirlerde en yüksek kullanım, % 76.4 ile on line haber, gazete ve dergi okuma amaçlı yapılmış iken, köylerden en yüksek kullanım, % 78.3 oranı ile internet üzerinden sosyal gruplara katılma amaçlı yapılmıştır. Bu sonucun, köy ortamında eksik olan sosyalleşme olgusunun bir sonucu olduğu ve bu nedenle sosyal paylaşım sitelerinin daha cazip bir kullanım amacı ile öne çıktığı değerlendirilmektedir. Sağlıkla ilgili bilgi arama amaçlı kullanım; şehirlerde % 62.4 iken köylerde % 46.2 oranında olmuştur. Herhangi bir konuda çevirim içi bilgi alma, şehirlerde % 9.0 iken, köylerde aynı oran, % 5.5 düzeyinde gerçekleşmiştir. İnternet bankacılığı alanında şehirlerde % 26.8 oranında bir kullanım söz konusu iken, köylerde bu oran, % 15.4 düzeyinde gerçekleşmiştir. Profesyonel bir gruba katılma amacına göre internet kullanımını, şehirlerde % 4.7 düzeyinde iken, köylerde bu oran, % 1.7 düzeyinde gerçekleşmiştir. İki kullanımın oransal ölçütleri göz önünde bulundurulduğunda en büyük farkın bu kategoride gerçekleştiğini söylemek mümkündür. Ayrıca, bu farkında şehir ve köylerde yaşayan bireylerin eğitim düzey farklarından kaynaklandığı düşünülmektedir. Sonuç olarak, şehir ve köy ortamında yaşayan insanların interneti kullanım amaçları farklı olsa da, her geçen yıl, artan oranda bir internet kullanımından söz etmek mümkündür. Köy

ortamının dar sınırları içerisinde yaşamak durumunda olan insanlar bakımından daha önemli bir araç olduğu düşünülen internetin, köyden kente göçü hızlandıran bir faktör olabileceği değerlendirilmektedir.

SONUÇ VE ÖNERİLER

Bilişim sektörü, Dünya’da en hızlı büyüyen sektörlerin başında gelmektedir. Bilgisayar donanımı alanında, özellikle bellek ve işlemci bazında sürekli bir değişim yaşanmaktadır. Ege Üniversitesi’nde kullanılan ilk bilgisayarın 8 Kb (8000x1024 byte) büyüklüğünde bir belleğe sahip olduğu düşünüldüğünde günümüzde ulaşılan nokta inanılmazdır. Günümüz standartlarında normal bir bilgisayarın 8 Gigabyte büyüklüğünde belleğe sahip olduğu düşünülürse, ana bellek kapasitesinde bir milyon misli bir değişimden söz edilmektedir. İşlemci hızlarının da benzer bir ivme ile geçmişle kıyaslanmayacak düzeyde hızlandıkları ve aynı oranda ucuzladıklarını belirtmek gerekir. Donanım alanında bu gelişmeler ve değişimler yaşanırken MS-DOS işletim sistemlerinden Android’e ulaşılan yolculuk dikkate değer ve önemlidir. Programlama dilleri; bellek, işlemci ve işletim sistemlerinde meydana gelen büyük değişimlere odaklı bir biçimde, devasa veri tabanları ile entegre olmuş ve görselleşmiştir. Bilgisayar kullanımı, internet sayesinde geometrik hızlarla artmaktadır. Bilgisayar, akıllı telefonlar biçiminde ceplere girmiştir. Bilgisayar kullanımı, % 100’lere hızla ulaşmaktadır. Bu kadar büyük teknolojik yenilikler yaşanırken meslek elemanlarının ve öğreticilerin sürekli yenilenme çabaları pek de kolay olmamaktadır. Asıl önemli riskin de burada olduğu değerlendirilmektedir. Bu kadar hızlı gelişen teknoloji karşısında, niteliği azalan meslek elemanlarının ayak uydurması bir hayli zor görünmektedir. Bu bakımdan aşağıda belirtilen önlemlerin alınmasına gerek bulunduğu düşünülmektedir:

1. Bilgisayar alanında basılı kitap uygulaması tamamı ile gereksizdir. Çünkü basılı bir kitabın 3 yıldan fazla kullanıma olanağı yoktur. Bundan dolayı, hem ciddi bir kaynak hem emek israfı söz konusu olmaktadır. Bunun yerine, Elektronik kitap uygulamasının daha gerçekçi olduğu düşünülmektedir. Böylece sürekli değişen yazılım araçlarını güncelleme ve ilgili birimlere dağıtma olanağı elde edilmiş olmaktadır. Bu konuda Türkiye Bilimsel ve Teknik Araştırma Kurumu (TUBİTAK) tarafından öğrenciler için akademik e-kitap ile videolardan oluşan e-Ders içerikleri hazırlama kararı alınmıştır. Çağrı kapsamında e-Kitap ve e-Ders hazırlamak amacıyla başvuru yapacak kişilerden en az doktora derecesine sahip olmaları, dersin ilgili olduğu alanda lisans ya da lisans üstü düzeyde eğitim almış ve ders vermiş olmaları şartı aranmıştır (TUBİTAK-Bülten, 2014:24).
2. Bilgisayar donanımı satın alma uygulaması yerine kiralama veya sürekli güncelleme seçeneklerinin hayata geçmesi gerekir. Bu yaklaşım üretici firmaların daha akılcı, işlemci ve bellek bakımından yükseltme (upgrade) potansiyeli olan üretim yapma noktasında AR-GE faaliyetlerine odaklanmalarına sebep olabilecektir.
3. Bilişim alanında yenilikleri ve teknolojik gereksinimleri karşılama noktasında özel sektörün (piyasanın), üniversitelerin çok önünde yer aldığı düşünülmektedir. Bu bakımdan bilişim eğitimi yapan bütün üniversitelerin sanayi ile işbirliği yapması bir zorunluluk haline gelmiştir. Bu nedenle özellikle mesleki eğitim yapan meslek yükseköğretim kurumlarının organize sanayi bölgeleri içerisinde kurulması mutlaka değerlendirilmelidir. Bilgisayar piyasası bakımından zayıf bölgelerde üniversite düzeyinde bilişim öğretiminin eksik olacağı değerlendirilmektedir. Bu, hem staj yapmak zorunda olan öğrenciler için staj yeri temin edilememesine hem de üniversite sanayi işbirliğinin kurulamaması noktasında önemli sıkıntılara neden olacağı değerlendirilmektedir.
4. Lisans eğitimi yapılan bölümlerin üç öğretim üyesi ile kurulmasına müsaade edilmesi gerçekçi değildir. Mutlaka nicelik ve nitelik bakımından daha yeterli akademik ölçütlerin hayata geçirilmesi, ana bilim dalı bünyesinde kurulması gereken bilim dallarının öğretim elemanı bakımından yeterli bir düzeye gelmesi için gerekli olan ölçütlerin tamamlanması değerlendirilmelidir.
5. Son yıllarda bilişim meslek elemanlarını yetiştiren çok sayıda lisans programı açılmış bulunmaktadır. Bu kadar bölüm ya da programın açılması gereksizdir. Bu durum, nitelikli meslek elemanlarının yetişmesi önünde ciddi bir engel olmakla birlikte teknik personel arzını artıran ve meslek elemanlarının yeterli ücretlerle istihdam edilmelerini ortadan kaldıran bir faktördür. Her meslek alanı için Devlet Planlama Teşkilatı (DPT) gereksinimlerin ne olduğu belirlemeli ve Yüksek Öğretim Kurulu (YÖK) ile işbirliği yapmalıdır.
6. Türkiye’de kurulu nitelikli vakıf üniversiteleri bulunmaktadır. Bu üniversitelerin az sayıda olduklarını belirtmek gerekir. Birçok vakıf üniversitesi, kontenjanlarını doldurma kaygısı ile bu mesleği öğrenemeyecek ve iş yaşamında başarılı olamayacak öğrencileri kabul etmekte ve özel dersaneler mantığı ile çok sayıda mezunlar verilmektedir. Yükseköğretim kurulunun 2015 yılı için Tıp ve Hukuk fakülteleri için getirdiği taban puan uygulamasını mühendislik programları için de hayata geçirmesi gerektiği düşünülmektedir.
7. Üniversitelerin bazı mesleklerde olduğu gibi bilişim alanında ihtisaslaşmış gerekir. Mesela, İstanbul ve sanayi bakımından gelişmiş bazı bölgelerde bilişim meslek elemanlarını yetiştirmek daha gerçekçidir. Çünkü bu

sayede sanayi ile etkin bir işbirliği kurmak mümkün hale gelebilir. Mezunların doğru ve güncel bilgilerle mezun olmalarının yanı sıra istihdamda görülmeye başlanan sıkıntıların ortadan kalkması kolaylaşabilir.

8. Üniversitelerin sanayi ile işbirliği sayesinde dinamik müfredat programlarını gerçekleştirme ve öğretici kadronun da güncel bilgilere ve yeniliklere erişimi olanaklı hale gelebilir.

9. Üniversite ve sanayi işbirliği ile gereksinim duyulan projeleri daha kısa ve doğru bir şekilde gerçekleştirme olanakları elde edilmiş olur.

10. Yeni kurulan veya gelişmekte olan üniversitelerle, gelişmiş olan üniversiteler arasında daha sıkı bir işbirliğinin tesis edilmesi bir zorunluluktur. Yeni kurulan bir bölümün, gelişmiş bölümlerin bilgi ve deneyimlerinden istifade etmesi sağlanmalı, öğretim üyesi kaynağından faydalanmalıdır.

11. Öğrencilere, klasik eğitim anlayışı dışında, daha çağdaş ve öğrenmeye odaklı öğretim modelleri ile eğitim yapılmalı ve proje geliştirme temelli çalışmalara yönlendirilmeleri tesis edilmelidir.

12. Bilişim teknolojilerinin bu kadar hızlı gelişmesi ve yaygınlaşması, bir dizi sosyal ve akademik içerikli olumsuzluklar da içermektedir. İlk, orta, lise ve üniversite düzeyinde öğrencilerin özellikle akıllı telefonlar vasıtasıyla internete erişim istekleri, tutkuya ve bağımlılığa dönüşebilmekte, bu da öğrencilerin öğrenme zamanlarını ortadan kaldıran bir faktör olma hüviyetine bürünmektedir. Ayrıca özellikle köylerde sosyal paylaşım sitelerine erişim amaçlı internet kullanımının çok sayıda sosyal içerikli olumsuzluğa sebep olduğu izlenmektedir.

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A RESEARCH ON MOTIVATION DEFICIENCY FOR ASSOCIATE DEGREE STUDENTS OF HIGHER EDUCATION

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ABSTRACT: Associate degree education of higher education in universities is two year after vocational secondary school. This institution have been making vocational training in universities. Students take associate degree diplomas after graduation. The period of training in this school is short, curriculum easy, but success low. Deficiency of success has been associated with vocational secondary schools where educational facilities are low and dissatisfaction and imposition to high academical education to students by instructors.

Nonetheless, it is not easy to explain this situation like this, It has been thought to take reliable argument, multi faceted research have to be implemented. Although it is possible to take the graduation bachelor's degree by way of direct transition system (DGS) to licence programs. It is thought that determining factor about the failure of students resulted from their lack of perception for academic education.

There have been constituted more than 700 vocational high school in universities in Turkey. When we accept that this is a political approach to correspond for demand of university education, it is serious unplanned approach and not academic requirement. In this circumstances, it can be said that approximation like this not profit for our country. One reality is necessity for qualified person, other, two million candidate for university education, and another paradoxical reality not sufficient student for university quota.

In this study, an investigation has been done between students and teachers at vocational high schools in Ege University. In order to comparison and taking inferences approaches between two side of education, different two questionnaire form are used. One of them is for students, other for teachers.

In this regard, to investigate reasons; problems about education, viewpoints about education, deficiency motivation for learning activities are planned on.

In order to adapt for learning and studying, activities like this must be seen as a hobby by students. Therefore, "What is funny activity for you?" question has been asked, and responds by students as follows:

1. 23.86 % walk around a place.
2. 23.80 % using internet.
3. 20.30 % listening music.
4. 09.64 % reading.
5. 08.12 % share other activities.
6. 05.08 % studying.

As can be seen, there is a lot of activities in front of studying. Studying is funny activity for 5.08 % of student. Other important and dramatic result from survey is that students use internet for in the ratio of 0.68 % for studying and academic learning activities.

Key Words: associate degree education, motivation deficiency of students, without examination crossing, risks of education.

YÜKSEKÖĞRETİMDE ÖN LİSANS ÖĞRENCİLERİNİN MOTİVASYON EKSİKLİĞİ ARAŞTIRMASI

ÖZET: Yükseköğretimde ön lisans eğitimi, lise eğitiminden sonra iki yıllık bir süreyi kapsamaktadır. Mesleki eğitim yapan meslek yüksekokulları, iki yıllık sürenin sonunda başarılı olan öğrencilere ön lisans diploması vermektedir. Bu okullarda öğretim süresi kısa, müfredat nispeten rahat olmasına rağmen başarı düşüktür. Başarının düşüklüğü, bu okulların büyük oranda kaynağı durumundaki meslek liselerindeki eğitimin yetersiz olması ile ilişkilendirilmekte ve bu öğrencilere teorik eğitim dayatmanın başarısızlığa neden olduğu değerlendirilmektedir.

Ancak hali hazırdaki durumu bu kadar basit nedenlerle izah etmenin güç olacağı ve çok boyutlu bir araştırmanın gerekli olduğu düşünülmektedir. Dikey Geçiş Sistemi (DGS) ile mezunların lisans mezunu olmaları gibi bazı

motive edici olanaklar bulunmasına rağmen, öğrencilerin algı düzeylerinin düşüklüklerinden kaynaklı sorunların belirleyici bir faktör olduğu düşünülmektedir.

Türkiye’de 700’ü aşkın meslek yüksekokulu kurmanın, yükseköğretim talebini karşılamaya yönelik politik bir yaklaşım olduğu kabul edildiğinde, ciddi bir plansızlığın olduğu, gereksinimlerin ve ülke gerçeklerinin ikinci planda düşünüldüğü sonucuna ulaşmak çok da zor değildir. Bir tarafta yetmişmiş elemana duyulan gereksinim, 2014 Yükseköğretime Geçiş Sistemi (YGS) sınavına 2 milyonu aşkın başvuru, 200’e yakın üniversite, diğer yandan lisans kontenjanlarının bile dolmadığı bir yükseköğretim gerçeği yaşanmaktadır.

Bu araştırma ile Ege Üniversitesi’nde meslek yüksekokulları düzeyinde öğrenciler ve öğretim elemanları temelinde bir alan araştırması yapılmıştır. Bu araştırma, iki farklı anket çalışmasının öğrencilere ve öğretim elemanlarına uygulanması esasına dayalı olarak gerçekleştirilmiştir. Çünkü eğitim ve öğretimin iki tarafı olarak kabul edilen, öğretim elemanları ve öğrencilerinin yaklaşımları arasında bir karşılaştırma yapılarak daha somut çıkarsamaların yapılabileceği varsayılmıştır.

Bu bakımdan, öğrenci ve öğretim elemanlarının sorunları, eğitim ve öğretime bakış açıları ve meslek yüksekokullarında öğrenci olmanın ortaya çıkardığı motivasyon eksikliğinin nedenleri araştırılmaya çalışılmaktadır.

Bir öğrencinin öğrenmeye ya da ders çalışmaya motive olabilmesi için o eylemi bir hobi gibi sevmesi gerekir. Bu konu ile ilgili yapılan bir çalışmada, hayatınızda en sevdiğiniz aktiviteler nelerdir? Sorusuna öğrencilerin;

1. Sırada % 23.86’sı gezmek ve dolaşmak
2. Sırada, % 23.80’i internet kullanmak,
3. Sırada % 20.30’u müzik dinlemek,
4. Sırada % 9.64’ü kitap okumak,
5. Sırada % 8.12’si diğer eğlence faaliyetlerine katılmak,
6. Sırada % 5.08’i ders çalışmak biçiminde yanıtlamıştır.

Görüldüğü gibi, öğrencilerin öğrenmeye motive olmalarına engel bir dizi aktivite bulunmakta ve ders çalışmak, ancak öğrencilerin % 5’i için sevilen bir aktivite olarak değerlendirilmektedir.

Bir diğer önemli ve dramatik olduğu düşünülen tespit, interneti araştırma ve ders öğrenme amaçlı kullanan öğrencilerin oranı sadece % 0.68 oranında çıkmış olmasıdır.

Anahtar Kelimeler: ön lisans eğitimi, öğrencilerde motivasyon eksikliği, sınavsız geçiş, eğitimde riskler.

GİRİŞ

Yükseköğretimde yapılan öğretim, akademik bir öğretimdir. Akademik öğretim, bilimsel metotların ve araştırmanın yapılmasını zorunlu kılan zor bir süreçtir. Öğrencilerin bu zor öğretim sürecinde başarılı olabilmeleri için belli bir bilgi temeline sahip olmaları gerekir. Ayrıca, öğrencilerin motivasyonunu sağlayan en önemli unsur, bu bilgi temelinde yapılan öğretime olan ilgileridir. Özetle, öğrencilerin ilgili olmaları için yaptıkları işi sevmeleri ve nitelik bakımından da yaptıkları işe uygun temel bilgilere sahip olmaları gerekmektedir. Üniversitelerde ön lisans öğrencilerinin büyük bir kısmı meslek liselerinden gelmektedir. Mesela, meslek lisesinin bilişim bölümünden mezun öğrenciler, sınavsız meslek yüksekokullarının bilgisayar programcılığı veya benzer programlarına kayıt olmaktadır. Meslek liselerinden mezun olan öğrencilerin akademik nitelik bakımından en zayıf öğrenci grubunu oluşturduğunu kabul ettiğimizde öğrencilerin ön lisans programı bile olsa, alanlarında başarılı olmaları kolay olmamaktadır. Bu başarısızlıkta çeşitli sebeplerin etken olduğu düşünülmektedir. Bunlar:

1. Meslek liselerinde disiplinli olmayan bir eğitim sürecinin uygulanması,
2. Mesleki bilgi düzey noksanlığı,
3. Meslek alanına ilgisizlik,
4. Geleceğe dönük endişeler,
5. İnternet ve iletişim araçlarına olan bağımlılık düzeyinde ilgi,
6. Öğretim ortamlarının yetersizliği ve benzeri sorunlar.

Bu temelde ön lisans öğrencilerinin motivasyon eksikliklerine sebep olduğu düşünülen hususlar bir anket araştırması ile öğrenciler ve öğretim elemanları temelinde sorgulanmıştır.

Böylece öğrenci başarısızlığına etkide bulunan sebeplerin, öğretimin iki tarafı olan öğretim elemanları ve öğrenciler tarafından sorgulanması mümkün hale gelmektedir.

Öğretim elemanı ve öğrencilere uygulanan anket araştırmalarında, öğretim elemanlarının ve öğrencilerin genel memnuniyetsizliğinden söz etmek mümkündür. Öğretim elemanları; öğrencilerde genel bir ilgisizlik bulunduğunu, öğrencilerin ders çalışmadıklarını, öğrenmeye motive olamadıklarını, sınavsız geçiş sisteminin ciddi sorunlar barındırdığını ve meslek yüksekokullarına öğrenci yerleştirme sisteminin yeniden gözden geçirilmesi gerektiğini ifade etmişlerdir. Anket araştırmasına katılan öğrenciler ise, meslek liselerinde yeterince eğitim ve öğretim temeli kazanamadıklarını, bu bakımdan öğretim elemanlarının uyguladığı öğretim modellerinin zor geldiğini, öğrenmeye motive olamadıklarını ifade etmişlerdir.

SINAVSIZ GEÇİŞ SİSTEMİ

Meslek yüksekokullarının durumunu sınavsız geçiş öncesi ve sonrası olmak üzere incelemek gerekir. Bu okulların doğuş, yükseliş ve çöküş dönemleri bulunmaktadır. Türkiye’de ilk mesleki eğitim veren okulun 1911 yılında “Nafia Fen Mektebi” adı ile kurulduğu görülmektedir. Öğrenim süresi ortaokuldan sonra iki yıl olan, okulun mezunlarına “Fen Memuru” yerine “Tekniker” diploması verilmiştir. 1965 yılında biri İstanbul, diğeri Ankara olmak üzere iki adet “Tekniker Yüksekokulu” açılmıştır. 1971 yılında bu okulların tamamı kapatılmış ve 1975 yılından itibaren Milli Eğitim Bakanlıklarına bağlı “Meslek Yüksekokulları” açılmıştır (Kaya, 2013).

1982 Yılından itibaren meslek yüksekokulları üniversiteler bünyesine alınmıştır. Bu süreç, üniversitelerde meslek yüksekokullarının doğuş dönemidir. Özellikle Bilgisayar Programcılığı, Elektronik ve Elektrik programlarının çok yüksek talep görmeleri nedeniyle 1985’li yıllar yükseliş dönemidir. Bu dönemde,Boğaziçi Üniversitesi bünyesinde açılan Bilgisayar programcılığı programı 470 fen puan ile öğrenci kabul ederken, 450 fen puanı ile öğrenci kabul eden çok sayıda tıp fakültesi bulunmakta idi. Bunun gibi, İstanbul Üniversitesi Bilgisayar Programcılığı, Ege Üniversitesi Bilgisayar Mühendisliği bünyesinde; Ege Üniversitesi Bilgisayar Programcılığı ve Dokuz Eylül Üniversitesi Bilgisayar Programcılığı programları çok sayıda mühendislik bölümünü kısıktırarak düzeyde puanlarla kazanılan bölümler olmuşlardır. Bu dönemler, meslek yüksekokullarının en parlak dönemleridir. Bu dönem mezunları; akademisyen, bilgi işlem yöneticisi, öğretmen, yönetici ve benzer konumlarda görev yapmaktadır. Bu parlak dönem 2000 yılına kadar devam etmiştir. Sınavsız geçiş sistemi ile meslek lisesi mezunlarının, meslek yüksekokullarına kayıt yapma hakkı elde etmeleri bu kurumların çöküş dönemine girmesine neden olmuştur. Bu tarihlerden itibaren üniversiteler bünyesinde çok sayıda meslek yüksekokulu ve program kurulmuştur. Bir ya da birkaç öğretim görevlisi ile kurulan bu programlar, niteliksiz öğrencilerin zaman geçirdiği alanlar haline gelmiştir ve bu kurumlara maalesef yazık edilmiştir. Öğrenci başarısı olağanüstü düşmüş, kayıtlı öğrencilerin %10’u bile, mesleğin gerektirdiği düzeylerde başarı gösterememektedir.

MESLEK YÜKSEKOKULLARI HAKKINDA GÖRÜŞLER

Aşağıda sövlemleri verilen mezunların görüşleri, telefon ile veya mail vasıtasıyla elde edilmiştir:

Ahmet CENGİZ-Tire Kutsan Meslek Yüksekokulu (2000 öncesi) Bilgisayar Programcılığı Mezunu-Cotton Fabrikaları Yazılım Müdürü: “...Hocam, sizden çok şey öğrendik, hemen iş buldum. Girdiğim ilk iş yerimde kesintisiz 12 yıl çalıştım. Sonra Cotton’a yazılım müdürü oldum. Ekibimde çoğu bilgisayar mühendisi 30’a yakın kişi çalışıyor, evlendim. Eşim, İstanbul Üniversitesi Bilgisayar Mühendisliği mezunu, iki tane çocuğumuz var. İş yoğunluğumuz çok fazla ama mutluyuz...”. (Sınavsız geçiş öncesi mezun olan öğrencilerden çok başarılı bir profil.)

Ahmet YÜKSEL-Tire Kutsan Meslek Yüksekokulu (2000 öncesi) Bilgisayar Programcılığı Mezunu-Şahinler Holding IT Müdürü: Öğrencilik yıllarında, Ahmet yaramaz bir çocuk ancak çok zeki, ders çalışmayı sevmeyen ancak yaratıcı fikirlerle dolu biri, görüşleri şöyle: “...Hocam, mezun olduktan sonra hemen iş buldum. 15 yıldır çalışıyorum. Yazılım müdürlüğüne yükseldim. Sürekli yurt dışı seyahatlerim oluyor, işlerimiz çok yoğun, bu yoğun işler arasında aynı zamanda Trakya Üniversitesi Bilgisayar Mühendisliği bölümünde Java dersleri veriyorum, iş bulamıyorum diyenlere inanamıyorum...”. (Sınavsız geçiş öncesi mezun olan öğrencilerden başarılı bir başka profil.)

İlker HACIOĞLU-Tire Kutsan Meslek Yüksekokulu (2000 öncesi) Bilgisayar Programcılığı Mezunu-Yazılım Müdürü: “... Hocam bu mesleğe ilişkin tek şikayetim, yoğun bir şekilde çalışıyor olmam, bunun dışında hemen iş buldum ve yeterli bir düzeyde de para kazanıyorum...”. (Sınavsız geçiş öncesi mezun olan öğrencilerden bir diğer başarılı profil.)

Bülent GÜNGÖR-Ege Meslek Yüksekokulu, 1987 Bilgisayar Programcılığı Mezunu-Yazılım Firması Sahibi: Bana hitap ederek: “...Ahmet, işler çok yorucu, uzun zaman önce kendi firmamı kurdum. Para da kazanıyorum. İzmir’deki firmam dışında Gana’da firmam var. İşlerin yoğunluğu yüzünden sağlık sorunlarım

var...”. Bülent Güngör’ün, 1985 yılında Ege Üniversitesi, Bilgisayar Programcılığı’nı kazanırken, 1. Tercih Boğaziçi Üniversitesi İşletme Bölümü imiş. Bu bölümden sonra aklından geçirdiği bölüm, meslek yüksekokulu, bilgisayar programcılığı olmuş. Bu günün ayağa düşmüş programları geçmişin en favori bölümlerinden biri olarak düşünülmüştür. Bu örnek, öğrenci kalitesi bakımından nerelerden nerelere düşüldüğünü ortaya koyan somut bir örnektir. (Meslek yüksekokullarının yükselme döneminden çok önemli bir örnek. Bilgisayar programcılığı ön lisans programı, Boğaziçi İşletme bölümünden sonra düşünülen bir alan olarak değerlendirilmiş.)

Abbas GÜÇLÜ: Milliyet Gazetesi, eğitim editörü Abbas Güçlünün 3 ağustos 2012 tarihli köşesinde mesleki eğitim konusundaki görüşleri şöyledir: “Güya mesleki eğitim, memleket meselesi idi. Ama hiç kimsenin umurunda bile değil, hâlâ amele okulu olarak görülüyorlar. Oysa ara insan gücü olmadan bir ülkenin kalkınması mümkün değildir. Siyasilere, katsayılar nedeni ile meslek liselerini şamar oğlanı haline getirdi. Bu okullara girenleri iyi birer meslek elemanı olarak özendirceklerine, akıllarına üniversiteyi sokup sonra da % 90’ını kapı önüne bırakarak, hayal kırıklığının en büyüğünü yaşıyorlar. Adaylar ve aileleri ise, iş gücü sahibi iyi bir teknisyen veya tekniker olmaktansa, donanımsız, işsiz güçsüz mühendis adayı olmayı tercih ediyorlar. Devlet üniversiteleri için meslek yüksekokulları adeta bir kambur. Vakıflar ise, para makinesi olarak görüp parayla diploma satar hale geldi. Mezunlar için, işin erbabı meslek adamı demeye bin şahit istiyor. Milletvekilleri ve Anadolu kentleri için de durum farklı değil. Onlar da artık bu yüksekokulları bacasız fabrika gibi görüp, 2, 3 bin öğrenci geldiğinde kasabanın havası değişiyor, ticaret canlanıyor diye bakıyorlar” demiştir (Güçlü, 2012).

Doç. Dr. Ahmet KAYA: Bu makalenin de yazarı; Kaya, Abbas Güçlünün noktaladığı görüşleri şu şekilde devam ettirmektedir; Bu yüksekokullar, işsiz fakülte mezunları için istihdam kapısı, öğretim görevlileri için doktora yaptıkları sürece maaş kazandıkları yerler. Bir kısım akademisyen için ek ders ücreti elde edilecek okullar, bazı öğretim üyeleri için müdürlük makam yerleri, idari personel için çay, kahve içilen yerler ve sekreterlik makamlarıdır. Bu yüksekokullar, adları meslek yüksekokulu olsa bile, mesleğin öğretilmediği okullardır. Ülkemizin kısıtlı kaynakları ile katma bütçeden desteklenen faydasız kurumlar, niteliksiz mezunlar ile ailelerin, gençlerin ve devletin kandırıldığı ve ivedilikle düzeltilmeleri zorunlu kurumlar ya da büyük bir kısmı birleştirilerek veya kapatılarak sayıları azaltılmak ve de niteliği yükseltmek durumunda olan hastalıklı kurumlardır.

Prof. Dr. Kenan ÇELİK: Bu okulların gereğinden fazla açıldığını ve bu anlayışın siyasilere tasarruflarından kaynaklı bir anlayışın sonucu olduğunu ifade eden bir saçmalık olduğunu vurgulayan araştırmacı, “Meslek Yüksekokullarını S-açma Politikaları” başlığını kullanmıştır (Çelik, 2013). (Çok sayıda ve gereksiz bir şekilde açılan meslek yüksekokullarının eleştirildiği bir yaklaşımdır.)

Prof. Dr. Harun Raşit UYSAL-Tire Kutsan Meslek Yüksekokulu Müdürü: “...Tire Kutsan Meslek Yüksekokulu, küçük menderes havzasının parlayan yıldızıdır. Yüksekokulumuzun doluluk oranı % 90’lar düzeyinde...” . (Sayın kurum müdürü, dolmayan boş kontenjanların aksine, yüksek doluluk oranına vurgu yapmak suretiyle kurumun başarılı olduğunu belirten açıklamalar yapıyor, üniversitelerin dolan kontenjanları bile bir başarı olarak vurgulanır hale gelmiştir.)

Tayfur ÇİÇEK-Tire Belediye Başkanı: “...Tire’mizin gelişmesi için ve ilçemizin kalkınması için, çok sayıda yeni programın açılması gerekir. Bu yetmez asıl hedef, veterinerlik fakültesi kurmaktır. Bu işlerin takipçisi olacağız...” . (Siyasi bir figür olarak, akademik kurumların bacasız fabrika olarak değerlendirildiği bir görüş.)

Nurettin MUTLU-Tire Kutsan Meslek Yüksekokulu, muhasebe programı öğrencisi: “...Hocam siz benim muhasebe okuduğuma bakmayın hiç sevmiyorum burayı... Ben moda okumalıyım...” . (Tamamen alakasız bir alanda okuduğu belli olan bir öğrenciye ait çarpıcı görüşler.)

Adnan MALIMOĞLU-Acıbadem Üniversitesi Sağlık Meslek Yüksekokulu: Adnan Malımoğlunun babasına yönelik sözleri şöyle olmuş: “... Baba ben burada okumam, benim kız arkadaşım, fakültede okuyor, benim iki yılda okumamı istemiyor, bu okulu bırakıyorum...” Adnan Malımoğlu, gerçekten kayıt yaptırıp dönemlik ücretini ödemediği vakıf üniversitesinden ayrılmış, önce Kâtip Çelebi Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümüne, ertesini yıl, Ege Üniversitesi, İktisadi ve İdari Bilimler Fakültesi İşletme Bölümüne kayıt yaptırmış ve okumaya devam etmektedir. (Türkiye’de YGS sınavlarına 2 milyonu aşkın adayın katılma nedenlerinden bir örnek. Geçerli bir alan olarak sağlık meslek yüksekokulundan ayrılarak, sırf prestij olsun diye fakülte öğrencisi olmanın garip bir öyküsü.)

MESLEK LİSELERİ HAKKINDA GÖRÜŞLER

Seçkin EZER-Tire Ticaret Meslek Lisesi, Bilişim Programı: “... İngilizce öğretmenimiz sürekli hastayım diyerek rapor alıyordu, okula gelmediği ders sayısı, geldiği ders sayısından daha fazladır...”

Asım SALMAN-Seyit Şanlı Endüstri Meslek Lisesi, Bilgisayar Programı: "...Bilgisayar derslerini atölyelerde yapardık, hocamız bize bir şeyler öğretmek yerine, bilgisayarlarda oyun oynamamıza müsaade ederdi, kendi de oyun oynardı, biz de bir şeyin farkında olmadan oyun oynuyorduk. Maalesef lisede hiçbir şey öğrenemedik..."

Engin GARAN-Küçükalyalı Kız Meslek Lisesi, Bilişim programı: "...Aslında okulumuzda eğitim gayet iyi idi. Ancak ben ders çalışmıyordum. Judo yarışına gittiğim için sınıfta kaldım..."

Aynur ARSLAN-Urla Anadolu Teknik Lisesi: "...Okulumuzda eğitim fena sayılmazdı, kötü sayılabilecek öğretmenlerimiz de vardı, ancak biz de ders çalışmıyorduk. Bu bakımdan çalışma disiplininiz eksik..."

Murat AKAY-Konak Atatürk Ticaret Meslek Lisesi: "...Öğretmenlerimiz bizim kadar bile bilgili değildi. Bazı şeyleri biz onlara öğretiyorduk. Böyle olunca ne kadar öğrenmiş olabiliriz ki? ..."

SINAV KÂĞITLARINA YAZILAN İBRET LİK PROFİLLER

Meslek yüksekokulları ortamında yaklaşık 20 yıldır öğretim elamanı olarak görev yapmış biri olarak, sınav kâğıtlarına yazılarak tarafıma aktarılan ve esasında sır olarak kalması gereken, ancak meslek yüksekokullarında yaşanan gerçeklikleri ortaya dökmek bakımından ifade edilmesinde mahsur görülmeyen bazı yazılar şu şekildedir:

Mücahit AKIN-Tire Kutsan Meslek Yüksekokulu, Muhasebe Programı: Mücahit Akın, çok başarılı olmayan, saf bir Anadolu çocuğu, Üç sınav kâğıdına da Mücahit ismini "mücahit" yazınca dikkatimi çekiyor. Mücahit'i çağırıp bir parça kâğıt uzatıp adını yazmasını rica ediyorum. Tekrar "mücahit" yazdığını görünce bunun yanlış olduğunu söylüyorum. Israrla doğru yazdığını söylüyor. Birkaç değişik kelime daha yazdırıyorum, ancak mücahit söylemde doğru, kâğıda yanlış yazıyor. Mücahit'e hayatında kitap okuyup okumadığını soruyorum. "Hayır, ne gerek var?" yanıtını alıyorum.

Volkan SAYIN-Tire Kutsan Meslek Yüksekokulu 2005 Yılı Öğrencisi: "...Hocam insan ailesiz ve uzakta olunca şaşırıyo, ama ben şaşırılmayacağım hiç. Baktık burdası bana göre değil çektim istanbula... (Volkan Sayın'ın kâğıt üzerinde bana yazdıklarıdır. Öğrencinin yazım hatalarına dokunulmamıştır.)

Alper KAŞKA-Tire Kutsan Meslek Yüksekokulu 2015 Yılı Öğrencisi: "... Hocam hiç çalışmadım. Bu aralar bazı şeyleri fazla takmaya başladım. Tabi hani bu sizin umurunuzda olmayabilir. Elimden gelen bu kadar..." (Alper KAŞKA, elimden gelen bu kadar dediği dersin sınavından ancak yüz üzerinden 5 puan alabilmiştir.)

Meslek Yüksekokullarının tercih konusunda öğrenci profilleri konusunda örnekler (Subaşı ve Türkyılmaz, 2011):

A1: "... Sınavla gelen öğrenciler ne yapmak istediğinin farkındaydı. Sınavsız geçişle gelen bir öğrencinin sınav kalitesi aşırı derecede düşmeye başladı. Örneğin sınavsız geçişle gelen bir öğrencinin sınav kâğıdındaki hadise şu şekilde: 16-7=0 (Öğrencinin tespiti şu: "Hocam 6'dan 7 çıkmaz, yandan 1 aldım 7-7=0 elde ettim.) Şimdi ben bu öğrenciye muhasebe mesleğini öğretmeye çalışacağım..."

A2: "...Üniversiteyi kazanamayacak düzeyde öğrencileri aileleri önce meslek liselerine, ardından sınavsız geçişle meslek yüksekokullarına gönderiyor. Bu bakımdan kalite çok düşük, sınavla gelen öğrencilerin algı düzeyleri çok iyi idi, bilinçli öğrencilerdi. Adını yazamayan, bomboş sınav kâğıdı veren öğrenciler var..."

A3: "... Bir büro açsam muhasebe bölümündeki öğrencilerden kaç tanesini işe alırım diye düşündüm. Şöyle bir baktım düşünmekten vazgeçtim. Bu durumda bir bölümde 2 veya 3 öğrenciyi kazanabilirsek iyidir diye düşünüyorum..."

A4: "... Önceden bütün sınıfa hitap edebilirken şimdi hedeflerimizi küçülttük maalesef. Önceden sınıfın büyük bir çoğunluğuna muhasebe öğretebileceğimizi düşünürken, sınavsız geçişle birlikte 5 tanesine muhasebe öğretebilsem yeterli diyorum. 100 liranın % 10'unu hesaplayamayan öğrenciler programı tercih edebiliyor. Sınav sonuçlarına değinmiyorum bile. Mantık olarak sınavsız geçiş ile güzel şeyler yapılmaya çalışıldı ama altyapı eksikliği, eğitim sisteminin öteden beri gelen problemleri gibi faktörlerle buraya kadar geldik..." şeklinde görüş bildirmişlerdir.

MESLEK YÜKSEKOKULLARINA İLGİNİN AZALMASI

Meslek yüksekokullarına, sınavsız geçiş ile birlikte boş kalan kontenjanlara sınavla kayıt hakkı kazanmak ta mümkündür. Zaten bu programlarda % 10'lar düzeyinde gerçekleşen başarı, sınavsız geçiş dışında, belli bir puanla kayıt hakkı kazanan öğrencilerden kaynaklanan başarıdır. Son yıllarda çok sayıda üniversite ve bu üniversitelerde çok sayıda lisans bölümünün açıldığı bilinmektedir. Özellikle iktisadi ve idari bilimler fakülteleri

bünyelerinde kontenjan sayısı yüksek, çok sayıda bölüm açılmış ve açılmaya devam etmektedir. Kontenjan sayılarında meydana gelen büyük artış, giriş puanlarını olağan dışı bir biçimde aşağı çekmiştir. Yükseköğretim Geçiş Sınavını (YGS) 180 puan barajı ile geçen bir öğrencinin bir lisans programına kayıt olması çok kolaylaşmıştır. Bunun sonucu olarak; adaylar, meslek yüksekokulları yerine lisans programlarını tercih eder duruma gelmişlerdir. Böyle olunca, meslek yüksekokullarında okumayı düşünen öğrencilerin sayısı hızlı bir şekilde azalmıştır. Böylece, esasında bir lisans programında okuma donanımına sahip olmayan çok sayıda öğrencinin fakülte öğrencisi olma sorunu ortaya çıkmıştır. Mesela, 2008 yılında meslek lisesi muhasebe programı mezunlarının mali müşavir olamamaları yönündeki yasal düzenlemeler, öğrencileri lisans programlarına çeken bir diğer etmen olmuştur. Meslek yüksekokulu mezunları lehine yasal düzenlemeler beklenirken, aleyhte çıkan yasalar, ön lisans programlarına ilgiyi azaltan bir faktör olarak değerlendirilmektedir. Öte yandan “meslek yüksekokulu mezunu olacağım da ne olacak işsiz kalacağım, hiç olmazsa bir idari veya mühendislik bölümünden mezun olurum, hem askerlik yaparken avantajlı olurum hem de er veya geç bir iş sahibi olurum” anlayışının etkin olduğu değerlendirilmektedir. Yani, meslek yüksekokullarından mezun kişilere, “siz üniversite mezunu oldunuz” yaklaşımı ile rektörün imzası ile bir diploma veriliyor ancak mezun olan birey, iş hayatında bunun hiçbir avantajı ile yüzleşemiyor. Mesela, iş bulma konusunda bir avantaj hissedilmiyor, özel sektörde asgari ücretten fazlası kazanılmıyor, askerlik konusunda da ilkökul mezunundan hiçbir farkları yok, uzun dönem askerlik yükümlülüğü var. Aileler ve toplum nezdinde de lisans mezunu kadar prestij sahibi olunmadığı hissettiriliyor. Nerden bakılırsa bakılınsa, lise mezunlarını meslek yüksekokullarına çekecek bir cazibe bulunmuyor. Bu yönlerden, bu okulları cazip kılacak bazı önemlerin alınması gerektiği kaçınılmaz görünmektedir.

ARAŞTIRMA YÖNTEMİ

Araştırma, öğretim elemanları ve öğrencilere farklı iki anketin uygulanması esasına göre planlanmıştır. Öğrenciler, Tire Kutsan Meslek Yüksekokulunda öğrenim gören öğrenciler arasından seçilmiştir. Öğretim elemanları, Ege Üniversitesi'nin değişik meslek yüksekokullarında görev yapan öğretim elemanları arasından seçilmiştir. Ankete örnek seçme işlemi, olasılıksız ve tam rastgele ölçütlere göre yapılmıştır. Öğrenci anketine katılım 83, öğretim elemanı anketine katılım 45 kişi (birim) düzeyinde gerçekleşmiştir. Öğrenci anketi bakımından 83 sayısı, yüksekokulda öğrenim gören öğrencilerin % 15'ini karşılamaktadır. Bu oran araştırmalar için yeterli kabul edilen % 5'lik oranın bir hayli üzerindedir ve yeterlidir (Baskan, 1990).

Burada üzerinde durulması gereken husus; örneğe seçilen bu birimlerin, bütün meslek yüksekokulu öğrenci ve öğretim elemanları için örnek teşkil edip etmedikleridir. Ege Üniversitesi'nin ülkemizin kuruluş bakımından dördüncü, akademik etkinlik bakımından da ilk 10 üniversitesi arasında bulunan bir üniversitedir. Bu bakımdan bu üniversitede, öğrenim gören öğrenciler ile görev yapan öğretim elemanlarının, diğer üniversiteler bakımından iyi birer örnek olacağı değerlendirilmiştir.

Anket verileri bakımından, frekans değerleri ve istatistik analiz bakımından uygun olması halinde verilerden elde edilecek çapraz tablolarla sonuçların elde edilmesine çalışılacaktır.

Ankete katılan öğrencilerin rahat bir yanıtlama yapmaları amacıyla ankete katılan birimlerden kimlik bilgisi alınmamıştır. Anket yanıtlama ortamının gürültüsüz, bireyin bağımsız yanıtlama yapmasına olanak sağlayacak şekilde oluşturulmuştur. Ankete katılımı yüksek tutmak ve yanıtlama esnasında bireyin sıkılmasına sebebiyet vermemek adına öğrencilere uygulanan anket 30 soru, öğretim elemanlarına uygulanan anket 20 sorudan oluşturulmuştur.

Öğrenciler bakımından sonucu merak edilen sorular şu şekilde belirlenmiştir:

1. Yüksekokulunuzda sosyal ve kültürel ortam yeterliliği hakkında ne düşünüyorsunuz? (Öğrencilerin sosyal, kültürel ve akademik beklentilerini dikkate almadan, sadece ilçelerin sosyal ve ekonomik amaçlarına hizmet etmek amacıyla kurulan ve “her ilçeye bir meslek yüksekokulu” sloganı ile akademik kurumlar açma politikasının öğrenciler bakımından değerlendirilmesi amaçlanmıştır.)
2. Günde kaç saat internet kullanıyorsunuz? (Öğrenciler bakımından öğrenme zamanı olarak değerlendirilen zamanın ne kadarı internet başında geçmektedir? Sorusuna yanıt aranmaktadır.)
3. İnterneti kullanma amacınız nedir? (İnternet gerçekten öğrenme veya akademik amaçlı mı? Yoksa bir salgın haline gelen sosyal platformlara erişmek anlamında mı kullanılmaktadır?)
4. Günde ortalama kaç saat ders çalışıyorsunuz? (Meslek liselerinden çalışma disiplininin uzak ve çalışmaya motive olamayan öğrenciler bakımından sorgulanan bir özellik olarak değerlendirilmektedir.)
5. Mezun olduğunuzda iş bulma kaygınız var mıdır? (İş bulma kaygısının motivasyon eksikliğinin sebeplerinden olduğu düşüncesi ile bu boyutun da araştırılması düşünülmüştür.)

6. Bölümünüzde okumayı cazip buluyor musunuz? (İlk fırsatta bölüm değiştirmek amaçlı, programlarından ayrılan öğrenci miktarı hakkında bilgi edinme amaçlı bir sorgulamadır.)
7. Bir fakültede öğrenci olmanın daha prestijli olduğunu düşünüyor musunuz? (Programında okumaya istekli ve bilinçli kayıt yaptıran öğrenciler hakkında bilgi edinme amaçlı bir sorgulama işlemidir.)
8. Derse girmek yerine hangi etkinliğe katılmak istersiniz? (Derse girmek, dışında başka etkinliklere katılmak isteyen öğrenci oranını belirlemek amaçlı bir sorgulama, bu sorgulama, motivasyonu azaltan faktörleri belirlemek amaçlı planlanmıştır.)
9. Sizce hayatta başarılı olmanın anahtarı üniversite okumak mıdır?

Öğretim elemanları bakımından öne çıkan sorular şu şekilde belirlenmiştir:

1. Kurumunuzda çalışmaktan memnun musunuz? (Öğretim elemanı memnuniyetini sorgulama amacıyla yöneltilmiş bir sorudur. Memnuniyetsiz öğretim elemanlarının öğrenci motivasyonuna olumsuz katkı yaptıkları değerlendirilmektedir.)
2. Meslek yüksekokullarında sınavsız geçiş hakkında ne düşünüyorsunuz? (Belki de bu bilimsel araştırmanın en can alıcı sorusu olarak değerlendirilmektedir. Bu sorgulama ile sınavsız geçiş sisteminin öğretim elemanları bakımından sorgulanması amaçlanmaktadır.)
3. Öğrenci başarısı hakkında ne düşünüyorsunuz? (Öğretim elemanlarının bakış açısı ile öğrenciler başarılı mı? Başarısız mı? Sorusuna yanıt aranmaktadır.)
4. Öğrenci başarısızlığını ortadan kaldıracak faktör hangisidir? (Eğer bir başarısızlık söz konusu ise, bunu ortadan kaldırma amaçlı tavsiyeler nelerdir? Bunların öğretim elemanlarının bakış açısı ile değerlendirilmesi amaçlanmıştır.)
5. Ön lisans eğitiminin süresi hakkında düşünceleriniz nelerdir? (Bilgisayar programcılığı gibi, mesleki teknik eğitimin ve uzmanlığın zor olduğu alanlarda iki yıllık öğretim süresinin yetersizliği konusunda sürekli bir tartışma söz konusu olmaktadır. Bu konuda öğretim elemanlarının görüşlerine başvurulmaktadır.)
6. Her ilçede bir meslek yüksekokulu anlayışı hakkında ne düşünüyorsunuz? (Özellikle siyasilerin bacasız fabrika olarak değerlendirdiği bu kurumların ilçelerde kurulmasının ne kadar doğru olduğu, öğretim elemanlarının bakış açısı ile değerlendirilmektedir. İlçelerde kurulu meslek yüksekokullarının daha çok siyasi odaklı talepleri yerine getirmek amacıyla yapıldığı sıklıkla değerlendirilmektedir. Hem bu değerlendirmelere cevap oluşturmak, hem de öğretim elemanlarının bu konuda görüşlerine yer vermek maksadıyla yapılmış bir sorgulamadır.)
7. Genel çözüm öneriler hakkında görüşleriniz nelerdir? (Meslek yüksekokullarının içinde bulunduğu durumu değerlendirmek ve sorunların çözümü yönünde görüş birliği oluşturmak amacıyla yapılan bir sorgulamadır.)

BULGULAR

Öğrenciler Temelli Sonuçlar

Meslek yüksekokullarında öğrenim görmekte olan öğrencilerin % 10'lar düzeyine düşmüş başarılarını sorgulamak ve motivasyon eksiklerine neden olan faktörleri belirlemek amacıyla Tire Kutsan Meslek Yüksekokulu Bilgisayar Programcılığı programında öğrenim gören 83 öğrenci temelinde yapılan ve öğrenciler bakımından cevap aranan sorulara ilişkin yanıtlamalar aşağıdaki gibi elde edilmiştir.

Soru: Yüksekokulunuzda sosyal ve kültürel ortam hakkında ne düşünüyorsunuz?

- | | | |
|----|---------|--|
| a) | % 60.24 | Yetersiz. |
| b) | % 25.30 | Kısmen yetersiz. |
| c) | % 09.64 | Yeterli. |
| d) | % 04.82 | Diğer (Öğrenci görüşleri: Hiçbir şekilde etkinlik yapma olanağımız yok, kesinlikle yetersiz, aktivite diye bir şey yok , ...). |

Soru: Günde kaç saat internet kullanıyorsunuz?

- | | | |
|----|----------|---|
| a) | % 01, 20 | Yanıtsız. |
| b) | % 18.07 | 1 saatten az. |
| c) | % 31.33 | 1-2 saat. |
| d) | % 22.89 | 2-3 saat. |
| e) | % 19.28 | 3 saatten çok |
| f) | % 07.23 | Diğer (Öğrenci görüşleri: Saati yok, her zaman, sık sık, çok saat, her dakika, 6 saatten fazla, ...). |

Soru: İnterneti kullanma amacınız nedir?

- | | | |
|----|---------|-----------------|
| a) | % 10.84 | Ders araştırma. |
|----|---------|-----------------|

- b) % 66.27 Sosyal platformlar (Facebook, Twitter, Instagram, Bloglar, vb.).
c) % 01.20 Arkadaşlık siteleri.
d) % 21.69 Diğer (Öğrenci görüşleri: Oyun oynama, Her türlü amaç için kullanıyorum, İşim gereği kullanıyorum, Ders dışı araştırmalar, Kültürel araştırmalar, Haber ve güncel olaylar, ...).

Soru: Günde ortalama kaç saat ders çalışıyorsunuz?

- a) % 45.78 1 Saatten az.
b) % 37.35 1-2 Saat arası.
c) % 04.82 2-3 Saat arası.
d) % 02.41 3 saatten çok.
e) % 09.64 Diğer (Öğrenci görüşleri: 1) Sınav haftası çalışıyorum. 2) Kafama göre, hemen hiç çalışmıyorum. 3) Nette geziniyorum, boş verin çalışmayı. 4) Hiç kadar az. 4) 15 Dakika. 5) Çalışmıyorum. 6) Çalışsam ne olacak ki? İş mi var? ...).

Soru: Mezun olduğunuzda iş bulma kaygınız bulunmakta mıdır?

- a) % 34.94 Evet.
b) % 39.76 Kısmen evet.
c) % 25.30 Hayır.

Soru: Bölümünüzde okumayı cazip buluyor musunuz?

- a) % 01.20 Yanıtsız.
b) % 68.67 Evet.
c) % 30.12 Hayır.

Soru: Bir fakültede öğrenci olmanın daha cazip olduğuna inanıyor musunuz?

- a) % 81.93 Evet.
b) % 18.07 Hayır.

Soru: Derse girmek yerine hangi etkinliğe katılmak istersiniz?

- a) % 23.86 Gezmek.
b) % 23.80 İnternet Kullanmak.
c) % 20.30 Müzik dinlemek.
d) % 09.64 Kitap okumak.
e) % 04.06 Gazete okumak.
f) % 18.34 Diğer.

Soru: Sizce hayatta başarılı olmanın anahtarı üniversite okumaktan mı geçer?

- a) % 12.05 Evet.
b) % 28.92 Kısmen evet.
c) % 54.22 Hayır.
d) % 04.82 Diğer (Öğrenci görüşleri: Hayatta başarılı olmak başka bir şey, Üniversite buna ancak katkı sunabilir, Üniversite hayatta başarıya katkı sunabilir, ...).

Öğrenci Temelli Sonuçların Değerlendirilmesi

1. Öğrenciler, ilçe ortamında bir yüksekokulda öğrenci olmanın sosyal ve kültürel anlamda yetersizliğini vurgulamışlardır. Ortamın bu bakımdan yeterli olduğunu düşünen öğrencilerin oranı % 10 düzeyindedir.
2. Öğrencilerin hemen tamamına yakını internet kullandığını ifade etmektedir. Sosyal ve kültürel ortam yetersizliği ve akıllı cep telefonlarının yoğun kullanımı ile öğrencilerin öğrenme zamanlarını internet ortamında, sosyal paylaşım platformlarında geçirdikleri sonucuna ulaşılmıştır.
3. Öğrencilerin % 55'i aşan oranda 1 saatten az çalıştığını ifade etmiştir. Bu oran içerisinde hiç ders çalışmadığını belirten öğrenciler de bulunmaktadır.
4. Mezun olduktan sonra iş bulma kaygısı taşımayan öğrencilerin oranı sadece % 25 düzeyinde gerçekleşmiştir. Toplam % 75'lik oran, Kısmen veya tamamen bu kaygıyı taşıdığını belirtmektedir.
5. Öğrencilerin önemli oranda bölümlerini okumaktan memnun görünmekle birlikte bir fakültede okumanın daha cazip olduğunu belirtenlerin oranı % 82 oranına yaklaşmaktadır. Bu bakımdan öğrenci görüşlerinin kuşkulu olduğu değerlendirilmektedir.
6. Derse girmeyi cazip bir etkinlik olarak görenlerin oranı ancak % 5 düzeyindedir. İşte öğrencilerin motive olamamalarının en büyük sebeplerinden birinin bu noktada gerçekleştiğini görmek gerekir. Gezmek, internet kullanmak ve müzik dinleme aktiviteleri çok daha eğlenceli bir aktivite olarak değerlendirilmiştir.

7. Hayatta başarılı olmanın anahtarı üniversite okumaktan geçer diyenlerin oranı ancak % 12 düzeyinde gerçekleşmektedir. Bu oranın oldukça düşük olduğu değerlendirilmektedir.

Öğretim Elemanı Temelli Sonuçlar

Öğretim adına meydana gelen başarının ya da başarısızlığın iki tarafı bulunmaktadır. Sadece öğrenci temeline dayalı araştırmaların eksik olduğu değerlendirilmektedir. Bu bakımdan meslek yüksekokullarında öğrenciler bakımından var olduğu düşünülen motivasyon eksikliğinin nedenlerini bir de öğretim elemanlarının bakış açısı ile irdelemek gerektiği düşünülmüştür. Bu nedenle, öğretim elemanlarının görüşleri doğrultusunda bir değerlendirme ile öğrenci değerlendirmelerini eşleştirmek ve görüşler arasında bir paralellik ya da çelişki bulunup bulunmadığını ortaya koymak hedeflenmiştir. Öğretim elemanlarına sorulan sorular ve bu sorulardan elde edilen sonuçlar aşağıdaki biçimde elde edilmiştir:

Soru: Kurumunuzda çalışmaktan memnun musunuz?

- | | | |
|----|---------|---|
| a) | % 88.89 | Evet. |
| b) | % 11.11 | Hayır (Öğretim elemanı görüşü: büyük oranda kadrosuzluk ve özlük haklarının yeterli olmamasından kaynaklanan bir neden ileri sürülmektedir. |

Soru: Meslek yüksekokullarına sınavsız geçiş sistemi hakkında ne düşünüyorsunuz?

- | | | |
|----|---------|--|
| a) | % 00.00 | Başarılı buluyorum, devam edilmelidir. |
| b) | % 11.11 | Kısmen başarılı, devam edilebilir. |
| c) | % 57.78 | Başarılı değil, revize edilmelidir. |
| d) | % 31.11 | Çok başarısız, derhal kaldırılmalıdır. |

Soru: Öğrenci başarısı hakkında ne düşünüyorsunuz?

- | | | |
|----|---------|--|
| a) | % 02.22 | Yanıtsız. |
| b) | % 20.00 | Kız öğrenciler daha başarılı. |
| c) | % 02.22 | Erkek öğrenciler daha başarılı. |
| d) | % 04.44 | Cinsiyet farkı yok, başarılılar. |
| e) | % 68.89 | Cinsiyet farkı yok, başarısızlar. |
| f) | % 02.22 | Diğer (1 öğretim elemanı görüşü: Mesleki alanda olan daha başarılı). |

Soru: Öğrenci başarısızlığını ortadan kaldırmak için ne yapmak gerekir?

- | | | |
|----|---------|--|
| a) | % 13.13 | Meslek liselerin eğitim düzeyi yükseltilmeli. |
| b) | % 73.33 | Sınavla giriş yeniden tesis edilmelidir. |
| c) | % 02.22 | İntibak sınıfı uygulaması getirilebilir. |
| d) | % 08.89 | Eğitim ve öğretim disiplini sağlanmalıdır. |
| e) | % 02.22 | Diğer (1 öğretim elemanı görüşü: a, b ve d maddeleri geçerlidir.). |

Soru: Ön lisans eğitiminin süresi hakkında ne düşünüyorsunuz?

- | | | |
|----|---------|--|
| a) | % 17.78 | Yanıtsız. |
| b) | % 33.33 | İki yıl süre yeterlidir. |
| c) | % 31.11 | Süre yetersiz, üç yıl olmalıdır. |
| d) | % 11.11 | İki yıl süreye ek olarak 1 yıl staj gerekir. |
| e) | % 06.61 | Bir yıl eğitim, bir yıl staj olmalıdır. |

Soru: Her ilçede bir meslek yüksekokulu anlayışı hakkında ne düşünüyorsunuz?

- | | | |
|----|---------|---|
| a) | % 17.78 | İlçelerin sosyal ve kültürel gelişimine katkı sağlanmaktadır. Olumludur. |
| b) | % 44.44 | Tamamen gereksizdir. İlçe yüksekokulları kampus ortamında birleştirilmelidir. |
| c) | % 35.56 | Her üniversite bünyesinde idari, teknik ve sağlık olmak üzere birer yüksekokul yeterlidir. |
| d) | % 02.20 | Diğer (1 öğretim elemanı görüşü: Kampus ve kampus dışı eğitim ve öğretim verilebilecek alanlara göre ve ihtiyaçlar doğrultusunda programlar açılmalı. |

Öğretim Elemanlarının Anket ile Elde Edilen Yorumaya Dayalı Tavsiyeleri Şunlardır:

Türkiye’de eğitim konusunda yetkili durumda bulunan kişilere tavsiyeler şu şekilde gerçekleşmiştir:

1. Sınavsız geçiş kesinlikle kaldırılmalıdır. (Sınavla geçiş sistemi getirilmelidir.)
2. Kadrolu üç öğretim elemanı bulunmayan programlar kapatılmalıdır.
3. Mesleki orta öğretim kurumları ivedilikle rehabilite edilmeli, eğitim, disiplin altına alınmalıdır.
4. Öğretim elemanı kalitesi yükseltilmelidir.

5. Öğretim elemanlarının özlük hakları iyileştirilmelidir.
6. Meslek yüksekokullarının sayısı azaltılmalıdır.
7. Meslek yüksekokul yöneticisi kurum içinden seçilmelidir.
8. Ortaöğretimde Alman Modeli getirilmelidir.
9. Yeni YÖK yasası çıkarılmalı ve her şey yeniden planlanmalıdır.
10. Meslek Yüksekokullarının iki yıl olan süresi artırılmalıdır.
11. Yabancı dil öğretimine önem verilmelidir.
12. Uygulamalı derslerin sayısı artırılmalıdır.
13. Avrupa'daki meslek yüksekokulları örnek alınarak yeni düzenlemeler yapılmalıdır.
14. Meslek liseleri ile işbirliği ve koordinasyon tesis edilmelidir.
15. Üniversitelerde yaygınlaşan psikolojik taciz (mobbing)'e son verilmelidir.
16. Meslek yüksekokullarının üniversitelerden ayrılması sağlanmalıdır.
17. Sorunlar YÖK başkanının bile çözebileceğinden daha derin. Düzeleceğini düşünmüyorum.
18. Meslek yüksekokullarında kadrolu atamalar artırılmalıdır.
19. Derslerin içeriği sürekli güncellenmelidir.
20. Araştırma ve öğretim yapan üniversiteler ayrılmalıdır.

Öğretim Elemanı Temelli Sonuçların Değerlendirilmesi

1. Ege Üniversitesi meslek yüksekokullarında görev yapan öğretim elemanlarının % 88.89'u kurumlarında görev yapmaktan memnun olduklarını belirtmişlerdir. % 90'lara varan bu memnuniyetin çok önemli olduğu, öğrencilerin motivasyon eksikliklerine olumsuz bir katkı sağladıkları düşünülmektedir.
2. Meslek yüksekokullarına sınavsız geçiş hakkında ne düşünüyorsunuz biçiminde sorulan soruda öğretim elemanlarının % 90'a yaklaşan oranı, sistemin kaldırılması veya revize edilmesi gerektiğini belirtmiştir. Kısmen başarılı diyenlerin oranı % 10 düzeyinde gerçekleşmiş iken, sistemi başarılı bulup devam edilmesi savunan hiçbir öğretim elemanına rastlanmamıştır.
3. Öğretim elemanlarının, öğrencilerin derslerdeki başarılarına yönelik görüşleri de dikkate değer olarak değerlendirilmiştir. Buna göre, Kız öğrencileri daha başarılı bulan öğretim elemanlarının oranı % 20.00 düzeyinde gerçekleşmiştir. Erkek öğrencileri daha başarılı bulan öğretim elemanlarının oranı % 02.22 düzeyinde gerçekleşmiştir. Cinsiyet farkı gözetmeksizin öğrencileri başarısız bulanların oranı % 68.89 düzeyinde gerçekleşmiştir. Cinsiyet farkı yok, bütün öğrenciler başarılı diyen öğretim elemanlarının oranı % 04.44 düzeyinde bulunmuştur.
4. Öğrenci başarısızlığını ortadan kaldırmak için ne yapmak gerekir? Biçiminde sorulan soruya öğretim elemanlarının verdiği yanıtlar şu şekildedir: % 73.33 oranında sınavla giriş yeniden tesis edilmelidir, % 13.13 oranında meslek liselerinin eğitim düzeyi yükseltilmelidir, biçiminde yanıtlanmıştır.
5. Ön lisans eğitiminin süresi hakkında ne düşünüyorsunuz? Biçiminde sorulan soruya verilen yanıtlar şu şekilde elde edilmiştir. Öğretim elemanlarının % 33.33'lük bir oranı 2 yıllık sürenin yeterli olduğunu vurgulamıştır. % 31.11'lik oran, iki yıllık eğitim süresinin yetersiz olduğunu, sürenin üç yıla çıkarılması gerektiğini ifade etmiştir. Öğretim elemanlarının % 11.11'lik oranı da iki yıllık eğitim süresine ek olarak 1 yıllık staj süresinin gerekli olduğunu dile getirmiştir. Bu sonuçlarla, öğretim süresinin artırılması gerektiğini ifade eden öğretim elemanlarının oranı % 42.22 düzeyinde gerçekleşmektedir.
6. "Her ilçeye bir meslek yüksekokulu" anlayışı, adeta slogan haline dönüşen bu yaklaşım hakkında öğretim elemanlarının görüşlerine baş vurduğumuzda elde edilen sonuçlar şu şekilde gerçekleşmiştir: Öğretim elemanlarının % 44.44'ü bu yaklaşımın tamamen gereksiz olduğunu, ilçelerde kurulu yüksekokulların kampus ortamında birleştirilmesi gerektiğini ifade etmektedir. İkinci yüksek oran, % 35.56'lık bir oranda, "her üniversite bünyesinde idari, teknik ve sağlık olmak üzere birer yüksekokul yeterlidir." Görüşünü dile getirmişlerdir. İlçelerde yüksekokul kurulması anlayışına olumlu yaklaşan öğretim elemanlarının oranı ancak % 17.78 nispetinde gerçekleşmiştir.

SONUÇ VE ÖNERİLER

Sonuçlar

Meslek yüksekokullarının içinde bulunduğu, eğitim ve öğretim bakımından problemlili durumu, öğrenciler ve öğretim elemanları temelinde sorgulayan bu araştırmanın ana hatları ile öne çıkan sonuçları şu şekilde ifade edilebilir:

1. Büyük oranda meslek liseli öğrencileri üniversiteli yapma anlayışı ile kurulan meslek yüksekokullarına sınavsız gelen öğrenciler, mesleki ve akademik bilgi bakımından çok yetersiz durumdadır.
2. Sınavsız geçiş sisteminin uygulanması ile birlikte programların başarıları olağan dışı bir oranda düşmüştür. Öğrencilerin başarı düzeyi % 10'ların bile altına gerilemiştir.

3. İlçelerde kurulan meslek yüksekokullarında ciddi oranda akademik, sosyal ve kültürel yetersizlikler bulunmaktadır.
4. Öğrencilerde akıllı telefonu dolayısıyla internet kullanımını % 100'lere ulaştırmaktadır. Sosyal paylaşım sitelerinin kullanımını öğrencilerde bir bağımlılığa dönüştürmüştür. Bu da öğrencilerin öğrenme zamanlarını ortadan kaldıran bir faktör olmakla birlikte, başarısızlığın faktörlerinden biri olarak değerlendirilmektedir.
5. Meslek yüksekokullarında okuyan öğrenciler bakımından bu kurumları bitirmek hiçbir avantaj sağlamamaktadır. Yeni çıkan yasal düzenlemeler, lisans mezunu olmayı gerektirmekte, bunun sonucu olarak meslek yüksekokullarına talep azalmaktadır.
6. Öğrencilerin önemli bir bölümü mezun olduktan sonra iş bulma kaygısı taşıdığını ifade etmektedir. Bu sonucun da önemli bir motivasyon eksikliğine sebep olduğu değerlendirilmektedir.
7. Meslek yüksekokullarında kayıtlı öğrencilerin önemli bir oranı gerçekte buldukları programlarda okumak yerine, başka bölüm veya programlarda okumak istemektedir.
8. Meslek yüksekokullarında okumaktan memnun olduklarını ifade etmekle beraber, bir fakülte de okumayı daha prestijli bulanların oranı % 80'lerin üzerine çıkmaktadır. Bu anlamda öğrencilerde bir kafa karışıklığı olduğunu belirtmek gerekir.
9. İlçelerde kurulu yüksekokullarının kampus ortamında ve idari, teknik ve sağlık olmak üzere üç ayrı meslek yüksekokulu bünyesinde kurulması büyük oranda kabul görmektedir.

Öneriler

1. Meslek lisesi mezunlarının bilgi yetersizliklerini ortadan kaldıran düzenlemeler yapılmalı, eğitim kalitesi mutlaka yükseltilmelidir. MESLEK LİSELERİNDEN MESLEK YÜKSEKOKULLARINA SINAVSIZ GEÇİŞ KESİNLİKLE KALDIRILMALIDIR.
2. Her ilçeye bir meslek yüksekokulu anlayışı doğru değildir. Meslek yüksekokulları, illerde kampus ortamına taşınmalı, her üniversite bünyesinde alt yapısı yeterli hale getirilen; idari, teknik ve sağlık meslek yüksekokulları olarak kurulmalıdır.
3. Öğrencileri akıllı telefon ve internet bağımlılığından kurtaracak, öğretimde uygulamanın ağırlığını artıracak modelleri hayata geçirmek gerekir.
4. Meslek yüksekokullarından mezun olacak meslek elemanlarının, istihdamını zorunlu hale getirecek yasal düzenlemeleri hayat geçirmek gerekmektedir.
5. Mezunları öğrenmeye ve mezun olmaya motive edici askerlik düzenlemelerinin de faydalı olabileceği değerlendirilmektedir.

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DETERMINATION OF THE VALUES USED IN THE TURKISH COURSEBOOKS OF 4TH GRADES IN 2014-2015 ACADEMIC YEAR OF

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ABSTRACT: The increase in negative behaviors in recent years has led to an increase on the importance given to values education in many countries. Educational institutions are trying to help individuals to create robust character by adding values education into the training which they have given since the early ages. There are more Turkish lessons than any other courses in the curriculum. Thus it provides an opportunity for transmission of values to more students in Turkish lessons. Also the texts that have a great role in the processing of Turkish courses play a major role in transmitting values to students. The textbooks belong to Primary, elementary and high schools are published in the Journal of Communication after obtaining the approval of the Ministry of Education Head Council of Education and Morality. In the 2014-2015 academic year, the names of the Turkish textbooks published by 20 different houses to be taught in Turkish lessons of fourth grades were published in the Journal of Communication (No. 2676 January 2014). In order to determine the values in the books used in research, 20 values taken part in Social Studies (4th-7th grades) Education Program used as a base by looking at the totality in education principle. These values are " being fair, giving importance to family unity, independence, peace, being scientific, sedulity, solidarity, honesty, sensitivity, tolerance, aesthetics, hospitality, freedom, give importance to being healthy, respect, love, responsibility, cleanliness, patriotism, cooperation ". Document analysis based on a qualitative method was used in this study. According to the results of the study, mostly sensitivity, being scientific and giving importance to be healthy took place in the texts contained in the coursebooks. On the contrary, being fair, freedom and cleanliness value took a little part. There is no value that is not included in the text from the specified values.

Keywords: values, values education, Turkish language

4. SINIFLARDA OKUTULAN TÜRKÇE KİTAPLARINDA YER ALAN METİNLERİN DEĞERLER ÖĞRETİMİ AÇISINDAN İNCELENMESİ

ÖZET: Son yıllarda görülen olumsuz davranışlardaki artış birçok ülkede değerler eğitimine verilen önemin artmasına sebep olmuştur. Eğitim kurumları, küçük yaşlardan itibaren verdiği eğitimin içine değerler eğitimini de alarak bireylerin sağlam karakterler oluşturmalarına yardımcı olmaya çalışmaktadır. Türkçe ders sayısının diğer derslerden daha fazla olması, değerlerin öğrencilere daha fazla iletimine olanak sağlamaktadır. Türkçe dersinin işlenişinde büyük bir yere sahip olan metinler de değerlerin öğrencilere kazandırılmasında büyük bir rol oynamaktadır. İlkokul, ortaokul ve liseye ait ders kitapları Milli Eğitim Bakanlığı Talim ve Terbiye Kurulu Başkanlığı'nın onayı alındıktan sonra Tebliğler Dergisi'nde yayınlanmaktadır. 2014-2015 Eğitim Öğretim yılında dördüncü sınıf Türkçe dersinde okutulmak üzere belirlenen yirmi yayın evine ait Türkçe ders kitabı 2676 sayılı Ocak 2014 Tebliğler Dergisi'nde yayınlanmıştır. Bu kitaplardan Milli Eğitim Yayınlarına ait olan Türkçe kitabının Ankara Adana Afyon İzmir Uşak Gaziantep Aydın Manisa Konya Osmaniye ve Şanlıurfa olmak üzere ilde Cem Veb Ofset Yayınlarına ait Türkçe ders kitabının ise diğer yetmiş ilde okutulmasına karar verilmiştir. Bu çalışmada bu iki yayınevine ait dördüncü sınıf Türkçe ders, öğretmen kılavuzu ve öğrenci çalışma kitaplarında yer alan metinlerde bulunan değerlerin tespit edilmeye çalışılmıştır. Araştırmada kullanılan kitaplarda değerler tespit edilirken, eğitimde bütünlük ilkesinden yola çıkarak Sosyal Bilgiler Dersi (4-7.sınıflar) Öğretim Programı'nda yer alan 20 değer baz alınmıştır. Bu değerler " adil olma, aile birliğine önem verme, bağımsızlık, barış, bilimsellik, çalışkanlık, dayanışma, dürüstlük, duyarlılık, hoşgörü, estetik, misafirperverlik, özgürlük, sağlıklı olmaya önem verme, saygı, sevgi, sorumluluk, temizlik, vatanseverlik, yardımlaşma" dir. Araştırma doküman incelemesine dayalı nitel yöntemle gerçekleştirilmiştir. Araştırma sonuçlarına göre belirlenen kitaplarda bulunan metinlerde en çok duyarlılık, bilimsellik ve sağlıklı olmaya önem verme değerleri yer alırken, en az adil olma, özgürlük ve temizlik değerleri yer almıştır. Belirlenen değerlerden metinlerde yer almayan değer bulunmamaktadır.

Anahtar sözcükler: değer, değerler eğitimi, Türkçe dersi

GİRİŞ

İnsan içinde bulunduğu durumlara anlamlar vererek yaşayan bir varlıktır. Çevresinde olup biten her şeyi sorgulayarak yorumlar ve anlamlandırmak için çalışır. Bu yaptığı eylemler de bireyi “değer” yargısına götürür. Değer kavramı anlamın içerisinde. Bu sebepten insan anlamsız bir hayat sürdüremeyeceği için değerleri olmadan da yaşayamaz. İnsan kendi değer yargısını oluşturan, zaman içerisinde yeni değerler üreten bir varlıktır (İnam, 2009: 85). Akbaş(2008: 10) , son zamanlarda yapılan akademik araştırmalarda sıkça yer alan değer kavramıyla ilgili birçok tanım yapıldığını ifade etmiştir. Yapılan tanımlara bakıldığında değer kavramı en çok inanç, eğilim, davranış ve tutum kavramlarıyla anılmıştır. Değerle ilgili yapılan tanımlardan bir tanesi de değer bireylere yaşantıları boyunca önemli olacak noktaların ve doğru tercihlerin belirlenmesinde yol gösterici olmasıdır. Koç(2013:9)’a göre, değerler herkeste, bütün kurumlarda, toplumlarda, kültürlerde bulunmaktadır. Değerler sayesinde her şey bir anlama bürünür. Bu sebepten değerler sayesinde toplum içerisinde bireyler arası uyum sağlanır, bir bütünlük mevcuttur. Toplumda huzur ve refah olur. Yani değerler toplumda belli bir bilincin oluşmasını sağlar. Değerler, dilin, dinin, yaşam tarzının, estetiğin, bilginin, kimliğin yani her şeyin, hayatın içinde varlığını göstermektedir. Toplumsal hayatı düzenleyen değerler farklı özellikleri bünyesinde barındırır. İçselleştirilen değerler, bireyin karakterine uygun özellikte gördüğü değerlerdir. Bu sebepten değerlerin sahip olduğu özellikler, değerlerin kişiler tarafından kazandırılması için önemlidir.

Yaman’a göre (2012: 18) değerler, bireyi değerli hale getiren, bireyin sahip olduğu en mükemmel niteliklerdir. Bireyde bulunan değerler bireyin kişiliğinin, hayata bakışının, davranışlarının şekillenmesinde büyük bir yere sahiptir. Bunlarda bireyin hayatını belirleyecek etmenler olduğundan bireyin değerlerini oluştururken bilinçli davranması gerekir. Tüm hayat boyunca devam eden değer oluşturma eylemine de “değerler eğitimi” denir. İnsanlar, yaşadıkları toplumun değerlerini çocukluk yıllarından başlayarak öğrenmeye başlarlar. Başlangıçta aileden daha sonra da yakın çevreden değişik yollarla öğrenilmeye başlanan değerler aileden, yakın çevreden, yazılı ve görsel materyallerden taklit ya da model alma yolu ile öğrenilir (Halstead ve Taylor, 2000). Değerlerin öğretilen ve öğrenilebilir olgular olduğu bilinmekle birlikte günümüzde değerlerin öğretilmesi çok daha zordur. Günümüzde çocukların değer sistemlerini etkileyen ve değişime sebep olan unsurlar artmıştır. Bu yüzden değerler eğitimi kontrollü bir şekilde verilmeli rastlantılara bırakılmamalıdır(Gömleksiz, 2007). Bunun için de küçük yaşlarda başlayan ve programlı bir şekilde devam eden, düzenli bir değerler eğitim programı şarttır.

Eğitim, kültür ve sosyal yaşam bağlamında düşünüldüğünde, dil ve değer aktarımı ilişkisi birbirinden ayrılmayacak şekilde önemli bir yer tutmaktadır. Yazılı ya da sözlü olarak çeşitli birikimsel öğeler, dil yoluyla önce çağdaş topluma daha sonra gelecek nesillere aktarılır. Bu birikimler, toplumun kalıcılığı yakalamak için yapmış olduğu kültür aktarımını da dilin himayesinde gerçekleştirir. Buna bağlı olarak, her millet ilköğretim çağına gelmiş olan genç nesillere evvela ana dil eğitimi verir (Moğul, 2012 :1). Eğitimin temel hedefi, eğitim alan kişide davranış değişikliği sağlayabilmektir. Eğitim gören bireylerin davranışlarında, tutumlarında, değer yargılarında değişimler olduğu bilinmektedir. Eğitimin geniş ve dar kapsamlı olacak şekilde birçok tanımı yapılmıştır. Eğitim genel olarak bireyde davranış değiştirme olarak tanımlanırken, geniş anlamda bireyin yaşam standartlarını, inançlarını, yaşamında gideceği yolu belirlemesinde etkili olan tüm sosyal süreçler olarak tanımlanmıştır (Demirel ve Kaya, 2009:5).

Eğitimde genel olarak bilişsel ve psikomotor kazanımlara ağırlık verilmesi, bireylerin toplumun devamı için gerekli olan duyuşsal kazanımları elde etmelerine engel olmaktadır. Bununla birlikte toplumun bütünlüğü için gerekli olan ortak hedeflerin belirlenmesi çok daha zor hale gelmektedir. Bu da okullarda değerler eğitiminin sistematik bir şekilde yapılmasının gerekliliğini ortaya koymaktadır. Değerler eğitiminin eğitim kurumlarında etkili olabilmesi ilk olarak değerler ile ilgili kavramların ve konuların öğretmenler tarafından özümsemesiyle olur. Bu durum, değerler eğitiminin okullarımızda sistemli ve etkili bir biçimde yapılması zorunluluğunu ortaya çıkartmaktadır (Yazıcı, 2006). Öğretmenler model olma, sınıf içerisinde öğrencilere ortak bir sosyal doku oluşturma, öğrencilerin ahlaki gelişimleri için her öğrenciye sorumluluk verme, öğrencileri cesaretlendirme, öğrencilerin kendi kararlarını vermeleri için olanak sağlama, öğrenciler arası paylaşımına imkan verme ve ortak çalışmalarını için teşvikte bulunma davranışlarını göstererek değerlerin öğrencilere kazandırılmasını sağlayabilir (Dilmaç, 2002: 4).

Değerler eğitimi 2005 yılında Sosyal Bilgiler dersine dahil edilmekle beraber diğer derslerde örtük bir şekilde verilmeye çalışılmıştır. Türkçe dersinde 2005-2006 eğitim öğretim yılından beri kullanılmakta olan Türkçe programında değerler eğitime ait bir program bulunmamasıyla birlikte ders kitaplarında, öğrenci çalışma kitaplarında ve öğretmen kılavuz kitaplarında değerlere yer verilmiştir. Türkçe dersine ait haftalık ders saatinin diğer derslere göre çok daha fazla olması verilmek istenen değerlerin öğrencilere kazandırılmasında Türkçe dersinin önemini gözler önüne sermektedir. Öğrencilerin verilmek istenen değerleri alabilmeleri için ilk olarak

iyi bir dinleyici, kendilerini ifade edebilme becerisi gerekmektedir. Bu da daha çok Türkçe dersinin amaçları içerisinde yer almaktadır. Türkçe Dersi (1-5.Sınıflar) Öğretim Programı'nın yapısı genel amaçlarında yer alan millî, manevî, ahlakî, tarihî, kültürel, sosyal, estetik ve sanatsal değerlere önem vermelerini sağlamak; millî duygu ve düşüncelerini güçlendirmek, programın içerdiği öğrenme alanlarıyla kazandırılmaya çalışılan temel becerilerden olan kişisel ve sosyal değerlere önem verme Türkçe programında yer alan değerler eğitiminin göstergeleridir (MEB, 2009:13).

Toplumlar değerleriyle beraber gelecek zamanlara yol alır. Değişmeden, zarar görmeden gelecek nesillere aktarılabilen temel değerler toplumun devamlılığını sağlamasını sağlayacaktır. Ders kitapları, eğitim ve öğretimde kullanılan önemli araçlardır. Türkçe ders kitaplarında yer alan metinler okuma, yazma, konuşma ve dinleme becerilerini içerdiğinde yer alan etkinliklerle kazandırmaya çalışıldığından temel dil becerilerini kazandırmada önemli bir yere sahiptir (Çeçen ve Çiftçi, 2007: 39). Türkçe çalışma kitapları, ders kitaplarında yer alan metinleri destekleyecek şekilde oluşturulmaktadır. Metinde öğrencilere verilmek istenen kazanımlar çalışma kitabında yer alan ve yönergelerle öğrenciyi hedefe ulaştırmaya çalışan etkinliklerle desteklenmektedir. Öğretmen kılavuzları ise, öğretmenlerin dersini daha rahat anlatabilmesi, öğrencilere daha renkli etkinlikler sunabilmesi için ders kitabını ve çalışma kitabını içeren bir kaynaktır. Derslerde kullanılan tüm kitaplarda bulunan metinler ışığında değerler öğrencilere verilmeye çalışılmaktadır.

Alan (2012), 6.,7. Ve 8.sınıf ders kitaplarında yer alan 104 metinden 35 tanesinde hiçbir değere yer verilmediğini tespit etmiştir. Doğan ve Gülüşen (2011) , de 6., 7. ve 8.sınıf Türkçe ders kitaplarını incelemiş en çok ulusal ve sorumluluk, en az en az misafirperverlik ve hayvan sevgisi değerlerinin metinlerde yer aldığını, dokuz metinde ise hiçbir değer bulunmadığını belirlemiştir. Külünkoğlu 2010 yılında yaptığı 1., 2.,3.,4. Ve 5.sınıflar için 5 farklı yayın evine ait 15 kitabı incelemiş çalışmanın sonucunda ders kitaplarını hazırlayanlar tarafından gereken önemin ve duyarlılığın gösterilmediği tespit edilmiştir. Metinler seçilirken sadece zorunlu ve seçmeli temalara uygun metinlerin seçildiği, metinlerin iletmediği değerlerin hiç önemsenmediği, sınıflar arası değer dağılımında dengesizliklerin olduğu görülmüştür.

Yukarıdaki açıklamalardan hareketle, öğrenciler için önemli bir kaynak olan ders kitaplarının içeriğinin değerler eğitimi noktasında eksik olmasına binaen ders kitaplarının değerler konusundaki yeterliği konusu araştırmaya değer görülmüştür.

Çalışmanın Amacı

Bu çalışmada derslerde kullanılan kitaplarda yer alan metinlerin öğrenciler tarafından kazanılması istenen değerleri içermesi ve Türkçe derslerinde bu değerlerin etkinliklerle öğrenciye verilmeye çalışılması göz önünde bulundurularak 4. sınıf ders, öğretmen kılavuzu ve öğrenci çalışma kitaplarında yer alan değerlerin belirlenmesi amaçlanmıştır. Bu temel amaca bağlı olarak araştırmada aşağıdaki alt problemlere cevap aranmıştır:

1. Ders kitaplarında yer alan değerler yayınevine göre farklılaşmakta mıdır?
- 2.Öğretmen kılavuzlarında yer alan değerler yayınevine göre farklılaşmakta mıdır?
3. Öğrenci çalışma kitaplarında yer alan değerler yayınevine göre farklılaşmakta mıdır?

YÖNTEM

Söz konusu ders kitaplarındaki metinler, nitel araştırma yöntemlerinden doküman incelemesi yöntemleriyle değerler bakımından taranmış, metinlerden hareketle değer listesi oluşturulmuştur. 2014-2015 eğitim-öğretim yıllarında 4.sınıflarda okutulan Cem Veb Ofset ve MEB yayınevine ait Türkçe ders kitaplarındaki metinler, içerdikleri değerler bakımından betimsel analiz yaklaşımına göre analiz edilip elde edilen bulgular tablo ve grafiğe aktarılmıştır.

Veri Toplama Aracı

Bu çalışmada, verilerin toplanmasında belge tarama yöntemi ile doküman incelemesi kullanılmıştır. Veriler, nitel veri kaynağı olarak 2014-2015 eğitim-öğretim yılında 4.Sınıflarda kullanılan Cem Veb Ofset ve MEB yayınevlerine ait Türkçe ders, öğretmen kılavuzu ve öğrenci çalışma kitapları incelenerek elde edilmiştir.

Verilerin Analizi

Araştırmanın sonunda elde edilen veriler, nitel araştırma yaklaşımlarından betimsel analiz yaklaşımına göre analiz edilmiştir. 20014- 2015 eğitim öğretim yılında 4. sınıf Türkçe derslerinde kullanılan Cem Veb Ofset ve MEB yayınevlerine ait ders kitapları, öğretmen kılavuz kitapları ve öğrenci çalışma kitapları içerisinde yer alan metinlerde belirlenen yirmi değerin varlığı analiz edilip, elde edilen bulgular tablolastırılmıştır. Ayrıca elde edilen bulgular yorumlanarak çeşitli önerilerde bulunulmuştur.

BULGULAR

Araştırmanın bu bölümünde, Cem Veb Ofset ve MEB Yayınları'na ait 4.sınıf Türkçe ders, öğretmen kılavuzu ve öğrenci çalışma kitaplarında yer alan değerler ve bu değerlerin yayınevlerine göre karşılaştırılmasına dair bulgular ve yorumlar sunulmaktadır.

Tablo1. Cem Veb Ofset Yayınları Ders Kitabı, Öğretmen Kılavuz Kitabı Ve Öğrenci Çalışma Kitabında Yer Alan Değerlerin Karşılaştırılması

Değerler	Cem Veb Ofset Ders Kitabı		Cem Veb Ofset Öğretmen Kılavuzu		Cem Veb Ofset Öğrenci Çalışma		TOPLAM	
	f	%	f	%	f	%	f	%
Adil Olma	1	1,63	0	0	0	0	1	1,27
Aile Birliğine Önem Verme	7	11,47	3	20	0	0	10	12,66
Bağımsızlık	2	3,27	0	0	0	0	2	2,53
Barış	3	4,91	0	0	0	0	3	3,80
Bilimsellik	7	11,47	2	13,33	1	33,33	10	12,66
Çalışkanlık	5	8,19	0	0	1	33,33	6	7,59
Dayanışma	3	4,91	0	0	0	0	3	3,80
Duyarlılık	6	9,83	4	26,66	1	33,33	11	13,92
Dürüstlük	0	0	1	6,66	0	0	1	1,27
Estetik	4	6,55	2	13,33	0	0	6	7,59
Hoşgörü	1	1,63	0	0	0	0	1	1,27
Misafirperverlik	1	1,63	0	0	0	0	1	1,27
Özgürlük	0	0	0	0	0	0	0	0,00
Sağlıklı Olmaya Önem Verme	5	8,19	2	13,33	0	0	7	8,90
Saygı	2	3,27	0	0	0	0	2	2,53
Sevgi	6	9,83	0	0	0	0	6	7,59
Sorumluluk	2	3,27	0	0	0	0	2	2,53
Temizlik	0	0	0	0	0	0	0	0,00
Vatanseverlik	4	6,55	1	6,66	0	0	5	6,37
Yardımlaşma	2	3,27	0	0	0	0	2	2,53
TOPLAM	61	100	15	100	3	100	79	100,00

Cem Veb Ofset Yayınları'na ait ders kitabında, öğretmen kılavuzunda ve öğrenci çalışma kitabında yer alan metinlerin iletildiği değerler yüzdeler oranları açısından incelendiğinde en çok duyarlılık (%13,92), aile birliğine önem verme (%12,66), bilimsellik (%12,66) ve sağlıklı olmaya önem verme (%8,90) değerleridir. Yayınevlerine ait incelenen kitaplarda çalışkanlık, estetik ve sevgi değeri de %7,59 oranıyla eşit sayıda yer almıştır. Aynı kitaplarda adil olma, hoşgörü, misafirperverlik (%1,27) ve dürüstlük (%1,27) değerine ise sadece birer metinde yer verilirken, özgürlük ve temizlik değerine hiç yer verilmemiştir.

Tablo 2.MEB Yayınları Ders Kitabı, Öğretmen Kılavuz Kitabı Ve Öğrenci Çalışma Kitabında Yer Alan Değerlerin Karşılaştırılması

Değerler	MEB Ders Kitabı		MEB Öğretmen Kılavuz		MEB Öğrenci Çalışma		TOPLAM	
	F	%	f	%	f	%	f	%
Adil Olma	0	0	0	0	0	0	0	0,00
Aile Birliğine Önem Verme	5	9,43	0	0	0	0	5	6,02
Bağımsızlık	1	1,88	0	0	0	0	1	1,20
Barış	3	5,66	0	0	1	4,54	4	4,82
Bilimsellik	4	7,54	1	12,5	1	4,54	6	7,23
Çalışkanlık	5	9,43	1	12,5	2	9,09	8	9,64
Dayanışma	2	3,77	0	0	1	4,54	3	3,61
Duyarlılık	5	9,43	1	12,5	2	9,09	8	9,64
Dürüstlük	1	1,88	1	12,5	2	9,09	4	4,82
Estetik	5	9,43	0	0	1	4,54	6	7,23
Hoşgörü	2	3,77	1	12,5	0	0	3	3,61
Misafirperverlik	0	0	0	0	1	4,54	1	1,20
Özgürlük	1	1,88	0	0	0	0	1	1,20
Sağlıklı Olmaya Önem Verme	5	9,43	1	12,5	3	13,63	9	10,84
Saygı	3	5,66	0	0	1	4,54	4	4,82
Sevgi	4	7,54	0	0	4	18,18	8	9,64
Sorumluluk	1	1,88	0	0	2	9,09	3	3,61
Temizlik	2	3,77	0	0	0	0	2	2,41
Vatanseverlik	2	3,77	2	25	1	4,54	5	6,02
Yardımlaşma	2	3,77	0	0	0	0	2	2,41
TOPLAM	53	100	8	100	22	100	83	100,00

MEB Yayınları' na ait ders kitabı, öğretmen kılavuzu ve öğrenci çalışma kitabında bulunan metinlerin iletği değerler yüzdelik oranları bakımından karşılaştırıldığında en fazla metinlerde yer alan değerlerin sağlıklı olmaya önem verme (%10.84) değeri olduğu görülmektedir. MEB Yayınları kitaplarında en çok yer alan diğer değerler ise çalışkanlık ve sevgi (%9.64), bilimsellik ve estetik (%7.23) değerleridir. Bağımsızlık, misafirperverlik ve özgürlük değerine birer metinde yer almış olup, adil olma değeri bu yayınevinin metinlerine dahil edilmemiştir.

Tablo 29.Cem Veb Ofset Yayınları ve MEB Yayınları'nda Yer Alan Değerlerin Karşılaştırılması Üzerine Genel Bir Değerlendirme

Değerler	Cem Veb Ofset Yayınları		MEB Yayınları		TOPLAM	
	f	%	f	%	f	%
Adil Olma	1	1,27	0	0,00	1	0,62
Aile Birliğine Önem Verme	10	12,66	5	6,02	15	9,26
Bağımsızlık	2	2,53	1	1,20	3	1,85
Barış	3	3,80	4	4,82	7	4,32
Bilimsellik	10	12,66	6	7,23	16	9,88
Çalışkanlık	6	7,59	8	9,64	14	8,64
Dayanışma	3	3,80	3	3,61	6	3,70
Duyarlılık	11	13,92	8	9,64	19	11,73

Dürüstlük	1	1,27	4	4,82	5	3,09
Estetik	6	7,59	6	7,23	12	7,41
Hoşgörü	1	1,27	3	3,61	4	2,47
Misafirperverlik	1	1,27	1	1,20	2	1,23
Özgürlük	0	0,00	1	1,20	1	0,62
Sağlıklı Olmaya Önem Verme	7	8,90	9	10,84	16	9,88
Saygı	2	2,53	4	4,82	6	3,70
Sevgi	6	7,59	8	9,64	14	8,64
Sorumluluk	2	2,53	3	3,61	5	3,09
Temizlik	0	0,00	2	2,41	2	1,23
Vatanseverlik	5	6,37	5	6,02	10	6,17
Yardımlaşma	2	2,53	2	2,41	4	2,47
TOPLAM	79	100,00	83	100,00	162	100,00

Cem Veb Ofset ve MEB Yayınları'nda yer alan değerlere bakıldığında 4.sınıf Türkçe kitaplarında en çok yer verilen değerlerin duyarlılık (%11,73), bilimsellik(%9,98) ve sağlıklı olmaya önem verme(%9,98), çalışkanlık (%8,64) ve sevgi (%8,64) değerleri olduğu görülmektedir. Cem Veb Ofset ve MEB Yayınları'nda adil olma (%0,62), özgürlük (%0,62), misafirperverlik (1,23), temizlik (%1,23) ve bağımsızlık (%1,85) değerleri metinlerde en az yer alan değerlerdir. Araştırma için belirlenen yirmi değer arasında Cem Veb Ofset ve MEB Yayınları'na ait ders, öğretmen kılavuz ve öğrenci çalışma kitaplarında yer alan metinlerde geçmeyen değer bulunmamaktadır.

SONUÇ VE ÖNERİLER

Bu araştırmada 4.sınıflarda Türkçe derslerinde kullanılan, iki farklı yayınevine ait ders, öğretmen kılavuzu ve öğrenci çalışma kitaplarında yer alan metinlerde geçen değerler tespit edilmiştir. Türkçe dersleri, değerlerin öğrencilere kazandırılmasında en etkili olacak derslerden biridir. Türkçe dersinin ders sayısının fazla olması, derslerde işlenen metinlerde yer alan değerlerin öğrenciye aktarımını kolaylaştırmaktadır. Bu araştırmada 20014- 2015 eğitim öğretim yılında, 4. Sınıflarda okutulan Türkçe ders kitaplarında yer alan değerler belirlenmiştir. Yapılan çalışmada bazı değerlerin ders kitaplarında çokça yer alırken, küçük yaşlarda kazandırılması gereken bazı değerlere çok az yer verildiği, kitaplarda bulunan değerler arasında orantısız bir dağılımın olduğu görülmüştür.

4.sınıflarda okutulan Türkçe ders kitapları, öğretmen kılavuz kitapları ve öğrenci çalışma kitaplarında yer alan metinlerde bulunan değerlerle ilgili genel bir değerlendirme yapıldığında, değerlerin metinlerde bulunma oranı ve sıralaması aşağıdaki gibidir:

- 1.Duyarlılık (%11.73)
- 2.Bilimsellik (%9.88)
- 3.Sağlıklı Olmaya Önem Verme(%9.88)
- 4.Aile Birliğine Önem Verme(%9.26)
- 5.Çalışkanlık(%8.64)
- 6.Sevgi(%8.64)
7. Estetik (%7.41)
8. Vatanseverlik(%6.17)
- 9.Barış(%4.32)
10. Dayanışma(%3.70)
11. Saygı(%3.70)
12. Dürüstlük(% 3.09)
13. Sorumluluk (%3.09)
14. Hoşgörü (%2.47)
- 15.Yardımlaşma(%2.47)
16. Bağımsızlık(%1.85)
17. Misafirperverlik(%1.23)
18. Temizlik(%1.23)
19. Adil Olma(%0.62)

20. Özgürlük(%0.62)

Görüldüğü üzere Türkiye genelinde 4. sınıflarda okutulan Türkçe ders kitapları metinlerinde en çok duyarlılık, bilimsellik ve sağlıklı olmaya önem verme değerleri yer alırken, metinlerde en az bulunan değerler özgürlük, adil olma ve temizlik değeridir.

Bu sonuçlara dayanarak, Türkçe dersinin büyük çoğunlukla metinler üzerinden işlendiği düşünülerek ders kitaplarına metin seçimi yapılırken, metinlerin çocukların dönem özelliklerine hitap etmesine dikkat edilmesi, seçilen metinlerde yer alan değerlerin (özellikle kazanıldığında beraberinde başka değerlerin de gelişmesine yardımcı olacak olan temel değerlerin) küçük yaşlarda kazanılması ve öğrenciler tarafından içselleştirilmesi adına uygun ortamlar oluşturularak öğretmenlerin bu konuda model olması, ders saatinin diğer derslerden daha fazla olması sebebiyle de Türkçe Öğretimi Programı'na değerler konusunun dahil edilmesi önerilebilir.

Bu araştırma sadece 4. Sınıf Türkçe kitaplarını içerdiği için diğer derslerin ve sınıfların ders kitaplarında yer alan değerleri inceleyen çalışmalara ihtiyaç olduğu söylenebilir. Ayrıca Türkçe dersinin diğer derslere göre daha fazla ders saatine sahip olması, dersin daha çok metinler doğrultusunda işlenmesi, değerler eğitiminde Türkçe dersinin ve ders kitaplarının önemini gündeme getirmektedir. Sosyal Bilgiler dersinde öğrencilere kazandırılması hedeflenen değerlerin diğer derslerde verilmeye çalışılarak daha etkili olabilmesi için yapılan bu çalışmanın ilgililere ışık tutacağını umuyorum.

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AN INVESTIGATION ON PROSPECTIVE PRE-SCHOOL TEACHERS' PERCEPTION OF THEIR ADEQUACY ON TEACHING FOREIGN LANGUAGES TO YOUNG CHILDREN

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ABSTRACT: This study aims to examine what extend the Pre-school teachers see themselves enough on making activities related to teaching foreign languages to young children with regards to several variables. The study group consisted of 3rd and 4th grade students studying in Early Childhood Education Program at Education Faculty of Malatya Inonu University and Kırşehir Ahi Evran University in the fall semester of 2014-2015 academic year.

“Efficacy Scale of Teaching English to Young Learners” obtained by scanning the related literature was used In order to collect data. The sale consisted of practice and activities that an effective teacher must have in order to make the foreign language teaching process successful.

Descriptive statistical techniques (frequency, percentage, etc.) and t test was used for dependent and independent groups to analyze the data. The collected data was analyzed by using SPSS 17.0 statistical software.

Keywords: teaching foreign language to children, prospective pre-school teachers, teacher training

OKUL ÖNCESİ ÖĞRETMEN ADAYLARININ ÇOCUKLARA YABANCI DİL ÖĞRETİMİ KONUSUNDAKİ YETERLİLİK ALGILARININ İNCELENMESİ

ÖZET: Bu çalışmanın amacı Okul Öncesi öğretmeni adaylarının çocuklara yabancı dil öğretimiyle ilgili etkinlikleri yapabilme konusunda kendilerini ne kadar yeterli gördüklerini çeşitli değişkenler açısından incelemektir. Araştırma, tarama modeline dayalı betimsel bir çalışmadır.

Araştırmanın çalışma grubu, 2014-2015 eğitim öğretim yılı güz yarıyılında Malatya İnönü Üniversitesi ve Kırşehir Ahi Evran Üniversitesi Eğitim Fakültesi Okul Öncesi Öğretmenliği programına devam eden 3. ve 4. sınıf öğrencisinden oluşmaktadır. Veri toplamak amacıyla ilgili alan yazının taranması sonucu elde edilen ve çocuklara yabancı dil öğretimi sürecinin başarıya ulaşması için etkili bir öğretmenin sahip olması gereken uygulama ve etkinliklerden oluşan “Çocuklara Yabancı Dil Öğretimi Yeterlik Ölçeği” kullanılmıştır.

Verilerin analizinde betimsel istatistik teknikleri (frekans, yüzde vb.) ve bağımlı ve bağımsız gruplar için t testi kullanılmıştır. Uygulama sonucunda toplanan veriler SPSS 17,0 istatistik programı kullanılarak analiz edilmiştir

Anahtar sözcükler: çocuklara yabancı dil öğretimi, okul öncesi öğretmen adayları, öğretmen yetiştirme

GİRİŞ

Dil, günlük hayta bilgi aktarımını sağlayan bir araçtır. Kişiler konuşurken dilbilgisi kurallarından çok anlama yoğunlaşır. Bu yüzden yabancı dil eğitimi, mümkün mertebe dilin iletişimi sağlayacak şekilde öğretimine imkan sağlamalı ve buna göre planlanmalıdır (Işık, 2005:23). Beynin belli bir dönemden sonra kendine gelen dilsel girdilere duyarsızlaşması erken yaşta yabancı dil eğitiminin gerekçelerinden biridir. Bu dönemde ana dil beyinde tam olarak oturmuş olacağından başka bir dilin öğrenilmesini tam anlamıyla engellemez ama öğrenimini kısıtlar (Alptekin, 2003:46). Erken yaşta yabancı dil çocukların karşılaştıkları olaylara olan bakış açısını genişletecek, farklı olana karşı anlayış, saygı ve hoşgörü çerçevesinde davranabilecek ve bunların yanında değişik kültürleri tanımasını sağlarken kendi kültürünün farkına vardıracağıdır (Haznedar,2003:123).

Dünyanın globalleşmesi beraberinde çok dilliliği getirmiştir. Bununla beraber erken yaşta yabancı dil eğitiminin gerekliliği artmıştır. Her ülkenin dil politikası farklı olsa da İngilizce diller arasında ayrıcalığını koruyarak AB üyesi ülkelerin %90'ında zorunlu dil olarak öğretilmektedir. Avrupa Konseyi tarafından 2002'de AB üyesi olan ülkelerde yabancı dil öğrenme yaşı 6 olarak belirlenmiştir. Ülkemizde de özellikle son yıllarda en çok öğretilen yabancı dil İngilizce'dir (Trim, 1998, Akt. Haznedar, 2010). Yabancı dil eğitiminin başlangıç yaşı ülkelere göre farklılıklar göstermektedir. Lüksemburg'da 1.sınıfta, Almanya'da 3.sınıfta, İskoçya'da 10 yaşında, Fransa'da 6-11 yaş arasında, Hollanda'da 10-12 yaş arasında yabancı dil eğitimi verilmektedir. Nüfusunun yaklaşık üçte biri yabancılardan oluşan Lüksemburg'da ise ilkökul 1. sınıfta Almanca, 2. sınıfta Fransızca dilleri ile ilgili eğitim verilmektedir (Koydemir, 2011:44).

Fröhlich-Ward (1997)' a göre çocukların toplumsal kurallara anlam vermeye başladıkları zaman dilimi, yabancı dil öğrenmeleri için de en önemli dönemdir. Bunun da Avrupa toplumları için beş yaş olduğunu söyler. Lambert (1972) 'a göre çocuk dil için kritik dönemi geçmeden ana dilin yanında yabancı dil eğitimi alırsa, gelecekte akranlarından bu konuda daha başarılı olacaktır. Erken çocuklukta öğrenilen yabancı dil, bu çocukların bilişsel yönden gelişimlerine de olumlu katkı sağlayacaktır. Lenneberg (1967) dilde kritik dönemi dikkate alarak çocukların 2-10 yaşlarında ikinci dili rahatlıkla öğrenebileceğini, beynin bu yaşlardan sonra sinir dokularındaki esnekliği kaybettiğini ve buna bağlı olarak yabancı dil ediniminin zorlaştığını ifade etmektedir (akt. Demirezen, 2003). Çocuklarda beyin gelişimi 2- 5 yaş arasında olur ve 6 yaşında bu süreç tamamlanır. Bu yaşlarda aynı zamanda dilsel bilinç de yoğundur. Bu yaşlarda doğru olarak yapılandırılan ve doğal ortamda sunulan bir yabancı dil eğitimi, çocukların dili daha kolay öğrenmesini sağlayacak e zihinsel gelişimine de katkıda bulunacaktır (Akdoğan, 2004). Çocukluktan sonra yabancı dile ait kelimelerin telaffuzuyla beraber öğrenimi de zor olur (Çiçek, 2002:122). İki dil konuşulan bir evde yaşayan üç yaş civarı çocuklar, bu dilleri sözcükler bazen karıştırıp, sözcükleri yavaşça kursa da hem anlayıp hem de konuşabilirler. Bir dilde kullandığı sözcüğü diğer dilde bilemeyebilirler. Çocuklar dört yaşına kadar iki dili konuşmadan önce ilk olarak bir dildeki sözcükleri öğrenirler. Sonra diğerinde gelişim gösterir. İkinci aşamada, söz dizim kurallarını her iki dildeki sözcüklere uygularlar. Son olarak da bildikleri dilleri duyduklarında birbirinden ayırabilirler (Artan ve Bayhan, 2004:141). Çocukların 3-4 ve 10-13 yaşlarında bir dili öğrenmenin temeli olan benzeşleme kapasitelerinin daha yüksek olduğundan, dil öğrenimine bu yaşlarda çok daha yatkındırlar. İşitme ve eklemlenme 13 yaşından sonra aynı kalmaktadır (Hagege, 1994, akt. Anşın,2006:13).

Türkiye'de batılılaşma çalışmalarında yabancı dil öğretimine de önem verilmiş, hem kamusal hem kişisel olarak büyük boyutlarda zaman ve kaynak sarf edilmiştir. Fakat yabancı dil öğretiminde beklenen başarı yakalanamamıştır (Demirel, 1999). Ülkemizde günümüze kadar yabancı dil öğretmeni yetiştirmek için farklı kurumlar devreye girmiştir. 1982'den önce üniversitede okuyup A,B,C kurlarında yabancı dil eğitimi alanlar, Eğitim Enstitüsü'nde dışarıdan yabancı dil bölümünü, yaygın öğretim yaz okulunu ve hızlandırılmış öğrenime katılanlar(1978-80) ve MEB tarafından açılan “öğretmen muavinliği” sınavında başarılı olanlar yabancı dil öğretmeni olarak görev yapmıştır. Günümüzde ise durum çok da farklı değildir. Şuan yabancı dil öğretmenlerinin içerisinde yabancı dil öğretmenliği bölümünü bitirmeyen çok sayıda farklı alanlardan öğretmenler bulunmaktadır (Çelebi, 2006: 288-289) .

1998 yılında zorunlu eğitim sekiz yıla çıkmış ve ilkökul 4. sınıftan itibaren yabancı dil dersinin okutulmasına karar verilmiştir. 2012 yılında yapılan yeni bir düzenleme ile zorunlu eğitim süresi değişmiş, 4 yıl ilkökul, 4 yıl ortaokul, 4 yıl lise (4+4+4) olacak şekilde 12 yıla çıkarılmıştır. Bu bağlamda, yeni eğitim sistemi ile birlikte öğrenciler yabancı dil (İngilizce) dersini ilkökul 2. sınıftan itibaren almaya başlamış ve İngilizce dersinin dışında başka bir yabancı dili de seçmeli olarak ortaokulda tercih edebilmiştir. Milli Eğitim Bakanlığı'nın 2000 yılı Nisan ayında 2511 sayılı Tebliğler Dergisinde yayınlanan 30.03.2000 tarihinde Talim Terbiye Kurulu Başkanlığı'nın 32 numaralı kararında göre 5 ve 6 yaş çocuklarında çerçeve programla beraber istenilen özellikleri taşıyan okul öncesi kurumlarında yabancı dil destekli program uygulanmaya başlanmıştır. 2012-2013 eğitim öğretim yılı ile 4+4+4 eğitim sistemine göre yabancı dil eğitimine 2.sınıfta başlanmıştır. Yeni eğitim reformu ile ilkökula başlama yaşı 5 olurken, yabancı dil eğitimi başlangıç yaşı da 6 olmuştur. Yabancı dil eğitimine sınıflar kademeli olarak geçmiştir Bu durumda bazı şartlarda yabancı dil derslerine yabancı dil öğretmenlerinin de girmesi beraberinde her öğretmen adayının yabancı dil konusuna yeterli olmasını gündeme getirmiştir. Şad (2010), sınıf öğretmenlerinin yabancı dil konusundaki yeterlik ve istekliliklerini ölçmeye yönelik 88 son sınıf öğrencisi ile yaptığı çalışmada; öğretmen adaylarını öğrencilerine yabancı dil öğretimiyle ilgili etkinlikleri yapabilme konusunda kendilerini orta düzeyin altında yeterli gördükleri, fakat gerekli eğitimleri aldıklarında bu etkinlikleri yapmada manidar düzeyde daha istekli oldukları görülmektedir.

Yapılan çeşitli araştırmalarda küçük yaşta yabancı dil öğretiminin çocuklara zarar vermediği görülmüştür. Bu konuda çıkan sonuç şudur: İnsanoğlu milyonlarca beyin hücresi yani nöronlarla doğar. Bu nöronlar birbirlerine sinaptik bağlantılarla bağlıdır. Zamanla kullanılan bağlar güçlenirken, kullanılmayan bağlar ölür. İnsan gelişiminin en aktif olduğu 0 – 6 yaş döneminin çok iyi değerlendirilmesi gerekir. Bu dönemde, nitelikli ve

çocukların gelişim dönemlerine uygun hazırlanmış yabancı dil öğretim programları mutlak başarının anahtarı olacaktır (Karakoç, 2007). Böyle bir durumda İngilizce derslerine okul öncesi eğitimi almış İngilizce öğretmenlerin yanı sıra, İngilizce eğitim almış Okul Öncesi öğretmenlerinin de girebileceği durumu ortaya çıkmaktadır. Bu da okul öncesi öğretmenlerinin bu konudaki yeterliklerini gündeme getirmektedir. Bu çalışmada okul öncesi öğretmenlerinin yabancı dili öğrencilerine öğretme noktasında kendilerini ne kadar yeterli gördüklerini tespit etmenin gerekliliğine binaen yapılmıştır.

Çalışmanın Amacı

Bu çalışmanın amacı okul öncesi öğretmen adaylarının, öğrencilerine yabancı dil eğitimi ile ilgili yapmaları gereken etkinlikleri uygulayabilmede, kendilerini ne kadar yeterli gördüklerinin çeşitli değişkenlere göre incelenmesidir. Bu temel amaca bağlı olarak araştırmada aşağıdaki alt problemlere cevap aranmıştır:

1. Okul öncesi öğretmen adaylarının çocuklara yabancı dil öğretimi konusundaki yeterlilik algıları nasıldır?
2. Okul öncesi öğretmen adaylarının çocuklara yabancı dil öğretimi konusundaki yeterlilik algıları arasında manidar düzeyde bir farklılık var mıdır?
3. Okul öncesi öğretmeni adaylarının çocuklara yabancı dil öğretimi konusundaki yeterlilik algıları arasında manidar düzeyde bir ilişki var mıdır?
4. Okul öncesi öğretmeni adaylarının çocuklara yabancı dil öğretimi konusundaki yeterlilik algıları açısından,
 - a) cinsiyet,
 - b) mezun olunan lise,
 - c) öğrenim türü (Birinci öğretim, İkili öğretim),
 - d) algılanan yabancı dil yeterlik düzeyi, değişkenlerine göre manidar düzeyde bir farklılık var mıdır?

YÖNTEM

Bu araştırma tarama modeline dayalı betimsel bir çalışmadır. Karasar'a (2005) göre, geçmişte veya halen var olan bir durumu, var olduğu şekliyle betimlemeyi amaçlayan araştırma yaklaşımlarıdır. Araştırmanın çalışma grubu, 2014-2015 eğitim öğretim yılı güz yarıyılında Malatya İnönü Üniversitesi ve Kırşehir Ahi Evran Üniversitesi Eğitim Fakültesi Okul Öncesi Öğretmenliği programına devam eden 3. ve 4. sınıf öğrencisinden oluşmaktadır. Veri toplamak amacıyla ilgili alan yazının taranması sonucu elde edilen ve çocuklara yabancı dil öğretimi sürecinin başarıya ulaşması için etkili bir öğretmenin sahip olması gereken uygulama ve etkinliklerden oluşan "*Çocuklara Yabancı Dil Öğretimi Yeterlik Ölçeği*" kullanılmıştır.

Örneklem

Tablo 1 Çalışma Grubunda Bulunan Öğrencilerin Cinsiyetlerine Göre Yüzde-Frekans Dağılımları

	f	%
Kız	174	88.8
Erkek	22	11.2
Toplam	196	100

Tablo 2 Çalışma Grubunda Bulunan Öğrencilerin Yaşlarına Göre Yüzde-Frekans Dağılımları

	f	%
20-22	167	85.2
23+	29	14.8
Toplam	196	100

Tablo 3 Çalışma Grubunda Bulunan Öğrencilerin Sınıflarına Göre Yüzde-Frekans Dağılımları

	f	%
3. Sınıf	97	49.5
4. Sınıf	99	50.5
Toplam	196	100

Tablo 4 Çalışma Grubunda Bulunan Öğrencilerin Mezun Oldukları Lise Türlerine Göre Yüzde-Frekans Dağılımları

	f	%
Anadolu Lisesi	114	58.2
Meslek Lisesi	45	23
Diğer Lise	37	18.9
Toplam	196	100

Veri Toplama Aracı

Bu araştırma için veri toplamak amacıyla "*Çocuklara Yabancı Dil Öğretimi Yeterlik Ölçeği*" uygulanmıştır. Ölçekte 19 madde yer almaktadır. Ölçekte yer alan her bir madde için katılımcılara kendilerini ne düzeyde yeterli hissettikleri ile ilgili sorular sorulmuştur. Katılımcıların "Kesinlikle katılmıyorum" Katılmıyorum" ile "Kararsızım" ve "Katılıyorum" ile "Tamamen katılıyorum" seçeneklerinden kendilerine uygun seçeneği işaretlemeleri istenmiştir.

Tablo 5 Öğrencilerin yabancı dil yeterliliklerini değerlendirme ölçeğinin puanlandırılması

Değerlendirme Kriteri	Puan	Değerlendirme Aralığı
Kesinlikle Katılmıyorum	1	1.00-1.80
Katılmıyorum	2	1.81-2.60
Kararsızım	3	2.61-3.40
Katılıyorum	4	3.41-4.20
Tamamen Katılıyorum	5	4.21-5.00

Verilerin Analizi

Verilerin analizinde betimsel istatistik teknikleri (frekans, yüzde vb.) ve bağımlı ve bağımsız gruplar için t testi kullanılmıştır. Uygulama sonucunda toplanan veriler SPSS 17,0 istatistik programı kullanılarak analiz edilmiştir

BULGULAR

Bu bölümde okul öncesi öğretmenliği 3. ve 4.sınıf öğrencilerinin öğrencilere yabancı dil öğretimi konusunda yeterlilik düzeylerine ilişkin görüşleri ile ilgili bulgu ve yorumlar sunulmaktadır. Altta ilk olarak araştırmaya katılanlarla ilgili cinsiyet, yaş, buldukları sınıf, mezun olunan lise, algılanan İngilizce yeterlik düzeyi değişkenlerine ait betimsel istatistikler sunulmaktadır.

Tablo 6 Öğretmen Adaylarının Yaşlarına Göre Yabancı Dil Yeterlilik Puan Ortalamalarının Karşılaştırılmasına İlişkin Bağımsız İki Grup Arası Farkların T Testi Sonuçları

	N	Ortalama	Standart Sapma	t	p
20-22	167	3.11	.68		
23 ve üzeri	29	3.31	.79	-1.4	.160

Tablo da görüldüğü üzere, öğretmen adaylarının yaşları ile yabancı dil yeterlilik puan ortalamaları arasında anlamlı bir farklılığın olmadığı bulunmuştur, ($t=-1.4$, $p=.160$).

Tablo 7 Öğretmen Adaylarının Cinsiyetlerine Göre Yabancı Dil Yeterlilik Puan Ortalamalarının Karşılaştırılmasına İlişkin Bağımsız İki Grup Arası Farkların T Testi Sonuçları

	N	Ortalama	Standart Sapma	t	p
Erkek	22	3.18	.80		
Kız	174	3.13	.68	.272	.786

Tablo da görüldüğü üzere, öğretmen adaylarının cinsiyetleri ile yabancı dil yeterlilik puan ortalamaları arasında anlamlı bir farklılığın olmadığı bulunmuştur, ($t=.272$, $p=.786$). Şad (2010)'un yaptığı araştırma sonuçlarına göre kadın ($x=53,01$; $S=22.45$) ve erkek ($x=40,48$; $S=20.88$) sınıf öğretmeni adaylarının yeterlik algılarına ilişkin puan ortalamaları arasında kadınlar lehine manidar bir fark gözlemlenmiştir [$t = 2,711$; $p=.008$].

Tablo 8 Öğretmen Adaylarının Sınıflarına Göre Yabancı Dil Yeterlilik Puan Ortalamalarının Karşılaştırılmasına İlişkin Bağımsız İki Grup Arası Farkların T Testi Sonuçları

	N	Ortalama	Standart Sapma	t	p
3. sınıf	97	3.15	.67		
4. sınıf	99	3.14	.73	.051	.96

Tablo da görüldüğü üzere, öğretmen adaylarının sınıfları ile yabancı dil yeterlilik puan ortalamaları arasında anlamlı bir farklılığın olmadığı bulunmuştur, ($t=.051$, $p=.96$).

Tablo 9 Öğretmen Adaylarının Mezun Oldukları Lise Türlerine Göre Yabancı Dil Yeterlilik Puan Ortalamalarının Karşılaştırılmasına İlişkin ANOVA Sonuçları

	N	Ortalama	Standart Sapma	F	p
Anadolu Lisesi	114	3.22	.72	2.02	.135

Meslek Lisesi	45	2.98	.6
Diğer Lise	37	3.1	.71

Tablo 9’da görüldüğü üzere, öğretmen adaylarının mezun oldukları lise türleri ile yabancı dil yeterlilik puan ortalamaları arasında anlamlı bir farklılığın olmadığı bulunmuştur, ($F=2.02$, $p=.135$). Şad (2010)’un yaptığı araştırma sonuçlarına göre Lise türü değişkeni açısından yeterlilik algısıyla ilgili yapılan bağımsız gruplar için t testi analizi sonucunda diğer $Cx=66,75$; $S=18.18$ liselerden mezun olan sınıf öğretmeni adayları ile genel lise ($x=39,51$; $S=19.40$) mezunu sınıf öğretmeni adaylarının yeterlilik algılarına ilişkin puan ortalamaları arasında birinci grup lehine manidar bir fark gözlemlenmiştir [$t = 5,788$; $p=.000$].

No	Madde	%	Kesinlikle katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Tamamen Katılıyorum	X	Ss
18	Sınıf içinde sürekli kullandığım basit yönergeleri İngilizce verebilirim.	% f	4,1 8	13,3 26	16,3 32	51,5 101	14,8 29	3,6	1,026
9	Sınıfın duvarlarını İngilizce poster, resim, pano vb. materyallerle süsleyebilirim.	% f	4,1 8	15,3 30	20,4 40	43,9 86	16,3 32	3,53	1,064
14	Çocukların yabancı dil öğrenmeye karşı tutumlarını olumlu yönde arttırabilirim.	% f	3,1 6	13,8 27	24,5 48	46,4 91	12,2 24	3,51	0,979
7	Teyp, TV, video, bilgisayardan İngilizce dinleme/izleme etkinlikleri yaptırabilirim.	% f	4,6 9	18,4 36	17,9 35	47,4 93	11,7 23	3,43	1,063
3	Çocukların fiziksel olarak yerine getirmesi gereken İngilizce komutlar verebilirim.	% f	6,6 13	14,8 29	20,4 40	48,5 95	9,7 19	3,4	1,064
10	İngilizce söylediklerimi mimik ve jestlerimle daha anlaşılır hale getirebilirim.	% f	5,6 11	17,3 34	24 47	40,8 80	12,2 24	3,37	1,08
11	Çocuklara resimli İngilizce çalışma yaprakları hazırlayabilirim.	% f	5,1 10	18,9 37	26,5 52	35,2 69	14,3 28	3,35	1,096
13	İngilizce dersleri için öğrencilere eğlenceli etkinlikler hazırlayabilirim.	% f	4,6 9	18,9 37	26,5 52	39,3 77	10,7 21	3,33	1,045
4	Çocuklara İngilizce çocuk şarkıları öğretebilirim.	% f	6,1 12	17,3 34	23,5 46	44,4 87	8,7 17	3,32	1,054
16	İngilizce derslerinde çocukların kendilerini kaygısız ve rahat hissetmelerini sağlayacak etkinlikler yapabilirim.	% f	5,6 11	17,3 34	32,1 63	34,2 67	10,7 21	3,27	1,049
15	İngilizce derslerinde çocuklara dünyanın farklı kültürlerini tanıtabilirim.	% f	10,2 20	22,4 44	26 51	30,1 59	11,2 22	3,1	1,175
19	İngilizce derslerinde çocukların diğer derslerde öğrendiği bilgilerden faydalanabilmelerini sağlayabilirim.	% f	8,7 17	20,9 41	36,2 71	29,6 58	4,6 9	3,01	1,02
2	Çocuklara İngilizce şiir ve tekerlemeler öğretebilirim.	% f	13 26	25 55	20 40	32 63	9,2 18	2,99	1,215
1	Sınıfta İngilizce oyunlar oynatabilirim.	% f	13,3 26	28,1 55	20,4 40	31,3 61	7,1 14	2,91	1,186
17	Öğrencilere telaffuz açısından iyi bir model	%	13,3	26,5	29,6	23	7,7	2,85	1,147

	olabilirim.	f	26	52	58	45	15		
5	İngilizceyi kullanarak el becerisi gerektiren etkinlikler (origami , kolaj, boyama, kesme-yapıştırma, süsleme vb.) yaptırabilirim.	%	10,2	37,2	24,5	21,9	6,1	2,77	1,094
		f	20	73	48	43	12		
8	Resimli hikâye kartlarından İngilizce hikâyeler okuyup sorular sorabilirim.	%	13,3	31,6	28,6	21,4	5,1	2,73	1,096
		f	26	62	56	42	10		
12	Öğrencilerin İngilizce portfolyolar (ürün dosyaları) hazırlamalarını sağlayabilirim.	%	13,8	33,2	32,1	14,8	6,1	2,66	1,081
		f	27	65	63	29	12		
6	İngilizce diyalog, rol oynama, drama etkinlikleri yaptırabilirim.	%	15,3	35,7	27,6	15,8	5,6	2,61	1,097
		f	30	70	54	31	11		

Araştırmaya katılan öğrencilerin yabancı dil ile ilgili hangi yeterliliklere sahip oldukları incelendiğinde; sınıfta kullanılan basit yönergeleri İngilizce verme (Ort=3.6, Ss: 1.026), sınıf duvarlarını İngilizce materyallerle zenginleştirme (Ort=3.53, Ss=1.064) , çocukların yabancı dil öğrenmeye karşı tutumlarını olumlu yönde arttırabilme (Ort=3.51, Ss=0.979) ve İngilizce dinleme/izleme etkinlikleri yaptırma becerilerinde (Ort=3.43, Ss=1.063) kendilerini diğer becerilere göre daha yeterli bulmuşlardır. Ancak, İngilizceyi kullanarak en becerisi gereken etkinlik yaptırma (Ort=2.77, Ss=1.094), resimli hikâye kartlarından İngilizce hikâye okuyup sorular sorma (Ort=2.73, Ss=1.96), İngilizce portfolyo hazırlama (Ort=2.66, Ss=1.081) ve İngilizce diyalog, rol oynama ve drama etkinlikleri yaptırma becerilerinde (Ort=3.51, Ss=0.979), ise öğretmen adayları kendilerini daha yetersiz görmektedirler. Öğretmen adaylarının yabancı dil yeterliliklerine genel olarak bakıldığında ise; öğretmen adayları yabancı dil yeterlilikleri konusunda kararsız bulunmaktadır (Ort=3.14, SS=.7).

Şad (2010)'un çalışmasına göre, katılımcıların çocuklara dünyanın farklı kültürlerini tanıtmaya (x = 2,80), sınıfın duvarlarını İngilizce poster, resim, pano vb. materyallerle zenginleştirme (x=2,67), fiziksel olarak yerine getirmesi gereken İngilizce komutlar verme (x 2,66), yabancı dil öğrenmeye karşı olumlu tutum geliştirme (x= 2,65) konularında kendilerini nispeten daha yeterli hissettikleri görülmektedir. Diğer taraftan İngilizce diyalog, rol oynama, drama etkinlikleri yaptırma (x=2,13), İngilizceyi kullanarak el becerisi gerektiren etkinlikler (origami, kolaj, boyama, kesme yapıştırma, süsleme vb.) yaptırma (x= 2,17), İngilizce portfolyolar (ürün dosyaları) hazırlama (x=2,23) gibi etkinlikler konusunda da kendilerini nispeten yetersiz ve öğrenmeye isteksiz hissettikleri görülmektedir.

Araştırmaya katılan öğrencilerin 30'u (%15) İngilizce diyalog, rol oynama, drama etkinlikleri yaptırabilmeye, 27'si (%14) öğrencilerin İngilizce portfolyolar (ürün dosyaları) hazırlamalarını sağlayabilmeye, 26'sı (%13) resimli hikâye kartlarından İngilizce hikâyeler okuyup sorular sorabilme, öğrencilere telaffuz açısından iyi bir model olabilmeye, Çocuklara İngilizce şiir ve tekerlemeler öğretebilmeye kesinlikle katıldıklarını belirtmişlerdir.

Öğrencilerin en çok kararsız kaldıkları maddeler incelendiğinde ilk sırayı 71 (%36) ile "İngilizce derslerinde çocukların diğer derslerde öğrendiği bilgilerden faydalanabilmelerini sağlayabilirim" maddesi almıştır. Onu 63 (%32) ile "Öğrencilerin İngilizce portfolyolar (ürün dosyaları) hazırlamalarını sağlayabilirim" ve "kaygısız ve rahat hissetmelerini sağlayacak etkinlikler yapabilirim." Maddeleri takip etmiştir. Daha sonra 58 (%30) ile "Öğrencilere telaffuz açısından iyi bir model olabilirim" maddesi ve 56 (%29) ile "Resimli hikâye kartlarından İngilizce hikâyeler okuyup sorular sorabilirim." maddesi gelmektedir.

Öğrencilerin tamamen katıldıkları maddelere bakıldığında 32 (%16) ile "Sınıfın duvarlarını İngilizce poster, resim, pano vb. materyallerle süsleyebilirim." maddesi ilk sırada yer almıştır. Daha sonra 29 (%15) ile "Sınıf içinde sürekli kullandığım basit yönergeleri İngilizce verebilirim." maddesi yer almıştır. Onu 28 (%14) ile "Çocuklara resimli İngilizce çalışma yaprakları hazırlayabilirim" maddesi takip etmiştir. Ardından ise 24 (12,2) ile "çocukların yabancı dil öğrenmeye karşı tutumlarını olumlu yönde arttırabilirim." ve "İngilizce söylediklerimi mimik ve jestlerimle daha anlaşılır hale getirebilirim." maddelerine gelmiştir.

SONUÇ VE TARTIŞMA

Bu araştırma ile "Türkiye'de yabancı dil eğitiminin okul öncesi dönemde başladığı varsayıldığında, yaşta yabancı dil öğretimi okul öncesi öğretmenleri tarafından yürütülebilir mi?" sorusuna, okul öncesi öğretmenliği 3. ve 4. sınıf öğrencilerin bakış açısıyla bir cevap aranmaya çalışılmıştır. Bu sorunun arkasında yatan temel ihtiyaç, okul öncesi eğitim kurumlarında yürütülmesi muhtemel olan yabancı dil öğretiminin, "çocuklara yabancı dil öğretimi" kapsamında ele alınmasından dolayı kendine özgü bir pedagojik bilgi ve beceriyi gerektirmesidir.

İngilizceyi İngilizce öğretmenlerinin öğretmesi durumunda halen Eğitim Fakülteleri Yabancı Diller Eğitimi müfredatında mevcut olan küçük yaşta çocuklara yönelik yarı teorik yarı uygulamaya yönelik derslerin dışında küçük yaşta çocuklara yönelik müfredat geliştirme ve değerlendirme, ölçme ve değerlendirme gibi derslerin müfredata eklenmesi gerekecektir. (Bayyurt, 2012). Dolayısıyla çocuklara yabancı dil öğretimi söz konusu olduğunda ideal bir öğretmen, ilköğretim pedagojisine sahip yabancı dil öğretmenleri ya da yabancı dil öğretimi pedagojisine sahip Okul Öncesi öğretmenleri arasından seçilebilir. Ancak yapılan bu araştırmadan elde edilen bulgularda okul öncesi öğretmen adaylarının yabancı dil yeterlilikleri konusunda kararsız oldukları tespit edilmiştir. Ort=3.14, SS=.7). Ayrıca araştırma sonuçlarına göre, öğretmen adaylarının yaş, cinsiyet, mezun olduğu Lise ve öğrenim gördüğü sınıf değişkenleri ile İngilizce öğretimi konusundaki yeterlilik algıları arasında anlamlı bir fark bulunmamıştır.

Araştırmaya katılan öğrencilerin yabancı dil ile ilgili hangi yeterliliklere sahip oldukları incelendiğinde; sınıfta kullanılan basit yönergeleri İngilizce verme, sınıf duvarlarını İngilizce materyallerle zenginleştirme, çocukların yabancı dil öğrenmeye karşı tutumlarını olumlu yönde arttırabilme ve İngilizce dinleme/izleme etkinlikleri yaptırma becerilerinde kendilerini diğer becerilere göre daha yeterli bulmuşlardır. Ancak, İngilizceyi kullanarak en becerisi gereken etkinlik yaptırma, resimli hikâye kartlarından İngilizce hikâye okuyup sorular sorma, İngilizce portfolyo hazırlama ve İngilizce diyalog, rol oynama ve drama etkinlikleri yaptırma becerilerinde ise öğretmen adayları kendilerini daha yetersiz görmektedirler. Öğretmen adaylarının yabancı dil yeterliliklerine genel olarak bakıldığında ise; öğretmen adayları yabancı dil yeterlilikleri konusunda kararsız bulunmaktadır. Bu sonuçlar okul öncesi öğretmen adaylarının İngilizce öğretimi noktasında gerekli yorumların yapılması tek başına yeterli değildir. Ayrıca okul öncesi öğretmen adaylarının yeterlilik algılarının onların yabancı dilin önceliği, yabancı dil eğitiminin gerekliliği, yabancı dil eğitiminin niteliği ve yabancı dil eğitiminin yeterliliği konusundaki görüşleriyle karşılaştırılması gerekmektedir.

Bu sonuçlardan hareketle okul öncesi öğretmen adaylarına fakülteedeki eğitimleri esnasında mevuttakinden daha fazla zorunlu ya da seçmeli yabancı dil ve çocuklara yabancı dil öğretimi dersleri verilmesi önerilebilir. Şuanda eğitim fakültelerinin İngilizce Öğretmenliği bölümlerinde yürütülen Çocuklara Yabancı Dil Öğretimi dersleri gerekli uyarlamalar (ders dili, içeriğin basitleştirilmesi vb.) yapılarak Okul Öncesi öğretmenliği bölümü öğrencilerine de açılabilir. Bu araştırmanın aday sınıf öğretmenlerinin yeterlik algılarıyla ilgili görüşleriyle sınırlı olduğu düşünüldüğünde, başta yabancı dil öğretimiyle ilgili deneyimleri olan sınıf öğretmenleri olmak üzere, konuyla ilgili Okul Öncesi öğretmenleri, yabancı dil öğretmenleri, Okul öncesi öğretmenliği ve yabancı dil öğretimi programlarından akademisyenler vb. eğitim uzmanlarının görüşlerini inceleyen çalışmalara ihtiyaç olduğu söylenebilir.

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THE USE OF DIFFERENT GEOPHONE PLATES ON PAVEMENT AND GRAVELED SURFACES

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ABSTRACT: Seismic refraction, active and passive surface wave methods have been used in soil investigation for many years. While sound waves, generated an artificial source are sent to underground in seismic refraction and active-multichannel surface wave analysis methods, natural noises (traffic etc.) are used in passive surface wave methods. Seismic waves for the purpose of study can be recorded by vertical or horizontal geophones on the ground surface. The useful information about subsurface are obtained by evaluating of recorded these signals. While this information provides the numerical data about engineering parameters of soils, engineering structures, being construction on the ground are also designed by using of this information. One of the most important steps to calculate engineering parameters of the soils can be obtained quality signal. Therefore, geophones, used during the seismic recordings are very crucial. Generally, contact with the ground of the geophones is provided to use a good planting of the geophone by a metal spike. However, to use these types of geophones is very difficult at the urban areas, covered concrete-asphalt surface or over consolidated soil and graveled site. In this type of environment, geophones are trying to planting in concrete or asphalt. However, this method is not always efficient because of both detrimental to the work area and for creating unpredictable damage the quality of the signal. In this study, tripod plate system, formed from chrome-steel was designed to collect the better quality data. The seismic measurements, acquired by tripod plate system, were compared with the geophone plates made from hard plastic for the same purpose in this study. Afterwards, all these measurements were compared and it was determined by which system can be collected more quality data. In addition, these measurements were evaluated to reveal the internal structure of the subsurface under the concrete/asphalt surface.

Key words: geophone, seismic, geophysics

BETON VE ÇAKILLI YÜZEYLERDE FARKLI JEOPHON TABLALARININ KULLANILMASI

ÖZET: Sismik kırılma ile aktif ve pasif kaynaklı yüzey dalgası analiz yöntemleri uzun yıllardan beri zemin etütleri çalışmalarında kullanılmaktadır. Sismik kırılma ve aktif-çok kanallı yüzey dalgası analiz yöntemlerinde yapay bir kaynakla üretilen ses dalgaları yer içerisine gönderilirken, pasif kaynaklı yöntemlerde ise yapay yollarla oluşan (trafik vb. gibi) ve yer altında yayılan dalgalar kullanılır. Yer altında yayılan dalgalar, yer üstünde çalışmanın amaçlarına göre düşey ya da yatay alıcılarda kayıt edilirler. Kayıt edilen bu sinyallerin farklı şekillerde değerlendirilmesiyle ölçüm alınan ortam hakkında yararlı bilgiler elde edilmektedir. Bu bilgiler zeminlerin mühendislik parametreleri hakkında sayısal veriler elde etmemizi sağlarken, zeminin üzerine yapılması planlanan mühendislik yapıları da bu bilgiler kullanılarak tasarlanmaktadır. Zeminlerin mühendislik parametrelerinin belirlenmesinde en önemli aşamalardan biri kaliteli sinyal elde edilebilmesidir. Bu nedenle kayıt sırasında kullanılan alıcılar oldukça önemlidir. Alıcıların yer ile teması genellikle, alıcıya bağlı ucu sivri bir metalin yere bastırılması şeklinde sağlanmaktadır. Ancak özellikle yerleşim yeri merkezleri gibi beton veya asfalt ile kaplı alanlarda ya da sertleşmiş, çakıllı alanlarda bu tip alıcıların kullanımı oldukça zordur. Bu tip ortamlarda beton veya asfalt delinerek alıcılar yerleştirilmeye çalışılmaktadır. Ancak bu yöntem hem çalışma alanına zarar verdiği için hem de sinyalin kalitesinde kestirilemeyen zararlar oluşturduğu için her zaman verimli olmamaktadır. Bu çalışmada, böyle alanlarda kaliteli veri toplanmasına yardımcı olacağı düşünülen krom çelikten oluşmuş üçayak sistem tasarlanmıştır. Çalışmada tasarlanan üçayak sistem ile alınan ölçüler, aynı amaç için sert plastikten yapılan alıcı tablalarıyla karşılaştırılmıştır. Daha sonra bu ölçümler kıyaslanmış ve hangi sistem ile daha kalite veri alındığı belirlenmiştir. Ayrıca bu ölçümler değerlendirilerek beton/asfalt yapısının altındaki zeminin iç yapısı ortaya konulmuştur.

Anahtar sözcükler: jeofon, sismik, jeofizik

GİRİŞ

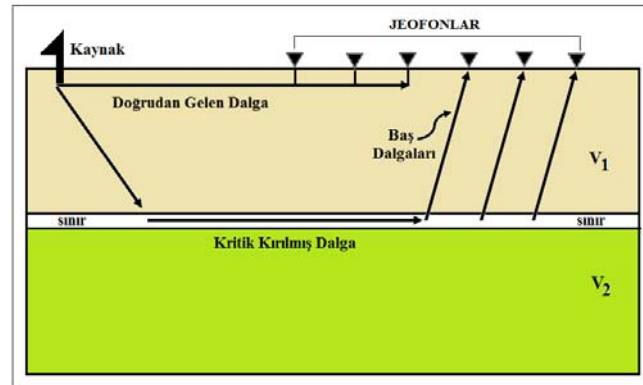
Büyük depremlerin meydana geldiği ülkemizde barajlar, havaalanları, binalar gibi büyük yapıların inşa edileceği alanların zemin özelliklerinin Jeofizik yöntemler ile önceden belirlenmesi ileride meydana gelebilecek bir çok olumsuz etkinin en aza indirilmesini sağlayacaktır. Jeofizik yöntemlerden olan sismik kırılma ve çok kanallı yüzey dalgası yöntemlerinde temel amaç, araştırılan alandaki yer altı tabakalarının hızlarını, derinliklerini ve bu tabakalara ait dinamik-elastik parametreleri hesaplamaktır. Bu parametrelerin belirlenmesi, özellikle yapılaşma alanlarının sınırlı olduğu bölgelerde uygun yer seçimi açısından oldukça önem taşımaktadır. Günümüzde sismik kırılma ve çok kanallı yüzey dalgası analiz yöntemleri ile hemen hemen her türlü ortamda başarılı ölçümler yapılabilmektedir. Ancak yapılaşmanın yoğun olduğu bölgelerde özellikle şehir içlerinde ölçüm almada bazı zorluklarla karşılaşmaktadır. Bu tip alanlarda ölçüm alınmasında kullanılan klasik ucu çivi şeklinde olan jeofonların kullanılması mümkün değildir. Bu alanlarda bu tip jeofonlar ile ölçüm alabilmek için her bir jeofon noktasının delinmesi gerekmektedir. Bu işlem ise hem zaman alıcı hem de çevreye zarar vermektedir. Bu alanlarda bu tip jeofonlar ile kullanılan sert plastikten yapılmış jeofon tablaları kullanılabilmektedir. Ancak sert plastikten yapılmış tablalar ile jeofonun yer ile iyi temas etmemesi ve bir kaynak vasıtasıyla üretilen enerjinin daha fazla sönmülenebileceği düşünülmektedir. Bu çalışmada, beton, asfalt veya sert zeminler gibi ortamlarda daha iyi kalitede veri toplanmasını sağlayacağı düşünülen ve daha düşük bir maliyete sahip krom çeliktan yapılmış ve jeofonlar ile bahsi geçen ortamlarda ölçüm alınmasını sağlayacak uçayak sistemi (Şekil 2b) tasarlanmıştır. Çalışmada tasarlanan uçayak sistem ile bu tür ortamlarda alınan ölçümler, aynı amaç için sert plastikten yapılan alıcı tablalarıyla alınan ölçümler ile karşılaştırılmıştır. Jeofonlardan elde edilen sismik sinyallerin spektral içeriği değerlendirilerek hangi sistem ile daha kaliteli veri alındığı belirlenmiştir. Ayrıca bu ölçümler değerlendirilerek ölçüm alınan ortamların yeraltı yapıları ortaya konulmuştur.

YÖNTEM

Bu çalışmada sismik kırılma ve yüzey dalgalarının çok kanallı analiz yöntemi kullanılarak, jeofonlar için tasarlanan uçayak ve sert plastikten yapılan tablalar ile farklı alanlarda ölçümler alınmıştır.

Sismik Kırılma Yöntemi

Sismik Kırılma Yöntemi, kaynaktan (balyoz, ağırlık düşürme, dinamit vs.) çıkan sismik dalgaların tabakalı ortamda ara yüzeylerde kritik olarak kırılarak yüzeydeki alıcılarda ilk varış olarak kaydedilmesi esasına dayanan bir sismik yöntemdir (Şekil 1). Sismik kırılma yöntemi, mühendislik jeofizikinde kırıcı tabakanın derinliği ve hızlarını bulmak için kullanılan en temel yöntemlerden birisidir. Sığ aramalarda kuyu yöntemlerine göre daha ucuz ve daha kullanışlı olması bakımından tercih edilen bir yöntemdir. Yapay bir kaynak vasıtasıyla üretilen enerji, yeraltında farklı hızlara sahip tabaka sınırlarından kırılarak yüzey de belirli aralıklarla doğrusal olarak yerleştirilmiş alıcılar yardımıyla kaydedilir.



Şekil 1. Bir Sismik Kaynaktan Çıkan Dalganın Işın Yolu

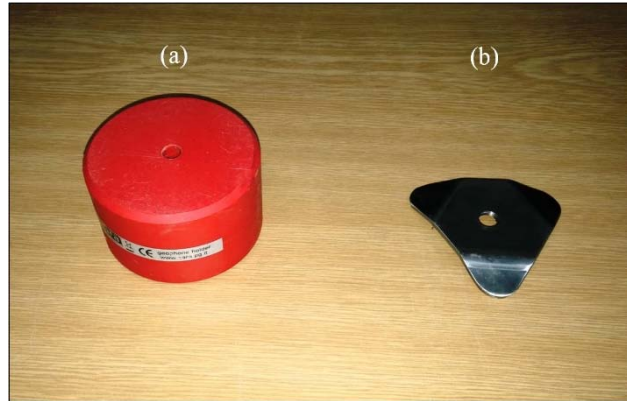
Bu kayıt edilen sismik verilerden ilk varış zamanları okunur ve zaman-uzaklık (x-t) grafiği oluşturulur. x -t grafiğinden elde edilen doğruların eğiminin tersinden hızlar elde edilir ve yer altı yapısı ortaya çıkarılır. Sismik kırılma verilerin değerlendirilmesinde, gecikme zamanı, genelleştirilmiş karşılıklı yöntem veya diğer yöntemlerin kullanılmasında bazı sınırlamalar mevcuttur. Bu sınırlamalar genel olarak sabit hızlı tabakalar, düşey hız değişimleri ve yanal heterojenite olarak sıralanabilir. Son yıllarda özellikle gelişen bilgisayar teknolojisi ile bu sınırlamaları en az indirecek yeni yöntemler geliştirilmektedir. Kırılma verilerinin değerlendirilmesinde kullanılmaya başlayan tomografi yöntemi, yanal düşey yöndeki hız değişimlerini etkin bir şekilde ortaya koyabilmektedir.

Yüzey Dalgalarının Çok Kanallı Analiz Yöntemi

Yüzey dalgalarının çok kanallı analiz (YDÇKA) yöntemi kesme dalgası hızlarının elde edilmesinde kullanılan sismik yöntemlerden birisidir. Yüzey dalgası tekniklerinin temeli tabakalı ortamda seyahat eden Rayleigh dalgalarının dispersif özelliklerine dayanır (Xia vd., 2000). YDÇKA yöntemi ile ölçüm alınırken temel olarak hem sismik kırılma hem de yansıma yöntemi uygulanabilir. Her iki yöntem hem kaynak-alıcı düzenekleri hem de veri-işlem teknikleri bakımından birbirinden ayrılır. YDÇKA yönteminde; bir profil boyunca çok sayıda alıcı hedef derinliğine göre belirli aralıklarla yerleştirilerek kayıt alınır. Park vd., (1999a) YDÇKA yönteminde çok sayıda alıcı kullanımının en önemli avantajı olarak Rayleigh dalgalarının temel mod dışında kalan yüksek modlar, cisim dalgaları ve gürültülerin etkin bir şekilde ayırt edilebileceklerini vurgulamışlardır. YDÇKA yönteminde kaynak olarak balyoz, ağırlık düşürme ve vibroseis kullanılır. Kayıtlar bir hat boyunca düşük frekanslı alıcılar kullanılarak alınır. (Park vd., 2002). Yüzey dalgalarının çok kanallı analizinden kesme dalgası hız yapısının elde edilmesi üç adımda gerçekleştirilir. İlk olarak yüzey dalgası atış kaydı elde edilir. İkinci adım yüzey dalgası verisinden dispersiyon eğrisinin elde edilmesidir. Yüzey dalgası verisinin analizi için kullanılan yöntemlerin çoğu dalga alanı dönüşümüne dayanır. Zaman uzaklık ortamında kaydedilen veri Fourier dönüşümü uygulanmak suretiyle frekans ortamına aktarılır (McMechan ve Yeldin, 1981). Daha sonra bu veriye integral dönüşümü uygulamak suretiyle faz hızı-frekans eğrisi elde edilir (Park vd., 1999a,1999b). Faz hızı-frekans ortamındaki eğrinin, her bir frekansa karşılık gelen maksimum genlik noktalarının işaretlenmesiyle dispersiyon eğrisi elde edilir. Dispersiyon eğrisinin elde edilmesi yüzey dalgası analiz yöntemlerinin en önemli aşamasıdır. Son aşamada ise elde edilen dispersiyon eğrisine doğrusal olmayan en küçük kareler yöntemini temel alan ters çözüm tekniğinin uygulanmasıyla derinliğe bağlı olarak kesme dalgası hız yapısı elde edilir (Hayashi, 2003).

VERİ TOPLAMA VE DEĞERLENDİRME

Bu çalışmada krom çelikten tasarlanan üçayak sistemini (Şekil 2b) denemek ve sert plastikten (Şekil 2a) yapılmış jeofon tablaları ile karşılaştırmak amacıyla 2 farklı alanda yüzey dalgası ölçümleri ve 1 alanda ise hem sismik kırılma hem de yüzey dalgası ölçümleri alınmıştır.



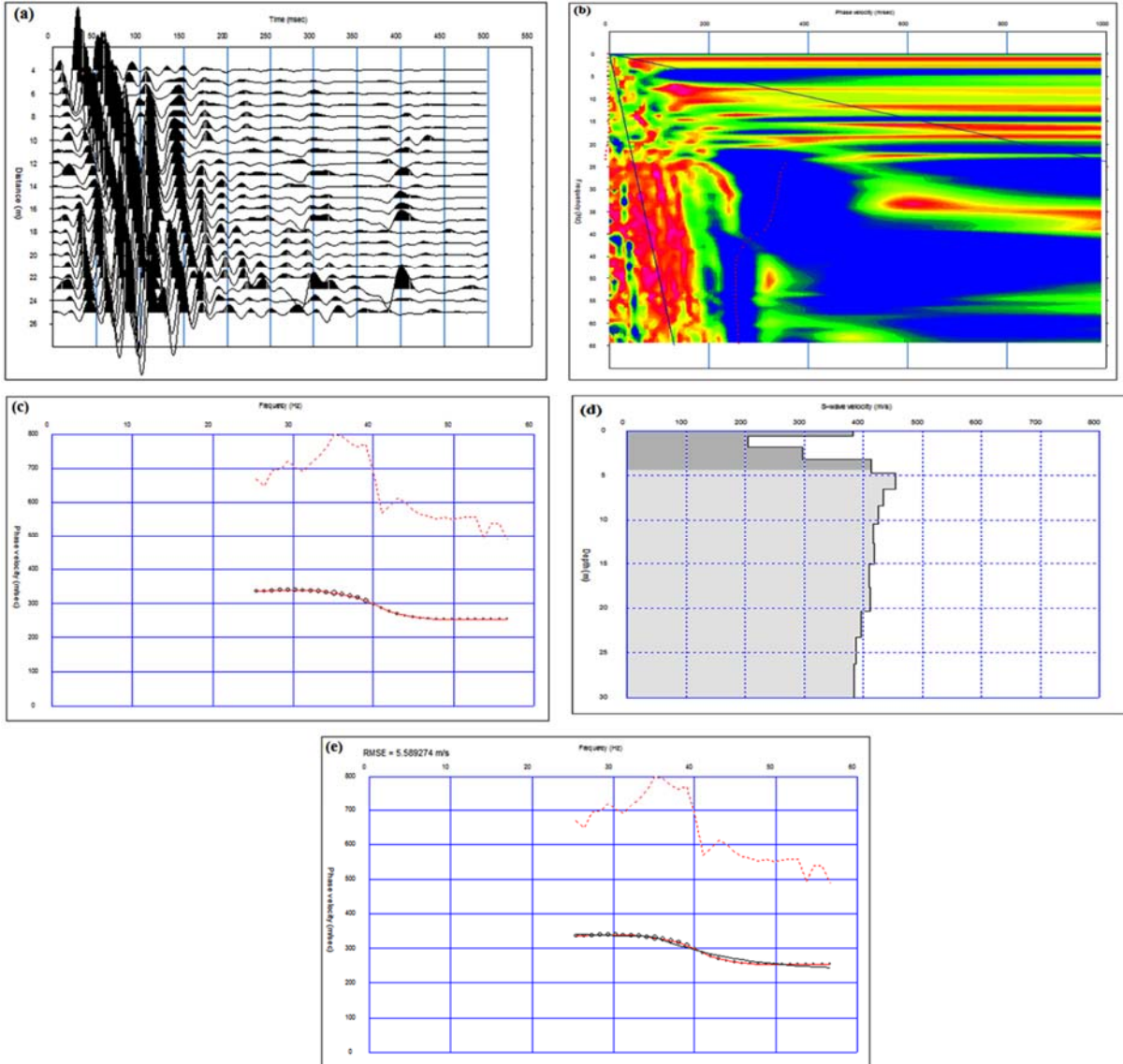
Şekil 2. Jeofon Tablaları A) Sert Plastik B) Krom Çelikten Üçayak Sistemi

Çalışma alanı olarak, Karadeniz Teknik Üniversitesi (Trabzon) kampüsü alanı (Şekil 3) içerisinde yer alan beton, asfalt ve sert-çakıllı toprak zeminden oluşan 3 farklı bölge seçilmiştir. Yüzey dalgası ölçümleri beton, asfalt ve sert-çakıllı toprak zemin üzerinde alınırken, sismik kırılma ölçüsü yalnızca sert-çakıllı toprak zemin üzerinde alınmıştır. Yüzey dalgası ve sismik kırılma ölçümleri 24 kanallı bir sismograf kullanılırken, kaynak olarak 10 kg balyoz ve sert plastikten tabla kullanılmıştır. 4.5 Hz'lik doğal frekansa sahip alıcılar ile 1m aralıklarla hem yüzey dalgası ölçümleri hem de sismik kırılma ölçüsü alınmıştır.

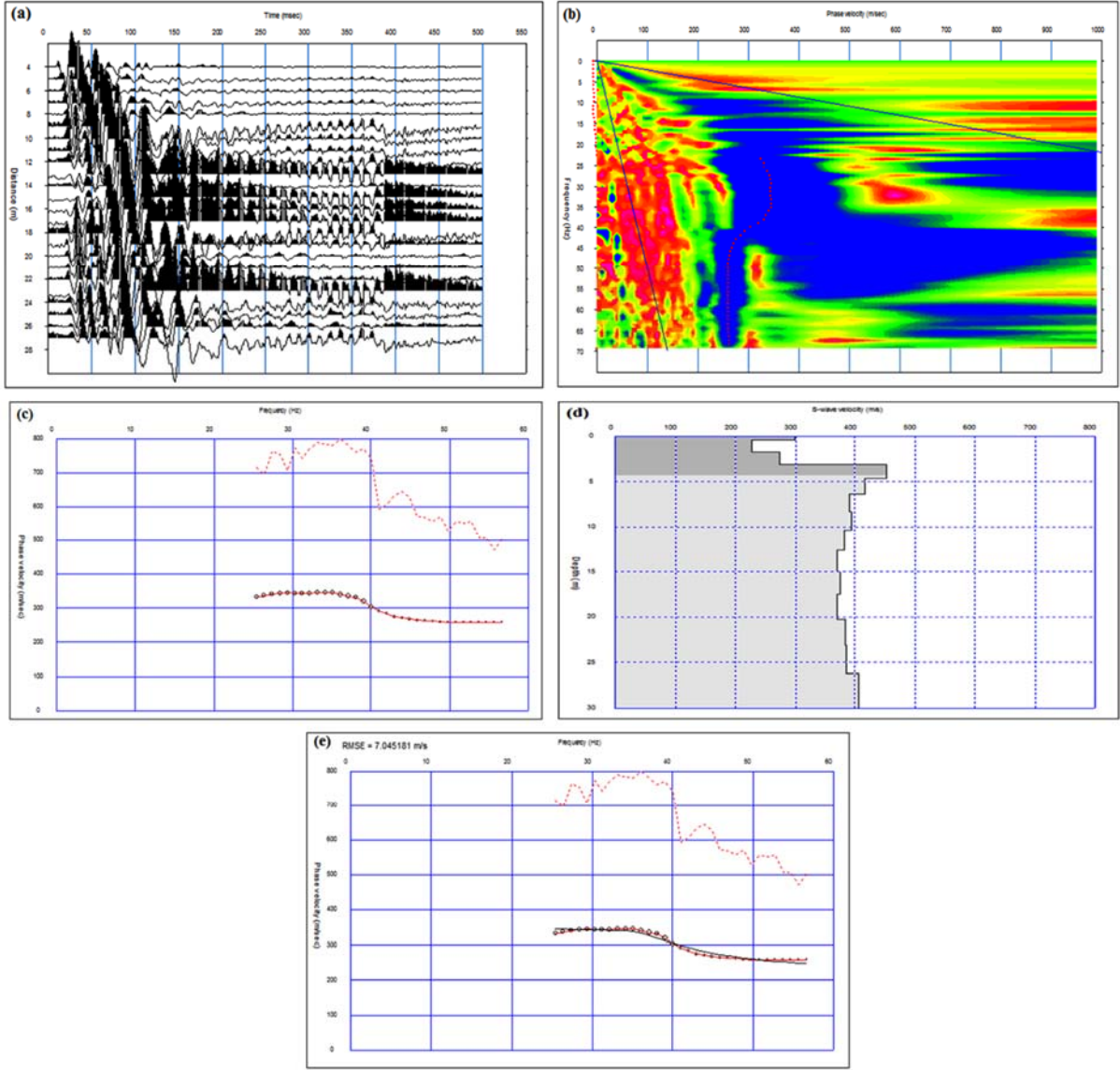


Şekil 3. Sismik Kırılma Ve Yüzey Dalgası Ölçüm Noktaları

Yüzey dalgası ölçümlerinde ilk olarak Şekil 3' te ölçü noktası 1 olarak görülen alanda yer alan beton zemin üzerinde hem krom çelikten tasarlanan üçayak hem de sert plastikten yapılmış jeofon tablaları kullanılarak ölçümler alınmış ve üç ayak sistemi ile elde edilen sonuçlar Şekil 4' te ve sert plastikten elde edilen sonuçlar ise Şekil 5' te verilmiştir.



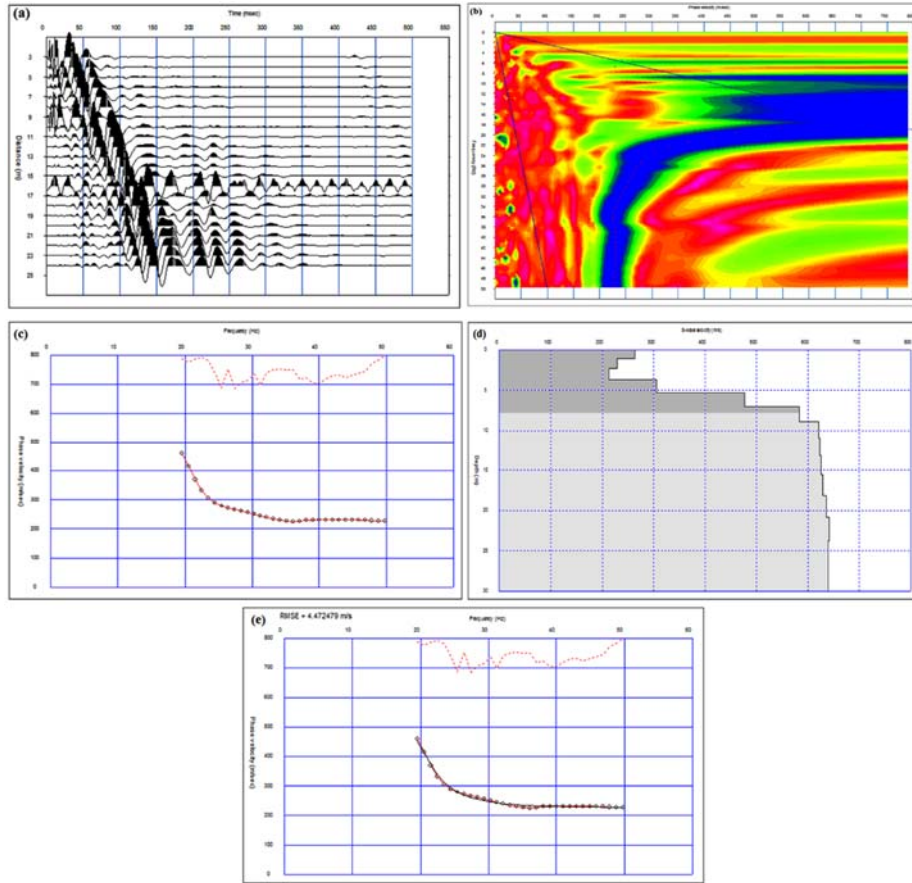
Şekil 4. Ölçü Noktası 1'de Üçayak Sistemi Kullanılarak Elde Edilen Yüzey Dalgası Verisi Ve Sonuçları



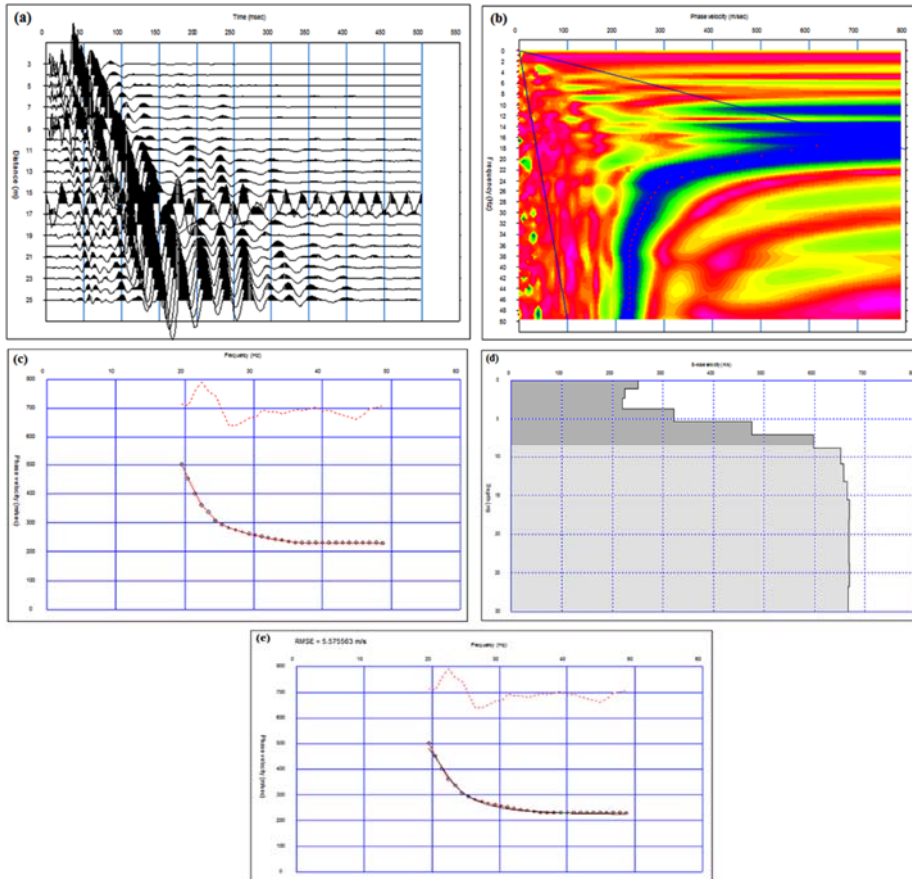
Şekil 5. Ölçü Noktası 1'de Sert Plastik Kullanılarak Elde Edilen Yüze Dalgası Verisi Ve Sonuçları

Beton yüzey için her iki sistem kullanılarak elde edilen sonuçlar incelendiğinde, hemen hemen birbirine yakın sonuçların elde edildiği görülmüştür. Ancak detaylı olarak incelediğimiz zaman krom çelikten yapılmış üçayak ile hem alınan kayıtların hem de sonuçların biraz daha iyi olduğu açıktır. Ayrıca bu alanda alınan kayıtların değerlendirilmesi sonucu yeraltı yapısı ve enine dalga hızlarının değişimi belirlenmiş ve bu hızlara göre üstte betonun etkisinden kaynaklanan nispeten yüksek hız ve onun altında daha düşük hıza sahip olan dolgu birimi olduğu düşünülmektedir.

Yüze dalgası ölçümlerinde ikinci olarak ise Şekil 3'te ölçü noktası 2 olarak görülen alanda yer alan asfalt zemin üzerinde hem krom çelikten tasarlanan üçayak hem de sert plastikten yapılmış jeofon tablaları kullanılarak ölçümler alınmış ve üçayak sistemi ile elde edilen sonuçlar şekil 6' da ve sert plastikten elde edilen sonuçlar ise Şekil 7' de verilmiştir. Asfalt yüzey üzerinden her iki jeofon sistemi kullanılarak elde edilen sonuçlara bakıldığında, üçayak sistemi ile elde edilen sonuçlarda çok küçük değişimler görülmektedir. Bu değişimler küçük olsa da sonuçlar üzerinde etkilidir. Bu alan için yüze dalgası verisinin çözümü ile yeraltı yapısı ve enine dalga hızlarının değişimi belirlenmiş ve bu hızlara göre üstte asfalttan kaynaklanan daha yüksek hız ve onun altında daha düşük hıza sahip örtü tabakası ve en altta ise hız 600 m/sn lerin üzerine çıkan sağlam bir birim yer almaktadır.

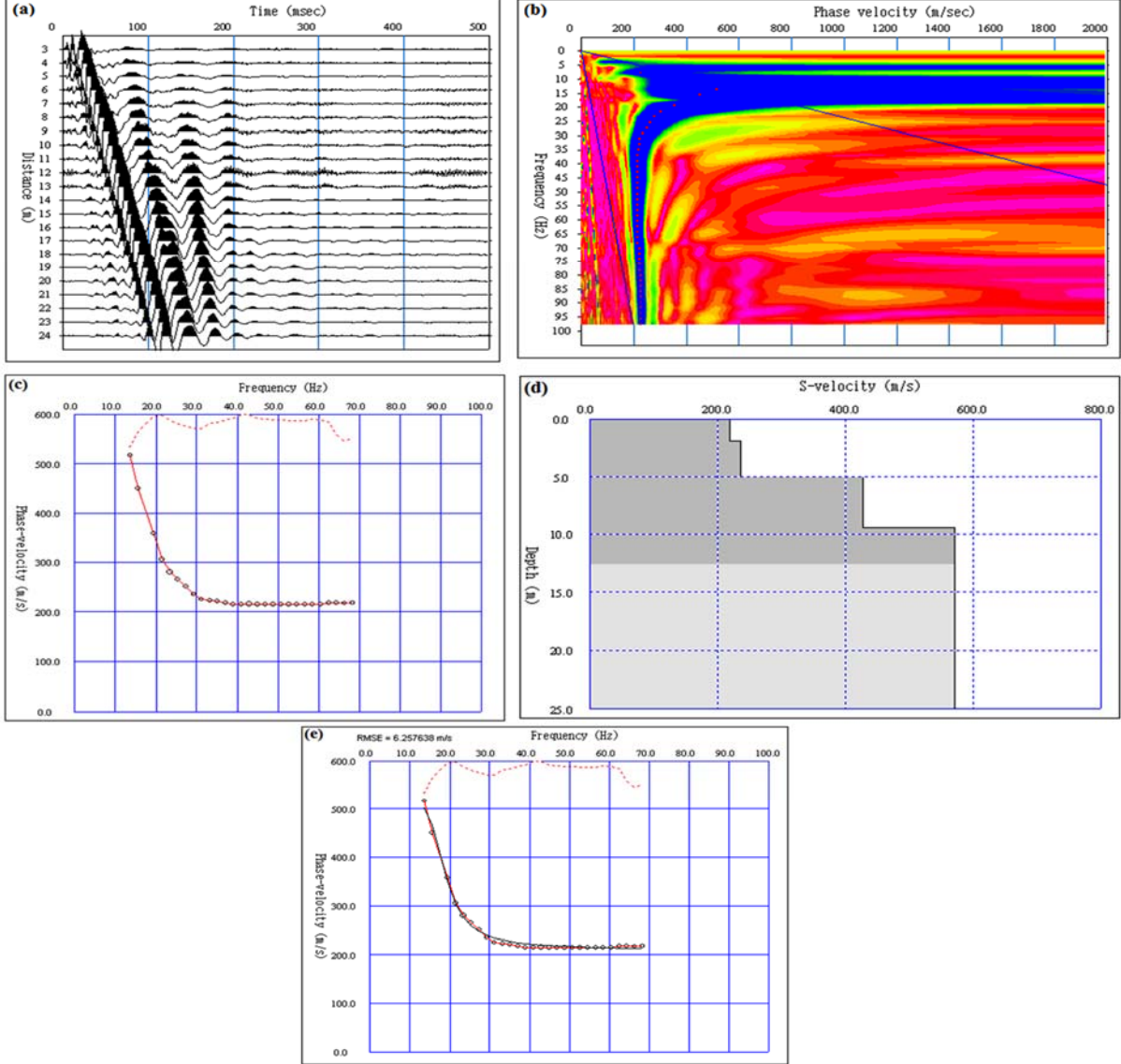


Şekil 6. Ölçü Noktası 2'de Üçayak Sistemi Kullanılarak Elde Edilen Yüzey Dalgası Verisi Ve Sonuçları

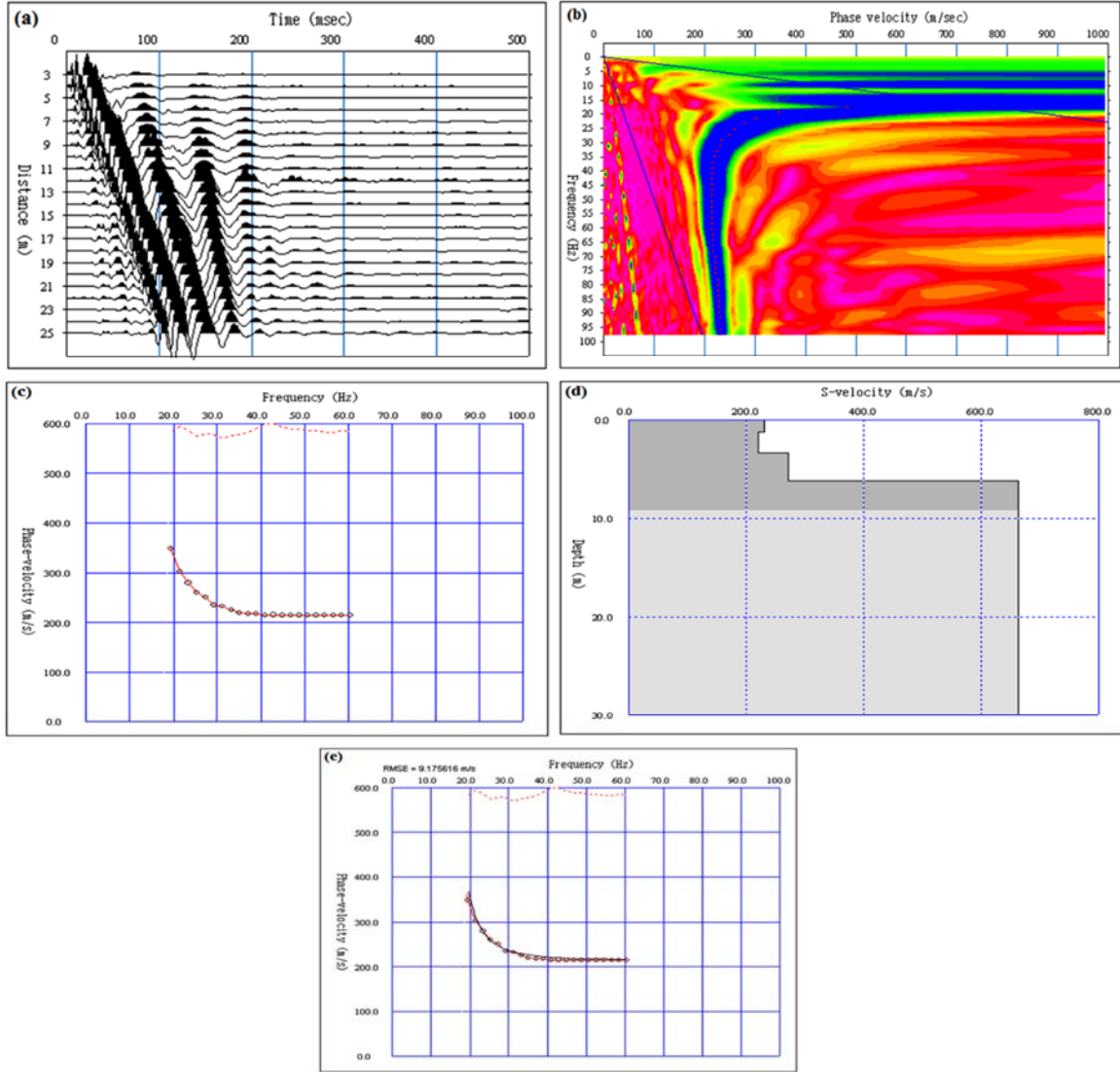


Şekil 7. Ölçü Noktası 2'de Sert Plastik Kullanılarak Elde Edilen Yüzey Dalgası Verisi Ve Sonuçları

Son olarak ise, 3. ölçüm noktasında hem yüzey dalgası hem de sismik kırılma kaydı alınmıştır. Yüzey dalgası ölçümlerinde her iki tip jeofon sistemi kullanırken, sismik kırılma kaydında sadece krom çelikten yapılmış üçayak sistemi kullanılmıştır. Şekil 3' te 3. ölçüm noktasının yeri ölçü noktası 3 olarak görülmektedir. Yüzey dalgası ölçümlerinin sonuçları sırasıyla Şekil 8 ve 9' da verilmiştir. Yüzey dalgası ölçümlerinde her iki tip jeofon sistemi için oldukça başarılı sonuçların elde edildiği görülmektedir. Hem elde edilen kayıt hem de kayıtların değerlendirilmesi ile elde edilen sonuçlar incelendiğinde yeraltı yapısı kolaylıkla ortaya çıkarılabilmektedir. Enine dalga hızı-derinlik kesitinden araştırma yapılan ortamın 3 tabakalı olduğu ve 10 metrelerden sonra sağlam zemine ulaşıldığı görülmektedir. Ayrıca, bu profil üzerinde alınan ölçüm yeri ve ekipman örnek olarak şekil 10' da verilmiştir.



Şekil 8. Ölçü Noktası 3'de Üçayak Sistemi Kullanılarak Elde Edilen Yüzey Dalgası Verisi Ve Sonuçları



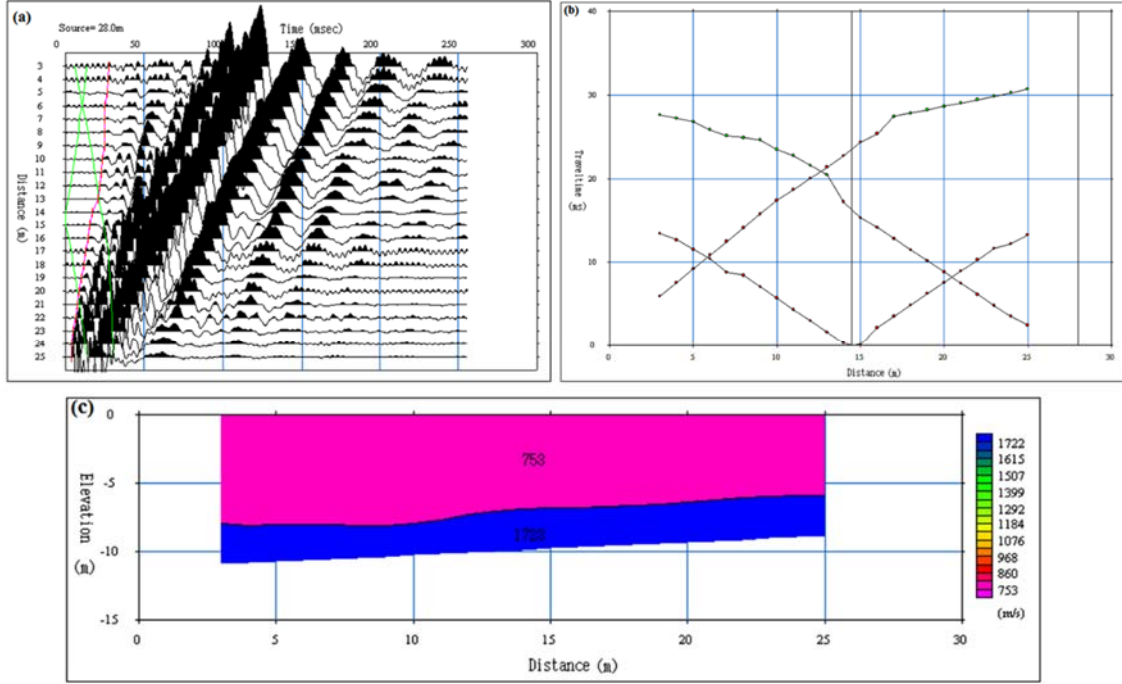
Şekil 9. Ölçü Noktası 3' De Sert Plastik Kullanılarak Elde Edilen Yüzey Dalgası Verisi Ve Sonuçları



Şekil 10. Ölçü Noktası 3' Ün Yeri Ve Ekipmandan Bir Görünüm

Ölçüm noktası 3' de krom çelik uçayak sistemi kullanılarak alınan sismik kırılma kaydı Şekil 11a' da verilmiştir. Bu sismik kırılma kaydı üzerinde ilk varış zamanlarının okunmasıyla elde edilen zaman-uzaklık grafiği Şekil 11b' de ve zaman-uzaklık grafiğinin değerlendirilmesiyle elde edilen 2 boyutlu boyuna hız dalgası derinlik kesiti ise

Şekil 11c' de verilmiştir. Şekil 11 incelendiğinde tasarlanan üç ayak sistemi ile de başarılı bir şekilde sismik kırılma kaydı alınabildiği anlaşılmaktadır. 2 boyutlu yeraltı yapısını gösteren kesit incelendiğinde, yaklaşık 10 metrelerden sonra yüksek hızlı bir ortama girildiği görülmekte, bu yüksek hız ise ortamın sağlam bir zemine sahip olduğunu göstermektedir.



Şekil 11. Ölçü Noktası 3'de Üçayak Sistemi Kullanılarak Elde Sismik Kırılma Verisi Ve Sonuçları

SONUÇ

Bu çalışmada daha düşük bir maliyetle üretilebilen krom çelikten yapılmış üçayak sistemi ile beton ve asfalt kaplı ortamlar ile sert-çakıllı toprak zeminde ölçümler alınmış ve elde edilen sonuçların başarılı olduğu görülmüştür. Sismik kırılma ve yüzey dalgası çalışmalarından elde edilen sinyaller incelenmiş hem de bu sinyallerin çözülmesi yapılarak araştırılan ortamın boyuna ve enine dalga hızları ile tabaka kalınlıkları başarılı bir şekilde belirlenmiştir. Sismik kırılma ve yüzey dalgası verisinin toplanması amacıyla kullanılan sert plastikten yapılmış jeofon tablaları ile kıyaslandığında krom çelikten tasarlanan üçayak sistemi ile az da olsa daha kaliteli veri toplanabildiği görülmüştür. Ayrıca tasarlanan üçayak sisteminin, sert plastik tablolara göre daha ucuz bir maliyete sahip olması ve yurt içinde üretilebilmesi en önemli avantajıdır.

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KATKI BELİRTME

Yazarlar, bu çalışmanın arazi ölçümlerinde yardımcı olan KTÜ Jeofizik Mühendisliği Bölümü öğrencilerinden S. Zeren KÖSE, Altan HAZAROĞLU ve F. Can AKBABA'ya teşekkür eder.

REMOTE CONTROLLED WALKING ROBOT

Hüseyin Oktay ERKOL

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ABSTRACT: Animals have been always interesting for people because of their adaptation ability in nature. Researchers have tried to make machines like them. There are many studies like bipedal robots, dog robots, insect robots and many other types. In this study, a six-legged robot and a walking algorithm is developed and implemented successfully. Each leg of the robot has 3-DOF. A kinematic co-processor is used for computing the joint angles using the feet positions as parameters. The walking algorithm is developed using Matlab/Simulink program and embedded in a low cost DSP board. The algorithm produces foot positions for walking. In addition, a remote control interface is developed on computer.

Key words: six legged robot, walking algorithm, man-machine interface.

UZAKTAN KUMANDA EDİLEBİLEN YÜRÜYEN ROBOT

ÖZET: Hayvanlar doğaya adaptasyon yetenekleri ile her zaman insanların ilgisini çekmişlerdir. Araştırmacılar onlara benzeyen makineler yapmak için çalışmışlardır. İki ayaklı insansı robotlar, köpek robotlar, böcek benzeri robotlar ve diğer canlı türler ile ilgili çalışmalar yapılmıştır. Bu çalışmada altı bacaklı yürüyen bir robotun tasarımı ve uygulaması yapılmıştır. Robotun her bir bacağı üç eklemlidir. Çalışmada, kendine gönderilen ayak pozisyonlarını kullanarak eklem açılarını hesaplayan bir yardımcı işlemci kullanılmıştır. Yürüme algoritmaları Matlab/Simulink programı ile geliştirilmiş ve bir DSP üzerine gömülmüştür. Geliştirilen algoritma yürüme eylemi için ayak pozisyonları üretmektedir. Ayrıca bilgisayar üzerinde bir uzaktan kumanda arayüzü geliştirilmiştir.

Anahtar sözcükler: altı bacaklı robot, yürüme algoritması, kumanda arayüzü.

GİRİŞ

Hayvanlar doğaya uyum ve adaptasyon yetenekleri bakımından daima insanlarda ilgi uyandırmıştır. Bu ilgi araştırmacıları onlara benzer makineler yapmaya itmiştir. Köpek robotlar, böcek robotlar ve daha birçok robot geliştirilmiştir ve halen popüler bir konudur. Bacaklı robotlar, tekerlekli ve paletli robotlara göre daha yüksek hareket kabiliyetine sahiptirler. Çünkü sürekli yer ile temasa ihtiyaçları yoktur. Bununla birlikte kontrol algoritmaları daha karmaşıktır ve daha yavaş hareket ederler. Bunlar göz önünde bulundurulduğunda altı bacaklı robotların, doğal şartlara uyum ve kontrol karmaşıklığı açısından, uygun bir seçenek olduğu düşünülmektedir. Böyle bir robotu gerçekleştirmek için kinematik denklem çözümlerine, yürüme algoritmasına ve uygun bir mekanik yapıya ihtiyaç vardır.

Çeşitli robotlar ile ilgili yapılan çalışmalar göz atacak olursak; 2011 yılında Yu ve arkadaşları tarafından yapılan çalışmada renkleri takip eden grup robotlar ile ilgilidir (Yu, Kwok, & Ha, 2011). Görüntü işleme ile ilgili bu uygulamada az enerji harcayan gerçek zamanlı bir kontrolcü elde etmek amaçlanmıştır. Paul ve ekibi 2012 yılında yaptıkları çalışmada yürüyebilen robotlar için çevredeki hareketi algılamalarına yardımcı olacak bir donanım gerçekleştirdiler (Journal & December, 2014). Bacaklı robotların arazi koşullarında dahi esnek bir şekilde hareket edebileceği vurgulanan çalışmada, bu yeteneğin daha da iyileştirilmesi için tek kamera kullanılarak etrafındaki hareketliliği algılamaya yönelik bir donanım geliştirildi. Wang ve arkadaşlarının 2013 yılında bir merdiven tırmanan robot çalışması yaptılar (Wang, Mi, Wu, & Tu, 2013). Motorlar ve diğer birimlerin kontrolü için DSP kullanılırken, kameradan gelen görüntünün işlenip hareket için gerekli parametrelerin belirlenmesinde FPGA kullanmayı tercih ettiler. 2008 yılında Koca ve ekibi uzaktan kumandalı robot kolları üzerine bir çalışma yapmıştır (Koca, Doğan, & Taplamacioğlu, 2008). Kumanda kolundan gelen sinyalleri yorumlayarak robotun hareket edeceği yeni konumu kestirip, bu konuma ulaşması için, kinematik eşitlikleri çözerek, gerekli eklem açılarını hesaplayan bir sistem üzerine çalışılmıştır. Chou ve arkadaşları yaptıkları çalışmada 3 eksenli bir gıda robotu üzerine çalıştılar (Chou, Kung, Tsui, & Cheng, 2013). 2013'de yapılan bir çalışmada ise bir iskelet-kas destek sistemi (motion assistive robotic-exoskeleton for superior extremity) geliştirilmiştir (Rahman, Saad, Kenne, & Archambault, 2013). 2012 yılında Barron-Zambrano ve arkadaşları tarafından yapılan bir çalışma Merkezi Örnek Üreticileri (Central Pattern Generators, CPGs) dört ve altı bacaklı iki robot üzerinde uygulanmıştır (Barron-Zambrano, Torres-Huitzil, & Girau, 2012). CPGs bacaklı

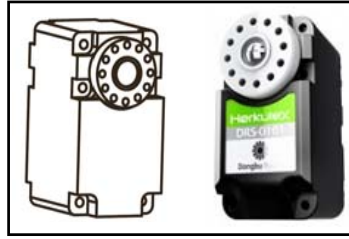
robotların biyolojik yürüme prensiplerine göre kontrol edilmesi için etkili bir kontrol mekanizması olarak tanımlanmıştır. Altı bacaklı robotlar ile ilgili yapılan bir başka çalışma ise Candinia arkadaşları tarafından 2009 yılında tasarlanan robottur (Candini, Paolini, & Piergentili, 2009). Tasarlanan robotun bacak yapısı iki eklemlilik ve kullanılan servo motorlar analog giriş sinyali ile çalışmaktadır. İki bacaklı yapı ile kinematik denklemler kullanılmadan açık çevrim bir kontrol ile ayakların hareketi sağlanmış. Üzerine bir gözlem kamerası yerleştirilmiştir.

Bu çalışmada altı bacaklı yürüyen bir robot tasarlanmış ve temel bir yürüme algoritması geliştirilmiştir. Robotun her bir bacağı üç eklemlilik ve robot toplamda 18 serbestlik derecesine sahiptir. Kinematik denklemlerin çözümü için bir yardımcı işlemci kullanılmıştır. Böylece ana işlemci üzerindeki yük hafifletilmiş ve uygun fiyatlı bir mikrodenetleyici kartı kullanılmıştır. Kullanılan yardımcı işlemci daha önce yaptığımız çalışmaların bir ürünüdür ve FPGA üzerinde VHDL dili ile geliştirilmiştir. Burada uygulanan yürüme algoritması Matlab/Simulink ortamında geliştirilmiş ve uygulanmıştır. Algoritma yürüme için gerekli ayak pozisyonlarını üretmektedir. Çalışma mekanik tasarım, elektronik tasarım ve yürüme algoritması olmak üzere üç kısımdan oluşmaktadır.

YÖNTEM

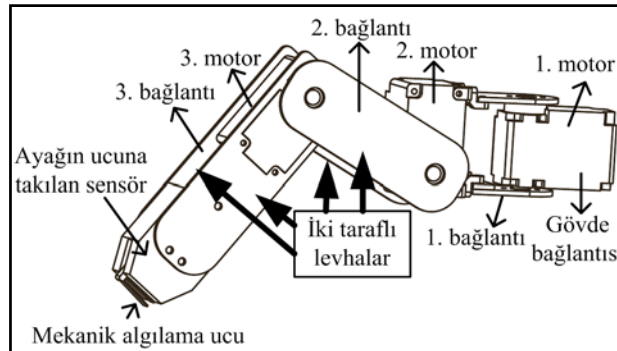
2.1. Mekanik Tasarım

Çalışmanın bu kısmında altı bacaklı robotun mekanik tasarımı ele alınmıştır. Bütün mekanik tasarım ve çizimler SolidWorks çizim ortamı kullanılarak yapılmıştır. Yapılan çizimlerin ardından parçalar fiberglass malzemeden kestirilerek mekanik yapı gerçekleştirilmiştir. Tasarlanan fiziksel yapının mukavemetini artırmak amacıyla gövde ve bacaklarda iki taraflı levhalar kullanılmıştır. Kullanılan servo motorun ölçülerine göre Şekil 1'deki çizim yapılmıştır. Bütün çizimler bu parça üzerine inşa edileceği ve üretimden sonra yapılacak düzenlemelerin maliyetli olması nedeniyle oldukça ayrıntılı bir şekilde motor çizilmiştir.



Şekil 1 Servo Motor Teknik Çizimi

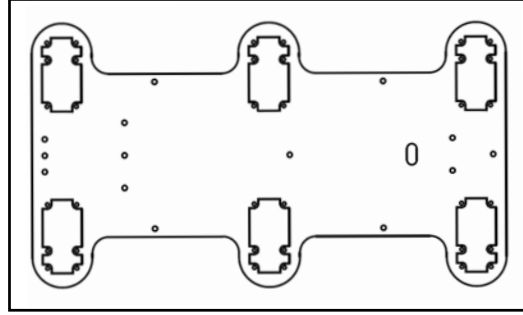
Tasarlanan bacak yapısı Şekil 2'de verilmiştir. Her bir bacak üç eklemlilikdir. Her ekleme bir servo motor yerleştirilmiştir. Birinci motor yatay düzlemde dönme sağlamak için, ikinci ve üçüncü motorlar bacağın dikey düzlemde hareketini sağlamaktadır.



Şekil 2 Üç Eklemlilik Bacak Yapısı

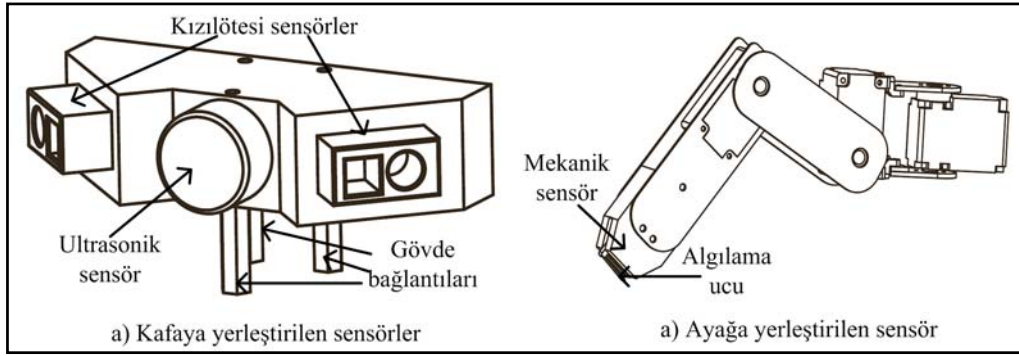
Tasarlanan robotun gövde çizimi Şekil 3'de verilmiştir. Gövde tasarımı yapılırken, üzerine montajı yapılan motorlar hareket sırasında birbirine engel olmayacak şekilde yerleştirebilmek için gerekli mesafeler bırakılmıştır. Gövde üzerindeki eklemin daha geniş açıda hareket edebilmesi için eklemler dışarı biraz çıkıntılı yapılmıştır; böylece dönme sırasında gövdeye çarpmadan hareket edebileceği alan artırılmıştır. Montaj ve

vidalama için gerekli delik ve boşluklar çizilmiştir. Malzemenin daha hafif olması için bu delik ve boşluklar gerekenden fazla çizilmiştir. Bu parçadan iki tanesi motorlar ile birleşerek robotun gövdesini oluşturmaktadır. Bu tasarımda motor tamamen gövdeye bağlanmakta ve bacaklar motorun rotoruna tutunmaktadır.

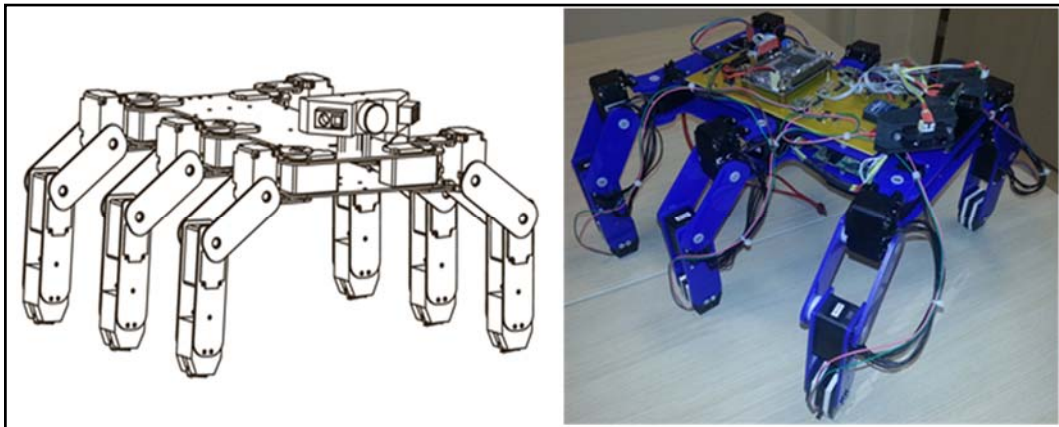


Şekil 3 Altı Bacaklı Robotun Gövde Yapısı

Ayakların yer ile temasını algılamak için ayaklara ve etraftaki nesnelere fark edebilmek için robotun üzerine çeşitli sensörler yerleştirilmiştir. Ayrıntısı Elektronik Tasarım bölümünde verilen bu sensörler, robotun ön kısmına, kafaya benzer bir yapı üzerine yerleştirilmiştir. Sensörlerden oluşan bu kafa Şekil 4.a'da verilmiştir. Ayrıca ayağa yerleştirilen sensör yapısı Şekil 4.b'de gösterilmiştir. Robotun bir bütün olarak çizimi ve mekanik ve elektronik montajının tamamlanmasından sonra alınan bir görüntüsü Şekil 6'da verilmiştir. Yapılan tasarım ile ilgili ölçüler Tablo 1'de verilmiştir. Bu ölçüler kinematik denklemlerin oluşturulması ve FPGA üzerinde geliştirilen donanım çalışmalarında kullanılmıştır.



Şekil 4 Robot Üzerinde Bulunan Sensörler



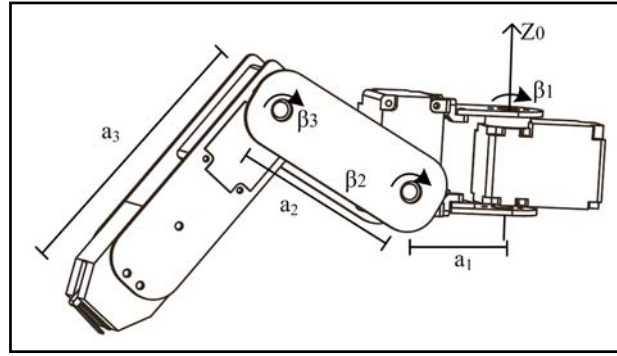
Şekil 5 Robotun Bir Bütün Olarak Çizimi Ve Montajın Tamamlanmış Hali

Tablo 1 Robotun Ölçüleri

Parça	Uzunluk
3. bağlantı (a_3)	103mm
2. bağlantı (a_2)	60mm
1. bağlantı (a_1)	49mm
Gövde genişliği ($2x_{AM}$)	125mm
Gövde uzunluğu	291mm
Robot ağırlığı	1786gr
Batarya ağırlığı	200gr

2.1.1. Kinematik Denklemlerin Oluşturulması

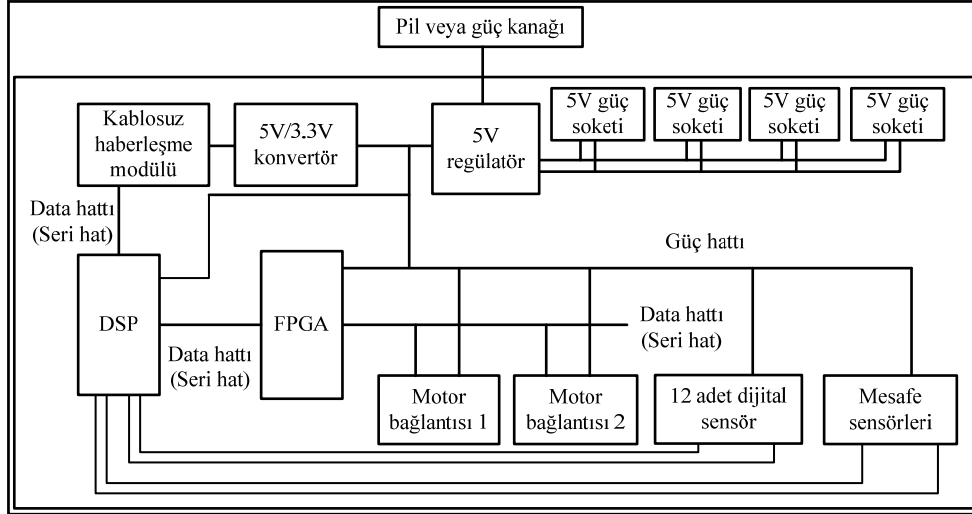
Tasarlanan robota ait bacak yapısı ve parametreleri Şekil 7’de verilmiştir. Bacak üç serbestlik derecesine sahiptir. Birinci eklem robot gövdesinin konumlandığı yatay düzleminde dairesel olarak hareket etmektedir. İkinci ve üçüncü eklemler robot gövdesine dik bir düzlemde, yine dairesel olarak hareket etmektedir. Robotun kinematik denklemleri oluşturulduktan sonra ters kinematik denklemleri elde edilmiş ve bu denklemler FPGA üzerinde kullanılarak gerçek zamanlı çalışan bir donanım gerçekleştirilmiştir. Bu bacağına ait Denavit–Hartenberg parametreleri Tablo 2’de verilmiştir. Ayrıntılı bilgi için (Erkol & Demirel, 2014) kaynağı incelenebilir.

**Şekil 6 Üç Eklemlili Bacak Modeli****Tablo 2 Tasarlanan Üç Eklemlili Bacağın Denavit–Hartenberg Parametreleri**

i	α_i	a_i	d_i	β_i
1	0	0	0	β_1
2	90	84,146mm	0	β_2
3	0	98,514mm	0	β_3

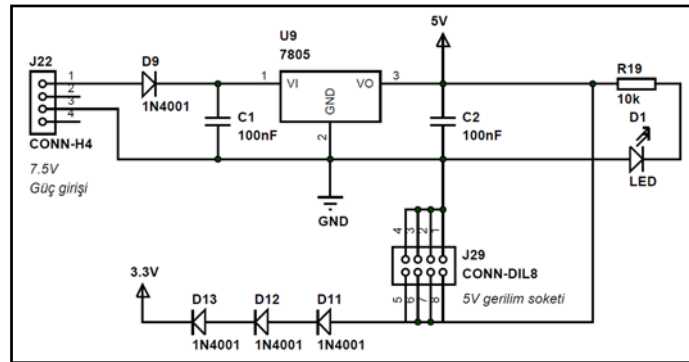
2.2. Elektronik Tasarım

Çalışmanın bu kısmında FPGA ile yapılan uygulamanın gerçekleştirilmesi ve robotun kontrol edilebilmesi için gerekli özellikleri taşıyan elektronik donanım geliştirilmiştir. Tasarlanan elektronik donanım bileşenler arasındaki elektriksel bağlantıyı temin etmekte, güç gereksinimlerini karşılamakta, doğabilecek yeni gereksinimler için ek bağlantılar içermektedir. Elektronik donanımı oluşturan temel bileşenler anakart, servo motorlar, FPGA kartı, DSP kartı, radyo modülü, sensörler ve bataryadır. Sistemin elektriksel bağlantı yapısı Şekil 8’de bir bütün olarak verilmiştir. Tasarlanan sistemde anakart, pil veya güç kaynağından gelen gerilimi uygun seviyelere düşürecek devreleri, FPGA ve diğer elektronik donanım arasında elektriksel bağlantıları sağlayacak yolları ve bağlantı soketlerini üzerinde bulundurmaktadır. Kullanılan servo motorlar kendi kontrolcülerine ve iletişim için kendi seri portlarına sahiptir. Bu motorları kumanda etmek için açılışın uygun formatta gönderilmesi yeterlidir. Sistemde DSP üzerinde koşan algoritma kablosuz haberleşme ve yürüme işlevinin gerçekleşmesi için ayak pozisyonlarının üretilmesinden sorumludur. Üretilen ayak pozisyonları FPGA üzerinde geliştirilen kinematik yardımcı işlemci ile çözülmekte ve yine FPGA üzerindeki donanımın bir parçası olarak geliştirilen seri port tarafından motorlara iletilmektedir.



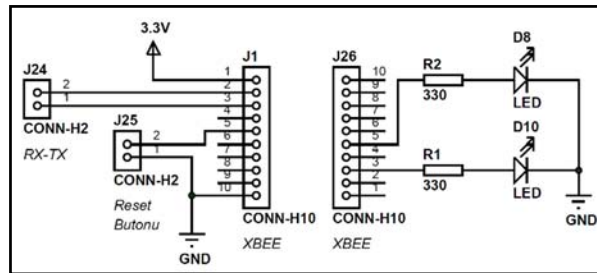
Şekil 7 Sistemin Genel Elektriksel Bağlantı Yapısı

Anakart üzerinde ihtiyaç duyulan farklı gerilim seviyelerinin elde edilmesi için Şekil 9'de verilen devre kullanılmıştır. Bu devrede giriş yaklaşık 7,5-12V olabilir. Giriş gerilimi öncelikle 7805 entegresi ile 5V seviyesine düşürülmektedir. Bu 5V gerilim ise diyotlar yardımı ile 3-3.3V aralığında bir değere düşürülmektedir. Elde edilen bu gerilim radyo modülünün çalışması için gereklidir. Ayrıca güç katı üzerinde bir güç gösterge ledi ve harici kullanım için dört adet 5V gerilim soketi bulunmaktadır. Bu soketlerden birisi DSP kartı beslemek için kullanılmıştır. DSP kartı 5V gerilim ile beslenebilmekte ancak çalışma gerilimi 3,3V'dur.



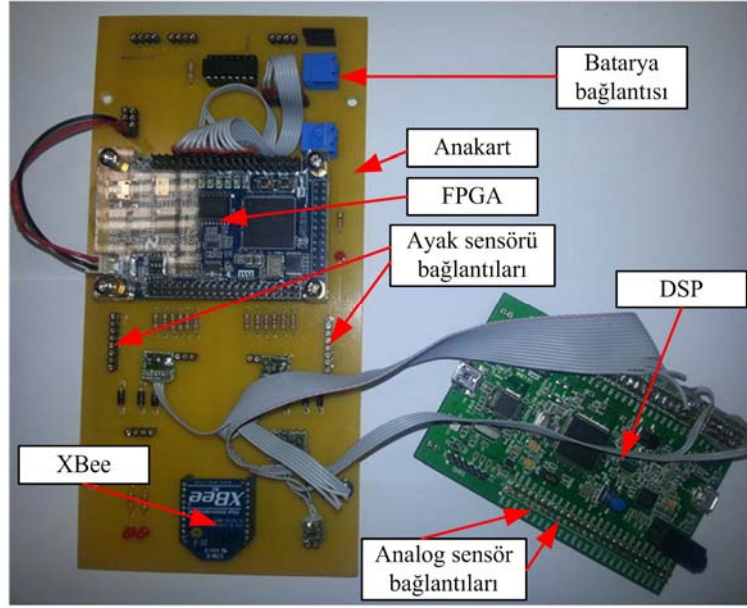
Şekil 8 Anakart Güç Katı

Kullanılan radyo modülünün sisteme entegrasyonu için Şekil 10'da verilen devre kullanılmıştır. J1 ve J29 soketleri radyo modülünün karta montajı için kullanılmaktadır. Radyo modülü DSP kartı ile iletişim kurmaktadır ve bağlantı kablo ile yapılmıştır. Kablonun bağlanacağı soket J24 soketidir. Ayrıca şekilde görülen iki adet led radyo modülünün çalışması sırasında kullandığı uyarı sinyallerini yansıtmak için kullanılmıştır.

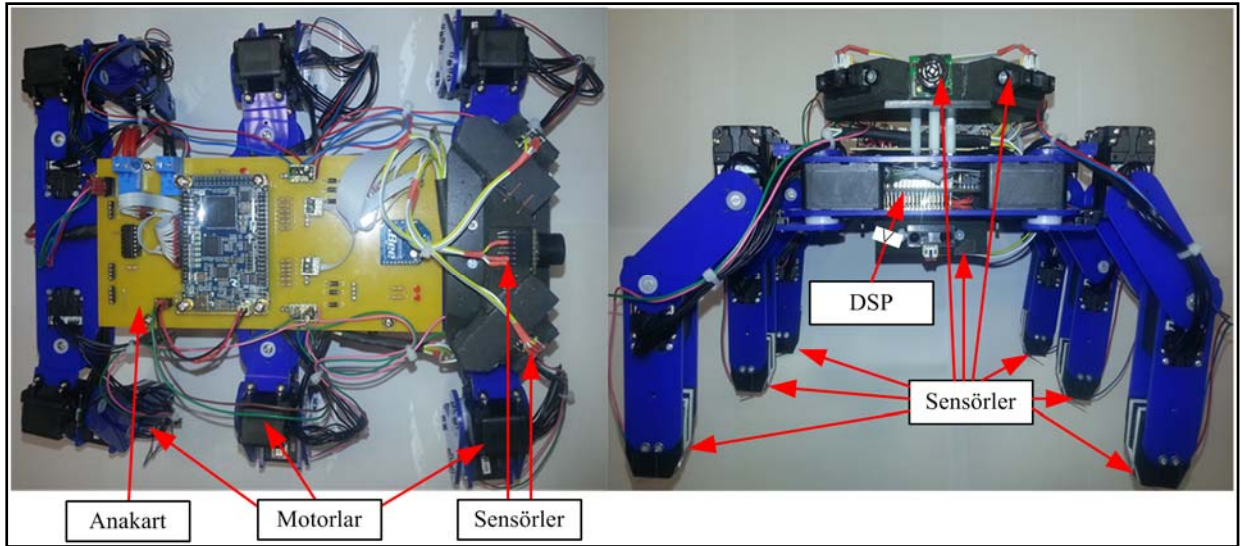


Şekil 9 Radyo Modülü Bağlantıları

Buraya kadar verilen bütün bölümleri üzerinde bulunduran anakart ve diğer elektronik elemanlar Şekil 11’de verilmiştir. Görüldüğü gibi DSP ve ayak sensörlerinin anakart ile olan bağlantısı kablolar ile sağlanmıştır. Analog sensörler direkt olarak DSP soketlerine bağlanmıştır. Sistem mekanik parçalar ile birlikte bir bütün olarak Şekil 12’de verilmiştir ve üzerinde elektronik bileşenler gösterilmiştir.



Şekil 10 Anakart ve Bileşenleri



Şekil 11 Sistem Üzerinde Anakart Ve Bileşenleri

2.2.1. Servo Motorlar

Tasarlanan sistemde robotun hareketini sağlamak için servo motorlar kullanılmıştır. Kullanılan servo motorlar, Şekil 13’de gösterilen, HerkuleX DRS-0101 dijital servolardır (Dongbu Robot, 2011). Bu motorların en önemli özelliği seri arabirimden kontrol edilebiliyor olmasıdır. Tek bir seri hatta 254 adede kadar motor bağlanıp, bu hat üzerinden kontrol edilebilmektedir. Motorun çalışma gerilimi yaklaşık 7,5-12V aralığında, haberleşme hattı sinyal seviyesi TTL standartlarında, açılabilir çözünürlüğü 0,325 derecedir. Rotorun taradığı alan yaklaşık 320 derecedir. Tamamen robotik uygulamalar için geliştirilmiş bir motordur.



Şekil 12 HerkuleX DRS-0101 Servo Motor

2.2.2. DE0-NANO BOARD

Altera DE0-Nano Board gömülü sistemler, bilgisayar mimarisi çalışmaları ve robot uygulamaları için kullanılacak bir FPGA kartıdır. Üzerinde Cyclone IV EP4CE22F17C6N yongası kullanılmıştır (Altera, 2015). Ayrıca kart üzerinde 32Mb sdram ve 2Kb eeprom bulunmaktadır. Üzerinde bulunan diğer donanımlar 3 eksen inme ölçer, 8 kanal analog-sayısal dönüştürücü, giriş olarak kullanılmak üzere 4 adet mini anahtar ve 2 adet buton, 8 adet led olarak sıralanabilir. Kart aynı zamanda dahili 50MHz'lik bir saate ve giriş-çıkış portlarını kullanabilmek için 3 adet erkek sokete sahiptir. Bütün bu özellikleri ile robotik uygulamalar için de çok uygun bir karttır.

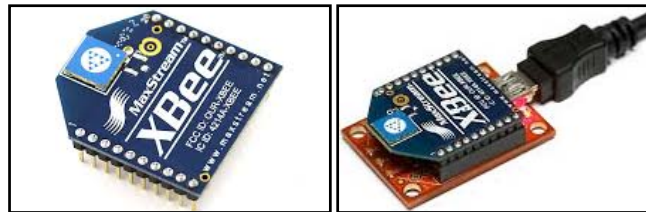
Çok eklemli yapılarda kinematik denklemler serbestlik derecesi ile orantılı olarak karmaşıklaşmaktadır. Özellikle hızlı, hassas ve düzgün hareketler istendiğinde bu hesaplar için bir yardımcı işlemci kullanılması zorunludur (Taira, Kamata, & Yamasaki, 2005; Zheng, Liu, & Kan, 2012). Merkezi işlemciden gelen parametreleri kullanarak gerekli hesaplamaları yapar ve işlemci üzerindeki yükü hafifleten bir yardımcı işlemci tasarımı yapılmış ve bu FPGA kartı ile robota entegre edilmiştir.

2.2.3. DSP Kart

DSP kartı olarak STM32 F4 Discovery kullanılmıştır. Üzerinde 168MHz'e kadar frekanslarda çalışabilen yüksek performanslı DSP, STM32F407VGT6 vardır (STMicroelectronics, 2015). Bu kontrolcü 32-bit ARM Cortex-M4F çekirdeğine sahiptir ve kart üzerinde 1 MB Flash ile 192 KB RAM bulunmaktadır. Besleme gerilim 5V'dur ve aynı zamanda USB portu üzerinden de beslenebilmektedir. Yapılan çalışmada bu kart Matlab/Simulink üzerinde geliştirilen yürüme algoritmalarının uygulanması için kullanılmıştır. Yürüme algoritmasının ürettiği çıkışlar bu kart vasıtası ile seri port üzerinden FPGA'ye iletilmektedir. Bu kart aynı zamanda yürüme algoritmasının işletilmesi sırasında ihtiyaç duyulan ayak sensörleri, isteğe bağlı olarak kullanılacak mesafe sensörleri ve uzaktan kumanda arayüzü ile haberleşmek için radyo modülü ile bağlantılıdır.

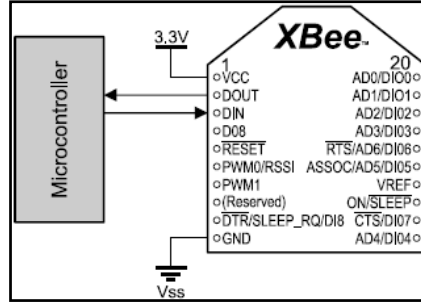
2.2.4. Radyo Modülü

Tasarlanan sistemde uzaktan kumanda bilgisayarı ile iletişim sağlamak için Digi firmasının ürettiği bir radyo modülü kullanılmıştır. Kullanılan modül Xbee Seri 1 radyo modülüdür. Bu modül açık alanda 90 metre çekim mesafesine, dahili bir antene, 112500 Kbps iletişim hızına sahiptir. Bilgisayara bağlı bir USB port ile kullanılması da mümkündür. Bunun için Şekil 13'de gösterilen "explorer" adı verilen kartın kullanılması gerekmektedir. Bu kartla bilgisayara bağlandıktan sonra Digi firması tarafından geliştirilmiş olan XCTU yazılımı ile konfigüre edilip kullanılabilir (Digi, 2014).



Şekil 13 Xbee Seri 1 ve Xbee ve Explorer Kartı

Şekil 14’de modülün kullanılabilmesi için gerekli, temel bağlantılar şematik olarak gösterilmiştir. Bilgisayar üzerinde kullanılan radyo modülü bilgisayara explorer ile bağlanmıştır. Bu bağlantı ile birlikte modül bilgisayar üzerinde bir seri port olarak görünmektedir. Bu seri porta yazılan veriler robot üzerindeki alıcıya iletilmektedir. Robot üzerinde kullanılan modül anakart tarafından beslenmekte ve DSP ile direkt bağlantılı olup 0-3V seviyesinde sinyaller ile iletişim kurmaktadır.



Şekil 14 Xbee Modülü Temel Bağlantı Şeması

2.2.5. Sensörler

Robot üzerinde üç tür sensör kullanılmıştır. Bunlardan ilki analog çıkış veren bir ultrasonik sensördür. Bu sensörün amacı uzun mesafede robotun önündeki engelin algılanmasıdır. Bu çalışmada kullanılan sensör, MaxBotix marka MB1240 model koduna sahip sensördür (MaxBotix, 2015). Sensörün resmi Şekil 15.a’da verilmiştir. Sensör 3,3 ve 5 volt gerilim seviyelerinde çalışmaktadır ve 7,5 metreye kadar lınç (2,54cm) hassasiyet ile ölçüm yapabilmektedir. Saniyede 10 ölçüm yapmaktadır. Analog, asenkron seri ve PWM sinyali şeklinde de çıkış verebilmektedir. Bu çalışmada veriler analog çıkıştan alınmıştır.



Şekil 15 Sistemde Kullanılan Sensörler

Kullanılan ikinci tip sensör kızıl ötesi sensör Şekil 15.b’de gösterilmiştir. Sharp markasının GP2Y0A41SK0F model koduna sahip ürünü kullanılmıştır. Sensör 4 ile 30 cm arasındaki nesnelere algılayabilmektedir. Beş volt gerilim ile çalışmakta, 16,5 ms’de bir ölçüm yapabilmektedir. Analog çıkışa sahiptir ve çıkışı lineer değildir. Bu sensörden robot üzerinde üç adet kullanılmıştır. Her üçü de yakın mesafe için kullanılan bu sensörlerden bir tanesi robot gövdesinin altına, ultrasonik sensör ile aynı yön ve doğrultuda yerleştirilmiştir ve diğer sensörlere göre daha alçak engellerin algılanmak amacıyla yerleştirilmiştir. Diğer iki sensör ise ultrasonik sensör ile aynı düzlemde, biri sağda biri solda olmak üzere ultrasonik sensör ile 45 derece açı yapacak şekilde yerleştirilmiştir. Bu sensörlerin amacı ise robotun yakın mesafe görüş açısını genişletmektir.

Kullanılan üçüncü tip sensör ise ayakların yere basıp basmadığı algılamak için kullanılan anahtarlardır. Şekil 15.c’de gösterilen, limit anahtar olarak adlandırılan, anahtarın üzerindeki metal kola basıldığı zaman içerisindeki elektriksel anahtar konum değiştirmektedir. Anahtar robot ayaklarına baş aşağı yerleştirilmiştir. Böylece ayağın yer ile teması sırasında anahtarın kontağı konum değiştirmektedir.

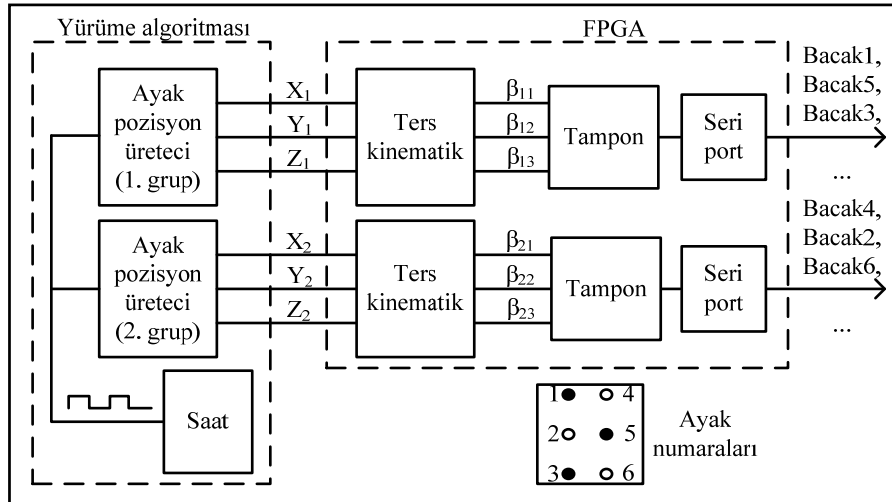
2.2.6. Batarya

Batarya olarak 7,4 volt gerilime sahip iki hücreli lityum-polimer pil tercih edilmiştir. Diğer alternatiflerine göre yüksek kapasitesi ve hafif oluşu bu bataryanın seçiminde temel etkidir. Motorlar direkt olarak pil ile beslenmiş, diğer elektronik elemanlar için bu değer 5V ve 3,3V seviyelerine düşürülerek kullanılmıştır.

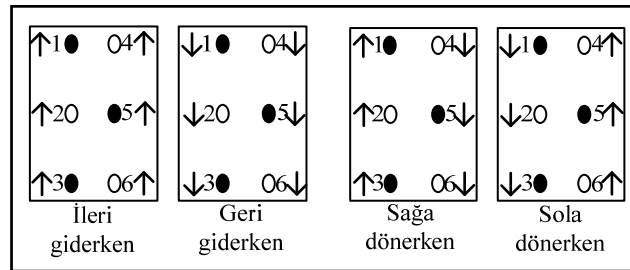
2.3. Yürüme Algoritması

Yürüme algoritmaları robotun yürüme hareketi yapabilmesi için gerekli adımları, ayakları birbirine uyumlu ve sıralı bir şekilde hareket ettirerek oluşturur. Altı bacaklı robotlarda tek ayak, iki ayak ve üç ayak gibi farklı yürüme şekilleri uygulanabilir. Buradaki ayak sayısı aynı anda adım atan, yani havaya kaldırılıp ileri doğru hareket eden, ayak sayısını ifade etmektedir. Diğer şartların değişmediğini düşündüğümüzde üç ayak yürümenin daha hızlı olacağı açıktır. Bu nedenle burada üç ayak yürüme şekli uygulanmıştır. Üç ayak yürümede uygulanacak genel yöntem Şekil 16'da verilmiştir. Bu yürüme biçiminde altı ayak, yürürken ve dönerken, iki gruba ayrılmakta ve farklı hareketler yapmaktadır. Üç ayak yürüme düzeninde, şekilde görüldüğü gibi, 1-3-5 numaralı ayaklar (siyah ile renklendirilmiş) 1 numaralı grubu, 2-4-6 numaralı ayaklar (beyaz renkte) 2 numaralı grubu oluşturmaktadır. Gruplar için gerekli ayak pozisyonları bu bölümde açıklanan algoritmalar ile üretilir ve FPGA'ye gönderilir. FPGA üzerinde ayak pozisyonlarını elde etmek için gerekli eklem açıları hesaplanır ve bu açılarda seri port üzerinden servo motorlara gönderilir. Böylelikle istenen hareket sağlanmış olur.

İleri hareket esnasında ilk ayak grubu kaldırılarak ileri hareket ettirilir ve bu ayaklar havada iken ikinci gruptaki ayakların geri hareket etmesi ile gövde ileri taşınır. Sonra havadaki ilk grup yere indirilir ve ikinci grup havaya kaldırılır. İkinci grup havada iken ilk grup ayaklar geri hareket ettirilerek gövde ileri taşınır ve ikinci grubun yere indirilmesi ile bir çevrim sona erer. İleri giderken bütün ayaklar ve gövde ileri doğru yer değiştirirken, aynı adımların ters olarak işletilmesi ile geri hareket sağlanır ve bu durumda ayaklar ve gövdenin yer değişimi geriye doğru olur. Dikkat edileceği üzere bir grup içindeki bütün ayaklar aynı yöne hareket etmektedir. İleri hareket sırasında ayakların hareket yönleri, şematik olarak, Şekil 17'de verilmiştir.



Şekil 16 Yürüme Algoritmasına Genel Bir Bakış



Şekil 17 İleri ve Geri Hareket Sırasında Ayakların İlerleme Yönleri

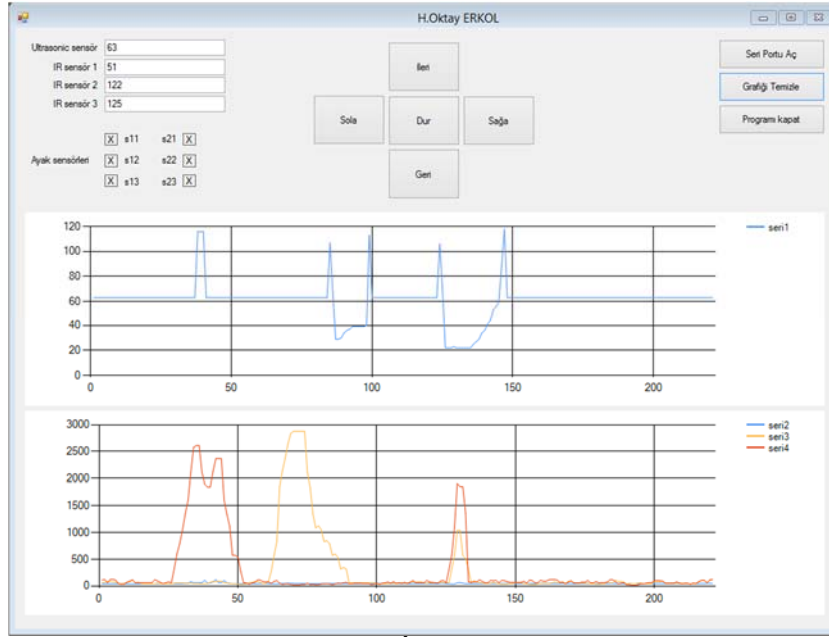
Benzer işlemler sağa ve sola dönme sırasında da yapılır. Bu hareketler esnasında ayakların ilerleme yönleri Şekil 17'de şematik olarak verilmiştir. Sağa dönme eylemi gerçekleştirilirken ilk grup havaya kaldırıldıktan sonra 1-3 ileri, 5 ise geri hareket ettirilir. Bu ayaklar havada iken ikinci grupta 2 geri 4-6 ileri hareket ettirilerek gövde bir miktar sağa döndürülür ve havadaki ayaklar indirilip diğer ayaklar kaldırılır. Havada olan 2 ileri, 4-6 geri hareket ettirilir; yerde olan 1-3 geri, 5 ileri hareket ettirilir ve havadaki ayaklar yere indirilir. Dönme eylemi devam ettiği sürece işlem tekrarlanır. Sola dönmek için ise sağa dönmek için yapılanların tam tersi yapılmaktadır.

Yapılan bu tanımlamalara uygun şekilde, yürüme eylemini gerçekleştirmek için gerekli bütün bu hareketleri koordineli bir biçimde kontrol eden, sensör bilgilerini okuyup yorumlayan ve uzak bilgisayara gönderen, aynı zamanda uzak bilgisayardan aldığı yön komutlarına göre robotu hareket ettiren bir sistem tasarlanmıştır. Tasarlanan bu sistem farklı ayaklarındaki sensörler ile engelleri algılayıp üzerinden geçebilme yeteneğine sahiptir. Sistem uzak bilgisayardan gelen yönlendirme komutlarını çözerek ürettiği ayak pozisyonlarını FPGA'ye göndermek suretiyle hareketin gerçekleşmesini sağlamaktadır.

2.4. Uzaktan Kontrol Arayüzü

Çalışmanın bu kısmında robotu uzaktan yönlendirebilmek için VisualStudio geliştirme ortamında C# programlama dili kullanılarak bir uzaktan kumanda arayüzü geliştirilmiştir. Geliştirilen arayüzün ekran görüntüsü Şekil 18'de verilmiştir. Geliştirilen bu program bilgisayarın seri portuna bağlı olan radyo modülü aracılığı ile robota yönlendirme komutları göndermektedir. Yine aynı radyo modülünden robot üzerindeki sensör bilgilerini alarak ekranda görüntülemektedir. Alınan veriler ekranda iki farklı grafik olarak gösterilmiştir. İlk grafik ultrasonik mesafe sensöründen alınan verileri göstermektedir. İkinci grafik ise kızıl ötesi mesafe sensörlerinden alınan verileri tek bir ekranda göstermektedir. Ultrasonik sensöre ait verilerin birimi santimetre, kızılötesi sensörlere ait verilerin birimleri ise mV'dur.

Program bilgisayarın seri portunu kullandığı için sağ üst köşeye seri portun açılmasını sağlayacak bir buton yerleştirilmiştir. Aynı butonun altına gerekli durumlarda grafik ekranını silmek için bir buton ve onun altına da programdan çıkmayı sağlayan bir buton eklenmiştir. Program ekranının sol üst kısmında ise robot üzerindeki bütün sensörlerin anlık değeri sayısal olarak görüntülenmektedir. Ayak sensörlerinin "1" değerine karşılık "X" işareti, "0" değerine karşılık "|" işareti kullanılmıştır. Ekranın üst kısmında ortada ise robotun yönlendirme komutları bulunmaktadır.



Şekil 18 Uygulama İçin Geliştirilen Arayüz

SONUÇ

Bu çalışmada 18 serbestlik dereceli, altı bacaklı bir robot tasarımı ve uygulaması yapılmıştır. Geliştirilen bu robot üzerinde seri arabirimden kontrol edilebilen servo motorlar kullanılmıştır. Üzerinde çeşitli mesafe sensörleri, ayakların yerle temasını algılamak için temas sensörleri, uzak bilgisayar ile veri alış verişi yapabilmesi için kablosuz haberleşme birimi mevcuttur. Ayrıca robot için bir uzaktan kumanda arayüzü tasarlanmış ve uygulanmıştır. Sistem engebeli zeminlerde ve dar alanlarda hareket edebilecek kabiliyettedir. Askeri uygulamalardan, arama kurtarma uygulamalarına veya bilimsel aşırılara kadar birçok alana uygulanabilir. Geliştirilen sistem üzerinde bir yürüme algoritması geliştirilmiştir. Bu algoritma ileri gitme, geri gitme, sağa/sola dönme gibi temel hareketleri yaparken ayakların koordinasyonunu sağlamaktadır. Gelecek planlarına otonom hareket algoritmalarının geliştirilmesi vardır.

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PROBLEMS OF EDUCATION AND PROPOSALS FOR SOLUTIONS IN VOCATIONAL SCHOOLS

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ABSTRACT: In this study, the issues deal with Vocational Schools (MYO), namely physical structure propriety to the education, laboratory/workshop facilities, student standards, dormitory facilities and academic staff are introduced. The precautions needed to graduate qualified and entrepreneur technicians who orient themselves to the actual conditions quickly, have skills to improve the produced goods and services, understand and handle the rapid developing/changing technology are disclosed.

Key words: vocational school, educational problems, technician, entrepreneur

MESLEK YÜKSEKOKULLARINDA EĞİTİM SORUNLARI VE ÇÖZÜM ÖNERİLERİ

ÖZET: Bu çalışmada Meslek Yüksekokullarının (MYO) fiziki yapılarının eğitime uygunluğu, laboratuvar ve atölye olanakları, okulların öğrenci yapısı, öğrencilerin yurt olanakları, öğretim elemanları gibi konularda mevcut durum ortaya konmuştur. Mevcut koşullara çabuk uyum sağlayabilen, problem ya da problemleri hızla çözebilen, üretilen mal veya hizmetleri daha da geliştirme yeteneğine sahip, hızla gelişen ve değişen teknolojiyi anlayıp uygulayabilen nitelikli ve girişimci teknikerler yetiştirmek için alınması gerekli önlemlere yer verilmiştir.

Anahtar sözcükler: meslek yüksekokulu, eğitim problemleri, tekniker, girişimci

GİRİŞ

Günümüzde teknolojiye yaşanan hızlı gelişmeler, pazarların küreselleşmesi, iletişimin baş döndürücü bir hızla gelişmesi, dünya çapında bilgi alışverişinin ve ulaşımın kolaylaşması, teknolojiye dayalı üretim ve ticaretin yaygınlaşması ülkelerin ekonomilerini etkilemiş ve rekabeti büyük ölçüde arttırmıştır.

Ülkelerin ve kurumların bu kıran kırana yaşanan rekabet içerisinde üretimde ve pazarlamada başarılı olabilmesi, üretim ve hizmet kalitesini artırabilmesi, insan ilişkilerini geliştirebilmesi, günümüzün ve geleceğimizin olmazsa olmazlarıdır. Bu nedenle günümüzde işletmeler teknolojiyi anlayan, uygulayabilen, verimli, kaliteli mal ve hizmet üreten, düzgün ilişkiler kurabilen işgücüne gereksinim duymaktadır. Diğer bir ifade ile iş dünyası gelişen teknolojiye çabuk uyum sağlayan, iletişim kurabilen, problemlere hızlı ve uygun çözüm üreten, mal ve hizmetleri sürekli geliştirme sorumluluğu taşıyan, maliyeti düşüren unsurları öğrenen, teknolojinin dayandığı fen ve matematik gibi temel bilgilere sahip işgücü aramaktadır.

Sanayi, ticaret ve hizmet sektörlerinin ihtiyaç duyduğu alanlarında yeterli bilgi ve beceriye sahip ara elemanların yetiştirilmesi amacıyla kurulmuş olan meslek yüksekokulları, mesleki ve teknik eğitim sisteminin en önemli bileşenini oluşturmaktadır (Alkan vd., 2014). Bu çalışmada, nitelikli ara eleman yetiştirme görevini üstlenen MYO'ların Türkiye'deki mevcut durumu ile sorunları incelenmiş ve çözüm önerilerine yer verilmiştir.

MESLEK YÜKSEKOKULLARININ MEVCUT DURUMU

MYO ve Öğrenci Sayıları

Nisan 2015 itibariyle ülkemizde 184 (104 devlet ve 80 vakıf üniversitesi) üniversite mevcut olup bu üniversitelerde toplam 907 MYO vardır (YÖK, 2015). 8 adet Vakıf MYO ile birlikte bu rakam 915 olmaktadır (Tablo 1).

Yükseköğretimde 1990 yılında % 14,5 olan okullaşma oranı 2012 yılında %75 seviyesine ulaşmıştır. Bu veri referans alındığında 2014 yılı için yükseköğretim brüt okullaşma oranlarının %80'in üzerine çıktığı tahmin edilmektedir. Bu olağanüstü artışta ön lisans programlarının önemli bir rolü olmuştur. Önümüzdeki yıllarda bu eğilimin, artan üniversite sayıları ve 12 yıllık zorunlu eğitim nedeniyle daha fazla yükseleceği görülmektedir.

Bütün bu veriler birlikte değerlendirildiğinde, brüt okullaşma oranları açısından Türkiye'nin birçok gelişmiş ülkele kıyaslanabilir bir noktaya geldiği görülmektedir (Çetinsaya, 2014).

	Devlet	Vakıf	Vakıf MYO	Toplam
Üniversite sayısı	104	72	8	184
MYO sayısı	808	99	8	915

1992-2014 yılları arasında açılan MYO sayısı 761'dir. Ayrıca, ilk yıllarda sadece yüzyüze öğretim programlarında sürdürülen ön lisans eğitimi 1992 yılından itibaren ikinci öğretim ve açıköğretim programlarında da başlatılmıştır. 2013-2014 öğretim yılı itibariyle ön lisans programlarında okuyan öğrenci sayıları 1.750.000'i aşmıştır (YÖK, 2015). Bunların 540.000'i birinci öğretimde, 253.000'i ikinci öğretimde, 935.000'i açıköğretimde, 20.000'i ise uzaktan öğretim programlarında okumaktadır (Tablo 2).

Yükseköğrenim gören öğrencilerin bütünü (5,5 milyon öğrenci) göz önüne alındığında önlisans eğitimi gören öğrencilerin oranı % 32,1 dir. MYO'larında 215 farklı program türü olmak üzere 7.454 programda eğitim verilmektedir. Açıköğretim önlisans eğitimleri, 3 devlet üniversitesinde bulunmakta ve 54 programda eğitimler sürdürülmektedir.

	Birinci Öğretim	İkinci Öğretim	Açıköğretim	Uzaktan Öğretim	Toplam
Devlet Üniversiteleri	489.749	239.134	935.750	18.411	1.683.044
Vakıf Üniversiteleri	43.704	13.075	0	639	57.418
Vakıf MYO	7.154	1.579	0	938	9.671
TOPLAM	540.607 (% 31)	253.788 (% 15)	935.750 (% 53)	19.988 (% 1)	1.750.133

Öğretim Elemanları

YÖK'ün Nisan 2014 istatistiklerine göre devlet ve vakıf üniversiteleri ile vakıf MYO'larda toplam 142.437 öğretim elemanı bulunmaktadır. Tablo 3 incelendiğinde toplam sayıları 20.471 olan öğretim görevlilerinin tüm üniversitelerde görev yapan öğretim görevlerinin % 60,6'sını oluşturduğu görülmektedir.

	Profesör	Doçent	Yrd.Doç.	Öğr.Gör.	Araş.Gör.	Diğer	Toplam
Üniversiteler toplamı	20.005	12.839	31.345	20.471	44.074	13.703	142.437
MYO'lar toplamı	239	284	2102	12.408	256	947	16.236
Öğr. Elemanının üniversitelerdeki oranı	% 14	% 9	% 22	% 14	% 31	% 10	
Öğr. Elemanının MYO'daki oranı	% 1,5	% 1,7	% 13,0	% 76,4	% 1,6	% 5,8	

Ayrıca üniversitelerde bulunan tüm öğretim elemanı sayısının %14,4'üne karşılık gelen grubun oldukça büyük bir kısmının MYO larda görev yaptığı anlaşılmaktadır. 2013-2014 öğretim yılı itibariyle MYO'larda öğretim elemanı başına ise 49 öğrenci düşmektedir. Bu oran Almanya'da 5, Avustralya'da 8, Belçika'da 10, Japonya'da 9, Kore ve Amerika Birleşik Devletleri'nde 21, İngiltere'de ise 20 olarak verilmektedir (Şencan, 2008). MYO'larda öğrenim gören öğrenci sayısı göz önüne alındığında (açık öğretim ve uzaktan öğretim hariç yaklaşık 800.000 öğrenci), MYO'lardaki mevcut öğretim elemanlarına ek olarak çok sayıda öğretim elemanına daha ihtiyaç duyulduğu görülmektedir (Alkan vd., 2014).

MESLEK YÜKSEKOKULLARINDA EĞİTİM SORUNLARI

Öğrencilerle İlgili Sorunlar

Sınavsız Geçiş:

Mesleki ve teknik öğretim kurumlarının cazip hale getirilmesi için mesleki ve teknik ortaöğretim kurumları ile MYO'ları arasında program bütünlüğü ve devamlılığının sağlanması amacıyla sınavsız geçiş projesi geliştirilmiştir. 4702 Sayılı Kanun 10.08.2001 tarih ve 24458 Sayılı Resmi Gazetede yayımlanarak yürürlüğe girmiş ve yasa ile 2002-2003 öğretim yılından itibaren mesleki ve teknik ortaöğretim programlarından mezun olan öğrencilerin programlarının devamı veya buna en yakın MYO'larındaki programlara sınavsız geçiş yapabilmesinin önü açılmıştır.

Bu yasa sonrası, meslek yüksekokullarına gelen öğrenci kalitesi fevkalade düşmüştür. Öyle ki, MYOların sorunları sayılırken, temel dört işlemi (toplama, çarpma, çıkarma, bölme) yapamayan öğrencilerden söz edilir hale gelinmiştir. Bir yandan üniversite sınavı ile bir yere yerleşemeyen öğrenciler, öte yandan hâli hazırda bir kurumda çalışıyor olup da meslek lisesi mezunu olduğu için sınavsız geçişten yararlanarak kayıt yaptıran ileri yaştaki öğrencilerden oluşan heterojen sınıflar, derslerin işlenme kalitesini olumsuz etkilemiştir. Bununla birlikte MYOlara öğrenme hevesiyle gelen öğrenciler de çoğunluk başarısız ve ilgisiz öğrencilerin oluşturduğu olumsuz şartlar altında yeterince kaliteli bir eğitim alamamaktadırlar. Umutsuzluğa kapılan “iyi öğrenciler” okuldan kayıt sildirmekte ve MYOlar için başarı neredeyse imkânsız hale gelmektedir.

Sınavsız geçiş ile MYO'larına gelen yetersiz, isteksiz mesleki ve teknik ortaöğretim öğrencileri MYO'lardaki öğretim elemanlarının motivasyonunu olumsuz yönde etkilemektedirler. Birçok platformda dile gelmesine rağmen bu yanlıştan dönmek adına YÖK tarafından bir çalışma yapılmamaktadır.

Öğrenci Profili: (İTO, 2008)

- Sosyal ve Ekonomik Profil: Araştırmaya katılan öğrencilerin daha ziyade gelir ve eğitim seviyesi düşük ailelerin çocukları oldukları anlaşılmaktadır.

- Kültürel ve Mesleki İlgi ve Donanım Düzeyi: Öğrencilerin kültürel ve sosyal ilgi düzeyleri çok düşüktür; kültürel ve mesleki donanımlarını artırma eğilimine de sahip değildirlir.

- Bilgi ve Beceri Bakımından Yetişmişlik Düzeyi: Öğrencilerin mesleki ve genel bilgi düzeyleri düşüktür. Bu durum ilk ve orta öğretim başarı düzeylerinde, okullarına giriş usullerinde ve eğitimlerine ilgilerinde gözlenebilmektedir. Öğretim elemanları da öğrencilerin bilgi ve beceri bakımından yetişmişlik düzeylerinin yetersizliğini doğrulamaktadır.

Öğretim Elemanları İle İlgili Sorunlar

MYO'lardaki öğretim elemanlarına bakıldığında, % 76'sının öğretim görevlilerinden, %15'inin de öğretim üyelerinden oluştuğu görülmektedir. MYO'larda öğretim görevlisi olmak için lisans mezunu olmak yeterli olabilmekte, yabancı dil koşulu gerekmemektedir. Araştırma görevlisi olmak için istenen şartlar öğretim görevlisi olmak için istenen şartlardan çok daha ağırdır. Bu bir tezat yaratmakta ve eğitim geçmişi olmayan kişilerin hatta herhangi bir iş bulamamış kişilerin dahi uygun şartları yaratarak MYO'ya hoca olmasına imkân vermektedir. Öğrenci diyalogları zayıf, eğitim ve öğretim temel etik kurallarından uzak, araştırma ve geliştirme yeteneği olmayan kişilerin yükseköğretimin bir parçası olan MYO'lara girmesi ile eğitim kalitesinin bozulmaya başladığı, geri dönülemez bir hata içerisine girildiği aşikârdır. Bu tarz öğretim elemanlarının öğrenme hevesinde olan öğrencilerin heveslerini de kaçırdığı söylenebilir.

Ayrıca, yeterince incelemeden hızlıca her ilçeye açılan MYO'larda öğretim elemanı eksikliği kendisini daha çok hissettirmekte, yöneticiler çoğu yerde liselerden temin edilen ve yarı zamanlı olarak görevlendirilen öğretmenler aracılığıyla bu açığı kapatma yoluna gitmektedirler. Dahası, dışardan derse gelen öğretim elemanlarının ders verme yeterlilikleri, uzmanlık alanlarındaki yeterlilikleri, verilecek dersin gerektirdiği uzmanlık alanı dikkate alınmadan tamamıyla MYO yöneticilerinin insiyatifinde görevlendirme yapılmaktadır. Bu durum etik, ahlaki ve vicdani ilkelere aykırıdır ve kabul edilemez.

MYO'ların öğretim kadrosu ile ilgili yukarıda ortaya konmaya çalışılan nitelikçe yetersizliklerden başka önemli bir diğer sorun da, nicelikçe yetersizliktir. Bunun doğal bir sonucu olarak ise boş geçen dersler sorunudur.

Fiziki Mekân, Altyapı ve Öğretim Planları İle İlgili Sorunlar

Araştırma yapılan okulların çoğunda bina sorunu yaşanmadığı söylenebilirse de, binaların uygunluğu, teknik altyapı ve sosyal-sportif imkanlar bakımından ciddi yetersizlik ve imkansızlıklar bulunduğu görülmektedir. Buna göre, MYO'lar henüz bir “üniversite havasına” kavuşmamıştır. Atölye ve laboratuvarlar ya hiç bulunmamakta yada gerçek anlamda güncel araç gereçlerle donatılmış değildir. Uygulamalı eğitimden yoksun öğrenimlerini tamamlayan öğrenciler konularında bilmeleri gereken en temel uygulamaları bile öğrenmeden, deney yapmadan hatta nasıl yapıldığını bilmeden mezun olmakta dolayısıyla istihdam edilmeleri beklenen iş dünyasının ihtiyaçlarına cevap veremeyen ancak diplomaları olan kişiler olarak kalmaktadırlar. Mezuniyet sonrası harcadıkları çaba sonucu iş hayatında kendilerine yer bulmaya gayret etmektedirler.

MYO'ların çoğu nüfusu merkeze uzak ilçelerde bulunmaktadır. Bu durum, öğrenciler için barınma, sosyal faaliyet yokluğu gibi sorunlar çıkarmaktadır. Üniversite personeli de her gün uzaktaki ikametgâhlarından gelip gitmek zorunda kalmaktadırlar. Bu durum iş verimi düşürmekte, iş sürelerinin uzamasına sebep olmaktadır.

MYO'larda teorikten daha fazla sayıda uygulamalı eğitimin olması gereklidir. Gerekli fiziksel şartların olmaması sebebiyle MYO dersleri çoğu kez tamamıyla teorik işlenmektedir. MYO'larda deneyimsiz olarak görev alan eğitimciler maalesef teorik seviyede de eğitim kalitesini düşürmektedirler.

MYO'larda uygulanan eğitim müfredatı kısmen yeterli gibi görünüyorsa da, ilgili sektörlerdeki gelişmelerin gerektirdiği şekilde güncellenmemektedir. Öğrencileri uzmanlaşmaya yönlendirmekten uzak bir yapıdadır.

ÇÖZÜM ÖNERİLERİ

Sınavsız geçiş ivedilikle kaldırılmalıdır. Bu MYO ların önünü açacak en önemli gerekliliktir. Öğrenci profili eğitim yapmaya uygun hale getirilmelidir. Fiziki, teknik ve akademik yapısı yeterli olan MYOlar arasında pilot okullar seçilerek, bu MYOlara sınavla öğrenci alınmalı, eğitim kalitesi düzeltilmeli ve MYO ların kaybolan itibarının yeniden kazandırılması için bu MYOlar üzerinden çaba harcanmalıdır. İyi sonuçlar geldikçe içinden çıkılmaz bir sorun yumağı haline dönen MYO sorunu çözülmeye başlayacaktır.

MYO'lardaki öğretim elemanlarına mesleki konularda teknolojik gelişmeleri takip edebilmeleri ve uygulama yapabilmelerine imkân sağlayacak eğitim programları düzenlenmelidir. Öğretim programları ve ders saatleri yeniden düzenlenmeli; bilişim ve teknoloji çağının gerekliliği haline gelen bilgisayar programlarının öğretildiği yeni müfredatlar oluşturulmalıdır. Bu konularda uzmanlık kazanmış yetkin öğretim elemanları ile çalışılmalıdır.

Öğretim görevlilerinin yeniden atamalarında “performans kriterleri” belirlenmelidir. Yeniden atamalar yayın, öğrenci anketleri, mesleki yeterlilik sınavları ile ders anlatım ve uygulama performanslarının değerlendirildiği özel koşullara bağlanmalıdır. MYO'lardaki öğretim görevlilerinin sayıları kademeli olarak azaltılmalı, araştırma görevliliği ile akademik hayatına başlayan eğitimcilere öncelik tanınmalıdır.

Üniversitelerin diğer birimlerinde görev alan öğretim üyeleri ile MYO'larda görev alan öğretim üyeleri arasında önlisans ders verme – lisans ders verme ve lisansüstü araştırma yapma amacıyla 3 aşamalı yıllık rotasyonlar uygulanarak ders veren öğretim üyelerinde çeşitlilik sağlanmalıdır. Akademik çalışma yapmak isteyen öğretim üyelerinin MYO'lardaki mevcut bozuk düzen içerisinde bilimsel açıdan yok olmaları engellenmelidir.

MYO'larda öğretim planları güncellenmeli, 3 yarıyıl ders alma döneminden sonra 1 yarıyıl işyeri eğitimi imkânı sağlanmalıdır. Bu eğitim uzatılmış staj süresi gibi düşünülmelidir.

MYO öğrencileri üniversitelerin üvey çocukları gibi görülmemeli; KOSGEB, TÜBİTAK, Kalkınma Ajansları ve İŞKUR ile işbirliği halinde düzenlenecek projelerde görev almaları sağlanmalıdır.

Küçük ilçelerde açılan MYO'lar bir program dahilinde ya büyük ilçe merkezlerinde ya da üniversite kampüsleri içerisinde birleştirilmeli; emek, zaman ve kaynak israfı ortadan kaldırılmalıdır. Böylelikle, öğrenciler için daha iyi barınma, yemek, çalışma, sosyal faaliyet imkanları yaratılabilir.

MYO'larda açılacak programlar ülkemizde gerekli olan ve/veya olması muhtemel iş kollarına ara eleman yetiştirmek niyetiyle detaylı olarak düşünülmeli ve yapılandırılmalıdır.

MYO'lar derme çatma binalarda kurulmamalı, hangi bina boşsa oraya bir yerleşelim sonra yeni bir yer buluruz mantığından derhal vazgeçilmelidir. Yeni bina ve tesislerin projelendirilmesinde ihtiyaçlar ve kullanım şartları iyi etüd edilerek eğitim için uygun binalar inşa edilmelidir. MYO'ların sahip olduğu laboratuvar ve atölyelerin sanayide kullanılan teknolojiye uygun donatılmış olması sağlanmalıdır.

MYO'lara öncelikli olarak öğrenci aktaran mesleki ve teknik orta öğretim kurumlarındaki eğitim sistemleri ile öğretmenleri gözden geçirilmelidir. MYO'na gelen öğrencilerin büyük bir çoğunluğunun temel matematik işlemlerini doğru yapamayacak, düzgün bir cümle yazamayacak, anlaşılır şekilde konuşamayacak seviyede olduğu düşünüldüğünde problemin önceki eğitim dönemlerine ait olduğu rahatlıkla söylenebilir. Bu konuda MEB üzerine düşen iyileştirme çabasını göstermelidir.

SONUÇ

Giderek daha büyük önem kazanan mesleki eğitimin en önemli unsurlarından biri olan meslek yüksekokulları 1,8 milyon öğrencisiyle yükseköğretim sistemimizin önemli bir bölümünü oluşturmaktadır. Kontrolsüz bir büyüme ile açılan birimler yeterli fiziki, teknik ve eğitici altyapısına sahip değildirler.

MYO ve öğrenci sayısındaki büyük patlama beraberinde çözülmesi hiç kolay olmayan bir sorun yumağı oluşturmuştur. MYOlar Avrupa Birliği uyum sürecinin etkisiyle yükseköğretimdeki okullaşma oranının hızla yükseltilmesinde bir araç olarak kullanılmıştır. Yerel siyaset için de elverişli malzeme olmaları, MYO'ların olağanüstü bir hızla çoğalıp yaygınlaşmasını sağlamıştır.

Şimdiye kadar MYOlar ile ilgili sorunlar birçok platformda tartışılmış, çözüm önerileri sunulmuştur. Ancak konunun yükseköğretime ve mesleki ortaöğretim kurumlarına ilişkin politik tartışmalara endeksli olarak yürütmesi çözümsüz kalmasını sağlamıştır. Öğrenci kalitesi - Öğretim elemanı yeterliliği - Fiziki ve altyapı donanımları başlıkları altında toplanabilecek sorunların çözümü hergeçen gün daha da güçleşmektedir.

Türkiye'nin kalifiye ara eleman ihtiyacı vardır. Bu talepler gün geçtikçe daha da artmaktadır. Dolayısıyla mesleki eğitim sorununa ilişkin kısa ve orta vadeli planlarının olmaması yada uygulamaya geçmemesi bu açığında devam edeceğini işaret etmektedir.

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A CONTENT ANALYSIS OF THE PROBLEMS ENCOUNTERED BY TURKISH SMES IN ACCESSING BANK LOANS

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ABSTRACT: Bank credits are very important sources of financing for Turkish SMEs as well as SMEs in the world. Despite this importance, SMEs encounter difficulties in accessing bank loans. In this study, the problems that SMEs face in accessing bank loans are analyzed with content analysis method. As a result of in-depth interviews made with managers responsible for the financing decisions of seven micro-sized SMEs, basic problems are reduced to one main theme and three categories. These three categories are the cautious approach of banks in providing loans to SMEs, high cost of SME loans and problems experienced by SMEs in the lending process.

Key words: SME, bank credit, content analysis

TÜRK KOBİLERİNİN BANKA KREDİLERİNE ERİŞİMDE YAŞADIĞI PROBLEMLERİN İÇERİK ANALİZİ İLE İNCELENMESİ

ÖZET: Tüm dünyada olduğu gibi Türkiye'de de KOBİler için banka kredileri çok önemli bir finansman kaynağıdır. Bu öneme rağmen KOBİler banka kredilerine ulaşma konusunda sıkıntı çekmektedir. Bu çalışmada KOBİlerin banka kredilerine ulaşımında yaşadığı problemler hakkında KOBİ yöneticileriyle yapılan derinlemesine görüşmeler içerik analizi yöntemiyle incelenmiştir. Yedi adet mikro ölçekli KOBİnin finansmandan sorumlu yöneticisiyle yapılan derinlemesine görüşmeler sonucunda temel problemler bir ana tema ve üç kategoriye indirgenmiştir. Bu üç kategoriyi bankaların KOBİlere kredi temininde temkinli davranmaları, KOBİ kredilerinin maliyetlerinin yüksek olması ve KOBİ kredi süreçlerinde yaşanan problemler oluşturmaktadır.

Anahtar sözcükler: KOBİ, banka kredisi, içerik analizi

GİRİŞ

KOBİler tüm dünya ekonomileri için ekonomik büyüme, özel sektörün gelişimi ve istihdam yaratma açısından kritik öneme sahiptir. Dış finansmana ulaşım banka finansmanına bağımlı olan KOBİlerin hayatta kalması ve büyümeleri için önde gelen faktörlerden biridir (Petersen ve Rajan, 1994). Fakat KOBİler büyümeleri önünde önemli bir engel oluşturan finansman kısıtı, diğer bir deyişle banka finansmanına ulaşamama durumuyla karşı karşıyadır. (Hughes, 2009; Mason ve Kwok, 2010; Shen, Shen, Xu ve Bai, 2009). Banka finansmanına ulaşım konusunda yaşanan zorluklar KOBİlerin günlük faaliyetlerini ve büyüme potansiyellerini olumsuz etkilemektedir. Literatürde birçok çalışma KOBİlerin banka finansmanına ulaşımında büyük firmalardan daha fazla engelle karşı karşıya kaldığını tespit etmiştir (Beck, Demirgüç-Kunt, Laeven ve Maksimovic, 2006; Beck, Demirgüç-Kunt ve Maksimovic, 2008; Pissarides, 1999). KOBİlerin yaşadığı bu finansman kısıtının sebebi olarak da küçük firmaların şeffaf olmamaları ve bankaların firmaların kapasitelerini değerlendirmekte zorluk çekmesi gösterilmiştir (Ang 1992; Berger ve Udell, 1998; Gregory, Rutherford, Oswald ve Gardiner, 2005). Bunun yanı sıra KOBİlerin finansal tablolarının büyük firmaların finansal tabloları kadar bilgi içermemesi ve daha önceden aldıkları ve geri ödemesi yapılan kredilerin sayısının da büyük firmalarınkinden daha az olması da finansman kısıtı sebepleri olarak gösterilebilir.

Gelişmekte olan ülkelerin KOBİleri banka finansmanına ulaşmakta gelişmiş ülkelerin KOBİlerine nazaran daha fazla zorluk çekmektedir (Hanedar, Broccardo ve Bazzana, 2014; Menkhoff, Neuberger ve Rungruxsirivorn, 2012). Bu sorun özellikle KOBİlerin çoğunun kayıt dışı faaliyet göstermesiyle ciddiyet kazanmaktadır (OECD, 2006).

Diamond (1991) genç ve küçük firmaların kredi almalarının bankalarla itibara dayalı sermaye yaratacak kadar uzun süreli ilişkilerinin olmamasından dolayı daha zor olduğunu öne sürmüştür. Levenson ve Willard (2000) kredi vermenin sabit maliyetlerinin yüksek olmasından ve bunun da kar marjlarını düşürmesinden dolayı bankaların küçük firmalara kredi vermeyi tercih etmediklerini belirtmişlerdir. Yazarlar küçük firmaların kredi başvurularındaki başarı oranlarının daha düşük olduğunu tespit etmişlerdir. Chakravarty ve Yılmaz (2009) de

firma büyüklüğü ile banka kredisi başvurularındaki başarı oranının arasında pozitif bir ilişki olduğunu tespit etmiştir.

Kon ve Storey (2003) KOBİler arasında banka kredisine ihtiyacı olmasına rağmen kredi alamayacağı düşüncesiyle başvuru yapmayan KOBİleri “cesareti kırılan banka müşterileri” olarak tanımlamıştır. Yazarlar bankaların bilgi asimetrisi probleminden kaynaklanan borç verme kararı sırasında yaptıkları tarama hatalarının firmaların banka kredisi başvurusu yapmak konusundaki cesaretini kırdığını belirtmektedir. Aynı zamanda “cesaret kırılması” durumuyla bankaların yaptıkları tarama hatalarının daha sık yaşandığı az gelişmiş ve gelişmekte olan ülkelerde daha fazla karşı karşıya kalındığından bahsetmişlerdir. Canton (2010) ise firmaların banka kredisine başvurma konusunda cesaretinin kırılması durumunu küçük firmaların daha sıklıkla yaşadığını ve bunun da bu firmaların düzgün muhasebe kayıtlarının olmamasından ve şeffaf olmamalarından kaynaklandığını belirtmişlerdir.

Banka kredilerine ulaşım KOBİler için kritik önemde olduğundan dolayı KOBİlerin banka kredisine erişimde yaşadığı problemlerin detaylı analizi literatüre önemli bir katkı olacaktır. Bu çalışmada KOBİlerin banka kredilerine erişimde yaşadığı problemler üzerine KOBİ yöneticileriyle yapılan derinlemesine görüşmeler içerik analizi ile incelenmiştir. Çalışma dört bölümden oluşmaktadır. İkinci bölümde veri seti ve araştırma yöntemi sunulmuştur. Üçüncü bölümde ampirik bulgulara, dördüncü bölümde ise son değerlendirmelere yer verilmiştir.

VERİ SETİ VE YÖNTEM

Çalışma için İstanbul’da Çağlayan semtinde perakende ticaret sektöründe faaliyet gösteren 7 adet KOBİ ile görüşmeler yapılmıştır. Görüşülen KOBİlerin çalışan sayısı 10 kişiden az olduğu için örnekleme mikro ölçekli KOBİlerden oluşmaktadır. Yöneticileri ile görüşülen KOBİlerle ilgili çalışan sayısı verileri Tablo 1’de sunulmaktadır.

Tablo 1. Yöneticileri ile Görüşülen KOBİlerin Çalışan Sayıları

	Çalışan Sayısı
Firma 1	5
Firma 2	8
Firma 3	9
Firma 4	6
Firma 5	7
Firma 6	7
Firma 7	8

Görüşmeler yarı yapılandırılmış derinlemesine görüşme yöntemiyle gerçekleştirilmiştir. Görüşülen kişiler firmaların finansman kararlarından da sorumlu olan firma sahipleridir. Örnekleme kartopu örnekleme yöntemiyle ulaşılmıştır. Her görüşülen firma sahibinden hangi işletmenin görüşme yapmak isteyebileceği konusunda tavsiye alınmış ve bir sonraki görüşme tavsiye edilen KOBİ yöneticisiyle gerçekleştirilmiştir. Görüşmeler otuz dakika civarında sürmüştür. Görüşmeleri yapan kişi bir soru listesiyle görüşmeye gitse de duruma göre ek sorular sormuştur ve gerektiğinde katılımcılara açıklamak veya eklemek istedikleri noktalar olduğunda fırsat tanımıştır. Yazılı dökümü hazırlanan görüşmeler üzerinde içerik analizi yöntemi uygulanmıştır.

AMPİRİK BULGULAR

Çalışmada KOBİlerin banka kredilerine erişimde yaşadığı problemler bir ana tema, üç kategori ve belirlenen alt kategorilere indirgenmiştir. Ana tema “bankaların KOBİ kredileri ile ilgili yaklaşımları” olarak belirlenmiştir. Ana tema, kategori ve alt kategoriler Tablo 2’de sunulmaktadır.

Bankaların KOBİlere Kredi Temininde Temkinli Davranmaları

Her ne kadar bankacılık sektöründeki rekabet dolayısıyla bankalar piyasa paylarını artırmak için KOBİler ile ilişkilerini güçlendirmeye çalışsa da, bankacılık sektörünün KOBİlerin ihtiyaçlarına cevap vermedikleri belirtilmektedir. KOBİlerin faaliyet gösterdikleri sektörün de bankaların kredi verme kararında önemli olduğu eklenmektedir. Örneğin tekstil sektörü gelirlerin bir süre için iyi olabileceği fakat sonrasında işlerin kolaylıkla

Tablo 2. Ana Tema, Kategoriler ve Alt Kategoriler

Tema 1	Bankaların KOBİ kredileri ile ilgili yaklaşımları
Kategori <i>Alt Kategoriler</i>	Bankaları KOBİlere kredi temininde temkinli davranmaları <i>Bankaların KOBİleri destekleme hedefinin olmaması</i> <i>Bankaların küçük ölçekli ve genç KOBİlere kredi vermek istememesi</i> <i>Ekonomik kriz dönemlerinde bankaların KOBİlere katı yaklaşımı</i>
Kategori <i>Alt Kategoriler</i>	KOBİ kredilerinin maliyetlerinin yüksek olması <i>Bankaların yüksek faiz oranları talep etmesi</i> <i>Bankaların KOBİlere çıkardığı ekstra masrafların KOBİleri zor durumda bırakması</i>
Kategori <i>Alt Kategoriler</i>	KOBİ kredileri süreçlerinde yaşanan problemler <i>KOBİlerin kredi maliyetleri hakkında yeteri kadar bilgilendirilmemeleri</i> <i>KOBİlerin kredi temini aşamasında imzaladıkları evrakların içeriği hakkında bilgilendirilmemeleri</i> <i>Bankaların kredi temini kriterleri hakkında bilgi vermemesi</i>

ters gidebildiği bir sektör olduğu için riskli bir sektör olarak görülmektedir. Bu nedenle bankalar tekstil sektöründe faaliyet gösteren KOBİlere kredi verme konusunda temkinli yaklaşmaktadır.

Bankaların KOBİleri Destekleme Hedefinin Olmaması

Bankacılık sektörünün “KOBİ Bankacılığı” ismiyle yeni bir oluşum amacı güttüğü belirtilmesine rağmen aslında sektörün KOBİleri desteklemeyi hedeflemediği öne sürülmektedir. KOBİ yöneticileri bankaların hedefinin tüketimi değil üretimi desteklemek olması gerektiğini belirtmektedir.

Bankaların Küçük Ölçekli ve Genç KOBİlere Kredi Vermek İstememesi

Küçük ölçekli KOBİler bankalar tarafından riskli görüldüğü için kredi müşterisi olarak pek tercih edilmemektedir. Bankalar yeni kurulmuş ve çok genç firmalara da kredi verme taraftarı değildir. Kredi müşterisi olarak daha çok sanayi firmalarının tercih edildiği eklenmiştir. Banka kredisine ulaşım zor olduğu için KOBİlerin kuruluş aşamasında firma sahiplerinin koyduğu sermayeyi kullandığına işaret edilmektedir.

Bankaların küçük KOBİlere KOBİ kredisi yerine ihtiyaç kredisi vermeyi teklif ettikleri belirtilmektedir. Bir KOBİ yöneticisi bu konuyu şöyle açıklamıştır:

“Bankacılar küçük firmaların KOBİ kredisi yerine ihtiyaç kredisi almasının daha uygun olacağını, böylece KOBİ kredisinin teferruatlarıyla da uğraşmaya gerek kalmayacağını belirtmektedir. Bankacı ve KOBİ kredi ihtiyaç miktarını belirler ve bilanço, gelir tablosu, mizan ve diğer gerekli evrakların teslimine gerek kalmadan KOBİye ihtiyaç kredisi sunulur.”

Küçük firmalar arasında Kon ve Storey'nin (2003) literatüre kavram olarak kattığı “cesareti kırılan banka müşterileri”nin varlığından bahsedilmektedir. Küçük ölçekli KOBİler içinde kredi alamayacağı düşüncesiyle banka kredisine başvurmayan firmalar vardır. Bir yönetici bu durumu şöyle açıklamıştır:

“Küçük ölçekli KOBİler içinde “Gitsem başvursam bile bana zaten kredi vermezler.” diyenler var. Bu KOBİ sahipleri kendine güvenmez, kendini küçük görür. Bu kişilerin hem bilgisi azdır, hem de kendilerini ifade etmekte zorlanırlar.”

Ekonomik Kriz Dönemlerinde Bankaların KOBİlere Katı Yaklaşımı

KOBİ yöneticileri bankaların ekonomik kriz dönemlerinde KOBİlere karşı oldukça katı davrandığından bahsetmektedir. Bir KOBİ yöneticisi bu durumu şöyle açıklamıştır:

“Bankalar güneşte açtıkları şemsiyeyi yağmurda kapatıyorlar.”

Yöneticiler bankaların ekonomik kriz dönemlerinde KOBİlere kredi temin etmediğinden ve faizler arttığı takdirde faiz artışı talep ettiklerinden veya krediyi geri çağırdıklarından bahsetmektedirler.

KOBİ Kredilerinin Maliyetlerinin Yüksek Olması

Görüşmelerde KOBİlerin kredi kullanma maliyetlerinin yüksek olduğu belirtilmiştir.

Bankaların Yüksek Faiz Oranları Talep Etmesi

Görüşülen KOBİ yöneticileri KOBİlere temin edilen kredilerin faiz oranlarının büyük firmalara temin edilen kredilerin faiz oranlarından her zaman bir miktar daha yüksek olduğunu belirtmektedir.

Bankaların KOBİlere Çıkardığı Ekstra Masrafların KOBİleri Zor Durumda Bırakması

Bankalar KOBİlere çıkardıkları ekstra masraflarla KOBİlerin bank kredisi başvurusu yaparken çekingen davranmasına neden olmaktadır. Görüşülen KOBİ yöneticileri bankaların aldığı hesap cüzdanı yazdırma ücreti, hesap işletim ücreti, dosya masrafı, POS hizmet ücreti ve düşük ciro ücreti gibi ücretlerin KOBİleri zorladığını belirtmektedir. KOBİler özellikle POS cihazından geçen cironun belli bir rakamın üzerine çıkmaması durumunda alınan düşük ciro ücretine olumlu yaklaşmamaktadır.

KOBİ Kredileri Süreçlerinde Yaşanılan Problemler

Görüşme katılımcıları kredi temini sürecinde yaşadıkları problem ve zorlukların da KOBİler açısından önemli olduğunu vurgulamıştır.

KOBİlerin Kredi Maliyetleri Hakkında Yeteri Kadar Bilgilendirilmemeleri

Yöneticiler banka kredisi alsalar dahi kredi maliyetleri hakkında bankalar tarafından yeteri kadar bilgilendirilmediklerinden bahsetmektedirler. KOBİler bu nedenle aldıkları kredinin gerçek maliyetini tam olarak bilememektedir. Görüşülen yöneticilerden biri bu durumu şöyle ifade etmiştir:

“Reklamlardaki okunamayacak kadar küçük harfli altyazılarda kredi maliyetleri ile ek ve çok önemli bilgiler olmasına rağmen birçok KOBİ bu yazıları okuyamamakta ve anlayamamaktadır”.

KOBİler faiz oranlarının bile tam anlaşılmadığından ve maliyetle ilgili bilgilerin KOBİlere net bir şekilde verilmesi gerektiğinden bahsetmektedir.

KOBİlerin Kredi Temini Aşamasında İmzaladıkları Evrakların İçeriği Hakkında Bilgilendirilmemeleri

Görüşmelerde bankaların KOBİlere açıklama yapmadan birçok evrak imzalattığı ve KOBİlerin bu evraklardaki içeriği bilmediğine işaret edilmiştir. Bir yönetici durumu şöyle açıklamıştır:

“Bankalar KOBİlere kredi verirken ne olduğu anlaşılmayan birçok evraka imza attırıyorlar. Daha sonrasında bankaların bir takım talepleri karşısından KOBİler “Bunları neden istiyorsunuz?” şeklinde soru yöneltince banka görevlilerinin cevabı “Daha önce bununla ilgili bir belge imzalamıştınız.” olabiliyor.”

Bankaların Kredi Temini Kriterleri Hakkında Bilgi Vermemesi

Bankalar kredi kararında hangi kriterleri kullandıkları konusunda da KOBİlere bilgi vermemektedir. KOBİ yöneticileri bankaların KOBİ kredisi kararlarını neye göre verdikleri konusunda bilgi sahibi olmak istediklerini belirtmektedirler.

SONUÇLAR

Bu çalışmada KOBİlerin banka kredilerine erişimde yaşadığı problemler hakkında KOBİ yöneticileriyle yapılan yarı yapılandırılmış derinlemesine görüşmeler içerik analizi yöntemi ile incelenmiştir. Çalışma için İstanbul’da faaliyet gösteren yedi adet mikro ölçekli KOBİ’nin finansmandan sorumlu yöneticisi ile görüşmeler yapılmıştır. İçerik analizi sonucunda banka kredileri ile ilgili yaşanan problemler dört kategoriye indirgenmiştir. Bu kategoriler bankaların KOBİlere kredi temininde temkinli davranmaları, KOBİ kredilerinin maliyetlerinin

yüksek olması ve KOBİ kredi süreçlerinde yaşanan problemlerdir. Yöneticiler bankaların küçük ölçekli ve henüz yeni kurulmuş KOBİlere kredi vermek istemediğini belirtmektedirler. Ekonomik kriz dönemlerinde KOBİlerin bankaların katı tutumlarıyla karşı karşıya kaldığına işaret edilmektedir. Bankaların KOBİlerden büyük firmalara göre daha yüksek faiz talep ettiği ve çıkardıkları ekstra masrafların KOBİler için ek yük oluşturduğu belirtilmektedir. Ayrıca bankaların KOBİ kredileri temini sürecinde kredi maliyetleri konusunda yeteri kadar bilgi vermediğinden, imzalatılan evrakların içeriğinin açıklanmadığından ve bankaların kredi kararında göz önüne alınan kriterler hakkında bilgilendirme yapmadıklarından bahsedilmektedir.

Bu çalışmada görüşmeler küçük çaplı bir örneklem ile gerçekleştirildiği için çalışmanın daha geniş bir örneklemle tekrarlanması gelecekte yapılabilecek araştırmalara güzel bir örnektir. Bu çalışma sadece perakende ticaret sektöründe faaliyet gösteren KOBİler üzerinde yapıldığı için farklı sektörlerden KOBİler de gelecekte yapılacak çalışmaların örneklemine dahil edilmelidir. Bunun yanı sıra analizin mikro ölçekli KOBİler dışında küçük ve büyük ölçekli KOBİler ile de yapılması farklı ölçekteki KOBİlerin yaşadığı problemlerde farklılıklar olup olmadığının anlaşılması için önemli olacaktır.

Teşekkür

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EFFECT OF VARIOUS FIBER MIXTURE COMBINATIONS ON THE MECHANICAL PROPERTIES OF POLYAMIDE 6 AND 6.6 MATERIALS

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ABSTRACT: Nowadays, thermoplastic composites have increasingly wide application areas due to their high stiffness and impact strength properties, superior fracture toughness, long duration of raw material shelf life and ease of production processes. Besides, they provide safer work environment. In this study, the effect of fiber mixture on the mechanical properties of two types of thermoplastic composites widely used in the industry, namely, polyamide 6 and polyamide 6.6 are investigated by varying the amount of fiber glass reinforcement.

Non-reinforced, 15 percent reinforced and 30 percent reinforced polyamide 6 and polyamide 6.6 samples are produced at Ege University Plastics Technology Department using plastic injection molding method and are subjected to tensile testing at five different pulling speeds using the Tensile Testing Device located in Dokuz Eylül University, Mechanical Engineering Department. The results obtained from testing and those gathered from the plastics manufacturer company are compared with data obtained from the literature. It is observed that the experimental results were highly consistent with those in literature.

According to these results, especially at high pulling speeds, the positive effect of the fiber glass reinforcement is observed. In this way, the different types of unreinforced and fiber glass reinforced polyamide 6 / polyamide 6.6 samples behavior under tensile loading and their respective tensile properties have been determined. In order to gain an understanding of the effect of the overall testing procedure for all speeds, stress – strain graphics are constructed.

Key words: polyamide 6, polyamide 6.6, thermoplastic, pulling speed, glass fiber composites

POLYAMİD 6 VE 6.6 MALZEMELERDE FARKLI ELYAF KARIŞIM KOMBİNASYONLARININ MEKANİK ÖZELLİKLERE ETKİSİ

ÖZET: Termoplastik kompozitler, yüksek sertlik ve çarpma dayanımı özellikleri, üstün kırılma tokluğu, hammaddenin raf ömrünün uzunluğu ve sertleşme prosesi kolaylığı gibi sebeplerden ötürü günümüzde giderek daha geniş bir uygulama alanına sahip olmakla beraber daha güvenli çalışma ortamı da sağlamaktadırlar. Buradan yola çıkarak bu çalışmada, termoplastik kompozitlerin örneklerinden olan ve endüstride yaygın olarak kullanılmakta olan polyamid 6 ve polyamid 6.6 malzemelerinin cam elyaf katkısıyla orantılı değişen mekanik özellikleri incelenmiştir.

Ege Üniversitesi Plastik Teknolojileri Bölümünde bulunan plastik enjeksiyon makinesinde üretilen ve Dokuz Eylül Üniversitesi Makina Mühendisliği Bölümü'nde bulunan çekme cihazında deneye tabi tutulan katkısız, yüzde 15 katkılı ve yüzde 30 katkılı polyamid 6 ve polyamid 6.6 numuneleri, belirlenen beş farklı çekme hızında çekilerek sonuçlar incelenmiştir. Gerek firma verilerinden alınan değerlere göre, gerekse literatürden elde edilen verilere bakıldığında, deney sonuçları yüksek oranda tutarlı çıkmıştır.

Bu sonuçlara göre cam elyaf katkısının malzemenin mukavemetine olumlu etkisi, özellikle yüksek çekme hızlarında belirginleşerek daha rahat gözlemlenmiştir. Bu sayede polyamid 6 ve polyamid 6.6 malzemelerinin farklı cam elyaf katkı oranlarındaki türevlerinin kuvvet altındaki davranışları ile mekanik özellikleri ortaya konulmuştur. Sonuçlar yorumlanırken tüm numunelerin tüm hızları için gerilme – uzama grafikleri oluşturulmuş ve malzeme davranışı tüm numuneler için incelenmiştir.

Anahtar sözcükler: polyamid 6, polyamid 6.6, termoplastik, çekme hızı, cam elyaf kompozitler

GİRİŞ

Teknolojinin hızla gelişmesi, sanayinin temel gereksinimi olan malzeme bilimi üzerindeki gelişmeleri de beraberinde getirmektedir. Ancak yeryüzünde bulunan malzemeler, gün geçtikçe gelişen teknolojiye ayak uyduramamakta ve ihtiyaçları istendiği düzeyde karşılayamamaktadır. Bu durum insanları farklı malzeme kombinasyonları ile oluşturulan ve istenen özellikli tek bir malzeme bulma arayışına itmiştir. Bu yüzden de seri üretim yapan makineler, otomobil, gemi, tren, uçak gibi ulaşım araçları, uzay araçları, makina parçaları için daha hafif, daha mukavemetli ve daha ekonomik malzemelerin geliştirilmesi büyük önem kazanmıştır.

Yeryüzünde bulunan ve sanayide kullanılan her malzemenin bir diğerine göre hem avantajı, hem de dezavantajı vardır. Bu dezavantajları mümkün olduğunca minimuma indirebilmek için ise, kompozit malzemeler geliştirilmiştir. Yani; iki veya daha fazla malzemenin, istenilen özellikte ve ihtiyaca uygun yeni bir malzeme oluşturabilmek için belirli şartlar ve oranlarda fiziksel olarak makro yapıda birleştirilmesi ile elde edilen malzemeye kompozit malzeme denir. Kompozit, sözlük anlamı olarak da “değişik tarzları bir arada taşıyan” anlamına gelmektedir.

Elyaf katkılı termoplastik bileşikler birçok geleneksel yöntemle elde edilebilmektedir. Bu kompozitler, birçok mühendislik uygulamasında metallerin tamamlayıcısı rolünde kullanılabilir, çünkü kompozit malzemeler istenilen şekilde üretilmekte olan hafif ve ekonomik malzemelerdir. Ancak malzeme hatalarına ilişkin sorunlar vardır. Bu hatalar, matris, elyaf veya elyaf/matris ara yüzü olmak üzere üç grupta toplanabilir. Kısa elyaflar içeren termoplastik kompozitlerin mekanik özellikleri, daha fazla dikkat istemektedir. Kompozitin mekanik özellikleri; elyaf ve matris kombinasyonları, matris özellikleri, elyaf/matris ara yüzünden gerilim transferi tarafından etkilenmektedir. Bunun yanında imalat yöntemleri, enjeksiyon şartları, sıcaklık ve dizayn da mekanik özellikler üzerinde büyük etki sahibidir (Bouchaib, Abdellatif, Nouredine, Salim ve Abdellatif, M., 2006).

En bilinen örneklerden olan misina, diş fırçası, elyaf, otomotiv yan sanayii parçaları, dişli, tekerlek gibi oldukça fazla kullanım alanına sahip ürünlerin hepsi, bu çalışmada kullanılan polyamid malzemeler ile imal edilmektedir. Dolayısıyla bu çalışma ile oldukça büyük bir öneme sahip termoplastiklerden olan polyamid 6 ve polyamid 6.6 malzemelerinin mekanik mukavemetlerinin cam elyaf katkı oranı ile ne şekilde değiştiği incelenmiştir.

Kompozit Malzemeler

Kompozit malzemeler genellikle üç gruba ayrılır. Bunlar metallere, seramiklere ve polimer malzemelerdir. Bu üç grubun birbirlerine göre üstün ve zayıf yönleri vardır. Tablo 1’de gösterilen, dayanım ve tokluk özellik çiftinin en uygun olduğu grup olan metallere makina mühendisliğinde en yaygın olarak kullanılan malzeme türüdür (Aran, 1990).

Tablo 1. Metal, Seramik ve Plastik Malzeme Özelliklerinin Karşılaştırılması

Malzeme Grubu	Yoğunluk	Dayanım	Tokluk	Isıl Kararlılık	Biçimlendirme	Birleştirme
Metaller	Orta Yüksek	Orta	İyi	Orta	Orta	Orta
Seramikler	Düşük Yüksek	Yüksek	Düşük	Yüksek	Kötü	Kötü
Plastikler	Düşük	Düşük	Düşük	Düşük	İyi	İyi

Polimer kompozit malzemelerin yoğunluğunun az olması, hacim bazında düşünüldüğünde önemli üstünlükler sağlamaktadır. Bu nedenle, ağırlığın kritik olduğu bütün sektörlerde olduğu gibi, örneğin uzay ve otomotiv sanayilerinde, polimer kompozit malzeme vazgeçilemez bir eleman olarak kullanılmaktadır.

Kompozitlerin Sınıflandırılması

Matris malzemelerine göre metal, seramik ve polimer olarak sınıflandırdığımız kompozit malzemelerin, matrislerine göre sınıflandırılma kategorisine ek olarak karbon ve nano matrislerini de ekleyebiliriz. Matrislerine göre kullanım alanlarına örnek vermek istersek:

- Metal matrisli kompozitler: Bu tip kompozitler yaygın olarak otomotiv, havacılık ve savunma sanayinde kullanılmaktadır.
- Seramik matrisli kompozitler: Son yıllardaki çalışmalar ile roket başlığı, uzay araçları, zırhlar, askeri amaçlı parça imali gibi kullanım alanlarına ek olarak insan vücudunda da biomalzeme olarak kullanılmaya başlanmıştır.
- Polimer matrisli kompozitler: Korozyon direnci sebebiyle denizcilik uygulamaları, hafifliği sebebiyle otomotiv ve diğer taşımacılık endüstrileri, spor malzemeleri, iç dekorasyon gibi alanlarda yoğunlukla kullanılmaktadır.
- Karbon matrisli kompozitler: Roket ağızlarında, uzay araçlarında bulunan kalkanlarda, debriyaj ve fren balatalarında kullanılmaktadır.
- Nano matrisli kompozitler: Kompozitlerin mekanik, yanmazlık ve ısı özelliklerini geliştirmektedir.

Kompozitleri yapı bileşenlerinin şekline göre sınıflandırmak istersek, bunu beş ayrı sınıfta yapabiliriz:

- Partikül takviyeli kompozitler; makroskobik veya mikroskobik parçacıkların matris ile oluşturdukları malzemelerdir.
- Fiber takviyeli kompozitler; anizotropik yapıya sahiptirler, yükü fiberlere iletir ve yükü fiberler taşır.
- Levhasal kompozitler; fazı içinde levha şekilli takviye elemanlarından oluşan kompozitlerdir.
- Tabakalı kompozitler; farklı bileşenli plakaların sandviç şeklinde birleştirilmesi ile elde edilir.
- Doldurulmuş kompozitler; iskelet bir yapıya sahip takviye malzemesi formunun doldurulması ile üretilen kompozitlerdir.

Polimer Matrisli Kompozitler

Bu araştırmada kullanılan cam elyaf katkılı polyamidler termoplastik polimer matrisli kompozit sınıfına girmektedirler. Polimerler yüzlerce monomerin kovalent bağlarla birleşerek oluşturduğu makro moleküllerdir. Monomer ise küçük mol kütleli kimyasal maddelere verilen isimdir.

Polimerler; elastomerler, termosetler ve termoplastikler olmak üzere üç gruba ayrılmaktadırlar. Termoplastik malzemelerin en önemli özelliği, yeniden ısıtıldıklarında viskozitelerinin düşmesi ile akışkan hale gelip yumuşayarak yeniden şekillendirilebilmeleridir. Bu ısı alışverişi termoplastik malzemenin kimyasal özelliklerini değiştirmez. Yani termoplastikler çevre açısından daha az zararlı, geri dönüşümlü malzemelerdir.

Çalışmamızda kullanılan ve piyasa dilinde naylon olarak da bilinmekte olan polyamidler, yüksek kristal yapıya sahip, bünyesinde amid bağları (CO-NH) bulunduran, molekül ağırlığı yüksek olan lineer polimerlerdir. Polyamidler mühendislik plastiklerinin en önemli gruplarından birini oluşturur. Aynı zamanda bir dibazik asitle bir diaminin yoğunlaşma polimerleşmesiyle de elde edilebilirler. Yaygın olarak tekstil, otomotiv, dokumacılık ve spor aletleri sektörlerinde kullanılmaktadır.

Naylonların en önemli özellikleri yüksek mekanik dayanım, aşınma direnci, yüksek üst sıcaklık limiti ve düşük sürtünme katsayısıdır. Naylonlar pahalıdır ve daha çok özel karakteristikleri yönünden kullanılırlar. Yüksek basınçlı hortum, konveyör kayışları, dirençli şişeler, aşınma dirençli kablo kılıfları naylondan elde edilir. Cam elyaf katkısı ile mekanik dayanımı ve ısıl bozulma sıcaklığı yükseltilebilir.

Fiber Takviyeli Kompozitler

Yumuşak ve sünek matris içine sert, dayanıklı, elastisite modülü yüksek fiberler ilave edildiğinde çekme dayanımı, yorulma dayanımı ve elastisite modülü özellikleri iyileştirilir. Matris malzemesi kuvvetleri elyaflara transfer ederek tokluk özelliği sağlarken elyaf uygulanan yükün çoğunu taşımaktadır. Elyaf, örme veya şerit fitil halinde olabilmekle beraber tabakalar halinde yönlü elyaflarda da kullanılmaktadır. (Karadeniz, 2006)

Fiberler, ya da yaygın diğer kullanım adlarıyla lifler veya elyaflar, kompozit malzemelerin en önemli mukavemet elemanlarıdır. Bunun sebebi ise kompozitin taşıdığı yükü üstlenmelerinden kaynaklanmaktadır. Kompozitlerde kullanılan başlıca fiberleri 6 başlık altında inceleyebiliriz:

1. Karbon elyaflar
2. Bor elyaflar
3. Silisyum – Karbür elyaflar
4. Alümina elyaflar
5. Aramid elyaflar

6. Cam elyaflar

Bu araştırmada kullanılan cam elyafın esasını silisyum (SiO₂) meydana getirmekle beraber belirli oranlarda sodyum, kalsiyum, alüminyum, bor ve demir gibi elementlerin oksitlerinden oluşur. Polimer esaslı kompozitlerde yaygın olarak kullanılan ve en ucuz olan takviye elemanıdır. Cam elyaflar birçok özelliği ile sanayide her geçen gün daha fazla yer almaktadır.

Kompozit Üretim Yöntemleri

Kompozit malzemeler genellikle matris adı verilen ana faz ile fiber olarak adlandırılan ikincil fazların istenilen oranda ve tertipte fiziki karışımı ile üretilirler. Monotolik (tek fazlı) yapıların dışında kalan bütün yapılar heterojen (kompleks fazlı) yapılardır. O halde monotolik malzemeler dışında kalan bütün malzemeler kompozit grubuna girer (Güleşen, 2005).

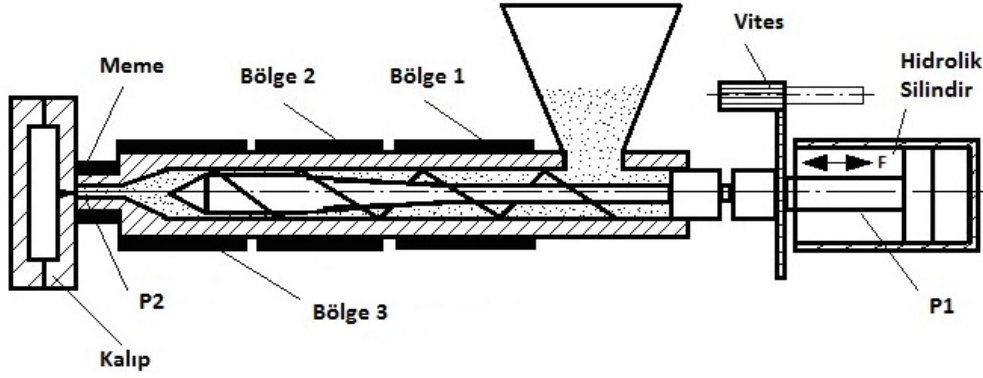
Makroskobik yapıda birbirinden bağımsız iki ya da daha fazla malzemenin uygun koşullarda bir araya gelmesiyle oluşan kompozit malzemeler, eğer mikroskobik yapıda birleştirilirse kompozit olarak tanımlanamazlar. Bu yüzden metal alaşımları veya polimer karışımları kompozit olarak adlandırılmamakta ve sınıflandırılmamaktadırlar. Daha önce de tanımını yaptığımız üzere kompozitleri meydana getiren bileşenler, istenen çalışma koşullarına en uygun malzemelerden seçilmektedir. Örneğin; hafif olması istenen, aynı zamanda da yüksek mukavemete sahip olması beklenen bir malzemede metaller yerine kompozitler kullanılabilir. Ancak aynı anda hafiflik, rijitlik, aşınma direnci, yorulma ömrü, elektriksel iletkenlik, ısı direnci gibi bütün özellikler aynı anda sağlanamaz. Bu yüzden kullanım alanına göre istenen özellik artırılır. İstenilen özelliklere sahip bir kompozit elde edilebilmesi için birçok kompozit üretim yöntemi bulunmaktadır. Bunlardan en bilinenleri ise şunlardır (Anonim-a, b.t):

- El yatırması metodu
- Püskürtme metodu
- Reçine enjeksiyon metodu
- Hazır kalıplama bileşimleri metodu
- Elyaf sarma metodu
- Savurma döküm metodu
- Profil çekme metodu
- Sürekli levha üretim metodu
- Preslenebilir takviyeli termoplastik metodu
- Uzun elyaf takviyeli termoplastik metodu
- Termoplastik enjeksiyon metodu

Termoplastik Enjeksiyon Metodu

Üretilecek parçaların şekline göre kullanılan yöntemler farklılık göstermekte iken, karmaşık şekilli ürünlerin kalıplanmasında enjeksiyon makineleri kullanılmaktadır. Profil şeklinde üretilecek parçalar ise ekstrüzyon makineleri ile üretilmektedir.

Hem enjeksiyon hem de ekstrüzyon makineleri malzemenin ergitilip istenilen şekle getirilmesi yönünden benzer şekilde çalışmaktadır. Enjeksiyon için besleme haznesinden granül olarak beslenen makina ve içine verilen malzeme, ısıtma bölgesinde homojen bir karışım halinde akışkan hale getirilir. Buradan da çıkış ucuna iletilir. Çıkış ucuna iletilen ergimiş malzeme, çıkış memesinin hemen yanında bulunan kapalı kalıp içerisine enjekte edilir. Buradaki kapalı kalıp içinde soğuması ve sertleşmesi sağlanan malzeme, daha sonra kalıptan çıkartılır. Şekil 1, termoplastik enjeksiyon metodunu göstermektedir.



Şekil 1. Termoplastik Enjeksiyon Metodu

DENEYSEL ÇALIŞMA

Yapılan çalışmada cam elyaf katkısının termoplastik malzeme üzerine etkisini yorumlayabilmek amacıyla katkılı ve katkısız polyamid malzemeler kullanılmıştır. Bu malzemeler şunlardır:

- 1-) Katkısız Polyamid 6
- 2-) %15 Katkılı Polyamid 6
- 3-) %30 Katkılı Polyamid 6
- 4-) Katkısız Polyamid 6.6
- 5-) %15 Katkılı Polyamid 6.6
- 6-) %30 Katkılı Polyamid 6.6

Bahsi geçen bu altı malzeme hakkında daha sağlıklı yorum yapabilmek adına tedarikçi firmalardan gerilme dayanımı, kopma uzaması ve elastisite modülü değerleri alınmıştır. Tablo 2, bu değerleri göstermektedir.

Tablo 2. Polyamid 6 ve Polyamid 6.6 Firma Verileri (Anonim-b, c, d, e, f, g, b.t)

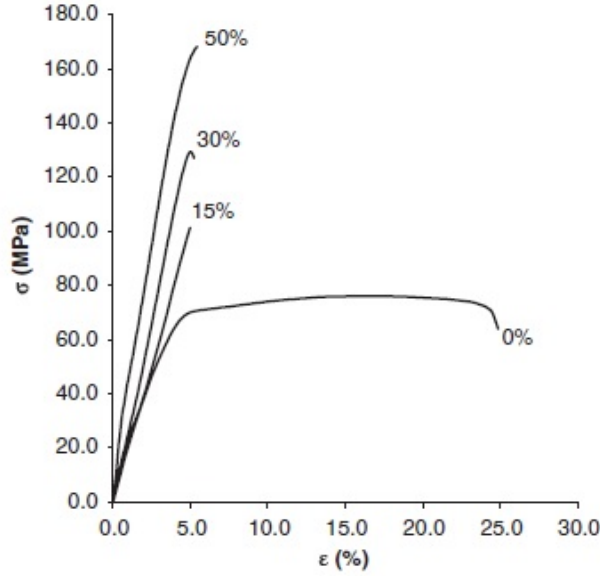
MALZEME İSMİ	FİRMA ADI	MAKSİMUM GERİLME	KOPMA UZAMASI	ELASTİSİTE MODÜLÜ
POLYAMİD 6	TECOMID	70 MPa	...	3500 MPa
POLYAMİD 6 %15 KATKILI	EPLAMID	70 MPa - 110 MPa	%5 - %11	3800 MPa - 4900 MPa
POLYAMİD 6 %30 KATKILI	AKULON	80 MPa	%3.6	6900 MPa
POLYAMİD 66	ULTRAMID	50 MPa - 85 MPa	%5 - %20	1100 MPa - 3100 MPa
POLYAMİD 66 %15 KATKILI	VYDYNE	83 MPa - 130 MPa	%3 - %11	4300 MPa - 6700 MPa
POLYAMİD 66 %30 KATKILI	UPAMID	> 130 MPa	> %3	> 6500 MPa

LİTERATÜR TARAMASI

Şekil 2'de verilen grafik bize öncelikle katkısız polyamid 6.6'nın sünek bir yapıda, elyaf katkılı olanların ise gevrek bir davranışta olduğunu göstermektedir. Aynı zamanda bu grafik bize net bir şekilde elyaf katkısının çekme mukavemetini ve elastik modülü arttırdığını göstermektedir. Tablo 3 ise farklı katkı oranlarındaki polyamid 6 malzemesi için maksimum gerilme ve elastisite modül değerlerini bize göstermektedir (Bouchaib, Abdellatif, Nouredine, Salim ve Abdellatif, M., 2006).

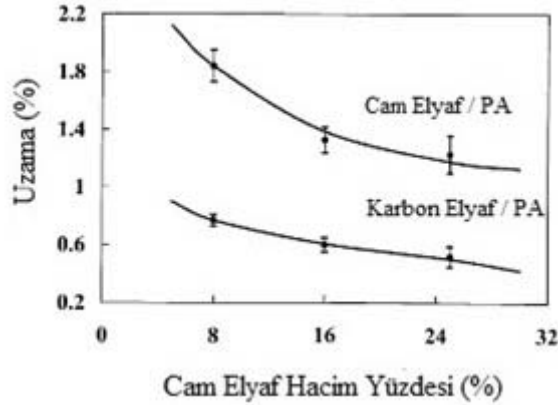
Tablo 3. Çeşitli Katkı Oranlarındaki Polyamid 6.6 Mukavemet Değerleri

	Maksimum Gerilme (MPa)	Elastisite Modülü (MPa)
Polyamid 6.6 %0 Katkılı	32.8	2079.1
Polyamid 6.6 %15 Katkılı	88.6	3609.6
Polyamid 6.6 %30 Katkılı	179	4791.7
Polyamid 6.6 %50 Katkılı	170.7	6320



Şekil 2. Çeşitli Katkı Oranlarındaki Polyamid 6.6 Gerilme – Uzama Grafiği

Çekme mukavemetlerinin incelendiği 2000 yılına ait başka bir çalışmada, uzama yüzdesinin elyaf katkı oranı arttıkça azaldığı belirtilmiştir. Deneyde kullanılan cam elyafın mekanik özelliklerini Tablo 4'te verirken, bununla beraber uzama ile elyafın hacimsel oranının değişimi de Şekil 3'te verilmiştir (Fu, Lauke, Mader, Yue ve Hu, 2000).



Şekil 3. Cam Elyaf Hacim Yüzdesi – Uzama Grafiği

Son olarak 2000 yılında yapılan bir diğer çalışmada, polyamid 6 malzemesinde %0, %10, %20 ve %30 cam elyaf katkı oranları için mekanik özellikler belirtilmiştir. Bu özellikler, Tablo 4.6'da gösterilmektedir (Wu ve diğer, 2000).

Tablo 4. Çeşitli Katkı Oranlarındaki Polyamid 6 Mukavemet Değerleri

	Maksimum Gerilme (MPa)	Elastisite Modülü (MPa)	Uzama (%)
Polyamid 6 %0 Katkılı	51.8	1073	276.3
Polyamid 6 %10 Katkılı	60.7	2164	20.3
Polyamid 6 %20 Katkılı	78.9	3158	7.93
Polyamid 6 %30 Katkılı	96.2	4321	5.63

Deney Yöntemi

Yapılan çalışmada altı farklı malzemenin mekanik özelliklerinin doğru bir şekilde elde edilebilmesi adına her bir numune 10 mm/dk çekme hızında üçer defa Shimadzu çekme makinasında çekilmiştir. Deneyin yapılışında deney numunesinin ortasında 50 mm aralıkla iki adet çizgi çizilip, makinanın çeneleri arasında sabitlenmiştir.

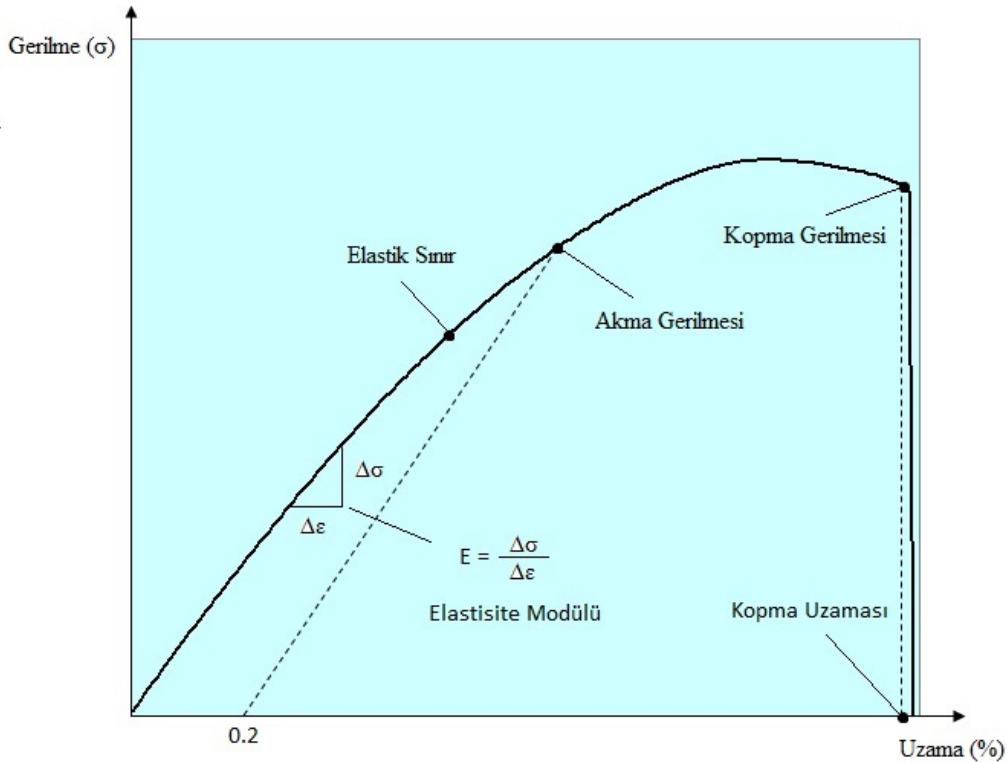
Çekme makinasının kamerası, çizilen iki adet çizgiyi yansısız şekilde görecektir şekilde ayarlandıktan sonra milimetrenin binde biri hassasiyetinde her bir numune için kalibre edilmiştir. Deney esnasında bilgisayara extensometre, stroke, kuvvet ve saniye verileri anbean aktarılmıştır. Katkısız polyamid 6 numuneleri hariç tüm deneyler numuneler kopana kadar sürdürülmüştür.

Hesap Yöntemi

Malzeme özelliklerinin belirlenmesi için uygulanan çekme deneyinde kullanılan malzeme türleri, iki çeşide indirgenebilir. Bunlar akma dayanımı belirgin olan malzemeler ile akma dayanımı belirgin olmayan malzemelerdir. Belirgin akma davranışı göstermeyen malzemelerde %0.2 plastik şekil değişimine sebep olan gerilme değeri akma dayanımı olarak adlandırılır. Bazı özel durumlarda kalıcı şekil değişim sınırı %0.2 yerine %0.1 veya %0.5 alınabilir. Fakat bu durumların belirtilmesi gerekir (Şahin, 2010).

Deney verilerine göre hesaplanan elastisite modülü, akma gerilmesi, kopma uzaması ve maksimum gerilme değerleri genel mukavemet denklemleri kapsamında elde edilmiştir. Şekil 4'te hesap yönteminin bölgesel gösterimine ait gerilme – uzama grafiği verilmiştir. Buna göre;

- Elastisite modülü; malzemenin elastiklik oranını niteleyen bu modül, malzeme üzerindeki normal gerilmenin birim şekil değiştirmeye oranı ile hesaplanmaktadır.
- Akma gerilmesi; deney sırasında uygulanan kuvvetin sabit kalmasına karşılık malzemenin yüksek düzeyde şekil değiştirip deformasyona uğradığı gerilmeyi temsil eder. Polimer esaslı malzemeler için numunenin %0.2'lik uzaması baz alınarak hesaplanmıştır.
- Kopma uzaması; numunenin yük taşıyamayacak hale gelip koptuğu anda bilgisayara aktarılan verilere göre mevcut uzama miktarı göz önüne alınarak hesaplanmıştır.
- Maksimum gerilme; birim alana etkiyen maksimum yükleme durumunu temsil eder ve deney numuneleri için de uygulabilen maksimum kuvvetin kesit alanına bölünmesi ile elde edilmiştir.



Şekil 4. Hesap Yöntemine Ait Gerilme – Uzama Diyagramı

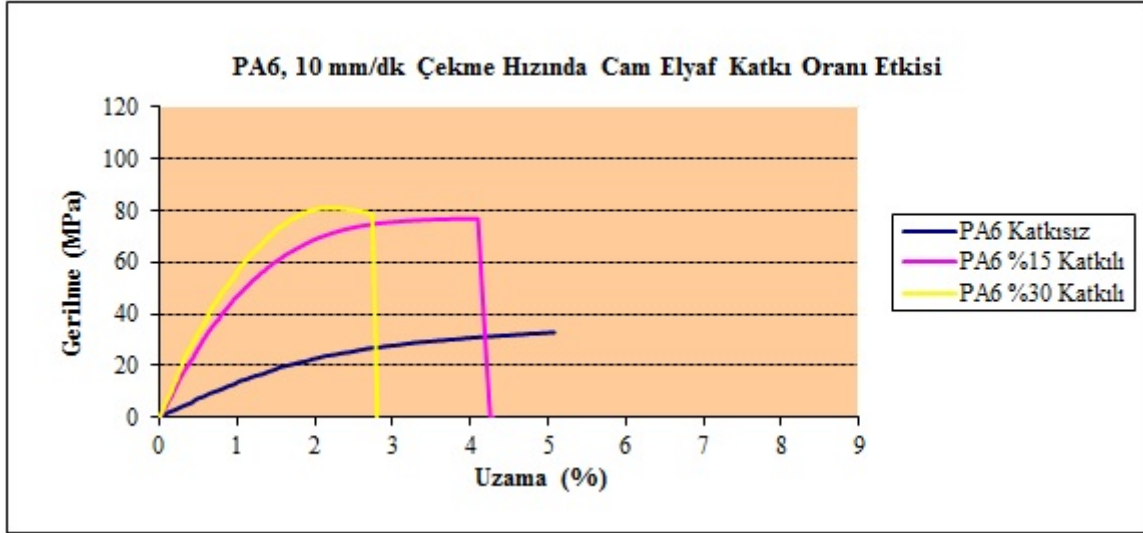
DENEY SONUÇLARI

Polyamid 6'ya ait üç farklı cam elyaf katkı durumu ve bütün durumlar için üçer deney numunesi ile yapılan deney büyük oranda istenilen düzeyde tamamlanmıştır. İstenilen davranışı göstermeyen %30 katkılı polyamid 6.6 numunesi ile ilgili olarak olası sebepler sonuç kısmında verilmiştir. Deney numuneleri içerisinde sadece

katkısız polyamid 6 numunesinin elastik kabiliyeti çok yüksek olduğundan (< %150) kopması beklenmeden deney verileri alınmıştır.

Polyamid 6'da Cam Elyaf Katkısının İncelenmesi

10 mm/dk çekme hızında çekilen katkılı ve katkısız polyamid 6 numunelerinin üçer defa çekilmesi ile elde edilen verilerin ortalaması alınarak Şekil 5'teki grafik elde edilmiştir.



Şekil 5. PA6, 10 mm/dk Çekme Hızında Cam Elyaf Katkı Oranı Etkisi

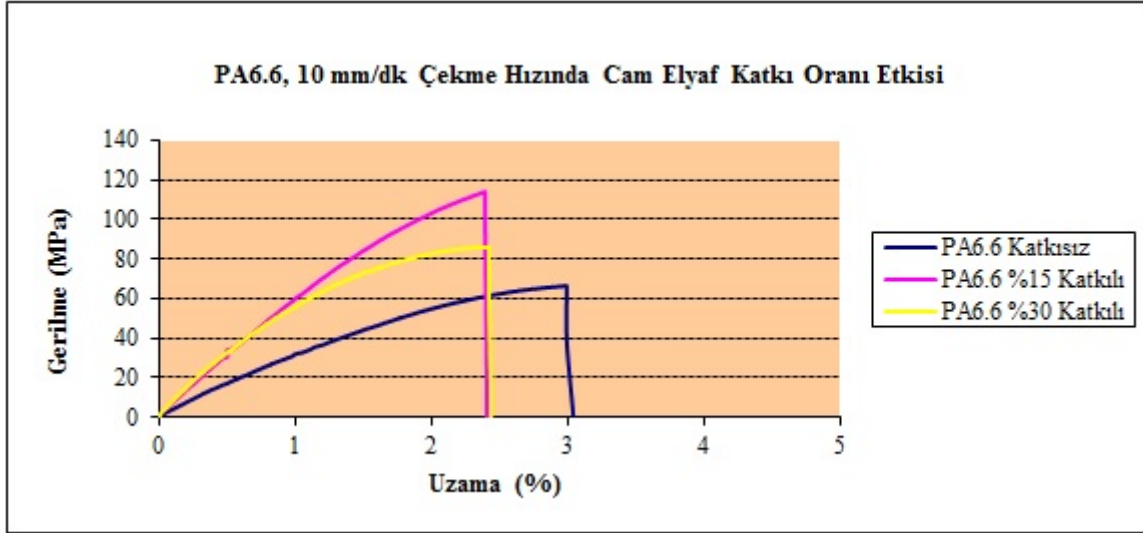
Tablo 5'de verilen değerler ise katkılı ve katkısız polyamid 6 numunelerine ait elastisite modül, akma gerilmesi, kopma uzaması ve maksimum gerilme değerlerini kapsamaktadır.

Tablo 5. Polyamid 6 Numunelerine Ait Mekanik Özellikler

10 mm/dk Çekme Hızı Mukavemet Değerleri	Elastisite Modülü, (Firma verileri) - MPa	Kopma Uzaması, (Firma verileri)	Akma Gerilmesi	Maksimum Gerilme, (Firma verileri) - MPa
PA6 KATKISIZ	1698, (3500)	> %100, (...)	22.24 MPa	43.82, (70)
PA6 %15 KATKILI	5553, (3800 - 4900)	%4.67, (%5 - %11)	48.71 MPa	77.44, (70 - 110)
PA6 %30 KATKILI	6954, (6900)	%3.13, (%3.6)	65.72 MPa	80.58, (80)

Polyamid 6.6'da Cam Elyaf Katkısının İncelenmesi

10 mm/dk çekme hızında çekilen katkılı ve katkısız polyamid 6.6 numunelerinin üçer defa çekilmesi ile elde edilen verilerin ortalaması alınarak Şekil 6'daki grafik elde edilmiştir.



Şekil 6. PA6.6, 10 mm/dk Çekme Hızında Cam Elyaf Katkı Oranı Etkisi

Tablo 6'da verilen değerler ise katkılı ve katkısız polyamid 6 numunelerine ait elastisite modülü, akma gerilmesi, kopma uzaması ve maksimum gerilme değerlerini kapsamaktadır.

Tablo 6. Polyamid 6.6 Numunelerine Ait Mekanik Özellikler

10 mm/dk Çekme Hızı Mukavemet Değerleri	Elastisite Modülü, (Firma verileri) - MPa	Kopma Uzaması, (Firma verileri)	Akma Gerilmesi	Maksimum Gerilme, (Firma verileri) - MPa
PA6.6 KATKISIZ	3703, (3100)	> %3.04, (%5 - %20)	55.93 MPa	66.36, (50 - 85)
PA6.6 %15 KATKILI	6435, (4300 - 6700)	%2.41, (%3 - %11)	92.31 MPa	113.80, (83 - 130)
PA6.6 %30 KATKILI	7379, (> 6500)	%2.44, (> %3)	71.98 MPa	82.87, (> 130)

SONUÇ VE TARTIŞMA

Deneysel sonuçlarda cam elyaf katkısının polyamid malzeme üstündeki etkisi ve numune davranışları net bir şekilde incelenmiştir. Elde edilen veriler ışığında %30 katkılı polyamid 6.6 malzemesi dışındaki tüm numuneler beklenen özelliklere yaklaşık davranışta bulunmuştur. Beklendiği üzere hem polyamid 6 numunelerinde hem de polyamid 6.6 numunelerinde cam elyaf katkı oranının artırılması malzemenin mukavemet özelliklerini artırıcı etkide bulunmaktadır. Ancak elastikliğe daha çok ihtiyaç duyulan noktalarda düşük kopma uzamasına neden olan cam elyaf katkı oranının artırılması olumsuz bir durum oluşturmaktadır. Deneysel ve literatürden elde edilen verilere göre;

- Polyamid 6 ve polyamid 6.6 malzemelerinin içerisinde cam elyaf katkı oranının artırılması numunelerin taşıyabileceği maksimum gerilme değerini arttırmıştır.
- Polyamid 6 ve polyamid 6.6 malzemelerinin içerisinde cam elyaf katkı oranının artırılması numunelerin elastisite modülü değerlerini artırarak numunelerin daha gevrek bir yapıya sahip olmalarını sağlamıştır.
- Polyamid 6 ve polyamid 6.6 malzemelerinin içerisinde cam elyaf katkı oranının artırılması numunelerin daha düşük uzama değerlerinde kopmasını sağlayarak elastik kabiliyetlerini azaltmıştır.
- Polyamid 6 ve polyamid 6.6 malzemelerinin içerisinde cam elyaf katkı oranının artırılması numunelerin akma gerilmesi değerlerini arttırmaktadır.
- Elde edilen veriler ışığında polyamid 6 ve polyamid 6.6 malzemelerinin farklı cam elyaf katkı oranlarındaki mekanik özellikleri, firma verileri ile büyük oranda tutarlılık göstermektedir ve bu malzemelere ihtiyaç duyan tasarımcıların kullanabileceği bir kaynak halindedir.

Elde edilen sonuçlar kapsamında çeşitli nedenlerden ötürü %30 katkılı polyamid 6.6 numuneleri beklenen sonuçlarda çıkmamıştır. Bu durumun önüne geçilebilir adımların olası nedenler ise şu şekilde belirlenmiştir:

- Enjeksiyon esnasında malzemenin kalıp içerisinde homojen bir şekilde dağılması,
- Malzemenin ortam şartlarından etkilenerek istenilen düzeyden daha fazla nem alması,

- Piyasada %30 cam elyaf takviyeli satılan polyamid 6.6 malzemelerinde farklı malzeme grupları karıştırıldığı için mekanik mukavemetin olumsuz yönde etkilenmiş olması.

Bu araştırmanın ve deneyin konusu olan polyamid 6 ve polyamid 6.6 malzemelerinin farklı cam elyaf karışım kombinasyonlu türevleri ile ilgili daha ayrıntılı analizlere ulusal tez merkezi sitesinden 10028473 referans numarasıyla ulaşılabilir.

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PRODUCING NEW MUSICAL COMPOSITIONS USING MARKOV CHAINS AND CLASSIFYING THE COMPOSITIONS

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ABSTRACT: In this project, a program made that can produce new compositions. As an input of the program two composition pairs used that had been already made in music industry. By using the program, which was an implementation of the modified Markov Chains algorithm, "new" and "different" compositions are possible to be produced. Then 1000 of these compositions given to a jury and wanted them to vote for each of these compositions to be good or not good. Jury composed of 5 people. Firstly the coherency of each jury member's votes tested. The first 500 ones of the 1000 compositions that were given to jury, included 10 different composition pairs that will be produced by the modified Markov Chains algorithm. The last 500 ones of the 1000 compositions that were given to jury, produced by the same algorithm, but the inputs were another composition pair from the first 500 ones. All of the reasons that these studies were done was to make a lot of comparisons during the classification stage. In the end, many kind of datasets tested by many classification algorithms and success was risen as much as it could be.

Key words: algorithmic composition, markov chains, classification

MARKOV ZİNCİRLERİ KULLANILARAK YENİ BESTELER ÜRETİLMESİ VE ÜRETİLEN BESTELERİN SINIFLANDIRILMASI

ÖZET: Bu çalışmada, yeni besteler üretebilen bir program geliştirildi. Daha önce müzik piyasasında üretilmiş bestelerden ikiserli beste çiftleri giriş verileri olarak kullanıldı. Program, Markov Zincirleri algoritmasının değiştirilmiş versiyonu algoritmasına göre kodlanmakla birlikte, program aracılığıyla olabildiğince çok sayıda "yeni" ve "farklı" beste üretilebilmektedir. Bu yöntemle oluşturulan 1000 tane beste, 5 kişiden oluşan değerlendiricilere verildi ve onlardan her bir beste için iyi veya iyi değil değerlendirmede bulunmaları istendi. Önce her bir değerlendirici üyesinin değerlendirmelerinin tutarlılığı test edildi. 1000 adet besteden ilk 500 tanesi; 10 adet birbirinden farklı ikili şarkı çiftinin Markov Zincirleri algoritmasının değiştirilmiş versiyonuna giriş verisi olarak girilmesi sonucunda elde edilen bestelerdi. Her bir değerlendiriciye verilecek 1000 adet besteden son 500 tanesi ise; önceki ilk 500 adet besteyi üretmek için girilen ikili şarkı çiftlerinden başka 1 adet ikili şarkı çiftinin aynı algoritmaya giriş verisi olarak girilmesi sonucunda elde edilen bestelerdi. Tüm bunların yapılma sebebi, sınıflandırma aşamasında çok çeşitli karşılaştırmalar yapılabilmesi içindi. En sonunda çok çeşitli veri setleri çok çeşitli sınıflandırma algoritmalarıyla test edildi ve en iyi sonuca ulaşacak veri seti girişi ve sınıflandırma algoritması bulunarak başarı mümkün olan en büyük orana çıkarıldı.

Anahtar sözcükler: algoritmik besteleme, markov zincirleri, sınıflandırma

GİRİŞ

Algoritmik Besteleme

Müzik ile matematiğin arasında doğrudan bir ilişki vardır. Nitekim notaların değerleri sayıya dönüştürülebilmektedir ve bu değerler üzerinde herhangi bir algoritma ile bir takım işlemler veya ayarlamalar yapılarak yeni sayılara ve dolayısıyla yeni nota değerlerine ulaşılabilir. Bu işlemleri ve ayarlamaları bir bilgisayar yardımıyla yapmak ise elbette daha hızlı ve hatasız bir süreçtir. Bilgisayar bilimlerinde bir çalışma sahası olan algoritmik besteleme; bilgisayar yardımıyla, yeni besteler üretmeyi amaç edinir.

Bilgisayar yardımıyla üretilen yeni bestelerin nitelikli olması, özeldir ve herhangi bir problem gibi kesin sonuçlara ulaşılması amaçlanan bir problematik değildir ama bu durum, onu bilimin dışına sürüklememiştir. Bilgisayar bilimleri içerisinde kendine bir yer edinmiştir ve iyiye kullanılması durumunda insan hayatına yarayan bir amacı gerçekleştirmektedir.

Algoritmik besteleme için çok çeşitli yöntemlere başvurulmaktadır. Sembolik, bilgi tabanlı sistemler, diller, yapay sinir ağları, evrimsel ve diğer popülasyon tabanlı metotlar, özbenzerlik ve hüresel otomata gibi kategorilere ayrılmaktadır (Fernández, J. D., & Vico, F. 2013). Bunlardan biri de Markov zincirleridir.

Algoritmik Bestelemde Markov Zincirleri ve Bu Çalışmanın Özellikleri ve Avantajları

Markov zincirleri, bütün ardışık durum ikilileri arasındaki geçiş olasılıklarına bağlı kalınarak; n sayısı 0'dan büyük bir doğal sayı olmak üzere, o anki durumdan n adım sonraki yeni duruma rasgele ama aynı olasılıkla geçmeyi gerçekleştiren algoritmalarıdır. Dereceleri vardır, en temelde birinci dereceden başlar ve n. dereceden Markov zincirleri, n adım sonraki olasılıkları irdeleyerek sıradaki n duruma geçmeyi amaçlayan bir algoritmadır.

Markov zincirleri her ne kadar kullanılan yöntemlerden sadece biri olsa da, inanılmaz sayıda çok beste türetilmesi sebebiyle bestecilerce çok talep görmektedir (Fernández, J. D., & Vico, F. 2013). Bu alanda Markov zincirlerinde kullanılan olasılık matris tablolarının; hâlihazırda bir besteler kümesinden değil de, dışarıdan oluşturulduğu sistemler vardır (Ariza, 2006), (Zicarelli, 1987). Elbette bu yaklaşımlar da önemlidir ancak, dışarıdan müdahale yapılması sözde yaratıcılığı o kadar fazla arttırabilir ki, müzik olma özelliği taşımayan “nota kalabalıkları” diye nitelendirilebilecek yapılar artabilir.

Verbeurgt et al. (2004) yaptığı çalışmada, Markov zincirleri algoritmasını uygulayarak modelini çıkarttığı besteleri, yapay sinir ağları ile son hâlini vermiştir. BoB sisteminde (Thom, 2000) ise Markov zincirleri yapay sinir ağları ile eğitilmiştir. Bu çalışmalarda mutlaka iki algoritmanın beraber kullanılma avantajı söz konusudur ancak yapay sinir ağları girilen örneklerden yapıyı ezberleyen bir sistemdir ve bu makalede yapılan çalışma gibi değerlendirici yani insan faktörünün sokulmasının daha büyük artı getireceği kolaylıkla öngörüülebilir. Werner ve Todd (1997) Markov zincirleri üzerinde yine farklı bir yaklaşımla çalışmış, evrimsel olarak değişen zincirlerler oluşturmuştur. Thornton (2009) üretken gramerler ile Markov zincirlerini bir arada kullandığı bir çalışma yapmıştır. Bu çalışmada üretken gramerlerde aşama aşama, Markov zincirlerine göre durumlar arası geçiş olasılıkları belirlenmiş ve bu olasılıklara göre yeni bestelerin türetilmesi gerçekleştirilmiştir.

Markov zincirlerini algoritmik bestelemde kullanma hususunda genel olarak şöyle bir deneyim vardır: Birinci dereceden Markov zincirlerinde üretilen bestelerin kendi aralarında ve Markov zincirlerine giriş verisi olan bestelerle pek bir benzerliği olmamakta ama bazen çok iyi olmayan besteler de çıkabilmektedir. Yaratıcılık açısından bakıldığında bu iyi bir durumdur. Markov zincirlerinin derecesi ne kadar çok artarsa yaratıcılık o derecede düşmektedir; hatta çok yüksek dereceli Markov zincirlerinde yeni besteler, giriş verisi olan bestelere çok benzemektedir. Bu durum ise müzik için çok büyük bir dezavantajdır. Bu durumdan yola çıkılarak yaratıcılığa en elverişli olan en düşük dereceli yani birinci dereceden Markov zincirleri ile bu çalışma yapıldı.

Markov zincirleri üzerinde gerek tek başına, gerekse algoritmalarla beraber daha başka çalışmalar da vardır. Yalnız bu çalışmadaki değerlendirici mantığının işin içine katılarak algoritmik besteleme için kullanılmasına dönük, Markov zincirleriyle beraber kullanıldığı başka bir çalışmaya rastlanılmamıştır ve bu eksikliğin tamamlanması ve kötü bestelerin elden geldiğince elenerek nihai en iyi besteleri üretebilme hedefine ulaşmak amaçlanmıştır.

Öncelikle bu çalışmada Markov zincirleri, daha iyi sonuç alınacak şekilde iyileştirilmiş yani algoritmanın yapısı biraz değiştirilmiştir. Akabinde; daha da iyi sonuç alabilmek için değerlendirici sistemi ve çeşitli sınıflandırma algoritmalarıyla beraber, değerlendiricilerce çok iyi olmadığı belirlenen bestelerin elenmesi ve değerlendiricilerce iyi bulunan bestelerin kalite çizgisindeki yeni bestelerin üretilmesi amaçlanmıştır.

Değerlendiriciler 5 kişiden oluşmaktadır. Değerlendiricilerden, 1000 adet besteye iyi veya iyi değil olarak değerlendirmede bulunmaları istenmiştir. Her bir beste için oylanan 5 adet besteden en az 3'ünün iyi olarak oylandığı besteler “iyi”, diğerleri “iyi değil” gruplarında sınıflandırılmıştır.

Besteler 16'şar notadan oluşmaktadır. Markov zincirlerine girecek olan veriler de bu 16'şar notadan üretilen 30'ar veri ile, sınıflandırıldığı iki gruptan hangisi olduğunu belirten 1'er veriden oluşmaktadır. Bu, her bir bestede toplamda 31'er adet veri eder.

Çeşitli sınıflandırma algoritmaları üzerinde yapılan testler sonucunda mükemmel olmayan ama doyurucu sonuçlara ulaşılmıştır. Tüm ayrıntılar, bu makalenin yöntem kısmında bulunabilir.

Algoritmik Bestelemde Diğer Yöntemler

Bilgi tabanlı sistemler, bilginin yapılandırılmış sembollerle ifade edilebildiği sistemlerin tümüdür. Elbette müziksel semboller manipüle edilerek yeni müziksel semboller oluşturulabilir -ki bunlar yeni bestelerdir ve algoritmik bestelemadaki temel amaç da zaten budur.

Rotgeb (1968) doktora tezinde, on sekizinci yüzyıl müziğinin üstünde yapılan bilimsel araştırmaları incelemiş ve klasik kuralların eksik ve tutarsız olduğunu keşfetmiştir. Thomas (1985) bestelere uygun akorları Lisp üzerinde, kendi öğrencilerine aktardığı müzik kurallarına göre üretmiştir. Lisp'in kullanıldığı çalışmalar olmakla birlikte SOM'un (bir tür yapay sinir ağı modeli) da kullanıldığı çok çeşitli çalışmalar yapılmıştır. Walker(1994) nesne tabanlı analiz-sentez motoru yapmıştır ki bu çalışmada, bir vokalin seslendirmesi neticesinde uygun caz müzik notaları basılmaktadır ve doğaçlama olması dolayısıyla algoritmik bestelemenin çalışma sahasına girmektedir.

Ames ve Domino(1992) kurallar ve Markov zincirlerini bir arada kullanarak çeşitli popüler müzik tarzlarında besteler üretmiştir. Farklı algoritmalarla hibrit olarak yapılan, algoritmik besteleme üzerinde çeşitli kural tabanlı sistem çalışmaları vardır.

Düzenli diller ile beste üretmekte önemli olan ilk adım, dilin kurallarını tanımlamaktır. Bu alanda yapılan ilk çalışmalar bu problemi; müzik kuralları teorilerine dayalı kâğıt üstünde elle çıkararak çözmüştür. Bunun dışında bir grup besteden kurallar çıkarma, ağaç yapısı kullanma, evrimsel algoritmalar kullanma gibi çeşitli yöntemler de kullanılmaktadır.

Olasılıklara göre dil kurallarının belirlendiği skolastik diller çok yaygındır. Ayrıca “A Generative Theory of Tonal Music” kitabı, müzik analizine dilsel yaklaşımla yaklaştığı için ve alanda prestiji yüksek puanlandırıldığı için de önemli bir kitaptır. Bu kitaptan ilham alınarak yapılan Pope (1991)'in “T_R Trees” çalışması ve Leach and Fitch (1995)'in “Event Trees” ve Hamanaka (2008)'in “Melody Morphing” çalışmaları vardır. Hamanaka; Lendhal'in iki besteden yeni beste üretilmesi sistemini, üretilmiş ağaç yapısını değiştirerek geliştirmiştir.

Lindenmeyers Sistemleri; diğer bir isimlendirmeye “L-Sistemleri”, hem anlaşılması hem de uygulanması daha kolay olduğundan, geleneksel formal dillere göre algoritmik besteleme alanında kullanımı daha yaygındır. Evrimsel metotlar da dillerle birlikte hibrit olarak kullanılmaktadır.

Yapay sinir ağları, insanın doğal beyin yapısı örnek alınarak geliştirilmiş algoritmalarlardır. Müzikte ilk defa, müziğin analitik teorilerini oluşturmak için kullanıldı. Sonradan Todd (1989) ilk defa, üç katmanlı bir yapay sinir ağının algoritmik bestelemeye kullanmasına öncülük etti. Shibata (1991) melodiye en uygun akoru kullanıcılara değerlendiren bir geri beslemeli yapay sinir ağı tasarladı. Bu çalışmadaki gibi en uygun akor seçimi popüler bir çalışma alanı olmakla birlikte, yeni beste üretmeye dönük çalışmalar da yapılmıştır. Örneğin Toiviainen (1995) Yapay Sinir Ağına eğittiği caz melodilerinden yeni melodiler üretti.

Yapay Sinir Ağlarını başka algoritmalarla karıştırarak gerçekleştirilen çalışmalar da vardır. İlk örneklerden biri Hild (1992)'in HARMONET çalışmasıdır. Bu çalışmada üç aşamalı bir yapı kullanılmıştır. İlk üç katmanlı bir Yapay Sinir Ağıdır ve çıkış verileri, ikinci aşama olan kural tabanlı bir kısıtlama algoritmasına girmektedir. Son aşamada ise, ikinci aşamadaki bahsedilen sistemden çıkan çıkış verileri, yine başka bir Yapay Sinir Ağına giriş verisi olarak girer ve bu son aşamada süs notaları -yani diğer bir deyimle bestenin kulağa daha hoş gelmesi için eklenen notalar- eklenir. Başka bir hibrit çalışma da Verbeurgt (2004) tarafından yapılmıştır. Bu çalışmada önce Markov Zincirlerine gelen giriş verilerinin sayısal nota değeri, Yapay Sinir Ağlarında eğitildikten sonra belirlenmekteydi. Yapay Sinir Ağlarının algoritmik bestelemeye kullanımı hususunda bu çalışmalar gibi oldukça çok ve çeşitli çalışma yapılmıştır.

Evrimsel algoritmalar şu ilkeyi benimser: Aday çözümleri değiştirmek, seçmek ve yeniden üretmek. Bu alanda da çeşitli algoritmik besteleme çalışmaları yapılmıştır. Mesela Marques (2000) direk temsili genotiplerle kısa polfonik melodiler üretmiştir. Gartland-Jones (2002) önceden belli olan iki beste üzerinde evrimsel bir algoritma uygulamıştır.

Algoritmik bestelemeye evrimsel metotlar; Markov zincirleri, kural tabanlı sistemler ve hücresel otomata ile hibrit bir şekilde de kullanılmaktadır. Pek çok çalışma vardır.

YÖNTEM

Çalışmada Kullanılacak Araçların Belirlenmesi Aşaması

İlgili Java kodunun üzerinde çalıştırılacağı bilgisayar olan Apple Macbook Pro, algoritmanın kodlanacağı Java programlama dili, Javayı derleyebilen Eclipse programı ve sınıflandırmaların yapılabilmesi için Weka programı

kullanıldı. Besteleri okumak, yazmak ve verileri yazmak ve değerlendiricinin değerlendirmelerini almak için .txt uzantılı dosya tipi kullanıldı. Değerlendirici değerlendirmelerini belli kurallara göre gruplandırma yapabilmek ve bunları verilerle birleştirebilmek için .xlsx uzantılı dosya tipi kullanıldı. Ayrıca verilerle Weka programı üzerinde çalışılabilmesi için .arff uzantılı dosya tipi kullanıldı.

Markov Zincirlerinin Uygulanması Aşaması

Giriş Verileri

Bir şarkı en az 1 bölümden oluşur. Farklılıklar olmakla birlikte, reklam gibi mecralarda genelde 1, şarkılarda ise genelde 3-4 bölüm bulunur. Aynı şarkının içindeki bölümleri arasında genelde çok bariz bir alâka olmaz. Bundan dolayı her bir bölüm kendi içerisinde bestedir diyebiliriz. Sonuçta bölümün içindeki her bir nota kendinden önceki ve sonraki notalarla, müziğin tanım gereğince düzenli bir bütün oluşturur. Bundan dolayı Markov zincirleri algoritmasına girilmesi için, daha önceden üretilmiş 8 farklı besteden 1'er tane bölüm alındı. Tarz olarak belli bir kısıtlamaya gidilmedi. Besteler klasik, trans, rak, pop, house, elektro müzik tarzlarındaydı. Markov zincirlerinin algoritmik bestelemeye uygulanmasının en büyük avantajlarından biri olarak, sadece caz müziğin yapay sinir ağları ile eğitildiği bazı çalışmalardakinin aksine, farklı müzik tarzlarının sentezine olanak tanınması ve bunun da yaratıcılığı artırması olduğu düşünülebilir.

Giriş verileri seçilirken; sonrasında bahsedilecek olan çıkış verilerinin aksine, herhangi bir nota kısıtlamasına gidilmedi. 15 adet notadan oluşan kısa denilebilecek bir beste de vardı, 50 adet notadan oluşan uzun denilebilecek bir beste de vardı. Bulgu bölümünde bu aşamada Markov zincirleri algoritmasının iyileştirilmesi anlatılmıştır.

Sınıflandırma İçin Veri Setinin Oluşturulması Aşaması

Birinci dereceden Markov zincirleri algoritmasına göre üretilen her bir yeni beste, istenirse kod içinde bulunan nota sayısı rahatlıkla değiştirilebilecek şekilde, 16 notadan oluşturuldu. Bu 16 notalık yeni bestenin analizinden oluşacak olan veri setlerinin her biri 30 birimlik oldu. Bunun için gerekli kodlar yazılıp, her bir yeni beste için aşağıdaki kurallara göre veriler elde edilip metin dosyasına kaydedildi.

1- Bu 30 birimin 1.'si; ardışık 2 notanın sayısal değerindeki (4 oktav do ile 4 oktav re'nin farkı meselâ) artma veya azalma olacaktır. (Ardışık 2 nota derken, 2. nota eğer boş notaysa, (eş anlamlısı rest nota ya da bir süreliğine sessizliği belirten nota) 1. notadan sonraki ilk boş olmayan nota ile 1. nota arasındaki fark hesaplanacaktır.)

2- Bu 30 birimin 2.'si; ardışık 2 notanın uzunluk değerleri (tam nota, yarım nota gibi) toplamı olacaktır. Boş notada da aynı yöntem uygulanacaktır.

Yukarıdaki 2 kural, 16 notanın oluşturduğu 15'erlik ardışık 2'li nota çiftleri için 15 kez tekrar edecek ve sonuçta 30 birimlik veri seti oluşacaktır.

Veri setinin 31. elemanı olarak ise, bu makalenin giriş kısmında açıklandığı şekilde; 5 değerlendiricinin yapacağı değerlendirmelere göre, iki gruptan hangisine ait olduğunu belirten 1'er veriden oluşmaktadır. Bu, her bir beste için toplamda 31'er adet veri eder.

5 değerlendiricinin aynı 1000 adet bestede yaptığı değerlendirmelere dayanılarak oluşturulan veriler, Weka programı üzerinde çalışılabilir şekilde .arff uzantılı dosya tipi şeklinde en son hâlini aldı. Daha önce de değinildiği gibi en az 3 değerlendiricinin iyi bulduğu değerlendirmeler "iyi" diğerleri "iyi değil" olarak gruplandırıldı.

Sınıflandırmaların Yapılması Aşaması

Weka ile birçok sınıflandırma algoritması üzerinde sınıflandırmalar yapıldı. Bulgu bölümünde ayrıntılı olarak elde edilen sonuçlara değinilmiştir.

BULGULAR

Markov Zincirlerinin Uygulanması

Markov Zincirleri Algoritmasının İyileştirilmesi İle Daha İyi Besteler Üretilmesi

Kodlama kısmı tamamlandığında geriye, uygun ikili beste çiftini seçip her yeni besteyi dinlemek için kodlanan tuşa basmak kâfiydi. Ancak sürekli tuşa basılıp yeni besteler üretildiğinde, bestelerin büyük çoğunluğunun müzik kalitesinin oldukça düşük olduğu fark edildi. Bunun sebebini bulmak için üzerinde epeyce düşünüldü.

Sorunun gereğinden fazla boş nota olduğu sonucuna varıldı. Müzik kalitesinde artışı sağlamak için boş notaların ihmal edilmesi gerektiği düşünüldü. Yeni algoritma değişikliğinden sonra bu sefer yine müzik kalitesinin bir önceki seferdeki gibi düşük olduğu saptandı.

En sonunda Markov zincirleri algoritması sonucunda yeni bestedeki notaların uzunluğunun (programda kullanılan en kısa nota uzunluğu olan 1/16'lık notada bu işlem uygulanmaksızın) yarıya düşürülmesi hâlinde, yeni bestelerin müzik kalitelerinde çok önemli artış olduğu görüldü.

Sınıflandırmaların Yapılması

Bu aşamada çok sayıda deney yapıldı. Burada önemli olanlar belirtilecektir.

Sınıflandırma Algoritmalarında Uygulanacak Yöntem

1000 veri içerisindeki eğitim ve test setlerini ayırmada çeşitli yöntemler denendi. Yöntemlerde birbirine yakın sonuçlar çıktığı için, bu makalede sadece yaygın olarak kullanılan ve etkin neticeler veren k katlamalı çapraz doğrulama (k fold cross validation) yöntemi ile elde edilen sonuçlar belirtilmiştir (K sayısı 10 alınarak).

Boş Notanın Sayısal Değerini En Uygun Hâle Getirme İçin Yapılan Çalışmalar

Boş notaya hangi değer verilmesi gerektiği bir sorundur. Bunun için çok sayıda sınıflandırma algoritmasında en yüksek yüzdellik değerini veren "-1" değerinin verilmesine, aşağıdaki tabloda gösterilen deneylerin sonucunda ulaşılmıştır.

Tablo 1. Değerlendiricilerin Genel Değerlendirmelerinin Farklı Boş Nota Sayısal Değerleri İle Elde Edilen Sonuçları

Yüzdeler		Boş değer (null)	999999	0	1	-1	2	-2	3	-3
"İyi" sınıfa göre duyarlılık (Precision)	NaiveBayes	64.8	63.2	65.0	64.6	65.3	64.6	65.2	64.7	65.1

Her Bir Değerlendiricinin Değerlendirmeleri Üzerinde Yapılan Çalışmalar

Sınıflandırma algoritmalarıyla yapılan deneylerde genelde beklendiği gibi oranlar birbirinden aşırı farklı çıkmamıştır. Bu nedenle bazılarının sonuçları aşağıdaki tabloda verilmiştir. Boş notaların sayısal değerinin ne olacağı ile ilgili daha önceden tespit edilen "-1" değeri kullanılmıştır.

Tablo 2. Değerlendiricilerin Her Birinin Değerlendirme Sonuçları

Yüzdeler		Değerlendirici 1	Değerlendirici 2	Değerlendirici 3	Değerlendirici 4	Değerlendirici 5
Doğru sınıflandırılma oranı	NaiveBayes	50.8	82,4	57.0	73.7	66.1
	Multilayer Perceptron	52.6	88.3	54.4	74.8	60.8
"İyi" sınıfa göre duyarlılık (Precision)	NaiveBayes	54.0	94.2	59.6	28.9	60.9
	Multilayer Perceptron	55.6	92.8	59.6	25.4	57.7
"İyi" sınıfa göre F ölçüsü (F-measure)	NaiveBayes	50.9	90.0	66.1	27.5	69.5
	Multilayer Perceptron	54.0	93.7	59.7	20.3	59.3

	n				
Değerlendiricilerin Yaptığı Değerlendirmelerde “İyi” Sınıfında Olanların Sayıları	530	919	565	190	478

Değerlendiricilerin Genel Değerlendirmeleri Üzerinde Yapılan Çalışmalar

Özet kısmından da hatırlanacağı üzere, ilk 500 beste ile son 500 beste farklıydı. 5 değerlendirici üzerinde çeşitli deneyler yapılmıştır. 6 sınıfa ayırma, 3 sınıfa ayırma, yalnızca ilk 500 adet veriyi sınıflandırma ve bunu, yalnızca son 500 adet verinin sınıflandırılması ile mukayese etme gibi. Bunların hepsinin sonuçlarında yakınlık vardır. Bu sebeple bu deneylere burada yer verilmemiş ama bu yakınlığın saptanması ve burada belirtilmesi açısından yapılan bu deneyler faydalı olmuştur.

Burada sadece, en az 3 değerlendiricinin iyi verdiği durumlarda “iyi” olarak sınıflandırılan ve diğer tüm durumlarda “iyi değil” olarak sınıflandırılan algoritmalarından elde edilen sonuçlar aşağıdaki tablodaki gibidir. Boş notaların sayısal değerinin ne olacağı ile ilgili daha önceden tespit edilen “-1” değeri kullanılmıştır.

Tablo 3. Değerlendiricilerin Genel Değerlendirmelerinin Sonuçları

Yüzdeler		Değerlendiricilerin Genel Değerlendirmesi
Doğru sınıflandırılma oranı	NaiveBayes	62.2
	Multilayer Perceptron	57.4
“İyi” sınıfına göre duyarlılık (Precision)	NaiveBayes	65.3
	Multilayer Perceptron	62.9
“İyi” sınıfına göre F ölçüsü (F-measure)	NaiveBayes	70.5
	Multilayer Perceptron	65.3
Değerlendiricilerin Yaptığı Değerlendirmelerde “İyi” Sınıfında Olanların Sayıları		590

Yukarıdaki tabloda duyarlılık (precision) oranları, doğru sınıflandırma oranlarından bile daha çok önemlidir. Sonuçta değerlendiricilerin kötü besteleri elemesi ve iyi olarak seçtiklerinin büyük çoğunluğunun gerçekten de iyi olması; yeni üretilecek bestelerin “sadece iyi olarak sınıflandırılanların” kullanıcıya dinletilmesi ile bu dinletilecek bestelerde iyi oranının fazla olmasında ve dolayısıyla kullanıcının iyi beste seçiminde daha kısa zaman harcamasında etkili olacaktır.

2 nolu değerlendirici diğer değerlendiricilerden farklı olarak, daha önceden besteleri olan bir değerlendiriciydi ve tablo 2 incelenirse onun özellikle duyarlılık (precision) oranları oldukça iyi çıktı. Bunda, elbette onun bazı bestelerin iyi beste olabilme potansiyelini görebiliriz, birkaç adet değeri veya yeri yanlış nota barındıran ve çoğu kişinin iyi bulmayacağı bestelerin yanlış notalarını zihninde doğru notalarla yer değiştirmesi ve zihninde oluşturduğu bu iyi bestelerden dolayı onlara iyi vermesi ile toplamda 919 besteyi iyi bulmasının payı vardır.

SONUÇ VE ÖNERİLER

Markov zincirleri algoritmasında daha çok geliştirilme yapılabileceği düşünülmeyle birlikte çok ihtiyaç duyulmadı. Sonuçta muazzam sayıda çok yeni beste üretilebiliyordu. Doğru sınıflandırılma oranı, duyarlılık, F ölçüsü gibi ölçütler arasında bu çalışmanın mantığına göre en önemli değer olan duyarlılık, çünkü en sonda iyi olarak sınıflandırılanlar son kullanıcıya dinletilecekti ve esas başarının “iyi olarak sınıflandırılanların arasındaki” doğru sınıflandırılmanın oranının tatmin edici olmasının gerekliliği idi. NaiveBayes algoritması ile duyarlılıkta (precision) %65.3’e ulaşıldı ve bu da, mükemmel değil ama tatmin edici bir orandı.

Buna benzer yapılacak çalışmalarda duyarlılık oranını arttırmak için iki fikir üzerinde düşünülebilir: Birincisi değerlendirici sayısını arttırmaktır. Sonuçta müzik insanlar için yapılı ve ne kadar çok insan değerlendirmede bulunursa, beste için o kadar yüksek popülariteye erişilebilir. İkincisi ise değerlendiriciyi müzik alanında otorite, en azından beste yapabilen insanlardan seçmektir.

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ARTIFICIAL NEURAL NETWORK AND FUZZY NEURAL NETWORK METHOD USING ANKARA WEATHER FORECAST

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ABSTRACT: Artificial neural networks and fuzzy neural network is frequently used in prediction and classification methods. Generally there are two methods of soft computing said called. These are known as approximate reasoning and functional approach. The probability models and fuzzy reasoning about the olşurk mantık' functional approach consists of neural networks and Genetic Algorithms. In addition, fuzzy neural networks are increasingly popular in recent years that's used with another model of fuzzy logic and neural networks. In this model the reasoning fuzzy neural network structure of neural networks , fuzzy logic combined with the rule structure and yields better results than many methods have been found in the name of efficiency. In this study, the neural networks and fuzzy neural network models using weather forecast of Ankara province and compared the various results.

Key Words: fuzzy neural networks, artificial neural networks, fuzzy logic

YAPAY SINIR AĞI VE BULANIK-YAPAY SINIR AĞI YÖNTEMLERİ KULLANILARAK ANKARA HAVA DURUMU TAHMİNİ

ÖZET:Yapay sinir ağları ve bulanık yapay sinir ağları yöntemleri tahmin ve sınıflandırma alanlarında sıkça kullanılmaktadır.Genel olarak yumuşak hesaplamalar adı altında geçen iki metod bulunmaktadır.Bunlar yaklaşık muhakeme ve fonksiyonel yaklaşım olarak bilinmektedir.Yaklaşık muhakeme olasılık modelleri ve bulanık mantık'dan olşurken fonksiyonel yaklaşım ise sinir ağları ve genetik algoritmalar'dan oluşmaktadır.Ayrıca son yıllarda gittikçe popülerleşen bir başka model olan bulanık mantık ve sinir ağlarının beraber kullanıldığı bulanık sinir ağlarıdır.Bu modelde bulanık mantığın kural yapısı ile sinir ağlarının muhakeme yapısı birleştirilmiş ve verimlilik adına birçok yöntemle kıyasla daha iyi sonuçlar veren bulanık sinir ağları bulunmuştur.Bu çalışmada ise sinir ağları ve bulanık sinir ağları modelleri kullanılarak Ankara ilinin hava durumu tahmini yapılmış ve çeşitli sonuçlar karşılaştırılmıştır

Anahtar Kelimeler: bulanık sinir ağları,yapay sinir ağları,bulanık mantık

GİRİŞ

Muhakeme ve sınıflandırma üzerine son yıllarda bir çok çalışma yapılmış ve bunların sinir ağları ile bulanık sinir ağları üzerinde gayet iyi sonuçlar verdiği görülmüştür.

Bu çalışmada ise 1994-1998 seneleri arasında elde edilen Ankara hava durumu verilerinden[1] yola çıkılarak çeşitli yöntemlerle hava tahmini yapılmak istenmiştir.Bu yıllar arasında elde edilen 1609 veri'den ilk %70'i eğitim için son %30'u ise test işlemi için kullanılmıştır.Tabii ortalama sıcaklığın tahmini yapılırken göz önünde bulundurmanız gereken başka bir husus ise hava durumu tahmininin bazı koşullara bağlı olmasıdır.Biz bu çalışmada temel olan birkaç etken üzerinde çalışacağız.Bunları şu şekilde sıralayabiliriz.[2]Maximum sıcaklık,minimum sıcaklık,çiğ nok- tası,yağış,deniz seviyesi basıncı,standart basınç,görünürlük(sis miktarı),rüzgar hızı,,maximum rüzgar hızı.

Bu etkenlere bağlı olarak kurduğumuz modeller neticesinde amaç ortalama sıcaklığı hesaplamak olacaktır.Ayrıca ortalama sıcaklığın hesaplanmasında eğer gerekli ise bütün verilerin belli bir aralıkta normalize edilmesi işlemi daha iyi sonuçlar ortaya çıkarabilir.Verisetine bakıldığında görülebilir ki yağış hariç bütün özellikler 0-100 arası değişirken yağış 0-1 arasında değişmektedir.O halde bu durumda verileri normalize etmemiz sonuçları olumlu yönde etkileyeceğinden bütün verisetine normalize işlemi uygulanmaktadır.[3]Birçok normalize metodu bulunmaktadır.Bu çalışmada en sık kullanılan normalize metodlarından birini kullanacağız.Bahsettiğimiz normalize

işlemi için gerekli olan bilgi her bir sütundaki maximum ve minimum sayıdır. Normalize edilecek veri'den o sütunun minimum sayısı çıkartılır ve o sütunun maximum sayısı ile minimum sayısı arasındaki farka bölünerek bulunabilir. Bunu formülize edecek olursak;

$$x_{i,0}'danise(normalize) = \frac{x_i - x_{min}}{x_{max} - x_{min}} \quad (1)$$

Burada;

x_i = Herhangi bir i 'nci veri

x_{min} = O sütundaki en küçük veri

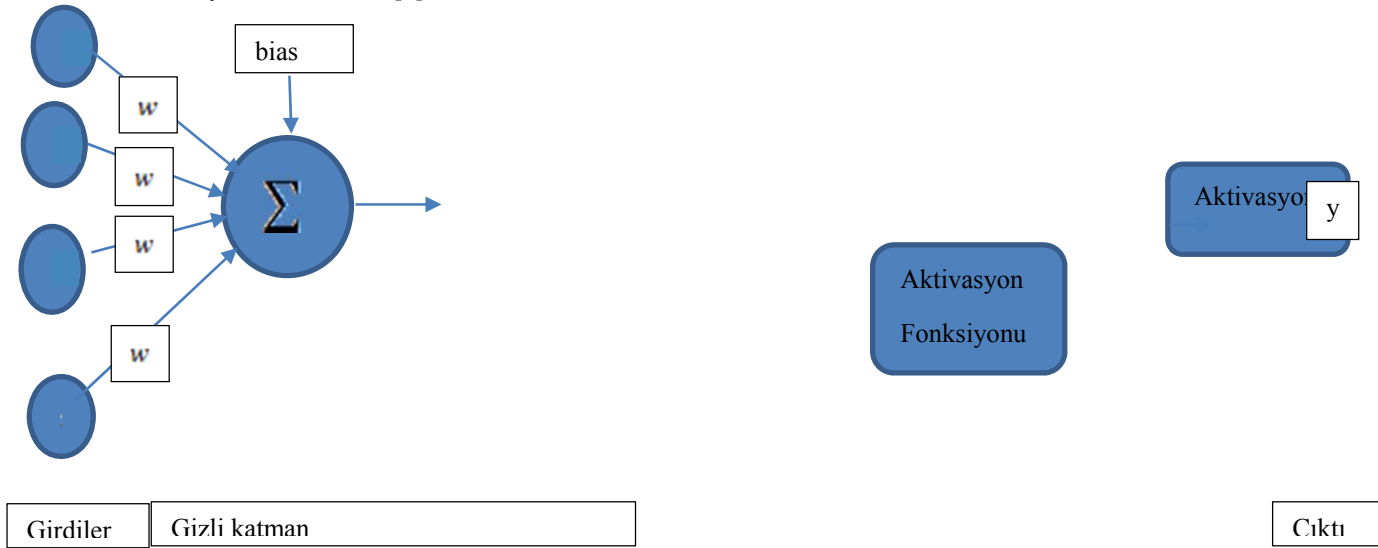
x_{max} = O sütundaki en büyük veri

$x_{i,0}'danise$ = 0 ile 1 arasında normalize edilmiş herhangi i 'nci veri

Bu normalize işlemi sonucunda görülür ki her veri 0 ile 1 arasında normalize hale getirilmiş olur. Bu işlem ise sinir ağları ve bulanık sinir ağları ile yapacağımız tahmin işleminin daha yüksek çıkmasında yardımcı olur. Bu çalışma yapılırken ilk 1120 veri eğitim için seçilirken geri kalan 489 veri test için seçilmiştir. Seçilen modeller üzerinde yapılan deneylere 3. bölümde daha detaylı bir şekilde değinilmiştir. Şimdi ise hava tahmini için kullanacağımız modeller olan sinir ağları ve bulanık sinir ağları modelleri hakkında bilgi verelim.

SİNİR AĞLARI VE NFTOOL

İnsan beyninin çok karmaşık olduğu herkes tarafından bilinmektedir. Bazı çalışmalar göre ise insan beyni yaklaşık 100 milyar nörona sahip olduğu bilinmektedir [4]. Sinir ağları insan beyninin çalışmasından esinlenerek ortaya çıkmış bir sistemdir. Bu sistemin çalışması üzerinde duracak olursak sinir ağlarının temeli olan perceptron'dan bahsetmemiz daha yerinde olacaktır. [5]



Şelik1: Basit Bir Perceptron'un Yapısı

Burada $1 \leq i \leq n$ için x_i 'ler perceptron'un girdileridir. $1 \leq i \leq n$ için w_i 'ler ise ağırlıkları olarak nitelendirilebilir. Perceptron'un çalışma prensibine geçecek olursak her bir girdinin ayrı ayrı ağırlıkları ile çarpılması sonucu bir eşik değeri (bias, treshold)

ile toplanarak aktivasyon fonksiyonundan geçirilmesi işlemidir. Burada bias dediğimiz perceptron'a ait bir eşik değeridir. Ancak unutmamamız gerekir ki başlangıçta ağırlıklar ve bias rastgele seçilmektedir. Ayrıca sinir ağları yapıları başlangıç değerlerine bağlıdır. Farklı sırada girilen girdi değerleri için program'ın yönü ona göre değişebilir. Aktivasyon fonksiyonu birçok çeşidi olan ve perceptron'u aktive eden bir fonksiyondur bu fonksiyon tek katmanlı perceptron'da adım fonksiyonu diye geçmektedir ve y ise çıktılar olarak düşünülebilir. Bu söylediklerimizi formülize edecek olursak;

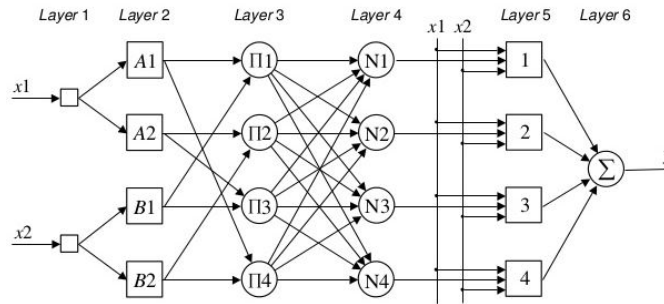
$$y = b + \sum_{i=0}^n w_i \cdot x_i \quad (2)$$

şeklinde ifade edilebilir. Sinir ağları için temel teşkil eden perceptron'dan bahsettikten sonra şimdi ise biraz da üzerinde çalışacağımız matlab'ın toolbox'larından biri olan nftool'dan bahsedelim. [6] Matlab'da sinir ağları

işlemleri için kullanılan bu yapıda girdi değerleri ile çıktı değeri ayrı ayrı verilmektedir. Daha sonra veriler rastgele olarak eğitim verisi ve test verisi olarak iki'ye ayrılabilir (İstenildiği takdirde eğitim, test ve doğrulama olarak da 3'e ayrılabilir.) Bu toolbox'da gizli katman sayısını kendimiz değiştirebiliriz. Eğitim (train) dediğimiz zaman ise verileri eğitiyor. Ancak unutmamamız gereken önemli noktalardan biri veriyi program'a tanıtırken son sütun hariç bütün sütunlar girdi niteliği taşıırken son sütun ise çıktı veya diğer bir adıyla hedef niteliği taşımaktadır. Bu işlemler yapılırken programa verdiğimiz girdi'ler ile program kendisi bir çıktı üretir ve bu çıktı bizim asıl olan hedef verilerimiz ile karşılaştırılarak gerekli hatalar bulunur. Eğer test verilerinin ve eğitim verilerinin bizim istediğimiz şekilde bölünmesini istiyorsak programın sonunda geniş kapsamlı bir script olarak bu kod üzerinde değişiklikler yapabiliriz. Eğitim yöntemi, hata tipi, epoch sayısı ve sonuçları sunmamızı sağlayan çeşitli grafikleri buradan ayarlayabiliriz.

UYARLANABİLİR BULANIK SINIR AĞLARI SİSTEMİ (ADAPTİVE NEURO-FUZZY İNFERENCE SYSTEM, (ANFİS))

Uyarlanabilir bulanık sınırlar, bulanık mantık ile sınırların birleşimi şeklinde düşünülebilir [7]



Şekil 2: Anfis Modelin Bütün Katmanları İle Yapısı

Her katmanı sırasıyla açıklayacak olursak;

Katman1: Girdi katmanıdır

Katman2: Bulanıklaştırma katmanıdır. Bu katmanda bulanıklaştırma yapmak için nöronların aktivasyon fonksiyonları olarak üyelik fonksiyonu belirlenir

Katman3: Bulanık kuralların belirlendiği katmandır. Bu katmanda her bir nöron bir sugeno tipi bulanık kurala karşılık gelmektedir. Bu yapıda Mamdani'de kullandığımız sugeno tipini kullanacağız. Bu katmanda çarpım işlemi uygulanır

$$y_i = \prod_{j=1}^k x_{ji} \quad (3)$$

$$y_{\Pi 1} = \mu_{A1} \times \mu_{B1} = \mu_1 \quad (4)$$

Böylece i'ninci nöron için çıktı elde edilmiş olur.

Katman4: Normalizasyon katmanıdır. Normalize işlemleri şu şekildedir.

$$y_i = \frac{x_{ii}}{\sum_{j=1}^n x_{ji}} = \frac{\mu_i}{\sum_{j=1}^n \mu_j} = \bar{\mu}_i \quad (5)$$

$$y_{N1} = \frac{\mu_1}{\mu_1 + \mu_2 + \mu_3 + \mu_4} = \mu_1 \quad (6)$$

4.katman'daki i'ninci nöron'un çıktısı bu şekildedir.

Katman5: Netleştirme (defuzzification) katmanıdır. Netleştirme katmanındaki her bir düğümde verilen bir kuralın ağırlıklandırılmış sonuç değerleri hesaplanmaktadır. Bu katmandaki parametreler, sonuç parametreleri olarak isimlendirilir. Bu katmandaki her bir i düğümü için normalize edilmiş nöronlar ile x_1, x_2 girdileri birbirleri ile bağlantılıdır. Eğer netleştirme nöronu hesaplanacak olursa

$$y_i = x_i [k_{i0} + x1k_{i1} + x2k_{i2}] = \bar{\mu}_i [k_{i0} + x1k_{i1} + x2k_{i2}] \quad (7)$$

Burada k_{i0}, k_{i1}, k_{i2} i'ninci kuralın sonuç parametreleri kümesidir.

Katman6: Bu katmanda tek bir toplam ile bütün nöronlar toplanır ve sonuç olarak;

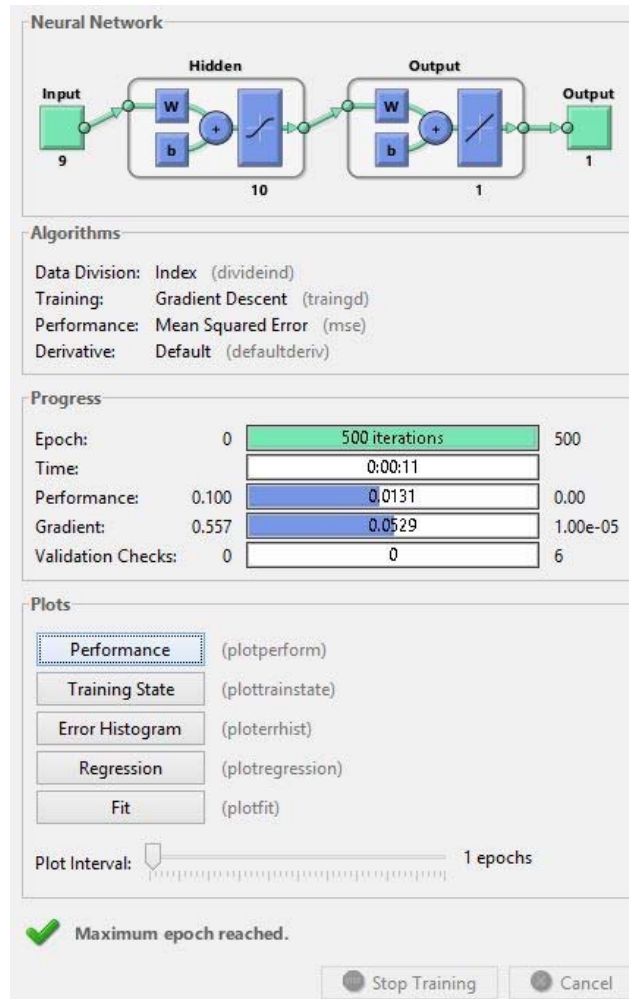
$$y = \sum_{i=1}^n x_i = \sum_{i=1}^n \bar{\mu}_i [k_{i0} + x1k_{i1} + x2k_{i2}]$$

ANFIS'in öğrenme algoritmasına geçecek olursak en küçük kareler yöntemiyle gradient descent metodun birleşimi olan hybrid algoritması kullanılabilir.Ancak anfisın içerisinde geri yayılım algoritması da bulunmaktadır.Hybrid algoritma seçildiği taktirde en küçük kareler tahmin edicisi üzerinden bazı işlemler yapılmaktadır.Ancak bu çalışmada kullanılan algoritma geri yayımlı(BackPropagation)olacağı için hybrid algoritmaya burada değinmeyeceğiz.ANFİS'in yapısından bahsedecek olursak eğitim ve test verileri için 2'ye ayırdığımız veriseti programa yüklenir ve Generate FIS butonuna basıldığında bir bulanık ilişki sitemi oluşturur.Burada iki kısım vardır.Biri grid partition seçeneği diğeri ise subtractive clustering seçenekleridir.Daha sonra eğitim kısmına geldiğimizde ise eğitim çeşidi olarak geriyayılım ve hybrid algoritmaları bulunmaktadır.Ayrıca bu kısımdan hata toleransı ile epoch sayısı da değiştirilebilir. Bütün girdilerin modele 1 defa uygulanması 1 epoch olarak tanımlanabilir.Veriler eğitildikten sonra bir de test işlemi uygulanır ve gerekli hatalar grafiklerle sunulur. Daha sonra istersek "Edit" kısmından kuralları ve üyelik fonksiyonlarını görebiliriz

DENEYSEL ÇALIŞMALAR

Üzerinde çalışacağımız konu Ankara hava durumu tahminleri olacaktır.Amaç belli şartlara bağlı olarak elimizdeki veriler'den Ankara'nın ortalama sıcaklığını tahmin etmektir.Bunun için iki modeli(ANFİS ve NFTOOL)çeşitli hata yöntemlerini kullanarak birbirleri ile karşılaştıracğız.Tabii ki bu iki sistemi karşılaştırırken eğitim verilerini ve test verilerinin aynı olmasına dikkat etmeliyiz.Veriler farklı olduğu taktirde hatalarda da bir değişim meydana gelir ki bu durumda iki sistemi doğru bir şekilde karşılaştırmış olamayız.Öncelikle sınır ağlarından başlayabiliriz.

SİNİR AĞLARI(NFTOOL)



Şekil 3:Verinin Eğitilme Aşaması

3 tür hata yöntemi kullanacağız Bunlar MSE, RMSE ve MAD (Mean Absolute Deviation) hatalarıdır. Şimdi ise bu hataların nasıl hesaplandığını bakalım

$$MSE = \frac{1}{n} \sum_{i=1}^n (\hat{Y}_i - Y_i)^2$$

Burada n toplam veri sayısı iken \hat{Y}_i : tahmin değeri Y_i : gerçek değerler

$RMSE = \sqrt{MSE}$ RMSE ise MSE'nin kareköküdür

Burada epoch sayısını 500 aldık ve gradient descent eğitim yöntemini kullandık. Ayrıca verilerde ilk 1120 veriyi eğitim için kalan 489 veriyi ise test için kullanılmıştır. Aynı zamanda MSE değeri'nin ise $MSE_{train} = 0.0131$ olduğu görülmektedir

trainPerformance <1x1 double>								
	1	2	3	4	5	6	7	8
1	0.0131							

testPerformance <1x1 double>								
	1	2	3	4	5	6	7	8
1	0.0139							

Test performansının ise $MSE_{test} = 0.0139$ olduğu görülmektedir. Bunlar MSE değerleridir. Eğer RMSE değerlerini hesaplayacak olursak MSE'nin karekökünü almamız yeterli olacaktır.

$RMSE_{test} = 0.117$ $RMSE_{train} = 0.114$ bulunur. MAD ise

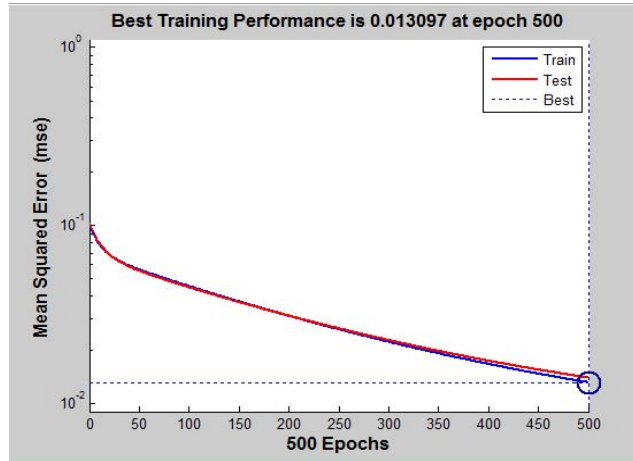
$MAD = \frac{1}{n} \sum_{i=1}^n |Gerçek - tahmini|$ formülü ile bulunur. $MAD_{train} = 0.0864$

MAD_train <1x1 double>								
	1	2	3	4	5	6	7	8
1	0.0864							

$MAD_{test} = 0.0899$

MADtest <1x1 double>								
	1	2	3	4	5	6	7	8
1	0.0899							

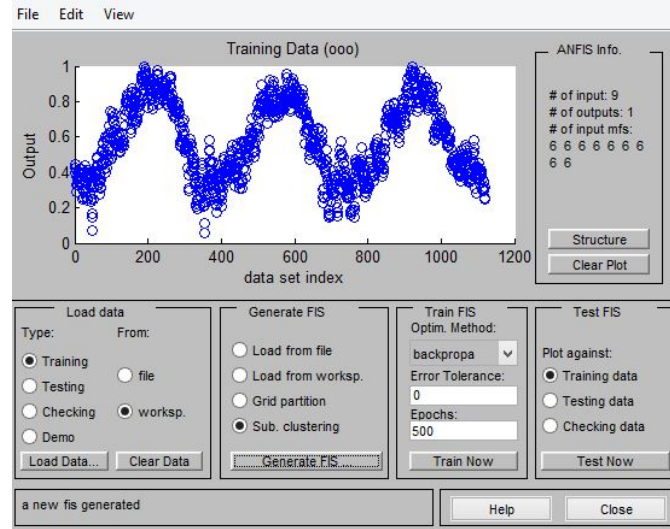
Eğitim performans grafiğini de gösterecek olursak;



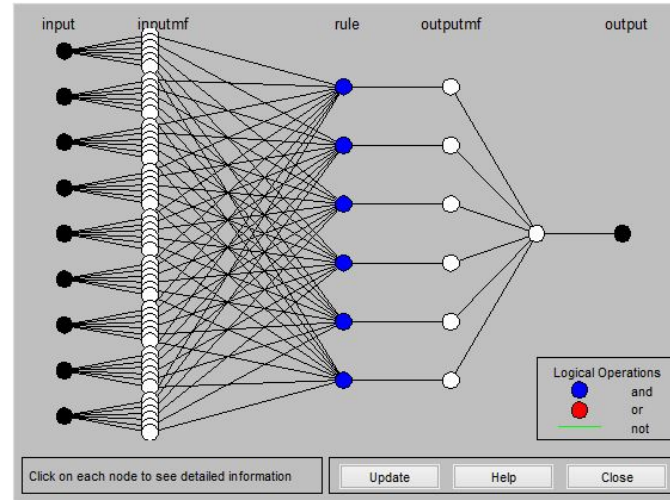
Şekil 4: 500 Epoch Sonundaki Eğitimin En İyi Performansı

ANFİS(Adaptive neuro fuzzy inference system)

ANFİS’de ise eğitim ve test verilerini programa vereceğiz karşılığında bize hata miktarını verecektir.

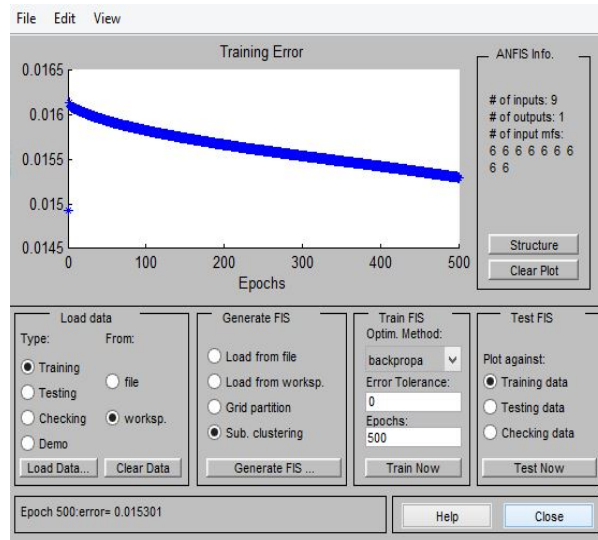


Şekil 5:Normalize Verilerin Eğitilmeden Önceki Hali



Şekil 6:Anfis Model Yapısı

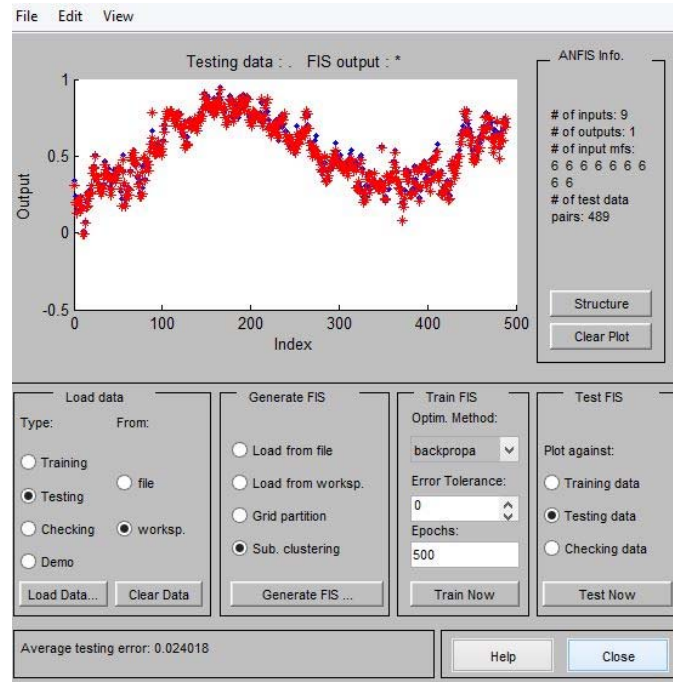
Buradaki üyelik fonksiyonu sayısı subtractive clustering’in etki oranına göre değişiklik göstermektedir..Subtractive clustering yapmamızdaki sebep ise grid partition yapıldığında verilerin çok fazla gelmesi ve ardından “out of memory” uyarısının ve görünmesidir.Ayrıca etki değerinin düşürüldüğünde üyelik fonksiyonu sayısının arttığı da gözlenmiştir.Ayrıca ANFİS’in kendi üzerinde hesapladığı hata ise RMSE olduğu bilinmektedir.Verileri 500 epoch’da eğittiğimiz zaman ise eğitim performansı şekil 7’deki gibidir.



Şekil 7: Verilerin Eğitim'den Sonraki Hali

Burada $RMSE_{train}=0.015301$ olduğu görülmektedir

O halde $MSE_{train} =0.000234$ bulunur.



Şekil 8: Verilerin test edildikten sonraki görüntüsü

Burada da $RMSE_{test}=0.024018$ iken

$MSE_{test}=0.000576$, $MAD=0.0138$ bulunur

Ayrıca $MAD_{train}=0.0119$ bulunur.

MADTrain_performance <1x1 double>								
1	2	3	4	5	6	7	8	9
0.0119								

MADTest_performance <1x1 double>								
1	2	3	4	5	6	7	8	9
0.0181								

$MAD_{test}=0.0181$

MAD(Mean Absolute Deviation) hatası hesaplanırken evalfis komutundan yararlanılmak istenmiştir.Bu komut output=evalfis(input,fis) şeklinde çalışmaktadır.Örneğin burada eğitim hatasını hesaplamak istiyorsak input kısmında son sütun hariç bütün eğitim verileri atılır.Çünkü burada son sütun bizim gerçek çıktımızdır..fis uzantılı kısım ise ANFİS programını bir kere çalıştırdıktan sonra kaydettiğimiz kısımdır. Output ise evalfis'in sonucunda döndürülen tahmini çıktılarımızdır.

SONUÇ

Bulunan hataların analiz edilmesi işlemine geçecek olursak;

Tablo 1: Anfis Ve Nftool Test Verisi Sonuçları

Test Hata türü	ANFİS	NFTOOL
RMSE	0.0240	0.117
MSE	0.000576	0.0139
MAD	0.0181	0.0889

Tablo 2: Anfis Ve Nftool Eğitim Verisi Sonuçları

Eğitim Hata Türü	ANFİS	NFTOOL
RMSE	0.015301	0.114
MSE	0.000234	0.0131
MAD	0.0119	0.0864

Herbir model için herbir hata türü hesaplandıktan sonra tablo1 ve tablo 2'deki gibi sonuçlar elde edilebilir

Sonuçları karşılaştırmak adına gerekli hatalar hesaplanmış ve iki sistem içinde sonuçlar sunulmuştur.Eğer gerçek ve tahmini ortalama sıcaklık verilerine ulaşmak istersek her iki sistem içinde gerçek çıktılar ile tahmini çıktılara denormalizasyon işlemi uygulanır

$$(x_{max} - x_{min}) * (x_{i,0'dan itibaren(normalize)}) + x_{min} = x_i$$

Bu çalışmada asıl hedeflenen ANFİS ve NFTOOL'un karşılaştırılmasıydı.Tablo 1 ve Tablo 2'den ANFİS'in 3 hata türünde de NFTOOL'dan daha az hata verdiği saptanmıştır.Ayrıca hatalar kendi aralarında da kıyaslandığında en düşük hata veren yöntemin MSE olduğu görülmektedir.O halde yaptığımız deneysel çalışmalardan yola çıkılarak söylenilebilir ki 1994-1998 seneleri arasında Ankara ili için yapılan hava durumu tahmininde test hata türü ANFİS'de NFTOOL'dan daha düşük çıkmış ve sonuç olarak bu çalışmada ANFİS'in NFTOOL'dan daha iyi sonuçlar verdiği görülmüştür.

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GEOMETRY OF FIVE-AXIS MOTION OF TWO-PARAMETER FAMILIES OF SPHERES IN MINKOWSKI SPACE

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ABSTRACT: In this paper, we construct efficient parametric approach of determining the motion of the envelope surface by a timelike curve in $R^{3,1}$. The resulting canal surfaces of Gaussian curvature and mean curvature availability, minimal state of the surface being investigated.

Keywords: canal surfaces, five axis nc machining, minkowski space.

MINKOWSKI UZAYINDA 2- PARAMETRELİ YÜZEY AİLELERİNİN 5- EKSENLİ HAREKETLERİNİN GEOMETRİSİ

ÖZET: Bu çalışmada R_1^3 Minkowski uzayında timelike eğri yardımıyla iki parametrelî küre ailelerinin 5-eksenli hareketlerinin geometrisi incelendi. Elde edilen kanal yüzeylerin Gauss eğriliği ve ortalama eğriliği araştırıldı. Son olarakta bu yüzeylerle ilgili örnek verildi.

Anahtar Kelimeler. kanal yüzey, 5-eksenli hareket, minkowski uzay

Mathematics Subject Classification (2000): 53A04, 53A05.

GİRİŞ

Açılabilir bir yüzey matematiksel olarak Gauss eğriliği sıfır olan bir yüzey olarak tanımlanır. Yani açılabilir yüzey, bir düzlem üzerinde biçim değişikliği yapılmadan sıkıştırılarak yada gerilerek oluş turulmuş bir yüzey olarak tanımlanabilir. Ayrıca bir düzlem yuvarlanarak, katlanarak yada bükerekte bir açılabilir yüzey oluşturulabilir. Genelde, varolan bu yöntemlerin çoğu bir açılabilir yüzeyin uzayda düzlemlerin bir parametrelî ailelerinin birleşimi olarak karakterize etmek için kullanılır.

Beş eksenli hareketler havacılık, savunma imalat sanayi, otomotiv, kalıpcılık ve medikal sektörlerinde karmaşık yüzeylerin imalatında sıklıkla kullanılır. Özellikle bu alanlarda kullanılmasının sebebi, yüzey kalitesinin ve bütünlüğünün önemli olduğu ve üretim toleranslarının çok dar olduğundandır. 5-eksen frezeleme (kesme hareketi) tekniği ise 3-eksen frezeleme (kesme hareketi) tekniğine ek olarak, takıma veya iş parçasına verilen 2 adet eğim veya dönme hareketi ile sağlanan bir işleme yöntemidir. CAD (bilgisayar destekli tasarım)/CAM (bilgisayar destekli imalat), kesici takım ve takım tezgah teknolojilerindeki gelişmeler yüksek hassasiyete sahip parçaların daha kısa sürede üretilmesine olanak sağlamıştır. Mühendislikte bu alanla ilgili pek çok çalışma vardır. Bunlardan bazıları ; Roth [18], 5-eksenli hareket boyunca oluşan torodial kesme, süpürme yüzeylerini ele aldı . Lartigue [17], 5-eksenli takım hareketleriyle beraber oluşan yüzeyin zarflarını inceledi. Wang [24], süpürme yüzeylerini geometrik özelliklerini çalıştı . Aras [1] iki parametrelî küre hareketlerinin geometrisini inceledi.

Kanal yüzeyi değişken yarıçaplı hareketli bir kürenin zarfı olarak tanımlanır. Kanal yüzeyini oluşturan hareketli kürenin yarıçap fonksiyonu sabit ise, kanal yüzeyine tüp ya da boru yüzeyi adı verilir. Kanal yüzeyleri, günlük hayatta karşımıza çıkan boru, halat, direk ve 3-boyutlu dökümleri temsil etmede kullanılırlar. Yine kanal yüzeyleri, bilgisayar destekli tasarım ve üretim için katıların ve yüzeylerin modellenmesinde de sıklıkla kullanılmaktadır. Temsili örnekler olarak, doğal kuadrikler, tüp yüzeyleri ve toruslar verilebilir. Kanal yüzeylerdeki bazı önemli çalışmalar şunlardır; Körpınar [12], Heisenberg grupta bishop çatısına göre kanal yüzeyleri inceledi. Yaylı [22], kanal yüzeylerin geometrik özelliklerini ele aldı . Karacan [11], Minkowski uzayında tüp yüzeylerini inceledi. Kim [14], kanal yüzeyin silüet eğrisini inceledi.

Bu çalışmada \mathbb{R}_1^3 Minkowski uzayında timelike eğri yardımıyla iki parametrelili küre ailelerinin 5-eksenli hareketlerinin geometrisi incelendi. Elde edilen kanal yüzeylerin Gauss eğriliği \tilde{g} i ve ortalama eğriliği araştırıldı . Son olarakta bu yüzeylerle ilgili örnek verildi.

EĞRİLER VE YÜZEYLERİN YAPISI

Üç boyutlu Minkowski Uzayında iç çarpım, $x = (x_1, x_2, x_3), y = (y_1, y_2, y_3) \in \mathbb{R}_1^3$ olmak üzere

$$\langle x, y \rangle = -x_1y_1 + x_2y_2 + x_3y_3$$

olarak tanımlanır. \mathbb{R}_1^3 de bir γ eğrisi boyunca Frenet çatısı $\{\mathbf{T}, \mathbf{N}, \mathbf{B}\}$, eğrilik ve burulmas κ, τ olan eğrinin Frenet--Serret formülleri

$$\begin{aligned} \mathbf{T}' &= \kappa\mathbf{N}, \\ \mathbf{N}' &= \kappa\mathbf{T} + \tau\mathbf{B}, \\ \mathbf{B}' &= -\tau\mathbf{N} \end{aligned} \quad (2.1)$$

dir. Burada

$$\begin{aligned} g(\mathbf{T}, \mathbf{T}) &= -1, \quad g(\mathbf{N}, \mathbf{N}) = 1, \quad g(\mathbf{B}, \mathbf{B}) = 1, \\ g(\mathbf{T}, \mathbf{N}) &= g(\mathbf{T}, \mathbf{B}) = g(\mathbf{N}, \mathbf{B}) = 0. \end{aligned} \quad (2.2)$$

Ayrıca vektörel çarpım

$$\mathbf{T} \wedge \mathbf{N} = -\mathbf{B}, \mathbf{N} \wedge \mathbf{B} = \mathbf{T}, \mathbf{B} \wedge \mathbf{T} = -\mathbf{N} \quad (2.3)$$

olarak tanımlanır.

Diğer yandan üç boyutlu Minkowski Uzayında bir M yüzeyi

$$\mathbf{M}(s, t) = (m_1(s, t), m_2(s, t), m_3(s, t))$$

olarak gösterilebilir. Bu yüzeyin s ve t parametrelerine göre türevleri

$$\mathbf{M}_s = \partial\mathbf{M}(s, t)/\partial s, \mathbf{M}_t = \partial\mathbf{M}(s, t)/\partial t$$

ile gösterilirse

$$E = \langle \mathbf{M}_s, \mathbf{M}_s \rangle, F = \langle \mathbf{M}_s, \mathbf{M}_t \rangle, G = \langle \mathbf{M}_t, \mathbf{M}_t \rangle, \quad (2.4)$$

$$e = \langle \mathbf{M}_{ss}, \mathbf{U} \rangle, f = \langle \mathbf{M}_{st}, \mathbf{U} \rangle, g = \langle \mathbf{M}_{tt}, \mathbf{U} \rangle \quad (2.5)$$

olmak üzere M yüzeyinin birinci ve ikinci temel formlar sırasıyla,

$$\mathbf{I} = E ds^2 + 2F ds dt + G dt^2, \quad (2.6)$$

$$\mathbf{II} = e ds^2 + 2f ds dt + g dt^2$$

dir. Bu durumda K Gauss eğriliği ve H ortalama eğriliği

$$K = \frac{eg - f^2}{EG - F^2}, H = \frac{Eg - 2Ff + Ge}{2(EG - F^2)} \quad (2.7)$$

dir.

İKİ PARAMETRELİ KÜRE AİLESİ

İki parametrelili küre ailesi,

$$(s, t) : (P - \mathbf{m}(s, t))^2 - r(s)^2 = 0, \quad (3.1)$$

eşitliğiyle tanımlanır. Burada (s, t) iki parametrelili küre ailesini göstermektedir. $\mathbf{m}(s, t)$ kürelerin merkez eğrisini, $r(s)$ de yarıçap fonksiyonunu ifade etmektedir. (s, t) nin sırasıyla s ve t parametrelerine göre kısmi türevlerini,

$${}_s(s, t) : (P - \mathbf{m}(s, t))\mathbf{m}_s + rr'_s = 0, \quad (3.2)$$

$${}_t(s, t) : (P - \mathbf{m}(s, t))\mathbf{m}_t = 0, \quad (3.3)$$

eşitlikleriyle verilir. Eğer r'_s sıfır olursa yüzey tüp(boru) yüzeyi olur. \mathbf{m}_s ve \mathbf{m}_t düzlemleri yüzeyin normalleridir.

Teorem 3.1. γ timelike eğrisinin bir parametrelili ailesi $\mathbf{m}(s,t)$ olsun. Buradan $\mathbf{m}(s,t)$ eğri ailesini kullanarak, 5-eksenli kanal yüzeyi $\mathbf{P}(s,t,\theta)$,

$$\begin{aligned} \mathbf{P}(s,t,\theta) &= \gamma + [t + \varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta t \tau)] \mathbf{T} \\ &+ [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)] \mathbf{N} \\ &\mp \frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')) \mathbf{B}, \end{aligned} \quad (3.4)$$

olur. Burada $r(s)r'(s) = \varphi(s)$, $r(s)\sqrt{1+r'^2(s)} = \xi(s)$ dir.

İspat. Kabul edelimki kanal yüzeyin merkezi $\mathbf{m}(s,t) = \gamma(s) + t\mathbf{T}(s)$ olsun. Burada γ Minkowski uzayında birim hızlı timelike eğrisidir.

Buradan $\mathbf{m}(s,t)$ nin Frenet denklemleri

$$\begin{aligned} \mathbf{T}^m(s) &= \mathbf{T}(s) + (t\kappa)\mathbf{N}(s), \\ \mathbf{N}^m(s) &= \frac{1}{\kappa^m} [(t\kappa^2)\mathbf{T} + (\kappa + t\kappa')\mathbf{N} + (t\kappa\tau)\mathbf{B}], \\ \mathbf{B}^m(s) &= -\frac{1}{\kappa^m} [(t^2\kappa^2\tau)\mathbf{T} + (t\kappa\tau)\mathbf{N} + (t^2\kappa^3 - \kappa - t\kappa')\mathbf{B}] \end{aligned}$$

olur.

Son eşitlikler yardımıyla kanal yüzey

$$\mathbf{P}(s,t,\theta) = \gamma + (t + r(s)r'(s))\mathbf{T}^m \mp r(s)\sqrt{1+r'^2(s)}(\cos \theta \mathbf{N}^m + \sin \theta \mathbf{B}^m)$$

olur.

Buradan

$$\begin{aligned} \mathbf{P}(s,t,\theta) &= \gamma(s) + [(t + r(s)r'(s)) \mp r(s)\sqrt{1+r'^2(s)} \frac{1}{\kappa^m} t \kappa^2 (\cos \theta - \sin \theta t \tau)] \mathbf{T}(s,t) \\ &+ [t^2 \kappa + r(s)r'(s)t \kappa \mp r(s)\sqrt{1+r'^2(s)} \frac{1}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)] \mathbf{N}(s,t) \\ &\mp r(s)\sqrt{1+r'^2(s)} \frac{1}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')) \mathbf{B}(s,t) \end{aligned}$$

elde edilir. $\mathbf{P}(s,t,\theta)$ düzenlenirse

$$\begin{aligned} \mathbf{P}(s,t,\theta) &= \gamma + [t + \varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta t \tau)] \mathbf{T} \\ &+ [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)] \mathbf{N} \\ &\mp \frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')) \mathbf{B}, \end{aligned}$$

olarak bulunur. Burada $r(s)r'(s) = \varphi(s)$, $r(s)\sqrt{1+r'^2(s)} = \xi(s)$ dir. Böylece teoremi ispatlamış oluruz.

Teorem 3.2. γ timelike eğrisinin bir parametrelili ailesi $\mathbf{m}(s,t)$ olsun. Buradan, 5-eksenli $\mathbf{P}(s,t,\theta)$ kanal

yüzeyinin Gauss eğriliği,

$$\begin{aligned} \mathbf{K} &= \frac{1}{\Gamma} [[-(\mu'_1 + \mu_2 \kappa) [\varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta \tau)] \\ &+ (\mu_1 \kappa + \mu'_2 - \mu_3 \tau) [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)] \\ &+ (\mu'_3 + \tau \mu_2) [\mp (\frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')))]]] [-(\lambda_1)_\theta [\varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta \tau)] \\ &+ (\lambda_2)_\theta [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)] + (\lambda_3)_\theta [\mp (\frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')))]] \\ &- [-(\mu_1)_\theta [\varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta \tau)] + (\mu_2)_\theta [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)] \\ &+ (\mu_3)_\theta [\mp (\frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')))]^2], \end{aligned} \quad (3.5)$$

dir. Burada

$$\Gamma = (-\mu_1^2 + \mu_2^2 + \mu_3^2)(-\lambda_1^2 + \lambda_2^2 + \lambda_3^2) - (-\mu_1 \lambda_1 + \mu_2 \lambda_2 + \mu_3 \lambda_3)^2$$

dir.

İspat. $\mathbf{P}(s, t, \theta)$ yüzeyini ve Frenet denklemleriyle beraber

$$\mathbf{P}_s = \mu_1 \mathbf{T} + \mu_2 \mathbf{N} + \mu_3 \mathbf{B},$$

olarak bulunur. Burada

$$\mu_1 = 1 + \varphi' \mp (\frac{\xi t \kappa^2}{\kappa^m})' (\cos \theta - \sin \theta \tau) \mp \frac{\xi t \kappa^2}{\kappa^m} (-\sin \theta \tau') + t^2 \kappa^2 + \varphi t \kappa^2 \mp \frac{\xi \kappa}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau),$$

$$\mu_2 = t \kappa + \varphi \kappa \mp \frac{\xi t \kappa^3}{\kappa^m} (\cos \theta - \sin \theta \tau) t^2 \kappa' + \varphi' t \kappa + \varphi t \kappa' \mp (\frac{\xi}{\kappa^m})' (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)$$

$$\mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa' + t \kappa'') - \sin \theta t \kappa' \tau - \sin \theta t \kappa \tau') \mp \frac{\xi \tau}{\kappa^m} (-\cos \theta (t \kappa \tau) + \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')),$$

$$\mu_3 = \mp (\frac{\xi}{\kappa^m})' (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')) + \frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau)' - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa'))]$$

$$+ t^2 \kappa \tau + \varphi t \kappa \tau \mp \frac{\xi \tau}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)].$$

ve

$$\mathbf{P}_\theta = \lambda_1 \mathbf{T} + \lambda_2 \mathbf{N} + \lambda_3 \mathbf{B},$$

burada

$$\lambda_1 = \mp \frac{\xi t \kappa^2}{\kappa^m} (-\sin \theta - \cos \theta \tau),$$

$$\lambda_2 = \mp \frac{\xi}{\kappa^m} (-\sin \theta(\kappa + t\kappa') - \cos \theta t\kappa\tau),$$

$$\lambda_3 = \mp \frac{\xi}{\kappa^m} (-\sin \theta(t\kappa\tau) - \cos \theta(t^2\kappa^3 - \kappa - t\kappa'))]$$

dir.

Buradan 1. temel formun bileşenleri E, F, G

$$E = -\mu_1^2 + \mu_2^2 + \mu_3^2,$$

$$F = -\mu_1\lambda_1 + \mu_2\lambda_2 + \mu_3\lambda_3,$$

$$G = -\lambda_1^2 + \lambda_2^2 + \lambda_3^2$$

olarak hesaplanır.

Öte yandan $\mathbf{P}(s, t, \theta)$ yüzeyinin normal vektörü

$$\varpi = \mathbf{P}(s, t, \theta) - \mathbf{m}(s, t),$$

$$\varpi = [\varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta t \tau)] \mathbf{T}$$

$$+ [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)] \mathbf{N}$$

$$\mp \frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa'))] \mathbf{B}$$

olarak elde edilir.

2. temel formun bileşenleri,

$$\mathbf{e} = -(\mu_1' + \mu_2 \kappa) [\varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta t \tau)]$$

$$+ (\mu_1 \kappa + \mu_2' - \mu_3 \tau) [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)]$$

$$+ (\mu_3' + \tau \mu_2) [\mp (\frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')))],$$

$$\mathbf{f} = -(\mu_1)_\theta [\varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta t \tau)]$$

$$+ (\mu_2)_\theta [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)]$$

$$+ (\mu_3)_\theta [\mp (\frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')))],$$

$$\mathbf{g} = -(\lambda_1)_\theta [\varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta t \tau)]$$

$$+ (\lambda_2)_\theta [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)]$$

$$+ (\lambda_3)_\theta [\mp (\frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')))],$$

elde edilir.

Ayrıca

$$\Gamma = (-\mu_1^2 + \mu_2^2 + \mu_3^2)(-\lambda_1^2 + \lambda_2^2 + \lambda_3^2) - (-\mu_1\lambda_1 + \mu_2\lambda_2 + \mu_3\lambda_3)^2$$

dir.

Sonuç 3.3. γ timelike eğrisinin bir parametrelili ailesi $\mathbf{m}(s,t)$ olsun. Buradan, 5-eksenli $\mathbf{P}(s,t,\theta)$ kanal yüzeyinin ortalama eğriliği,

$$\begin{aligned} \mathbf{H} = & \frac{1}{2\Gamma} [(-\mu_1^2 + \mu_2^2 + \mu_3^2)(-\lambda_1)_\theta [\varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta t \tau)] \\ & + (\lambda_2)_\theta [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)] \\ & + (\lambda_3)_\theta [\mp (\frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')))] \\ & - 2[-\mu_1 \lambda_1 + \mu_2 \lambda_2 + \mu_3 \lambda_3](-\mu_1)_\theta [\varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta t \tau)] \\ & + (\mu_2)_\theta [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)] \\ & + (\mu_3)_\theta [\mp (\frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')))] \\ & + [-\lambda_1^2 + \lambda_2^2 + \lambda_3^2][-(\mu_1' + \mu_2 \kappa) [\varphi \mp \frac{\xi t \kappa^2}{\kappa^m} (\cos \theta - \sin \theta t \tau)] \\ & + (\mu_1 \kappa + \mu_2' - \mu_3 \tau) [t^2 \kappa + \varphi t \kappa \mp \frac{\xi}{\kappa^m} (\cos \theta (\kappa + t \kappa') - \sin \theta t \kappa \tau)] \\ & + (\mu_3' + \tau \mu_2) [\mp (\frac{\xi}{\kappa^m} (\cos \theta (t \kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t \kappa')))], \end{aligned} \quad (3.6)$$

dür. Burada

$$\Gamma = (-\mu_1^2 + \mu_2^2 + \mu_3^2)(-\lambda_1^2 + \lambda_2^2 + \lambda_3^2) - (-\mu_1 \lambda_1 + \mu_2 \lambda_2 + \mu_3 \lambda_3)^2$$

dir.

Sonuç 3.4. Kabul edelim ki $\mathbf{L}(s,t,\theta)$ tüp yüzeyinin timelike merkez eğrisi $\mathbf{m}(s,t): I \rightarrow \mathbb{R}_1^3$ olsun. Buradan $\mathbf{L}(s,t,\theta)$ tüp yüzeyinin parametrizasyonu

$$\begin{aligned} \mathbf{L}(s,t,\theta) = & \gamma + [t \mp r (\cos \theta \frac{t \kappa^2}{\kappa^m} - \sin \theta \frac{t^2 \kappa^2 \tau}{\kappa^m})] \mathbf{T} \\ & + [t^2 \kappa \mp r (\cos \theta \frac{\kappa + t \kappa'}{\kappa^m} - \sin \theta \frac{t \kappa \tau}{\kappa^m})] \mathbf{N} \\ & \mp r [\cos \theta \frac{t \kappa \tau}{\kappa^m} - \sin \theta \frac{1}{\kappa^m} (t^2 \kappa^3 - \kappa - t \kappa')] \mathbf{B}, \end{aligned} \quad (3.7)$$

olur.

Sonuç 3.5. $\mathbf{L}(s,t,\theta)$ tüp yüzeyinin Gauss eğriliği,

$$\begin{aligned} \mathbf{K} = & \frac{1}{\Lambda} [-(\eta_1' + \eta_2 \kappa) [\mp r (\cos \theta \frac{t \kappa^2}{\kappa^m} - \sin \theta \frac{t^2 \kappa^2 \tau}{\kappa^m})] + (\eta_1 \kappa + \eta_2' - \eta_3 \tau) [t^2 \kappa \mp r (\cos \theta \frac{\kappa + t \kappa'}{\kappa^m} - \sin \theta \frac{t \kappa \tau}{\kappa^m})] \\ & + (\eta_2 \tau + \eta_3') (\mp r (\cos \theta \frac{t \kappa \tau}{\kappa^m} - \sin \theta \frac{1}{\kappa^m} (t^2 \kappa^3 - \kappa - t \kappa')))] [-(\rho_1)_\theta [\mp r (\cos \theta \frac{t \kappa^2}{\kappa^m} - \sin \theta \frac{t^2 \kappa^2 \tau}{\kappa^m})]] \end{aligned}$$

$$\begin{aligned}
 & + (\rho_2)_\theta [t^2 \kappa \mp r (\cos \theta \frac{\kappa + t\kappa'}{\kappa^m} - \sin \theta \frac{t\kappa\tau}{\kappa^m})] + (\rho_3)_\theta [\mp r (\cos \theta \frac{t\kappa\tau}{\kappa^m} - \sin \theta \frac{1}{\kappa^m} (t^2 \kappa^3 - \kappa - t\kappa'))] \quad (3.8) \\
 & - [-(\eta_1)_\theta [\mp r (\cos \theta \frac{t\kappa^2}{\kappa^m} - \sin \theta \frac{t^2 \kappa^2 \tau}{\kappa^m})] + (\eta_2)_\theta [t^2 \kappa \mp r (\cos \theta \frac{\kappa + t\kappa'}{\kappa^m} - \sin \theta \frac{t\kappa\tau}{\kappa^m})] \\
 & + (\eta_3)_\theta [\mp r (\cos \theta \frac{t\kappa\tau}{\kappa^m} - \sin \theta \frac{1}{\kappa^m} (t^2 \kappa^3 - \kappa - t\kappa'))]]^2],
 \end{aligned}$$

olur. Burada

$$\Lambda = (-\eta_1^2 + \eta_2^2 + \eta_3^2)(\eta_1^2 + \eta_2^2 + \eta_3^2) - (-\eta_1\rho_1 + \eta_2\rho_2 + \eta_3\rho_3)^2,$$

$$\rho_1 = \mp r [-\sin \theta \frac{t\kappa^2}{\kappa^m} - \cos \theta \frac{t^2 \kappa^2 \tau}{\kappa^m}],$$

$$\rho_2 = \mp r [-\sin \theta \frac{\kappa + t\kappa'}{\kappa^m} - \cos \theta \frac{t\kappa\tau}{\kappa^m}],$$

$$\rho_3 = \mp r [-\sin \theta \frac{t\kappa\tau}{\kappa^m} - \cos \theta \frac{1}{\kappa^m} (t^2 \kappa^3 - \kappa - t\kappa')],$$

$$\eta_1 = 1 \mp (r (\cos \theta (\frac{t\kappa^2}{\kappa^m})' - \sin \theta (\frac{t^2 \kappa^2 \tau}{\kappa^m})') + t^2 \kappa^2 \mp (r \kappa (\cos \theta \frac{\kappa + t\kappa'}{\kappa^m} - \sin \theta \frac{t\kappa\tau}{\kappa^m}))),$$

$$\begin{aligned}
 \eta_2 = t\kappa \mp (r \kappa (\cos \theta \frac{t\kappa^2}{\kappa^m} - \sin \theta \frac{t^2 \kappa^2 \tau}{\kappa^m})) + (t^2 \kappa' \mp r (\cos \theta (\frac{\kappa + t\kappa'}{\kappa^m})' - \sin \theta (\frac{t\kappa\tau}{\kappa^m})')) \\
 \mp (r (-\cos \theta \frac{t\kappa\tau^2}{\kappa^m} + \sin \theta \frac{1}{\kappa^m} (t^2 \kappa^3 \tau - \kappa\tau - t\tau\kappa'))),
 \end{aligned}$$

$$\eta_3 = t^2 \kappa\tau \mp (r \tau (\cos \theta \frac{\kappa + t\kappa'}{\kappa^m} - \sin \theta \frac{t\kappa\tau}{\kappa^m})) \mp (r (\cos \theta (\frac{t\kappa\tau}{\kappa^m})' - \sin \theta (\frac{t^2 \kappa^3 - \kappa - t\kappa'}{\kappa^m})'))$$

dir.

Sonuç 3.6. $L(s, t, \theta)$ tüp yüzeyinin ortalama eğriliği,

$$\begin{aligned}
 \mathbf{H} = \frac{1}{2\Lambda} [(-\eta_1^2 + \eta_2^2 + \eta_3^2) [-(\rho_1)_\theta [\mp r (\cos \theta \frac{t\kappa^2}{\kappa^m} - \sin \theta \frac{t^2 \kappa^2 \tau}{\kappa^m})] \\
 + (\rho_2)_\theta [t^2 \kappa \mp r (\cos \theta \frac{\kappa + t\kappa'}{\kappa^m} - \sin \theta \frac{t\kappa\tau}{\kappa^m})] + (\rho_3)_\theta [\mp r (\cos \theta \frac{t\kappa\tau}{\kappa^m} - \sin \theta \frac{1}{\kappa^m} (t^2 \kappa^3 - \kappa - t\kappa'))]] \quad (3.9) \\
 - 2 [(-\eta_1\rho_1 + \eta_2\rho_2 + \eta_3\rho_3) [-(\eta_1)_\theta [\mp r (\cos \theta \frac{t\kappa^2}{\kappa^m} - \sin \theta \frac{t^2 \kappa^2 \tau}{\kappa^m})] + (\eta_2)_\theta [t^2 \kappa \mp r (\cos \theta \frac{\kappa + t\kappa'}{\kappa^m} - \sin \theta \frac{t\kappa\tau}{\kappa^m})] \\
 + (\eta_3)_\theta [\mp r (\cos \theta \frac{t\kappa\tau}{\kappa^m} - \sin \theta \frac{1}{\kappa^m} (t^2 \kappa^3 - \kappa - t\kappa'))]] + [\eta_1^2 + \eta_2^2 + \eta_3^2] [-(\eta_1' + \eta_2\kappa) [\mp r (\cos \theta \frac{t\kappa^2}{\kappa^m} - \sin \theta \frac{t^2 \kappa^2 \tau}{\kappa^m})]],
 \end{aligned}$$

olur. Burada

$$\Lambda = (-\eta_1^2 + \eta_2^2 + \eta_3^2)(\eta_1^2 + \eta_2^2 + \eta_3^2) - (-\eta_1\rho_1 + \eta_2\rho_2 + \eta_3\rho_3)^2,$$

$$\rho_1 = \mp r [-\sin \theta \frac{t\kappa^2}{\kappa^m} - \cos \theta \frac{t^2 \kappa^2 \tau}{\kappa^m}],$$

$$\rho_2 = \mp r [-\sin \theta \frac{\kappa + t\kappa'}{\kappa^m} - \cos \theta \frac{t\kappa\tau}{\kappa^m}],$$

$$\rho_3 = \mp r \left[-\sin \theta \frac{t\kappa\tau}{\kappa^m} - \cos \theta \frac{1}{\kappa^m} (t^2\kappa^3 - \kappa - t\kappa') \right],$$

$$\eta_1 = 1 \mp \left(r \left(\cos \theta \left(\frac{t\kappa^2}{\kappa^m} \right)' - \sin \theta \left(\frac{t^2\kappa^2\tau}{\kappa^m} \right)' \right) + t^2\kappa^2 \mp \left(r\kappa \left(\cos \theta \frac{\kappa + t\kappa'}{\kappa^m} - \sin \theta \frac{t\kappa\tau}{\kappa^m} \right) \right) \right),$$

$$\eta_2 = t\kappa \mp \left(r\kappa \left(\cos \theta \frac{t\kappa^2}{\kappa^m} - \sin \theta \frac{t^2\kappa^2\tau}{\kappa^m} \right) \right) + \left(t^2\kappa' \mp r \left(\cos \theta \left(\frac{\kappa + t\kappa'}{\kappa^m} \right)' - \sin \theta \left(\frac{t\kappa\tau}{\kappa^m} \right)' \right) \right) \\ \mp \left(r \left(-\cos \theta \frac{t\kappa\tau^2}{\kappa^m} + \sin \theta \frac{1}{\kappa^m} (t^2\kappa^3\tau - \kappa\tau - t\tau\kappa') \right) \right),$$

$$\eta_3 = t^2\kappa\tau \mp \left(r\tau \left(\cos \theta \frac{\kappa + t\kappa'}{\kappa^m} - \sin \theta \frac{t\kappa\tau}{\kappa^m} \right) \right) \mp \left(r \left(\cos \theta \left(\frac{t\kappa\tau}{\kappa^m} \right)' - \sin \theta \left(\frac{t^2\kappa^3 - \kappa - t\kappa'}{\kappa^m} \right)' \right) \right)$$

dir.

ÖRNEKLER

Örnek 4.1.

$$\gamma(s) = \left(-\frac{5}{9} \cosh 3s, \frac{4}{3}s, -\frac{5}{9} \sinh 3s \right)$$

timelike eğrisini ele alalım, burada $-1 \leq s \leq 1$ dir. O halde bu eğrinin Frenet vektörleri

$$\mathbf{T}(s) = \left(-\frac{5}{3} \sinh 3s, \frac{4}{3}, -\frac{5}{3} \cosh 3s \right),$$

$$\mathbf{N}(s) = (-5 \cosh 3s, 0, -5 \sinh 3s),$$

$$\mathbf{B}(s) = \left(-\frac{4}{3} \sinh 3s, \frac{5}{3}, -\frac{4}{3} \cosh 3s \right)$$

olarak hesaplanabilir.

Öte yandan $K(s, t, \theta)$ yüzeyini,

$$K(s, t, \theta) = -\frac{5}{9} \cosh 3s + \left[(t + rr' \mp r\sqrt{1+r'^2} \frac{1}{\kappa^m} t\kappa^2 (\cos \theta - \sin \theta t\tau)) \right] \left(-\frac{5}{3} \sinh 3s \right) \\ + \left[t^2\kappa + rr' t\kappa \mp r\sqrt{1+r'^2} \frac{1}{\kappa^m} (\cos \theta (\kappa + t\kappa') - \sin \theta t\kappa\tau) \right] (-5 \cosh 3s) \\ + \left[r\sqrt{1+r'^2} \frac{1}{\kappa^m} \cos \theta (t\kappa\tau) - \sin \theta (t^2\kappa^3 - \kappa - t\kappa') \right] \left(-\frac{4}{3} \sinh 3s \right), \\ \frac{4}{3}s + \frac{4}{3} \left[(t + rr' \mp r\sqrt{1+r'^2} \frac{1}{\kappa^m} t\kappa^2 (\cos \theta - \sin \theta t\tau)) \right] \\ + \frac{5}{3} \left[r\sqrt{1+r'^2} \frac{1}{\kappa^m} \cos \theta (t\kappa\tau) - \sin \theta (t^2\kappa^3 - \kappa - t\kappa') \right], \\ -\frac{5}{9} \sinh 3s + \left[(t + rr' \mp r\sqrt{1+r'^2} \frac{1}{\kappa^m} t\kappa^2 (\cos \theta - \sin \theta t\tau)) \right] \left(-\frac{5}{3} \cosh 3s \right) \\ + \left[t^2\kappa + rr' t\kappa \mp r\sqrt{1+r'^2} \frac{1}{\kappa^m} (\cos \theta (\kappa + t\kappa') - \sin \theta t\kappa\tau) \right] (-5 \sinh 3s) \\ + \left[r\sqrt{1+r'^2} \frac{1}{\kappa^m} \cos \theta (t\kappa\tau) - \sin \theta (t^2\kappa^3 - \kappa - t\kappa') \right] \left(-\frac{4}{3} \cosh 3s \right)$$

şeklinde hesaplanır.

Yani,

$$\begin{aligned}
 x_{\kappa}(s, t, \theta) &= -\frac{5}{9} \cosh 3s + [(t + rr' \mp r\sqrt{1+r'^2} \frac{1}{\kappa^m} t\kappa^2 (\cos \theta - \sin \theta \tau))(-\frac{5}{3} \sinh 3s) \\
 &\quad + [t^2 \kappa + rr' t\kappa \mp r\sqrt{1+r'^2} \frac{1}{\kappa^m} (\cos \theta (\kappa + t\kappa') - \sin \theta t\kappa \tau)](-5 \cosh 3s) \\
 &\quad + [r\sqrt{1+r'^2} \frac{1}{\kappa^m} \cos \theta (t\kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t\kappa')](-\frac{4}{3} \sinh 3s)], \\
 y_{\kappa}(s, t, \theta) &= \frac{4}{3} s + \frac{4}{3} [(t + rr' \mp r\sqrt{1+r'^2} \frac{1}{\kappa^m} t\kappa^2 (\cos \theta - \sin \theta \tau)) \\
 &\quad + \frac{5}{3} [r\sqrt{1+r'^2} \frac{1}{\kappa^m} \cos \theta (t\kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t\kappa')], \\
 z_{\kappa}(s, t, \theta) &= -\frac{5}{9} \sinh 3s + [(t + rr' \mp r\sqrt{1+r'^2} \frac{1}{\kappa^m} t\kappa^2 (\cos \theta - \sin \theta \tau))(-\frac{5}{3} \cosh 3s) \\
 &\quad + [t^2 \kappa + rr' t\kappa \mp r\sqrt{1+r'^2} \frac{1}{\kappa^m} (\cos \theta (\kappa + t\kappa') - \sin \theta t\kappa \tau)](-5 \sinh 3s) \\
 &\quad + [r\sqrt{1+r'^2} \frac{1}{\kappa^m} \cos \theta (t\kappa \tau) - \sin \theta (t^2 \kappa^3 - \kappa - t\kappa')](-\frac{4}{3} \cosh 3s).
 \end{aligned}$$

Parametrik denklemlerinin grafiği aşağıdaki gibi olur.

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ANALYSIS OF EPISTEMOLOGICAL BELIEFS OF TEACHERS BASED ON SOME VARIABLES

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ABSTRACT: The aim of this study is to examine teachers' epistemological beliefs according to some variables. The sample of this research is 512 teachers working in the Ministry of Education in the 2014-2015 academic year in the Konya province. Based on the survey model, "Epistemological Belief Scale" is used to gather data. Research findings showed that there were significant differences in epistemological beliefs according to teachers' gender, marital status, graduation, age, seniority, the number of students in the school worked, the number of teachers in the school worked and the working regions.

Keywords: teacher, epistemology, belief, variable

ÖĞRETMENLERİN EPİSTEMOLOJİK İNANÇLARININ BAZI DEĞİŞKENLERE GÖRE İNCELEMESİ

ÖZET: Bu araştırmanın amacı, öğretmenlerin epistemolojik inançlarını bazı değişkenlere göre incelemektir. Araştırmanın örneklemini 2014-2015 eğitim- öğretim yılında Konya ilinde Milli Eğitim Bakanlığında görev yapan 512 öğretmen oluşturmaktadır. Tarama modeline dayalı olarak gerçekleştirilen çalışmada ölçme aracı olarak "Epistemolojik İnanç Ölçeği" kullanılmıştır. Araştırma bulgularına göre öğretmenlerin cinsiyet, medeni durumu, mezuniyet, yaş, kıdem, görev yapılan okulların öğrenci sayısına, görev yapılan okulların öğretmen sayısına, görev yapılan bölgelere göre epistemolojik inançlarında anlamlı farklar bulunmuştur.

Anahtar Kelimeler: eğitim-öğretim, epistemolojik inanç, öğretmen, bilgi.

GİRİŞ

İnançla ilgili literatür incelendiğinde birbirine yakın ya da farklılık gösteren birden çok tanıma rastlanmaktadır. Sigel (1985), inancı genellikle doğru olduğu düşünülen ve davranışa yön veren "tasarımlar ya da kavramların içine yerleşmiş ve onlarla bütünleşik zihinsel deneyim yapılandırılmaları" olarak; Rokeach (1968), "Bir kimsenin söyledikleri ya da yaptıklarından çıkarılan ve 'Ben inanıyorum ki...' tümcesinden sonra gelen, bilinçli ya da bilinçsiz herhangi basit bir önerme" olarak; Harvey (1986), bir insanın geliştirdiği ve düşünce ve davranışa yön verecek kadar geçerliliğe, doğruluğa ya da güvenilirliğe sahip gerçeklik tasvirleri olarak tanımlamıştır. Hofer ve Pintrich, (1997)'e göre bireylerin aldıkları tüm kararların ve gösterdikleri tüm davranışların gerisinde sahip oldukları inanış sistemlerinin yer aldığı söylenebilir (Eroğlu ve Güven, 2004). Mengüşoğlu(1992)'na göre, gerçekte herhangi bir şeye inanmayan bir insan yoktur. İnanılan şey farklı olabilir; fakat inanma duygusu insanda hiçbir zaman eksik olamaz. Çünkü hiçbir şeye inanmayan bir insan yaşayamaz

Epistemoloji terimi; felsefenin bilgi sorununu temel alarak, bilgiyle ilgili problemleri araştıran, bilginin doğasını, yapısını, kaynağını, kökenini, değerini, ölçütlerini, geçerliliğini ve sınırlarını inceleyen felsefe alanı olarak tanımlanabilir. Epistemoloji doğal olarak bilgiyi merkeze alan birçok soru sormuş, bu sorular merkezinde bireyler cevapları bulmaya çalışarak, kendi içsel inançlarını epistemoloji sayesinde yönlendirmişlerdir. Bu yönlendirme sonucunda epistemolojik inançlar ortaya çıkmıştır. Epistemolojik inançlar ise kısaca bireylerin, bilginin ne olduğu, bilme ve öğrenmenin nasıl gerçekleştiği, kesinliğinin derecesi, sınırları, organizasyonu ve kriterleri üzerindeki görüşleri ile ilgili öznel inançları olarak tanımlayabiliriz.

Epistemolojik inançlarla ilgili farklı yaklaşımlar bulunmaktadır. Bu yaklaşımlar daha çok öğrenci ve öğretmenlerin bilgiye ve epistemolojik konulara ilişkin inançlarını tanımlama ve ölçmeye yöneliktir. Araştırmaların çoğunun kökeni, Perry'nin üniversite öğrencilerinin zihinsel ve ahlaki gelişimi üzerine olan ve yeni ufuklar açan çalışmasına dayanmaktadır. Bu alandaki araştırmalar, 1960'lı yılların sonundan 1980'li yılların sonlarına kadar tek boyutlu olarak gelişme göstermiş, 1990'lı yıllarda Schommer'in çalışmalarıyla çok boyutlu bir nitelik kazanmıştır.

Schommer (1990; 1998) epistemolojik inançları geleneksel ve gelişmiş epistemolojik inançlar olarak ikiye ayrılarak ele alınmıştır. Diğer bir ifadeyle bireyler bazı açılardan gelişmiş bazı açılardan ise gelişmemiş epistemolojik inançlara sahip olabilirler. Schommer tarafından geleneksel olarak nitelendirilen epistemolojik inançların pozitivist bilim anlayışına, gelişmiş epistemolojik inançların ise postmodernist bilim anlayışına uygun düştüğü söylenebilir. Bu iki epistemolojik bakış açısı birbirine karşıttır.

Epistemolojik inançların oluşumunu ve gelişimini etkileyen etmenleri; zihinsel gelişim, yaş, aile yapısı, eğitim düzeyi ve içinde yaşanılan kültür olarak sınıflayabiliriz. Henüz güçlü biçimde kanıtlanmamış olmasına karşın, cinsiyetin ve öğrenim görülen alanın da epistemolojik inançların biçimlenmesinde etkili olduğu söylenebilir (Deryakulu, 2004: 268). Zihinsel görevlerin doğasını ve karmaşık-güç koşullarla başa çıkmak için hangi stratejilerin uygun olduğuna karar vermeyi etkilediği için epistemolojik inançların çalışma becerileri ve öğrenme stratejileri olan üst bilişle ilişkili olduğu söylenmektedir (Öngen, 2003: 156).

Epistemolojik inançların nasıl geliştirilebileceği ya da değiştirilebileceği özellikle öğretme öğrenme süreçlerinin daha etkili ve verimli kılınması ile öğretmen eğitimi açısından tartışılan bir konudur.

Schommer'ın modelindeki gelişmiş epistemolojik inançların yapılandırmacı öğrenme yaklaşımıyla paralel olduğu, gelişmemiş epistemolojik inançların ise nesnelci öğretim yaklaşımıyla paralel olduğu, bu nedenle yapıcı öğrenme modellerinin daha etkili biçimde uygulanabilmesi için öğretmenlerin epistemolojik inançlarının daha gelişmiş/olgunlaşmış hale getirilmesi gerektiğini savunmaktadırlar. Bu amaçla, öğretmenlerde epistemolojik inanç değişimi sağlamayı hedefleyen, yapıcı öğrenme yaklaşımına dayalı, dört hafta süreli bir yetiştirme programı uygulamışlardır. Programın sonunda öğretmenlerin "Bilgi Basittir", "Öğrenme Hemen Gerçekleşir" ve "Bilgi Kesindir" boyutlarındaki inançlarının daha gelişmiş hale geldiği görülmüştür. (Deryakulu, 2004:276).

Çalışmalar, önceden varsayıldığı gibi epistemolojik inançların değişmez bir yapı olmadığını, özellikle öğrenciyi etkin kılan, tek bir nesnel gerçekliğin/doğrunun var olmadığı, tersine bilginin öğrenci tarafından yapılandırıldığı görüşünü benimseyen, öğrenmenin öğrencinin çabasına ve katılımına bağlı olduğunu vurgulayan yapıcı öğrenme yaklaşımına dayalı uzun süreli ve tutarlı öğretim uygulamalarıyla değişebileceğini göstermektedir.

Öğretmenlerin, epistemolojik inançları, eğitim-öğretim faaliyetlerini yürütürken kullanacakları öğretim yöntemi ve tekniklerini, öğrencileriyle kuracakları ilişkinin niteliğini ve sınıf yönetimini önemli ölçüde etkileyeceğinden dolayı, öğretmenlerin epistemolojik inançlarının bilinmesi gerekmektedir (Öngen,2003). Yapılan araştırmalar kişisel epistemolojik inançların kişinin biliş ve biliş üstü işlemlerinde anlamlı bir etkiye sahip olduğunu (Schommer, 1994), epistemolojik inançların öğrencilerin öğrenmesinin önemli bir ögesi olduğunu ortaya koymaktadır (Hofer, 2001). Schommer'a (1990, 1994), göre, yetkin, deneyimli ve eleştirel bir tavra sahip öğrenciler, tamamlanmış ve mutlak formunu almış bir bilginin olmadığını, bilgilerin bir kısmının henüz keşfedileceğine, büyük bir kısmının ise gelişmeye devam ettiğine inanmaktadırlar. Daha tecrübesiz öğrenciler ise bilginin çok az bir bölümünün değiştiğine ve büyük bir bölümünün nihai şeklini aldığını düşünmektedirler. Bununla birlikte öğrenme-öğretme yaklaşımlarının temelinde epistemolojik inançların olduğunu ortaya koyan çeşitli araştırmalar da mevcuttur (Cano, 2005; Phan, 2008; Phillips, 2001). Buradan hareketle epistemolojik inançların, öğrenme-öğretme süreçlerini çok yönlü olarak etkileyen bir değişken olarak öğretmenlerin benimsemiş oldukları eğitim felsefelerinin şekillenmesinde de önemli etkilere sahip olduğu kanaatini doğurmaktadır (Biçer, 2013).

Epistemolojik inançlar, bireyin düşünce niteliği ve düşünme becerileriyle doğrudan ilgilidir ve bu nitelik ve beceriler toplumsal yaşamdaki entelektüel normlardan yoğun bir biçimde etkilenir. Doğduğumuz yer ve dönem, yaşadığımız kültür, yetişmemizi sağlayan aile, çevremizin inançları ve yaşam boyu kurduğumuz ilişkiler, düşüncemizi oluşturan rasyonel ya da akıldışı güçlerin temelini oluştururlar (Oksal, 2006). Bilimsel epistemoloji alanındaki araştırmalar, Pomeroy'un (1993; akt. Deryakulu ve Bıkmaz, 2003) da belirttiği gibi nesnel görüşün etkisi altındaki deneyci anlayıştan öznel bilgi üzerine şekillenen yapıcı ya da post modern bilim anlayışına geçilmesi ile hız kazanmıştır.

Bireylerin davranışlarını açıklamada oldukça etkili oldukları görülen, epistemolojik inancın, yaşam boyu öğrenmenin önemini giderek daha çok hissettiğimiz bir dönemde tartışılması özellikle de öğretmenler üzerinden tartışılması anlamlı görünmektedir. Zira öğretmenlerin sahip oldukları inanç sistemleri hem kendi öğrenmeleri hem de öğrencilerinin öğrenmeleri üzerinde belirleyici olacaktır (Erdem, Yılmaz ve Akkoyunlu, 2008: 699).

YÖNTEM

Araştırma Modeli

Bu araştırma, ilişkisel tarama modeli ile gerçekleştirilmiş bir çalışmadır. “Tarama modelleri, geçmişte ya da halen var olan bir durumu, var olduğu şekliyle betimlemeyi amaçlayan araştırma yaklaşımlarıdır” (Karasar, 1994: 76).

Çalışma Grubu

Araştırmanın çalışma grubunu 2014-2015 eğitim- öğretim yılında Konya ilinde Milli Eğitim Bakanlığında görev yapan 512 öğretmen oluşturmaktadır Çalışma grubunun; %52,7’ ünü erkek %47,3’ sini ise kadın öğretmenler; %66,4’ ünü evli %33,6’sını ise bekâr öğretmenler; %47,5’inin 20-29; %35,7’ünün 30-39; %13,7’unun 40-49; %3,1’inin 50-59; %0,1’inin 60-69 yaş aralığında olduğu %45,1’inin 1-5; %25,8’inin 6-10 ; %12,3’ünün 11-15; %8,6’nın 16-20; %4,5’inin 21-25; %3,7’sinin 26-30 yıl kıdeme sahip olduğu; %3,3’ünün ön lisans; %88,9’unun lisans; %7,8’inin lisansüstü eğitime sahip olduğu görülmüştür. Öğretmenlerin görev yaptığı okulların %12,5’i il merkezinde; %54,1’inin ilçe merkezinde; %18,6’sının beldede; % 14,8’inin köyde görev yaptığı görülmektedir.

Veri Toplama Araçları

Uygulanan anketin birinci bölümü demagojik özellik testi, ikinci bölümü ise epistemolojik inanç testi olmak üzere iki bölümden oluşmaktadır.

Epistemolojik İnanç Ölçeği

Schommer (1998)’in geliştirdiği Epistemolojik İnanç Ölçeği kullanılmıştır. Epistemolojik inanç Ölçeği’nin Karhan (2007) tarafından, Türkçe formunun dilsel ve kültürel eşdeğerliği, geçerlik ve güvenilirlik çalışması yapılmıştır. Karhan (2007) tarafından yapılan faktör analizi çalışmaları sonucunda ölçeğin üç faktörlü bir yapıya sahip olduğu belirlenmiştir. Bunlar; “bilginin kaynağı uzmandır ve öğrenme yetenek işidir” “öğrenme çabaya bağlı değildir” ve “bilgi tek ve kesindir” boyutlarıdır. Ölçeğin güvenilirlik katsayıları boyutlarıyla aşağıda verilmiştir.

Tablo:1 Ölçeğin Güvenirlik Katsayıları

Boyutlar	Cronbach Alpha	Araştırma Örnekleminde Cronbach Alpha
Bilginin Kaynağı Uzmandır ve Öğrenme Yetenek İşidir.	0,831	0,85
Öğrenme Çabaya Bağlı Değildir.	0,689	0,724
Bilgi Tek ve Kesindir.	0,710	0,751
Tüm Ölçek	0,744	0,784

BULGULAR

Tablo 2: “Cinsiyet Değişkenlerine Göre Öğretmenlerin Epistemolojik İnançlarının Alt Boyutları Puanları Arasındaki t Testi Karşılaştırmasına İlişkin Bulgular”

Epistemolojik İnanç	Cinsiyet	N	\bar{X}	ss	t	P
Bilginin kaynağı uzmandır ve öğrenme yetenek işidir.	Erkek	270	34,93	8,75	4,490	0,000
	Kadın	242	32,46	6,74		
Öğrenme çabaya bağlı değildir.	Erkek	270	29,80	6,07	0,751	0,453
	Kadın	242	29,49	5,66		

Bilgi tek ve kesindir.	Erkek	270	34,44	5,91	1,788	0,074
	Kadın	242	33,73	5,40		

Epistemolojik inancın bilginin kaynağı uzmandır ve öğrenme yetenek işidir alt boyutunda erkeklerin puan ortalamaları 34,93; kadınların puan ortalamaları ise 32,46 olduğu görülmektedir. Erkek ve kadınların puan ortalamaları arasındaki t değeri 4,490 olarak hesaplanmıştır. Öğrenme çabaya bağlı değildir alt boyutunda erkeklerin puan ortalaması 29,80; kadınların ise 29,49 ve bu iki puan ortalamaları arasındaki t değeri 0,751 olarak hesaplanmıştır. Bilgi tek ve kesindir boyutunda erkeklerin puan ortalaması 34,44; kadınların puan ortalamaları ise 33,73, bu iki puan ortalamaları arasındaki t değeri 1,788 olarak bulunmuştur. Bu bulgulara sonucunda öğretmenlerin cinsiyet değişkenlerine göre; “Bilginin kaynağı uzmandır ve öğrenme yetenek işidir.” Alt boyutunda erkeklerin puan ortalamaları, kadınların puan ortalamalarından anlamlı düzeyde yüksek bulunmuştur.

Tablo 3: “Medeni Durum Değişkenlerine Göre Öğretmenlerin Epistemolojik İnançlarının Alt Boyutları Puanları Arasındaki t Testi Karşılaştırmasına İlişkin Bulgular”

Epistemolojik İnanç	Medeni Durum	N	\bar{X}	ss	t	P
Bilginin kaynağı uzmandır ve öğrenme yetenek işidir.	Evli	340	34,29	8,02	2,598	0,010
	Bekâr	172	32,72	7,89		
Öğrenme çabaya bağlı değildir.	Evli	340	29,71	5,95	0,395	0,693
	Bekâr	172	29,54	5,76		
Bilgi tek ve kesindir.	Evli	340	34,37	5,61	1,933	0,054
	Bekâr	172	33,54	5,85		

Epistemolojik inancın bilginin kaynağı uzmandır ve öğrenme yetenek işidir alt boyutunda evlilerin puan ortalamaları 34,29; bekârların puan ortalamaları 32,72 olduğu görülmektedir. Evlilerin ve bekârların puan ortalamaları arasındaki t değeri 2,598 olarak hesaplanmıştır. Öğrenme çabaya bağlı değildir alt boyutunda evlilerin puan ortalaması 29,71; bekârların ise 29,54 ve bu iki puan ortalamaları arasındaki t değeri 0,395 olarak hesaplanmıştır. Bilgi tek ve kesindir boyutunda evlilerin puan ortalaması 34,37; bekârların puan ortalamaları ise 33,54, bu iki puan ortalamaları arasındaki t değeri 1,933 olarak bulunmuştur. Öğretmenlerin medeni durumu değişkenlerine göre; “Bilginin kaynağı uzmandır ve öğrenme yetenek işidir.” Alt boyutunda evlilerin puan ortalamaları, bekârların puan ortalamalarından anlamlı düzeyde yüksek bulunmuştur.

Tablo 4: “Her Çocuk Bilgiyi Öğrenebilir mi Değişkenine Göre Öğretmenlerin Epistemolojik İnançlarının Alt Boyutları Puanları Arasındaki t Testi Karşılaştırmasına İlişkin Bulgular”

Epistemolojik İnanç	Bilgiyi Öğrenme	N	\bar{X}	ss	t	P
Bilginin kaynağı uzmandır ve öğrenme yetenek işidir.	Evet	169	33,63	9,05	-0,483	0,629
	Hayır	343	33,92	7,46		
Öğrenme çabaya bağlı değildir.	Evet	169	29,22	6,45	-1,511	0,131
	Hayır	343	29,87	5,59		
Bilgi tek ve kesindir.	Evet	169	34,63	5,63	1,787	0,074

Hayır	343	33,88	5,71
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Tablo 4 de epistemolojik inancın alt boyutları olan bilginin kaynağı uzmandır ve öğrenme yetenek işidir, öğrenme çabaya bağlı değildir, bilgi tek ve kesindire ait t testi bulguları verilmiştir. Her çocuk öğretilmek istenen bilgiyi öğrenebilir mi değişkenine göre epistemolojik inancın alt boyutlarına bakıldığında her çocuk öğretilmek istenen bilgiyi öğrenebilir diyenler ile her çocuk öğretilmek istenen bilgiyi öğrenemez diyenler arasında herhangi bir anlamlı fark görülmemiştir.

Tablo 5 : “Öğretmenlerin Epistemolojik İnanç Alt Boyutları Düzeyinin Kıdem Değişkenine Göre İstatistiksel Verileri”

Epistemolojik İnanç	Kıdem (Yıl)	N	\bar{X}	ss	F	p	Gruplar Arası Fark (Tukey)
Bilginin kaynağı uzmandır ve öğrenme yetenek işidir.	1.1-5	231	32,78	7,56	2,434	0,033	1-6
	2. 6-10	132	34,25	8,39			
	3. 11-15	63	34,61	8,21			
	4. 16-20	44	34,22	6,16			
	5. 21-25	23	34,13	9,05			
	6. 26-30	19	36,53	10,29			
Öğrenme çabaya bağlı değildir.	1.1-5	231	28,93	6,01	2,669	0,021	1-6
	2. 6-10	132	29,85	5,85			
	3. 11-15	63	30,06	5,76			
	4. 16-20	44	30,28	5,58			
	5. 21-25	23	29,69	6,14			
	6. 26-30	19	32,05	5,19			
Bilgi tek ve kesindir.	1.1-5	231	32,98	5,65	7,214	0,000	1-3 1-4 1-5 1-6
	2. 6-10	132	34,03	5,58			
	3. 11-15	63	34,94	5,60			
	4. 16-20	44	35,66	5,18			
	5. 21-25	23	34,88	6,02			
	6. 26-30	19	37,25	5,52			

Tablo 5’de kıdem değişkenine göre öğretmenlerin epistemolojik inancın “Bilginin kaynağı uzmandır ve öğrenme yetenek işidir.” alt boyut puan ortalamaları; kıdemi 1-5 yıl olan öğretmenlerin 32,78; kıdemi 6-10 yıl olan öğretmenlerin 34,25; kıdemi 11-15 yıl olan öğretmenlerin 34,61; kıdemi 16-20 yıl olan öğretmenlerin 34,22; kıdemi 21-25 yıl olan öğretmenlerin 34,13; kıdemi 26-30 yıl olan öğretmenlerin ise 36,53 olarak gözlenmiştir. Yapılan ikili karşılaştırmalar sonucunda bilginin kaynağı alt boyutunda kıdemi 1-5 yıl olan öğretmenlerin puan ortalamasının kıdemi 26-30 yıl olan öğretmenlere göre anlamdı düzeyde düşük olduğu görülmüştür.

“Öğrenme çabaya bağlı değildir.” alt boyutunda kıdemi 1-5 yıl olan öğretmenlerin 28,93; kıdemi 6-10 yıl olan öğretmenlerin 29,85; kıdemi 11-15 yıl olan öğretmenlerin 30,06; kıdemi 16-20 yıl olan öğretmenlerin 30,28; kıdemi 21-25 yıl olan öğretmenlerin 29,69; kıdemi 26-30 yıl olan öğretmenlerin ise 32,05 olarak gözlenmiştir. Yapılan ikili karşılaştırmalar sonucunda öğrenme çabaya bağlı değildir alt boyutunda kıdemi 1-5 yıl olan öğretmenlerin puan ortalamasının kıdemi 26-30 yıl olan öğretmenlere göre anlamdı düzeyde düşük olduğu görülmüştür.

“Bilgi tek ve kesindir” alt boyutunda kıdemi 1-5 yıl olan öğretmenlerin 32,98; kıdemi 6-10 yıl olan öğretmenlerin 34,03; kıdemi 11-15 yıl olan öğretmenlerin 34,94; kıdemi 16-20 yıl olan öğretmenlerin 35,66; kıdemi 21-25 yıl olan öğretmenlerin 34,88; kıdemi 26-30 yıl olan öğretmenlerin ise 37,25 olarak gözlenmiştir. Yapılan ikili karşılaştırmalar bilgi tek ve kesindir alt boyutunda kıdemi 1-5 yıl olan öğretmenlerin puan

ortalamasının kıdemi 11-15, 16-20, 21-25 ve 26-30 yıl olan öğretmenlere göre anlamdı düzeyde düşük olduđu görülmüştür.

Tablo 6: “Öğretmenlerin Epistemolojik İnanç Alt Boyutları Düzeyinin Öğretmenlerin Öğrenim Durumu Değişkenine Göre İstatistiksel Verileri”

Epistemolojik İnanç	Öğrenim Durumu	N	\bar{X}	ss	F	p	Gruplar Arası Fark (Tukey)
Bilginin kaynağı uzmandır ve öğrenme yetenek işidir.	1.Ön lisans	17	37,66	10,61	4,493	,011	1-2
	2.Lisans	455	33,80	7,80			1-3
	3.Lisans Üstü	40	32,52	8,35			
Öğrenme çabaya bağlı değildir.	1.Ön lisans	17	32,63	5,28	4,155	,016	1-2
	2.Lisans	455	29,59	5,81			1-3
	3.Lisans Üstü	40	29,17	6,58			
Bilgi tek ve kesindir.	1.Ön lisans	17	37,03	6,03	4,126	,016	1-2
	2.Lisans	455	34,03	5,64			1-3
	3.Lisans Üstü	40	33,82	5,83			

Öğretmenlerin öğrenim durumu değişkenine göre epistemolojik inancın bilginin kaynağı uzmandır ve öğrenme yetenek işidir, öğrenme çabaya bağlı değildir, bilgi tek ve kesindir alt boyutlarında anlamlı düzeyde farklılaşmanın olduđu görülmüştür. Varyans analizi sonuçları incelendiğinde, ön lisans mezunu öğretmenlerin puan ortalamalarının lisans ve lisansüstü eğitim mezunu öğretmenlerin puan ortalamalarına göre anlamlı düzeyde yüksek olduđu görülmüştür.

TARTIŞMA VE SONUÇ

Öğretmenlerin cinsiyet değişkenlerine göre; kadın öğretmenlerin epistemolojik inançlarının erkek öğretmenlere göre daha gelişmiş bilim anlayışına uygun düştüğünü görülmüştür. Buna göre erkek öğretmenlerin kadın öğretmenlere göre daha geleneksel epistemolojik inançlara sahip oldukları söylenebilir. Epistemolojik inançların “öğrenme çabaya bağlı değildir” ve “bilgi tek ve kesindir” boyutlarında ise kadın ve erkek öğretmenlerin görüşleri arasında anlamlı düzeyde farklılığın olmadığı sonucuna ulaşılmıştır.

Epistemolojik inançlar ile cinsiyetin ilişkisini inceleyen çalışmalarda (Deryakulu ve Büyüköztürk, 2005; Eroğlu, 2004; Neber ve Schommer-Aikins, 2002; Oğuz, 2008; Aksan ve Sözer, 2007; Öngen, 2003; Topçu ve Yılmaz-Tüzün, 2009 ve Kurt, 2009) kızların erkeklere göre daha gelişmiş/olgunlaşmış epistemolojik inanca sahip oldukları rapor edilmiş ve bu sonuçlar eldeki çalışmanın sonuçları ile paralellik göstermektedir.

Öğretmenlerin medeni durumu değişkenlerine göre; evli öğretmenlerin epistemolojik inançlarının bekâr öğretmenlere göre daha gelişmiş bilim anlayışına uygun düştüğünü görülmüştür.

Bu bulgu Çetin’inin (2010) “İlköğretim okulu öğretmenlerinin mizaç ve karakter özelliklerinin bilimsel epistemolojik inançlarını yordama gücü” adlı yüksek lisans tezinde bulduđu sonuç ile örtüşmektedir.

“Her çocuk öğretilmek istenen bilgiyi öğrenebilir mi değişkenine göre epistemolojik inancın alt boyutlarına bakıldığında her çocuk öğretilmek istenen bilgiyi öğrenebilir diyenler ile her çocuk öğretilmek istenen bilgiyi öğrenemez diyenler arasında herhangi bir anlamlı fark görülmemiştir.

Okulda güvenlik görevlisi olup olmaması durumu değişkenine göre epistemolojik inancın tüm alt boyutlarında herhangi bir anlamlı fark görülmemiştir.

Okulda laboratuvar olup olmaması durumu değişkenine göre epistemolojik inancın bilginin kaynağı uzmandır ve öğrenme yetenek işidir, öğrenme çabaya bağlı değildir, bilgi tek ve kesindir alt boyutları puan ortalamalarına göre; okulunda laboratuvar olanlar ile okulunda laboratuvar olmayanlar arasında anlamlı düzeyde bir farklılık görülmemiştir.

Okulda spor salonu olup olmaması durumu değişkenine göre okulunda spor salonu olan ile okulunda spor salonu olmayan öğretmenlerin epistemolojik inancın tüm alt boyutlarında herhangi bir anlamlı fark görülmemiştir.

Araştırmaya katılan öğretmenlerin epistemolojik inançlarının tüm alt boyutlarında kıdem değişkenine göre anlamlı düzeyde farklılaştığı görülmektedir. Buna göre 1-5 yıl kıdem grubundaki öğretmenlerin bilginin kaynağı ve öğrenme çabaya bağlı değildir alt boyutlarındaki görüşleri, 26-30 yıl kıdem grubundaki öğretmenlerin görüşlerine göre, gelişmiş epistemolojik inançlara daha yakındır. Bilgi tek ve kesindir alt boyutunda ise kıdemi 1-5 yıl olan öğretmenlerin görüşleri kıdemi 11-15, 16-20, 21-25 ve 26-30 yıl olan öğretmenlere göre daha gelişmiştir. Öğretmenlerin kıdem düzeyi arttıkça, görüşlerine ilişkin ortalama puanın da arttığı görülmektedir. Bu bulgu daha kıdemli öğretmenlerin daha geleneksel epistemolojik inançlara sahip olduklarının bir göstergesi olarak kabul edilebilir.

Kıdem, “Bilgi tek ve kesindir” alt boyutu için farklılık gösterdiği ve bu farkın 1-5 yıl deneyime sahip öğretmenler ile 26-30 yıl meslekte olan öğretmenler arasında, tek ve kesin doğru olduğuna inanç boyutunda ise 1-5, 6-10 yıl arası deneyime sahip öğretmenler ile 26-30 yıl deneyime sahip öğretmenler arasında olduğu saptamıştır. Meslekte yeni olan öğretmenlerin meslekte emeklilik evresindeki öğretmenlerden daha sofistike inançlara sahip oldukları görülmüştür. Bu farkın öğretmenlerin aldıkları eğitimle ilintili olduğu düşünülmektedir (Karhan, 2007; Çetin, 2012)

Öğretmenin çalıştığı okul türü değişkenine göre epistemolojik inancın bilginin kaynağı uzmandır ve öğrenme yetenek işidir, öğrenme çabaya bağlı değildir, bilgi tek ve kesindir alt boyutlarında anlamlı farklılaşmanın olmadığı görülmektedir. Bu sonuç okul türünün öğretmenlerinin epistemolojik inançlarını etkilemediğini göstermektedir.

Karhan’a (2007) göre öğretmenlerin görev yaptıkları okul türü iki alt boyutta farklılık yaratmaktadır. Özel okullarda görev yapan öğretmenler devlet okullarında çalışan öğretmenlere göre çabanın sonuç vereceğine ve doğruların tek ve kesin olmayabileceğine daha fazla inanmaktadırlar.

Öğretmenlerin öğrenim durumu değişkenine göre epistemolojik inancın bilginin kaynağı uzmandır ve öğrenme yetenek işidir, öğrenme çabaya bağlı değildir, bilgi tek ve kesindir alt boyutlarında ön lisans mezunu öğretmenlerin epistemolojik inançlarının lisans ve lisansüstü eğitim mezunu öğretmenlerin epistemolojik inançlarına göre daha gelişmemiş ve daha geleneksel inançlara sahip olduğu sonucuna ulaşılmıştır. Öğretmenlerin eğitim düzeyi arttıkça, görüşlerine ilişkin ortalama puanın da arttığı görülmektedir. Bu bulgu daha yüksek eğitilmiş öğretmenlerin daha gelişmiş epistemolojik inançlara sahip olduklarının bir göstergesi olarak kabul edilebilir.

Karhan’a göre (2007) eğitim durumu değişkenine göre üniversite mezunu öğretmenler ile üniversite mezunu olmayan öğretmenler arasında, üniversite mezunu öğretmenler lehine fark bulmuştur. Hem eğitim fakültesi mezunları, hem de diğer fakültelerden mezun öğretmenler, normal lisans eğitimi almamış olan öğretmen okulu, eğitim enstitüsü gibi öğretmen yetiştiren kurumlardan mezun olan öğretmenlerden göreceli olarak daha sofistike inançlara sahiptirler. Bu sonuçlardan farklı olarak Çetin (2010) ise öğretmenlerin eğitim düzeyleri açısından epistemolojik inancın tüm alt boyutlarında anlamlı bir farklılaşma saptamamıştır.

Öğretmenlerin yaş değişkenine göre epistemolojik inancın bilginin kaynağı uzmandır ve öğrenme yetenek işidir alt boyutunda yaşı 20-29 arası olan öğretmenlerin epistemolojik inançlarının, yaşı 50-59 arasında olan öğretmenlerin epistemolojik inançlarına göre daha gelişmiş bilim anlayışına sahip olduğu görülmüştür. Öğrenme çabaya bağlı değildir alt boyutunda yaşı 50-59 arasında olan öğretmenlerin epistemolojik inançlarının yaşı 20-29; 30-39; 40-49 arasında olan öğretmenlerin epistemolojik inançlarının göre daha geleneksel ve daha gelişmemiş bilim anlayışına sahip olduğu; bilgi tek ve kesindir alt boyutunda ise yaşı 20-29 arasında olan öğretmenlerin epistemolojik inançlarının yaşı 30-39; 40-49; 50-59 arasında olan öğretmenlerin epistemolojik inançlarına göre daha gelişmiş bilim anlayışına sahip olduğu görülmüştür. Schommer (1998), epistemolojik inançlar üzerinde yaşın ve eğitim düzeyinin belirleyici etlilerinden bahsetmiştir. Çalışmasında bireylerin eğitim düzeyi ve yaşı yükseldikçe, bilginin basit değil karmaşık ve kesin yani değişmez değil, duruma göre değişebilen bir yapısı olduğuna daha güçlü biçimde inanmakta olduğunu saptamıştır. Çetin’e (2010) göre epistemolojik inancın tüm alt boyutlarında yaş ile epistemolojik inançlar arasında pozitif yönde bir ilişki bulmuştur

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DETECTION OF DISORDERED REGIONS IN PROTEINS WITH MACHINE LEARNING METHODS

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ABSTRACT: In proteins, disordered regions plays a significant role in determining of regulation of transcription and translation, protein-protein, protein-DNA interactions and also the tertiary structure of the proteins. To date, studies have showed that disordered regions have in relation with cancer, cardiovascular, diabetes, autoimmune diseases and neurodegenerative disorders. In this paper, to predict disordered regions in proteins we build feature vectors using physicochemical properties of amino acids and also compared our performance with similar studies in the literature. According to empirical studies, conducted on disprot and protein data bank (PDB) data sets, an accuracy value of 77.23 % and 0.67 f-score has been achieved with k-Nearest Neighbor (k-NN) learning algorithm.

Key words: disordered regions in proteins, physicochemical properties of amino acids, learning algorithms

PROTEİNLERDE DÜZENSİZ BÖLGELERİN MAKİNE ÖĞRENMESİ YÖNTEMLERİ İLE TESPİTİ

ÖZET: Proteinlerde düzensiz bölgeler, proteinin transkripsiyon ve translasyon regülasyonu, protein-protein, protein-DNA etkileşimlerinde ve tersiyer yapısının belirlenmesinde önemli bir rol oynar. Bugüne kadar yapılan çalışmalarda, düzensiz bölgeler kanser, kardiyovasküler, diyabet, otoimmün hastalıkları ve nörodejeneratif bozuklukları ile ilişkili olduğu belirlenmiştir. Bu bildiride, proteinlerdeki düzensiz bölgelerin kestirimi için kaos teorisi tabanlı seçilen amino asitlerin fiziko-kimyasal özelliklerine dayanan öznelik matrisi uygulanmıştır ve literatürdeki benzer çalışmalar ile kıyaslanmıştır. Elde edilen deneysel çalışmalarda, disprot ve protein data bank (PDB) veri setleri üzerinde k-en yakın komşuluğu (k-EYK) öğrenme algoritması ile % 77,23 sınıf doğruluğu ve 0,67 f-skor performansı elde edilmiştir.

Anahtar sözcükler: proteinlerde düzensiz bölgeler, amino asitlerin fizikokimyasal özellikleri, öğrenme algoritmaları

GİRİŞ

Proteinler, canlılarda üstlendikleri işlevleri ile canlının hayatını devam ettirmesinde kritik önem taşırlar. Proteinler hemen hemen tüm biyokimyasal reaksiyonlar da yer alırlar. Proteinlerin üç boyutlu yapıları, işlevlerini belirleyen en önemli unsurlardandır. Şöyle ki proteinin işlevinin aydınlatılması için üç boyutlu yapısının ve böylece düzensiz bölgelerinin de incelenmesi gereklidir. Düzensiz bölgeler proteinin işlevi yanı sıra, ait olduğu proteinin, diğer proteinler ile etkileşimlerinde etkin rol oynar [1].

Fizyolojik koşullar altında geniş düzensiz segmentler içeren proteinler, düzensiz proteinler olarak adlandırılır. Düzensiz proteinler, daha az sayıda düzensiz bölge içeren proteinlere göre daha çok işleve ve esnekliğe sahiptirler ve ligandları ile daha kolay etkileşime girerler. Bugüne kadar yapılan çalışmalarda, düzensiz proteinlerin kanser, kardiyovasküler, diyabet, otoimmün hastalıkları ve nörodejeneratif bozuklukları ile ilişkisi tespit edilmiştir [2,3].

Proteinlerin düzensiz bölgeleri in vitro ortamlarda kolaylıkla görülemez. Dolayısıyla proteinin üç boyutlu yapısının son halinin oluşturulması ve düzensiz bölgelerin incelenmesi zordur [4, 5]. Bu nedenle problemin çözümüne in silico ortamlarda biyoinformatik ve makine öğrenmesi bilim disiplinleri yöntem ve teknikleri ile

çözüm aramak hem zaman hem de çevresel (laboratuvar ortamı-imbânları, insan faktörü, vb.) faktörlerden kaynaklanan problemlerin üstesinden gelme açısından daha doğrudur. Bilgisayar ortamında, geliştirilen öznitelik vektörleri makine öğrenmesi algoritmasına girilir ve algoritma sınıflandırmayı gerçekleştirir.

Biz bu bildiri de proteinlerdeki düzensiz bölgelerin kestirimi için disprot ve PDB veri setleri üzerinde Lyapunov üstelleri temelli belirlediğimiz en iyi fizikokimyasal özelliğe göre öznitelik matrisini oluşturarak Naive Bayes, k-en yakın komşuluğu (k-EYK), kümeleme ile sınıflandırma algoritmalarını kullanarak sınıflandırdık.

YÖNTEMLER

Veri seti

Proteinlerde düzensiz bölgelerin kestirimi, DISPROT (6,02 versiyonu) [6] ve PDB [7] veri setleri kullanılarak gerçekleştirilmiştir. 96'sı DISPROT, 273'ü PDB'den olmak üzere toplam 369 protein dizilimi eğitim ve test için kullanılmıştır.

Naive bayes Algoritması

Naive Bayes, hedef değişkenle bağımsız değişkenler arasındaki ilişkiyi analiz eden bir sınıflandırma algoritmasıdır. Naive Bayes, verinin öğrenilmesi esasına dayanmaktadır. Yani eğitimde kullanılan veriler, modelin öğrenilmesi için her çıktının kaç kere meydana geldiğini hesaplar. Bu değer öncelikli olasılık olarak adlandırılır. Hesaplamalar sırasında her bir bağımsız değişkenin bağımlı değişkenlere bölümünün kombinyonu olayın meydana gelme sıklığını bulur. Bu da veri kümesinden yapılacak tahmin için kullanılır [8].

Naive Bayes, bağımlılıkları tersine çeviren, sonsal olasılıkları koşullu ve önsel olasılıklardan hesaplayan bir teoremdir. Böylece tanı konmasına yani karar verilmesini en büyük olasılık temelinde sağlar.

k-EYK Algoritması

k-EYK yöntemi, veri öbeklemesine dayanan bir gözetimli bir öğrenmedir. Uygulanmasının kolay ve veri dağılımından bağımsız olması üstünlükleridir. Öbek sayısının sezgisel olarak belirlenmesi, zaman karmaşıklığının veri sayısı ile artması ise kısıtlarıdır. Algoritmanın genel mantığı, yeni gelen örneği sınıflandırmak için kendisine en yakın k adet örneğin sınıfına bakılır. En fazla sınıf bilgisi olan sınıftan kabul edilir [9]. Bu çalışma da k komşuluk değeri 9 olarak belirlendi.

K-ortalamalar Algoritması

K-ortalamalar, kümeleme problemini çözen en temel gözetimsiz öğrenme yöntemleri arasında yer alır. Algoritmanın genel mantığı n adet veriden oluşan bir veri kümesini, giriş parametresi olarak verilen k ($k < n$) adet kümeye bölümlenektir. Amaç, gerçekleştirilen bölümlenme işlemi sonunda elde edilen kümelerin, küme içi benzerliklerinin maksimum ve kümeler arası benzerliklerinin minimum olmasını sağlamaktır. Yöntemin performansını k küme sayısı, başlangıç olarak seçilen küme merkezlerinin değerleri ve benzerlik ölçümü kriterleri etkilemektedir [10].

GELİŞTİRİLEN ÖZNİTELİK VEKTÖRÜ

Proteinlerde düzensiz bölgeleri tespit etmek için birimdik kodlama ve seçilen en iyi fizikokimyasal özelliği birleştirerek yeni öznitelik matrisleri oluşturduk. Birimdik kodlamada, proteini oluşturan her bir kalıntı, birbirine dik, $d_i = (\delta_{i1}, \delta_{i2}, \dots, \delta_{i20})$ vektörlerle ifade edilir. Burada δ_{ij} Kronecker delta sembolüdür. Birimdik kodlamada her bir amino asit 20 bit uzunluğunda vektör ile temsil edilir. Bu temsilde, her bir amino asitin sırasına karşılık gelen bit, 1 ile geri kalan değerler ise 0 ile temsil edilir [11]. Birimdik kodlama yönteminin başlıca sakıncası, temsil ettiği protein içindeki kalıntıları sadece ikili sayı sisteminde ifade eder ve dolayısıyla proteinin içeriğine dair herhangi bir bilgi taşımaz. Diğer bir ifade ile, amino asitlerin birbirleri ile olan fizikokimyasal benzerlikleri veya farklılıkları hakkında bilgiler içermez. Bu durum verinin içeriğinin tam olarak temsil edilememesine neden olur. Bu kısıtın üstesinden gelmek için seçilen en iyi fizikokimyasal özellik, kalıntıyı temsil eden öznitelik vektöründe 1 biti yerine yerleştirildi. Böylece birimdik kodlamanın, öznitelik vektörlerinin örnek uzayında dik olması üstünlüğü ile amino asitlerin fizikokimyasal indeks değerlerini birleştirerek öznitelik vektörlerinin sınıflandırıcı algoritmalar tarafından daha iyi tanınması sağlandı. Birimdik kodlama ile [12] numaralı kaynaktaki kaos teorisi tabanlı seçilen "Averaged turn propensities in a transmembrane helix" fizikokimyasal özelliği

kullanıldı. AAindex'den [13] elde edilen fizikokimyasal özellik indeks değerleri, z-skor [14] yöntemi ile normalize edilmişlerdir.

BULGULAR

Geliştirilen öznelik tekniğinin performans değerlendirmesi, DISPROT ve PDB veri setleri üzerinde 10-kat çapraz doğrulama test tekniği kullanılarak gerçekleştirilmiştir. Bu tekniğe göre veri seti 10 eşit kümeye bölünür. 9 küme eğitim için 1 küme test için kullanılır. Böylece test sonunda 10 adet performans metriği elde edilir. Elde edilen her bir metriğin aritmetik ortalaması alınır [11]. Bu çalışma da proteinlerde düzensiz bölgelerin kestirimi için geliştirilen öznelik vektörü tekniğinin performansı, sınıf doğruluğu, duyarlık ve f-skor istatistik metrik değerleri ile ölçülmüştür. Sınıf doğruluğu, duyarlık ve f-skor değerleri karmaşıklık matrisinden elde edilir:

$$\text{Doğruluk} = \frac{TP + TN}{TP + FP + TN + FN}$$

$$\text{Duyarlık} = \frac{TP}{TP + FN}$$

$$F - \text{skor} = \frac{2 \cdot TP}{(2 \cdot TP + FP + FN)}$$

TP, doğru tahmin edilen birinci sınıfa ait örneklerin, TN, doğru tahmin edilen ikinci sınıfa ait örneklerin, FP, yanlış tahmin edilen birinci sınıfa ait örneklerin, FN, yanlış tahmin edilen ikinci sınıfa ait örneklerin sayısıdır. F-skor, duyarlık ve kesinlik metriklerinin harmonik ortalamasıdır. Tablo 2'de, geliştirilen öznelik tekniğinin DISPROT ve PDB veri setleri üzerinde Naive Bayes, k-EYK ve k-ortalamlar algoritmalarına göre deneysel sonuçları görülmektedir.

Tablo 1. Geliştirilen Öznelik Kodlama Tekniğinin Performansı

Sınıflandırıcılar	Sınıf doğruluğu	Duyarlık	F-skor
Naive Bayes	77,04	0,77	0,67
k-EYK	77,24	0,77	0,67
K-ortalamlar	73,25	0,74	0,67

k-EYK algoritması % 77,24 sınıf doğruluğu, 0,77 kesinlik, 0,67 f-skor değerleri ile en iyi sonucu vermiştir. Böylece kaos teorisi tabanlı seçilen en iyi fizikokimyasal özelliğin (AAindex'de 453. fizikokimyasal özellik) problemin çözümünde kullanılabileceği elde edilen sınıflandırıcı değerlerle gösterilmiştir.

SONUÇLAR

Proteinlerde düzensiz bölgelerin yüksek doğruluk oranları ile kestirimi başta kalp hastalıkları ve kanserin teşhisi ve tedavisi açısından önemli bir eşiktir. Bu çalışma da disprot ve PDB veri setleri kullanılarak oluşturulan öznelik vektörleri, k-EYK, Naive Bayes ve k-ortalamlar makine öğrenmesi algoritmaları ile test edilmiştir. Elde edilen doğruluk oranları problemin çözümü için ileriye yönelik yapılacak çalışmalar için umut vericidir. Gelecekte yapılacak çalışmalar da öznelik vektörünü oluşturan bileşke sayısal değerlerin seçiminde kalıntıların protein içindeki rolünü belirleme açısından farklı fiziko-kimyasal özellikler, BLOSUM ve PAM gibi skor matrisleri kullanılması planlanmaktadır. Ayrıca farklı makine öğrenmesi sınıflandırıcıları birleşimi ve öznelik seçim yöntemleri kullanımı da hedeflenmektedir.

TEŞEKKÜR

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PARAECOLOGICAL" PARADIGM IN EDUCATION TO COMBAT ENVIRONMENTAL PROBLEMS

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ABSTRACT: The relationship between man and nature has long been monitored and has become even more examined in light of the rapidly developing information technology. The deteriorating ecosystem caused by environmental disasters occurring around the world has spread negative effects to other places as well. In particular, climatic instability caused by global warming, as well as problems in the food supply chain due to inefficiencies in the soil and plant, has negatively affected the quality of life.

Mankind is at the heart of these environmental problems both globally and locally, playing the main role in finding solutions to such problems. However, the trend to continuously increase people's welfare has ultimately led to an even greater exploitation of ecosystems. Although people seem to want to resolve the ecological problems, at the same time they drag their feet in taking the necessary steps or changing their lifestyles to fix the problems. The problem in this case is the inability to resolve the problem of human self-alienation. Thus, the purpose of this paper is to examine ecological problems' causes, effects, and solutions in order to identify the importance of "paraecological" paradigms and appropriate methodology in education to help mature the human spirit as part of nature.

Paraecological parameters that will be used in the educational process were examined by using Malık Sensitivity model approach. This paper describes the tragic results of the environmental problems to clarify their causes as an important step in the first stages of education. These steps should be supported using a variety of teaching techniques (quantum techniques, experiential education, incrementalism, thinking techniques, etc.). Civil society organizations and role models should encourage ecological lifestyles in this process. These solutions can challenge environmental problems through society's use of unique habits, cultures, religious trends, symbols, rituals, and myths that are easier to internalize and transform into a lifestyle. Such a solution must be supported by a psychological approach to the possibility of its implementation in daily life, and its impact should be expanded by establishing legal regulations.

Key words: paraecology, paradigm, ecological lifestyle, incrementalism

ÇEVRE SORUNLARI İLE MÜCADELE EĞİTİMİNDE "PARAEKOLOJİK" PARADİGMA

ÖZET: Hızla gelişmekte olan bilişim teknolojileri ile beraber insan ve doğa arasındaki ilişkiler daha izlenebilir ve tartışılabilir bir duruma gelmiştir. Böylece yeryüzünün herhangi bir yerinde meydana gelen bir çevre felaketinin zaman ve mesafe kavramı gözetmeksizin farklı coğrafyalarda olumsuz etkilerini devam ettirebildiği gözlemlenebilmektedir. Özellikle küresel ısınma ile beraber meydana gelen iklimsel istikrarsızlıkların neden olduğu toprak ve bitki verimsizliği ve gıda teminindeki sorunların yanında, hayat kalitesinde meydana getirdiği olumsuzluklarda yadsınamayacak ölçülere ulaşmıştır.

Küresel ve lokal ölçekteki çevresel sorunların merkezinde olan insan yine bu sorunların çözümünde de başrolde. Ancak insanın refah düzeyini devamlı artırma eğilimi her geçen gün ekosistem üzerindeki baskıları artırmakta ve daha fazla sömürülmesine yol açmaktadır. Ancak insan meydana gelene bu ekolojik sorunları çözmek için istekli görünmekle beraber, gerekli adımları atmak veya yaşam tarzını değiştirmekte ayak diretmektedir. Bunun temel nedeni insanın "kendisine yabancılaşma" problemini aşamamasıdır. Bu bildirinin amacı; günümüzde nedenleri, etkileri ve çözüm yolları herkes tarafından bilinen ekolojik sorunlarla mücadelede insanı doğanın bir parçası olarak anıklaşmasında yardımcı olan "Paraekolojik" paradigmların eğitimdeki önemini ve metodolojisini irdelemektir.

Bu araştırmada eğitim sürecinde kullanılacak olan Paraekolojik parametreler Malık Sensitivity model yaklaşımı kullanılarak irdelenmiştir. Eğitimin ilk aşamasında öncelikle çevre sorunlarının trajik sonuçlarının tanıtılması ve daha sonra bunların nedenlerinin anlaşılmasının sağlanması, paraekolojik etkinin oluşması için önemli bir adımdır. Bu aşamalar çeşitli öğretim teknikleri kullanılarak (kuantum tekniği, deneysel öğretim, aşamalılık, düşünme teknikleri vb) aşılanmalıdır. Bu süreçte sivil toplum örgütleri, organizasyonlar ve rol modeller ekolojik yaşam stilini özendirici olmalıdır. Toplamların kendilerine özgü yaşam tarzları, alışkanlıkları, kültürleri, dini

inanç eğilimleri, değer verdikleri semboller, ritüeller ve mitler kullanılarak çevre sorunlarına karşı üretilen çözümlerin yaşam stili haline dönüşmesi ve içselleştirilmesi için daha yardımcı olabilecektir. Bu çözümlerin günlük yaşamda uygulama imkanı bulabilmesi için psikolojik yaklaşımlarla desteklenmeli ve yasal düzenlemelerle de teşvik edilerek etkisi yaygınlaştırılmalıdır.

Anahtar kelimeler: paraekoloji, paradigma, ekolojik yaşam stili, aşamalılık

GİRİŞ

Çevre sorunları ile mücadele kapsamında özellikle toprak, hava ve su gibi kaynaklar üzerinde sürdürülebilir kalite standartlarına ulaşması için gereken eylemlerin yer aldığı dönemsel planlar eşliğinde mücadele yapılmaktadır. Ancak bu eylemler genelde kalite standartlarına sahip bir kaynağın korunmasına yönelik değil, kalite standartları bozulan kaynağın daha fazla bozulmasının önüne geçmek için alınan tedbirleri içermektedir. Hâlbuki bozulan kaynağın rehabilitasyonu yüksek maliyet, uzun bir süreç ve büyük emek gerektirir. Bu nedenle doğal ekosistem hizmetlerinin süreğenliğinin sağlanması ve çevre etiğinin içselleştirilmesi için eğitim süreçlerine entegrasyonu ön plana çıkmaktadır.

Ekolojik etik, ekosistem içerisindeki yaşamı sürdürme eylemini ahlaki değerlerin ışığında yapmaya çalışmak olarak ifade edilebilir (Bookchin, 1994). Burada ekosistem kavramı içerisinde canlı ve cansız çevrenin birbirleri ile olan etkileşimleri bütüncül bir yaklaşımla ön plana çıkmaktadır. Ancak materyalist güdümün etkisi altında gelişen teknolojiler etik değerlerin gelişmesini zayıflatmıştır (Şenel, 1997). Teorik olarak geliştirilen etik kavramı hayata geçirilmesiyle ahlaki olarak tamamlanabilmektedir (Billington, 1997). Çevre etiği kavramı bilim adamları tarafından farklı yaklaşımlarla ortaya konulmuştur. Eko-konservatif, eko- sosyalizm, eko-feminizm, derin ekoloji, eko-sofi vb. yaklaşımlar ekolojik sorunların nedenleri, sonuçları ve çözüm yollarındaki farklılıklardan meydana gelmiştir (Görmez, 1997; Ünder, 1997). Orman mühendisi olan Aldo Leopold (1887-1948) ekosistem vurgusunu ön plana çıkaran bütüncül bir çevre etiği felsefesini ortaya atmıştır. Sistem içerisinde cansız varlıkların devamlılığını sağlamak için canlı varlıklara müdahale edilebileceğini savunmuştur (Tont, 1996). Paraekolojik yaklaşımda çevre sorunları ile mücadele öncelikle farklı ekolojik bölgelerde çevre sorunlarına neden olan başat faktörün tespitinin ardından, özellikle insanın neden olduğu çevre sorunlarının azaltılmasında ve zarar gören ekolojik koşulların ıslah sürecine insanın da eko-etik açıdan rehabilitasyona dahil edilmesine dayanmaktadır. Bu süreçte sosyoloji, psikoloji ve felsefe insan odaklı rehabilitasyonun aktif elemanları olarak kullanılmalıdır (Dindaroğlu, 2014).

Ekolojik sorunlarının çözümünün devamlılık arzemesi erdemli bir insan oluşturma çabasını gündeme getirmektedir (Fukuyama, 1998). Ancak, ekolojik hareketler gerçek hayatta uygulama imkanı bulamayan ilkeleri benimsemeleri nedeniyle eleştirilmektedirler. Küresel ölçeğe ulaşan çevre sorunları ile mücadele ancak küresel ahlak anlayışının benimsenmesiyle başarılabilir (Antes, 1999). Ancak ekolojik görüşlerin politik güçler tarafından desteklenmeden başarıya ulaşamayacağı anlaşılmaktadır (Brzezinski, 1994). Bunun için çevre eğitimi küçük yaşlarda başlayarak verilmelidir.

Çevre eğitiminin toplumda beklenen hedeflere ulaşması ancak farklı eğitim disiplinleri ile beraber desteklendiğinde mümkün olabilir (Atasoy ve Ertürk, 2008). Çevre eğitimi aynı zamanda insanın davranışlarını yönlendirebilen bir özelliğe sahip, doğaya saygılı donanımlı bir insan yetiştirmek amacıyla dizayn edilmelidir (Geray, 1995; Ayvaz, 1998). Ancak ezbere dayanan çevre eğitimi insanlar üzerinde fazla etkili olmamaktadır (Yücel ve Morgil, 1998; Haktanır ve Çabuk, 2000). Bu nedenle bilgiyi düşündüren, kavratın, analiz ettiren, sentezleyen, değerlendiren ve uygulatan farklı öğretim stratejileri kullanılmalıdır (Ben-Peretz vd., 2003). Ancak çevre eğitimi gibi farklı etki faktörlerine sahip alanların birbiriyle olan ilişkisinin kurulması için modellemelere de ihtiyaç duyulmaktadır.

Bu araştırmanın amacı ekolojik problemlerle mücadelede özellikle insanın eko-etik ıslahını sağlamasında yardımcı olabilecek psikolojik, sosyolojik ve felsefi değerlerini ön plana çıkaran paraekolojik yaklaşımlara uygun parametrelerin belirlenerek çevre eğitiminde kullanılabilme potansiyellerini irdelemektir.

YÖNTEM

Çevre sorunlarının sürdürülebilir çözümünde insan yaşamının organize edilebilmesi için Johnson (1998) organizasyon teorisinde kültür ağındaki temel yedi element kullanılmıştır. Bunlar; mitler, semboller, hedefler, organizasyon düzeni, kontrol sistemi, ritüeller, rutinler ve paradigma olarak sıralanabilir. Çevre sorunları ile mücadele eğitiminde paraekolojik yaklaşımlara (Dindaroğlu, 2014) uygun olarak tespit edilen parametrelerle "Malik Sensitivity Model" de oluşturulan metodolojinin ana bileşenleri kullanılarak (Vester, 1999) etki matrisleri oluşturulmuştur (Çizelge 1). Aktif ve pasif değerlere göre parametrelerin etkileri katılımcılar ve

uzmanlar tarafından tespit edilmiştir. Öne çıkan paraekolojik parametreler; çevre sorunlarının anlaşılması, öğretim stratejileri, kültürel yaklaşım, semboller, ritüeller, mitler, yaşam tarzı, alışkanlıklar, inanç eğilimleri, psikolojik destek, politik etki, yasal düzenlemeler, iletişim, düşünme, metaforlar, aşamalılık, kuantum tekniği, sivil toplum örgütleri, organizasyonlar, multimedya, materyaller, arazi deneyimleri ve rol modeller olarak belirlenmiştir.

Çizelge 1. Çevre Sorunları İle Mücadele Eğitiminde Ön Plana Çıkan Paraekolojik Parametreler Matrisi

Paraekolojik yaklaşımın eğitimdeki parametreleri	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	PT	
1 Çevre sorunlarının anlaşılması	■																								
2 Öğretim stratejileri		■																							
3 Kültürel yaklaşım			■																						
4 Semboller				■																					
5 Ritüeller					■																				
6 Mitler						■																			
7 Yaşam tarzı							■																		
8 Alışkanlıklar								■																	
9 İnanç eğilimleri									■																
10 Psikolojik destek										■															
11 Politik etki											■														
12 Yasal düzenlemeler												■													
13 İletişim													■												
14 Düşünme														■											
15 Metaforlar															■										
16 Aşamalılık																■									
17 Kuantum tekniği																	■								
18 Sivil Toplum Örgütleri																		■							
19 Organizasyonlar																			■						
20 Multimedya																				■					
21 Materyaller																					■				
22 Arazi deneyimleri																						■			
23 Rol modeller																							■		
AT																									

AT: Aktifler toplamı, PT: Pasifler toplamı

BULGULAR

Paraekolojik yaklaşımın çevre sorunları ile mücadele eğitimine entegrasyonu kapsamında ön plana çıkan parametreler kesin olmayıp değişkendir. Bu değişkenler ve içerikleri aşağıdaki gibidir.

1. Çevre sorunlarının anlaşılması

Çevre sorunlarının sonuçlarının zamansal, mekansal ve etki değerlerinin farklılık göstermesi bu sorunların önceden anlaşılmasını zorlaştırmaktadır. Öncelikle hangi kirletici türünün nasıl bir çevre sorununa neden olduğu görsel olarak algılanmalıdır. Günümüzde gözlem alanları olarak kullanılabilir çevre kirliliğinin sonuçlarının gözlemlenebileceği lokasyonlar fazlalaşmıştır.

2. Eğitim sürecinde “Paraekolojik Yaklaşım” a uygun bazı öğretim yöntemleri

2.1.1. Kuantum tekniği

Kuantum öğretim tekniği Bobbi De Porter (De-Porter vd, 1992) tarafından geliştirilmiştir. Çevre sorunlarının olumsuzlukları ekosistem içerisinde doğal yapıları doğrudan yada dolaylı olarak etkiledikleri için bütüncül bir yaklaşımla anlaşılmalı ve daha sonra çözümleri gerekmektedir. Bu çözümler bazen yıllar sürecektir olan uzun süreçleri kapsayabilir. Bu nedenle beyin uyumlu ve ekosistemin bütüncül yapısına uygun öğretim stratejilerinden birisi olan Kuantum tekniği önerilmiştir.

2.1.2. Deneyimsel öğretim

Çevre sorunlarının anlaşılması ve çözümü için öğretim sürecinde bireysel deneyimlerin olumlu etkisinden yararlanılmalıdır (Kolb, 1984). Kolb'un deneyimsel öğrenme kuramı çevre sorunlarının anlaşılmasında da önemli aşamaların kat edilmesini sağlayabilir.

2.1.3. Aşamalılık

Çevre sorunları ile mücadele eğitiminde genelden özele, basitten karmaşığa doğru olan tümdengelim yaklaşımı olayların anlaşılmasında ve ayrıca öğrenim sürecinin yönetimi açısından da önemli bir yöntemlerin başında gelmektedir (Mintzberg, 1977).

2.1.4. Düşünme teknikleri

Düşünme ve öğrenme birbirleriyle güçlü etkileşimleri olan sorgulayıcı süreçleri meydana getirmektedir. Bu nedenle çevre sorunlarının oluşması, anlaşılması ve çözümüne kadar meydana gelen süreçlerde aktif yaratıcılığı sağlamaktadır.

2.1.5. Meteforlar

Meteforlar -benzetme yöntemiyle betimleme- öğretim metodolojisinde önemli bir yere sahiptir (Tomkins ve Lawley; 2002). Çevre sorunlarının anlaşılmasında da meteforların kullanılması sorunları insanların beyinde şekillenmesi açısından önemlidir.

2.1.6. Sınıf dışı öğretim teknikleri (Arazi deneyimleri)

Çevre sorunlarını yerinde gözlemlene gibi gerçek deneyim kazandırır. Beyinde kalıcı anılar oluşturabilme özelliği nedeniyle tercih edilen bir metottur.

3. Rol modeller

Toplum etkileme ve ona yön verme pozisyonunda olan insanlar (anneler, babalar, öğretmenler, sanatçılar, politikacılar, kanaat önderleri vb.) özellikle çevre etiği konusunda daha vurgulayıcı periyodik girişimlerle örnek olmalıdır.

Rol modellerin toplumda en etkin figürü kahramanlardır. Kahramanlar bir toplumun geçmişi ve geleceği arasında köprü kurabilen ve eylemleri tereddütsüz kabul gören hayal ürünü ya da gerçek kişilerdir (Terzi, 2000a).

4. İletişim araçları

İletişim araçları uzak lokasyonlarda meydana gelen çevre sorunlarının kamuoyuna duyurulması ve farkındalık yaratılması açısından önemlidir (Kaya, 2014). Bu nedenle günümüzde çok yoğun olarak kullanılan televizyon, radyo, gazete ve internet ortamları çevre etiğinin oluşturulması aşamalarında, çevre sorunlarının anlaşılmasında ve çözümünde eğitici araçlar olarak kullanılabilir.

4.1. Multimedya

Görsel ve işitsel duyuların aktif olarak kullanılması günümüzde multimedya daha araçlarını etkili ve gerekli kılmaktadır. İnsan zamanının büyük bir kısmını bilgisayar ortamlarında geçirmektedir. Bu nedenle bütün multimedya uygulamalarında (internet, interaktif oyunlar vb.) çevre etiği eğitimi yerleştirilmelidir.

5. Organizasyonlar

Çevre etiğinin oluşması, olgunlaştırılması, ekosistemin korunması, çevre sorunlarının olumsuz etkilerinin anlatılması ve çözüm süreçlerine katılımın sağlanması amacıyla periyodik ve koordinasyonlu hareket edebilme özelliğine sahip kuruluşların sayıları ve etkinlikleri artırılmalıdır.

5.1. Sivil Toplum Örgütleri

Çevre sorunlarının oluşmaması veya oluşan çevre sorunları ile mücadele zaman, maliyet, devamlılık ve kararlılık gerektiren bir süreçtir. Bu nedenle gönüllülük prensibine göre çalışmalar yapacak sivil toplum örgütleri aktif rol oynamalıdır (Kaya, 2014).

6. Materyaller

Özellikle çevre etiğinin oluşturulmasında paraekolojik yaklaşımlara uygun (psikolojik, sosyolojik ve felsefi) materyallerin kullanımını etkinliği artıracaktır.

7. Kültürel yaklaşım

Çevre sorunları ekosisteme yönelmiş olan tehditlerdir. Bu nedenle ekosisteme bütüncül yaklaşım prensibine uygun olarak her bir ekolojik birim kendi içerisinde değerlendirilmelidir (Dindaroğlu vd, 2013). Farklı kültürler kendi içerisinde değerlendirilerek farklı paraekolojik yaklaşımlar geliştirilmelidir. Bu yaklaşımlar çevre etiğinin oluşması ve olgunlaşmasına uygun olmalıdır.

Kültür, hayata bakış açısını, konuşma dili, davranış şekilleri, ahlaki değerler, inanç eğilimleri, giyiniş, ritüeller, semboller, semboller ve mitlerin bileşimidir (Koçel, 2005).

7.1. Semboller

Simge ve semboller kozmik bilgilerin toplumda devamlı olarak yaşamasını sağlayan güçlerdir (Bayat, 2006). Bu nedenle etkilerini uzun yıllar boyunca kaybetmeden kolayca sonraki nesillere aktarıma özelliğine sahiptirler. Her toplumda farklı anlamlara sahip olan simge ve semboller toplum içinde birleştirici, toplumlar arasında ise ayrıştırıcı bir rol üstlenebilirler.

7.2. Ritüeller (Adetler, Ayinler)

Ritüeller sosyal etkileşimlerle gerçekleştirilen ve kültürel değerleri güçlendiren etkinliklerdir (Terzi, 2000b). Çevre etiğinin oluşturulmasında ve çevre sorunlarının çözülmesinde periyodik olarak tekrarlanan kadim ritüellerin yanı sıra sonradan tasarlanan modern ritüellerle de aktif olarak kullanılabilir.

7.3. Mitler

Mitler olağan üstü durumlarda meydana gelmiş, gerçek ve kutsal olaylardır. Varlıkların yaratılış gayesinin anlaşılmasında önemli bir yere sahiptirler. Mitler ruhun olgunlaşmasında da önemli rollere sahip olduğundan dolayı etkisi her zaman tazedir (Eliade, 1993). Özellikle toplumda örnek davranışların mitleşmesi aidiyet duygusunun güçlenmesine ve tutuculuğun artmasına neden olabilmektedir (Terzi, 2000c; Terzibaş, 2006). Çevre etiğinin olgunlaşmasında mitlerin pozitif yönü kullanılmalıdır. İlgili kadim gelenekler, öykü ve efsaneler yanında sonradan oluşmuş ve mitleşmiş olaylarda bu amaçla kullanılabilir.

7.4. Yaşam tarzı

Yaşam tarzları çevreye bakış açısının şekillenmesinde çok etkilidir. Farklı ortamlarda gerçekleştirilen çevre sorunları ile mücadele eğitiminin etkinliği ve verimliliği farklı yaşam tarzlarına özgü öğretim metotları ile mümkün olabilir. Bu nedenle yaşam tarzları analiz edilerek ve buna uygun çevre eğitim modeli geliştirilmelidir.

7.5. Alışkanlıklar

Yazılı kurallara bağlı olmayan alışkanlıklar yaşam tarzının şekillenmesinde de önemli bir yere sahiptir (Berberoğlu, 1990). Alışkanlıklar insan bilincinde varlığını sürdürdüğünden dolayı zaman zaman yazılı kurallardan daha etkili olabilmektedir (Eren;1993). Bu nedenle sürdürülebilir çevre etiğinin oluşmasında etik değerlerin alışkanlık haline gelmesi önemlidir.

7.6. İnanç eğilimleri

Farklı inanç eğilimleri farklı manevi kültürleri oluşturur. Bu kültürel yaklaşımlar yaşam tarzını ve alışkanlıkları da etkilemektedir. Toplumların inanç eğilimlerinin bilinmesi davranış şekillerinin tahmin edilmesini sağlayabilmektedir (Yavuz, 2006). İnanç eğilimlerinin çevre etiği konusundaki yaklaşımları toplumlar üzerinde yazılı kurallardan daha etkilidir.

8. Adaptasyon süreci

Bozulan ekolojik dengenin yeninden kurulması rehabilitasyon projeleri ile beraber ancak devam eden alışkanlıkların değişmesiyle de sürdürülebilir olabilmektedir. Bu nedenle alışkanlıkların değişmesi için belirli bir adaptasyon sürecine ihtiyaç vardır.

8.1. Psikolojik destek

Alişkanların ekolojik dengenin yeniden onarılmasının lehinde yeniden düzenlenmesi ve günlük yaşama adapte edilebilmesi için eğitim psikolojik olarak da desteklenmelidir.

9. Politik etki

Çevre sorunları ile mücadele eğitimi ve sonrasında uygulanabilirliği ancak politik uygulamaların eşgüdümüyle sağlanabilir.

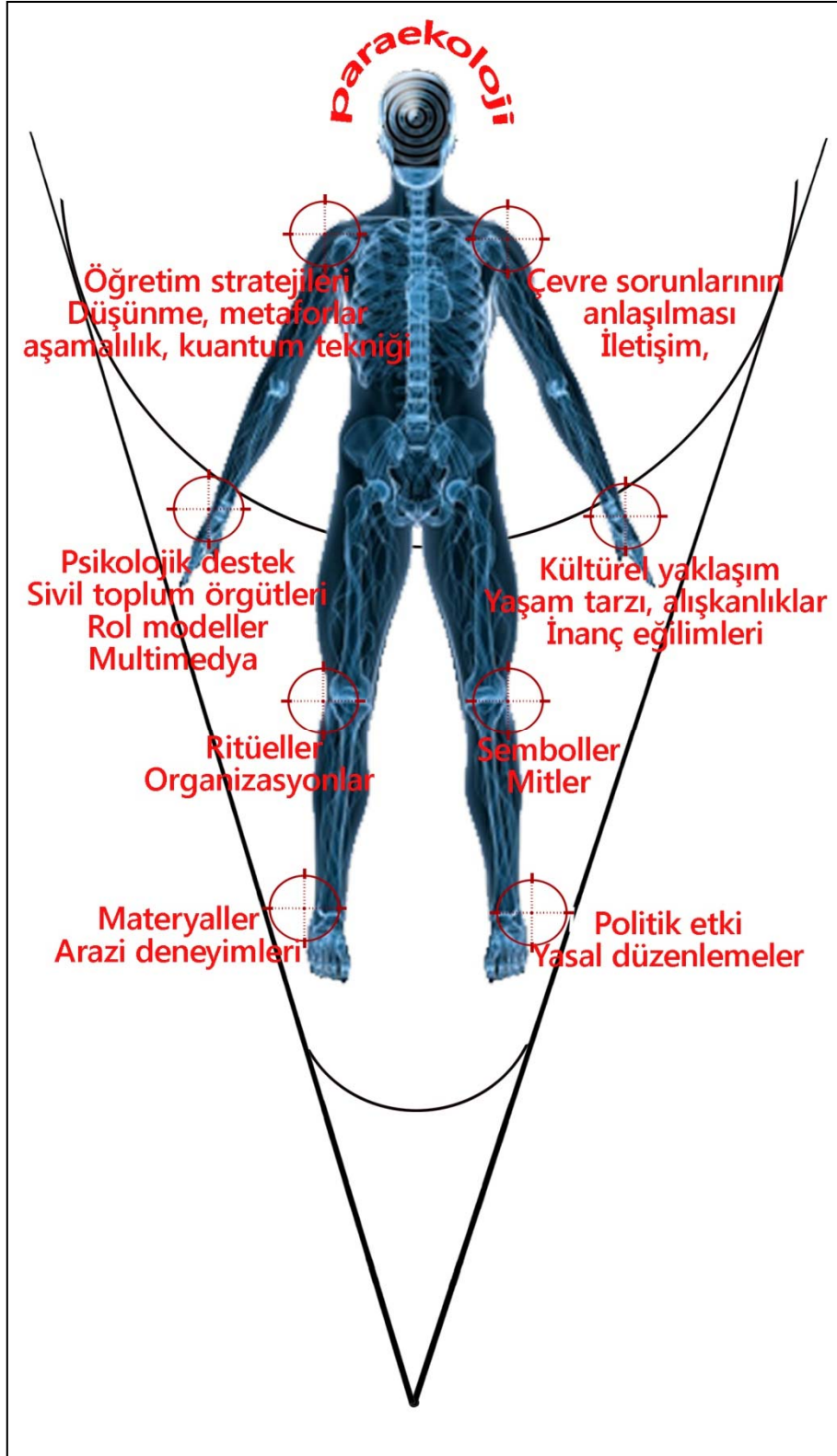
9.1. Yasal düzenlemeler

Yasal düzenlemeler ekosisteme zarar verenlerin cezalandırılacağı yasaklamaların olduğu kadar ekosistemi koruyanlarında ödüllendirildiği bir içeriğe sahip olmalıdır. Bu düzenlemeler yaşama aktarılabilen özellikte olmalıdır.

Çevre sorunları ile mücadele eğitiminde ön plana çıkan paraekolojik parametrelerin aktif ve pasif toplamlarının ortalaması Çizelge 2’de verilmiştir.

Çizelge 2. Çevre Sorunları İle Mücadele Eğitiminde Ön Plana Çıkan Paraekolojik Parametreler Matrisi (Ortalama Değerler)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Pasif Toplam (PT)	
1	Çevre sorunlarının anlaşılması	3	3	3	3	2	2	2	3	3	3	1	3	3	3	3	3	3	3	2	3	2	3	2	58	
2	Öğretim stratejileri	3	3	2	2	2	1	2	3	1	3	3	3	3	3	3	3	3	2	3	3	1	3	3	55	
3	Kültürel yaklaşım	3	3	3	3	3	3	3	3	3	0	0	0	1	1	1	1	1	2	2	2	2	2	3	42	
4	Semboller	2	2	3	3	3	3	1	3	2	1	1	1	1	1	2	2	2	2	2	2	2	2	0	2	42
5	Ritüeller	2	2	3	3	3	3	1	3	2	1	1	1	1	1	2	2	2	2	2	2	2	2	0	2	42
6	Mitler	2	2	3	3	3	3	1	3	1	1	1	1	1	1	2	2	2	2	2	2	2	2	0	2	41
7	Yaşam tarzı	3	3	3	2	2	2	3	3	2	1	1	3	3	3	3	3	3	3	3	3	3	2	1	3	55
8	Alışkanlıklar	3	3	3	2	2	2	3	3	2	1	1	3	3	3	3	3	3	3	3	3	3	3	1	3	56
9	İnanç eğilimleri	3	2	3	3	3	3	3	3	2	2	1	3	3	3	3	3	3	3	3	3	3	3	0	3	58
10	Psikolojik destek	3	3	3	1	1	1	3	3	2	2	2	2	3	3	3	3	3	3	2	3	1	1	3	52	
11	Politik etki	3	3	3	1	1	1	3	3	0	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	47
12	Yasal düzenlemeler	3	3	3	1	1	1	3	3	0	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	47
13	İletişim	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	66
14	Düşünme	3	3	2	2	1	1	3	3	3	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	58
15	Meteforlar	3	3	2	2	1	1	1	3	3	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	56
16	Aşamalılık	3	3	2	1	1	1	1	3	1	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	52
17	Kuantum tekniği	3	3	2	2	1	1	1	3	3	3	2	2	3	3	3	3	3	3	3	2	2	2	2	2	52
18	Sivil Toplum Örgütleri	3	3	1	1	1	1	1	1	1	1	2	2	3	3	2	2	2	3	3	2	1	2	2	2	41



Şekil 2. Eğitimde Paraekolojik Parametreler ve Konsensüs Matrisi

Ekosisteme yönelik tehditlerin ortadan kaldırılmasında gerekli adımları atamayan insanın doğanın rehabilitasyon sürecinde devre dışı bırakılarak başarı beklenmesi rasyonel değildir. Bu durum soruna neden olan insanında rehabilitasyon sürecine dahil edilmesi gerekliliğini ortaya koymaktadır. Bozulan doğa ile beraber rehabilite edilecek olan insanın asıl problemi "kendisine yabancılaşma" sorunudur. Burada ekolojik açıdan yabancılaşma; insanın ekosistem içerisindeki görevini yerine getirememesi veya amacını unutmasıdır (Dindaroğlu vd., 2013).

"Paraekolojik açıdan eğitilerek motivasyon kazandırılması alışlagelmiş yaşam tarzında değişikliklere neden olacaktır. Böylelikle bu bilince sahip insan, yaşamını kolaylaştıracak teknolojilerin de çevreci olmasını sağlayacaktır. Aksi takdirde yeryüzünün dinamik halde tutan ekolojik döngüler, üzerlerindeki aşırı baskı nedeniyle görev yapamaz duruma geleceklerdir. Bu ise yaşam kaynaklarının tükenmesi anlamına gelmektedir. Bu durumda günde en az 17000 defa nefes alıp vermek zorunda olan, en az 2-3 litre temiz su tüketen ve devamlı besine bağımlı olan insanın önünde üç yol vardır; 1- Kirlitecek başka yaşam alanları keşfetmek! 2- Su, besin vb. doğal kaynak savaşları sonucu yok olmak, 3- Gereklî önlemleri alarak yaşamın devamını sağlamaya çalışmak" (Dindaroğlu, 2014).

SONUÇ ve ÖNERİLER

Çevre sorunları ile mücadele özellikle çocuk yaşlarda başlaması gereken iyi kurgulanmış eğitimlerle daha etkin ve kalıcı olabilir. Paraekolojik parametreler matris değerleri ortalamalarına göre çevre sorunlarının anlaşılması, öğretim stratejileri, kültürel yaklaşım, yaşam tarzı, alışkanlıklar, inanç eğilimleri, psikolojik destek, iletişim, düşünme, metforlar, aşamalılık, kuantum tekniği, sivil toplum örgütleri, multimedya, rol modeller gibi parametreler kritik bölgede yer alırken; semboller, ritüeller, mitler, politik etki, yasal düzenlemeler, organizasyonlar, materyaller ve arazi deneyimleri gibi parametreler ise kritik olmayan ancak önemli alanda yer almışlardır. Önerilen parametrelere farklı ekolojik bölgelere özgü yeni parametreler eklenebilir yada zamanla etkisi kaybolanlar çıkarılabilir.

Paraekolojik yaklaşıma göre ekosistemlere yönelik tehditlerin azaltılması ve oluşan çevre tahribatının ıslahı sürecinde insanında sosyolojik, psikolojik ve felsefi açıdan rehabilitasyonuna gereksinim duyulmaktadır. Bunun amacı sorunun odağında olan insanın çözüm sürecinde aktif rol almasını sağlamaktır. Paraekolojik yaklaşımlar kabul gören ya da oluşturulması planlanan etik olguların bireylerin yaşamında içselleştirilmesinde yardımcı olan özellikle psikoloji, sosyoloji ve felsefeyi bir arada kullanan esnek bir düşünce gücüne sahiptir. Küresel ölçekteki çevre sorunlarını çözmekte ayak direten insanoğlu için "Asıl tehlikeli olan dünyadaki aktif değişimlere ve gelişmelere paralel olarak ekolojik planlamayı ve uygulamayı yapamayan insanın kendisine yabancılaşması problemidir. Öncelikle bu sorunsalın tespiti ve daha sonra bunun aşılması gerekmektedir". Günümüzde genel olarak ekolojik sorunların temelinde insanın ekosistem içerisindeki görevini ve amacını unutması yatmaktadır. "Bütün bunlar dünyadaki anıklığın önemli bir parçasını oluşturmaktadır. Bu bağlamda yapacağımız planlardan önce toplumu aktif, sürdürülebilir ekolojik bir çevre ahlakıyla donatmalı ve doğal kaynaklarımızı bu perspektifle planlamalıyız. Çünkü bu süreçlerin yönetimi ve sorumluluğunda yine merkezde olan insandır" (Dindaroğlu vd, 2014).

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INVESTIGATING OF TEACHER CANDIDATES' SELF REGULATED LEARNING IN TERMS OF EMOTIONAL INTELLIGENCE AND EPISTEMOLOGICAL BELIEFS

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ABSTRACT: The aim of this research to investigate the relationships between teacher candidates' emotional intelligence and epistemological beliefs with self regulated learning. The research was based on the relational search model and the sample set of research was consisted total 1265 teacher candidates studying in a Faculty of Education in Konya. In this study, self regulated learning scale, emotional intelligence scale and epistemological beliefs scale was practiced to teacher candidates. To analyze the data regression analysis and correlation technique is used. According to the findings of the research; emotional intelligence and self regulation skills are the predictors of self regulated learning.

Key words: self regulated learning, emotional intelligence, epistemological beliefs

ÖĞRETMEN ADAYLARININ ÖZ DÜZENLEME BECERİLERİNİN DUYGUSAL ZEKÂLARI VE EPİSTEMOLOJİK İNANÇLARI AÇISINDAN İNCELENMESİ²

ÖZET: Bu araştırmanın amacı öğretmen adaylarının öz düzenleme becerileri ile duygusal zekâları ve epistemolojik inançları arasındaki ilişkinin incelenmesidir. İlişkisel tarama yöntemiyle yapılan bu araştırmanın örneklemini Konya ilinde bir Eğitim Fakültesinde öğrenim gören 1265 öğretmen adayı oluşturmaktadır. Bu çalışmada öğretmen adaylarına Öz Düzenleme Becerisi Ölçeği, Duygusal Zekâ Ölçeği ve Epistemolojik İnançlar Ölçeği uygulanmıştır. Verilerin çözümlenmesinde regresyon analizi ve korelasyon tekniği kullanılmıştır. Araştırmanın bulgularına göre; duygusal zekâ ve epistemolojik inançlar öz düzenleme becerilerini anlamlı düzeyde açıklamaktadır.

Anahtar sözcükler: öz düzenleme becerisi, duygusal zekâ, epistemolojik inançlar

GİRİŞ

Bir ülkenin gelişebilmesi için yeterli sayı ve nitelikte yetişmiş insan gücüne gereksinim vardır. Bunu sağlamanın yolu da o ülkenin eğitim sisteminin verimli biçimde çalışması ile ilişkilidir (Sümbül, 1998). Bireylerin bilgi ve becerileri bir öğretim programına devam etmeksizin kendi kendilerine de edinebildikleri bilinmektedir. Ancak özellikle çocukluk yıllarında merak ve dürtüsel nedenlerle harekete geçirilen öğrenmelerin, ilerleyen yıllarda yerini bireyin daha bilinçli seçimlerini yansıtan, hedefe dayalı öğrenmelere bırakabilmesi önemlidir. Günümüzde okullarda, üniversitelerde ve yaşamın her alanında daha karmaşık bilgi ve becerilerin edinimi, bireyin bir şekilde öğrenme sürecini yönetebilmesini gerektirmektedir (Rheinberg ve arkadaşları, 2000).

21. yüzyılda eğitimin temel amaçlarının başında öğrencilere kendi öğrenimlerini düzenleme becerileri kazandırma amacı gelmektedir. Bu becerilerinin, okul yaşamı boyunca öğrencilere rehberlik edeceği ve yaşam boyu öğrenmeyi de sağlayacağı düşünülmektedir (Zimmerman, 2002; Puustinen ve Pulkkinen, 2001). Örgün öğretimin ardından sosyal, iş veya akademik yaşama atılan bireyden pek çok beceriyi kendi başına edinmesi beklenir. Bu beklentinin karşılanabilmesi ise büyük ölçüde bireyin sahip olduğu öz düzenleme becerilerinin

² Bu çalışma GÜLER (2015)'in "Öğretmen Adaylarının Öz Düzenleme Becerilerinin; Duygusal Zekâları, Epistemolojik İnançları ve Bazı Değişkenler Açısından İncelenmesi" adlı doktora tezinden türetilmiştir.

dercesine bağlanmıştır. Yapılan araştırmalar öz düzenleme becerilerine sahip öğrencilerin karar alma süreçlerinde daha etkin ve bağımsız olduklarını göstermektedir. Ayrıca bu nitelikteki öğrencilerin kendi öğrenimlerini izleyebilmek, değerlendirebilmek ve yönetebilmek için gereken bilişsel kaynaklara, üst biliş bilgisi ve stratejilerine, öğrenme sürecini kararlılıkla sürdürebilmeleri için kritik olan motivasyon inançlarına ve bu inanç sistemlerini kontrol edebilme becerisine sahip olduklarını ortaya koymuştur (Özby, 2008).

Öz düzenleme öğrenmeye ilişkin önemli bir kavram olup, öğrencilere kendi farkındalık düzeylerini yükseltme konusunda görevler yüklemiştir. Kendi düşüncelerinin farkında olmaya ek olarak bilişleri hakkında da daha fazla bilgi sahibi olmanın farkındalığını yükseltmek ve böylece en iyisini öğrenme eğiliminde olmak, kendi öğrenmesini kendisi sağlayan öğrenciler olabileceği yolunu açmıştır. Dahası öz düzenleme becerisine sahip öğrenci olmaya açılan kapı, öğrencinin kendi biliş, metabiliş ve öğrenme özelliklerinin farkında olması kadar motivasyon konusunda da farkındalık düzeyinin yükselmesini sağlamıştır (Özturan Sağır ve Azapağası, 2009:132). Öz düzenleme becerisine sahip öğrenciler; belli bir öğrenme durumunu doğru olarak tanıma, öğrenebilmesi için en uygun öğrenme stratejisini seçme, stratejinin ne derece etkili olduğunu inceleme ve öğrenmeyi gerçekleştirene kadar güdülenmiş olarak yeterli çabayı gösterme işlem basamaklarını etkili olarak uygulayabilen öğrencilerdir (Arrends, 1979). Derry ve Murphy (1986)'ye göre öz düzenleme becerisine sahip öğrenciler hedefi analiz etme ve tanımlama, stratejiyi planlama, stratejiyi uygulama, stratejinin sonuçlarını izleme ve stratejiyi uygun hale getirme halinde beş basamaklı olan ve aynı zamanda da yukarıdaki dört basamağı içine alan yaklaşımı benimseyen öğrencilerdir. Dolayısıyla bu öğrenciler öz düzenleme becerisinin önemini bilincinde olup uygulayan kişilerdir.

Son yıllarda eğitim sistemimizde öğrenen merkezli bir anlayışa geçilmiştir. Buna göre öğretmen ile öğrenci arasındaki roller de değişime uğramaktadır. Yani öğretmenden, bilgi aktarıcısı olmaktan ziyade öğrenmeyi kolaylaştırma, rehberlik etme ve destekleme; öğrenenden ise kendi öğrenme sürecinin sorumluluğunu üstlenme gibi rolleri gerçekleştirmesi beklenmektedir. Öğrencinin bu öğrenme sürecinde daha etkin olabilmesi öz düzenleme becerileri ile mümkün görülmektedir. Öğrencilerin öz düzenleme becerilerinin geliştirilmesinde en büyük rol öğretmenlere düşmektedir. Öğretmenler; öğrencilerin esnek ve uygulanabilir bilişsel etkinliklere (görev analizi, strateji seçimi ve kullanımı gibi) katılımlarını teşvik ettikleri oranda onların öz düzenleme becerilerinin gelişimine katkı sağlayabilirler.

Öğrencilerin öz düzenleyici öğrenme becerisi kazanmalarında öğretmenler ve öğrenme ortamı önemli bir rol oynamaktadır (Eshel ve Kohavi, 2003:252). Ayrıca Randi (2004)'ye göre, öğretmenlerin öz düzenleme becerileri ile öğrencilerin öz düzenleme becerilerini geliştirme yetenekleri arasında yüksek bir ilişki vardır. Bunlardan dolayı geleceğin öğretmenlerinin öz düzenleme becerilerinin geliştirilmesi sayesinde, onların aynı şekilde öz düzenleme becerileri yüksek öğrenenler yetiştirmelerine olanak sağlayacaktır.

Duygusal zekâ, kişilerin düşüncelerinden yararlanarak duyguya ulaşabilme, duyguları anlama, bilme yeteneği ile duyguları düzenleme yeteneğidir (Nettelbeck ve Wilson, 2005). Goleman'a göre doğuştan getirilen bazı eğilimler, yetenekler ve kişisel özellikler bulunmakla birlikte, duygusal zekâ yeterlikleri genel olarak sonradan kazanılabilecek olan yeterliklerdir. Psikolojik ve gelişimsel araştırmalar, duygusal zekânın gelişiminde eğitimin, genetik kadar önemli bir rol oynadığını göstermektedir. Pek fazla bilinmiyor olsa da, araştırma ve uygulamalar açık olarak duygusal zekânın öğrenilebildiğini ortaya koymaktadır (Goleman, 1998:93). Bundan dolayı öğretmenler büyük görevler düşmektedir. Duygusal zekâ seviyesi gelişmiş bir öğretmen öğrencilerinin üzerinde olumlu etkiler gösterir ve öğrencilere iyi bir model olarak daha başarılı olmalarını sağlamak amacıyla etkin iletişime geçer. Öğretmenlik mesleği duyguların ön plana çıktığı bir meslektir. Bu yüzden öğretmenlerin duygularını tanıma, anlama ve kontrol etme yeterliliğine sahip olmaları gerekmektedir.

Epistemolojik inançların öğrencilerin tercih ettikleri öğrenme yaklaşımları, yöntemleri ve ortamları, kullandıkları öğrenme stratejileri, çeşitli bilgileri ve belirli öğrenme deneyimlerini algılama ve yorumlama biçimleri üzerinde belirleyici etkileri gözlenmektedir. Ayrıca öğretmenlerin sahip oldukları inanç sistemleri, hem kendi öğrenmeleri hem de öğrencilerinin öğrenmeleri üzerinde belirleyici olmaktadır. Bu nedenle bir öğretmenin sahip olduğu epistemolojik inancın, öğrencilerinin sahip olduğu epistemolojik inancın yönünün belirlenmesinde oldukça etkili bir değişken olacağı söylenebilir. Yapılan çalışmalar incelendiğinde, epistemolojik inançları gelişkin bireylerin akademik başarılarının daha yüksek olduğunu, daha etkili öğrenme alışkanlıklarına sahip olduklarını ve yeni karşılaştıkları bilgileri ne düzeyde kavradıklarını kontrol etmede daha başarılı olduklarını ortaya koymaktadır (Schommer, 1990).

Çalışmamızda duygusal zekâları ve epistemolojik inançları yüksek öğretmen adaylarının öz düzenleme becerilerinin de bu değişkenlerden etkileneceği düşünülerek, bu bağlamda araştırma kapsamında öğretmen

adaylarının öz düzenleme becerilerinin, duygusal zekâları ve epistemolojik inançları ile ilişkisinin incelenmesi amaçlanmıştır.

Araştırmanın genel amaçlarına bağlı olarak aşağıdaki sorulara cevap aranmıştır:

1. Öğretmen adaylarının öz düzenleme becerileri ile duygusal zekâları ve epistemolojik inançları arasında ilişki var mıdır?
2. Öğretmen adaylarının duygusal zekâ düzeylerinin alt boyutları (iyimserlik ve ruh halinin düzenlenmesi, duyguların değerlendirilmesi, duyguların kullanımı) öz düzenleme becerilerinin bilişsel düzenlemeler, çabanın düzenlenmesi ve zaman ve çalışmanın düzenlenmesi alt boyutlarını anlamlı düzeyde açıklamakta mıdır?
3. Öğretmen adaylarının epistemolojik inançlarının alt boyutları (öğrenmenin çabaya bağlı olduğuna inanç, öğrenmenin yeteneğe bağlı olduğuna inanç, tek bir doğrunun var olduğuna inanç) öz düzenleme becerilerinin bilişsel düzenlemeler, çabanın düzenlenmesi ve zaman ve çalışmanın düzenlenmesi alt boyutlarını anlamlı düzeyde açıklamakta mıdır?

YÖNTEM

Bu bölümde araştırmanın modeli, evren ve örnekleme, veri toplama araçları ve verilerin analizine ilişkin bilgiler yer almaktadır.

Araştırma Modeli

Bu araştırma, öğretmen adaylarının öz düzenleme becerileri ile duygusal zekâları ve epistemolojik inançları arasındaki ilişkiyi belirlemeye yönelik olduğundan betimsel nitelikte ilişkisel tarama modelindedir. Tarama modelleri kendi içinde iki bölüme ayrılmaktadır. Bu bölümler; genel tarama ve örnek olay taramalarıdır. İlişkisel tarama modeli genel tarama yöntemi içine giren bir yöntemdir. Genel tarama modelleri; çok sayıda elemandan oluşan bir evrende, evren hakkındaki genel yargıya varmak amacı ile evrenin tümü ya da ondan alınacak bir grup örnek ya da örnekleme üzerinde yapılan tarama düzenlemeleridir. İlişkisel tarama modelinde iki değişken arasındaki değişimin varlığı ve/veya niceliği belirlenmeye çalışılır (Karasar, 2009:77-81).

Araştırma Grubu

Araştırma grubunu Konya ilinde bir Eğitim Fakültesi öğrencileri oluşturmaktadır. Araştırma grubu gönüllülük esasına göre katılan 1265 öğretmen adayından oluşmaktadır.

Araştırmada Kullanılan Veri Toplama Araçları

Öz Düzenleme Becerisi Ölçeği: Ölçek, öz düzenleme becerilerini belirlemek amacıyla Arslan (2008) tarafından geliştirilmiştir. Öz düzenleme becerisi ölçeğinin Cronbach Alfa güvenirlik katsayısının .87 olduğu gözlenmiştir. Buna göre ölçeğin güvenirliğin yüksek olduğu ve ölçeğin öz düzenleme becerisini gerçeğe oldukça yakın ölçtüğü söylenebilir. Ölçek 20 madde; (i) Bilişsel Düzenlemeler, (ii) Çabanın Düzenlenmesi ve (iii) Zaman ve Çalışmanın Düzenlenmesi olmak üzere 3 alt boyuttan oluşmaktadır.

Duygusal Zekâ Ölçeği: Duygusal Zekânın (DZ) ölçülmesinde Shutte vd. (1998) tarafından geliştirilen, Austin vd.(2004) tarafından yeniden düzenlenen, Tatar vd.(2011) tarafından Türkçeye uyarlanan Shutte Duygusal Zekâ Ölçeği kullanılmıştır. Ölçeğin Cronbach-Alpha iç tutarlık katsayısı bütünü için 0,82, alt boyutları için ise .75, .39 ve .76 olarak tespit edilmiştir (Tatar vd.:2011). Ölçek; İyimserlik ve Ruh Halinin Düzenlenmesi (İRH) (21 ifade), Duyguların Değerlendirilmesi (DD) (13 ifade) ve Duyguların Kullanımı (DK) (7 ifade) olmak üzere 41 ifadeden ve üç alt boyuttan oluşmaktadır.

Epistemolojik İnanç Ölçeği: Epistemolojik İnanç Ölçeği; öğrencilerin epistemolojik inançlarını belirlemek amacıyla Schommer (1993) tarafından geliştirilmiş, Deryakulu ve Büyüköztürk (2005) tarafından Türkçe'ye çeviri ve uyarlaması ile geçerlik ve güvenirlik çalışması yapılmış bir ölçektir. Ölçek 'Öğrenmenin Çabaya Bağlı Olduğuna İnanç' (ÖÇBOİ), 'Öğrenmenin Yeteneğe Bağlı Olduğuna İnanç' (ÖYBOİ) ve 'Tek Bir Doğrunun Var Olduğuna İnanç' (TBDVOİ) olmak üzere üç alt boyuttan oluşmaktadır. Ölçeğin Cronbach Alpha iç tutarlık katsayıları birinci alt boyut için .84, ikinci alt boyut için .69, üçüncü alt boyut için .64 ve ölçeğin bütünü için ise .81 olarak hesaplanmıştır. Ölçeğin güvenilir bir ölçek olduğu düşünülerek çalışmamızda kullanılmıştır. Ölçeğin 'Öğrenmenin Çabaya Bağlı Olduğuna İnanç' boyutunda hepsi olumsuz toplam 17 madde (1.-17. madde) bulunmaktadır. Ölçeğin 'Öğrenmenin Yeteneğe Bağlı Olduğuna İnanç' boyutunda hepsi olumlu toplam 8 madde (18.-25. madde) yer almaktadır. Ölçeğin 'Tek Bir Doğrunun Var Olduğuna İnanç' boyutunda ise hepsi olumlu toplam 9 madde (26.-34. madde) bulunmaktadır. Olumsuz maddeler tersine puanlanmakta olup, ölçekten alınan

puanlar boyut bazında değerlendirilmekte, her bir boyuttan alınan yüksek puan, bireyin o boyuta ilişkin olgunlaşmamış inançlara, düşük puan ise olgunlaşmış inançlara sahip olduğunu göstermektedir.

Verilerin Toplanması ve Analizi

Çalışmada kullanılan veri toplama tekniği anket olarak belirlenmiştir. Katılımcılara dağıtılan anketlerin tamamı bireysel olarak ulaştırılarak cevap alınmıştır. Çalışma evreni içerisinde 1265 kişilik katılımcıdan sağlanan veriler kodlanarak bilgisayar ortamına aktarılmış ve analizler için hazır hale getirilmiştir. Verilerin çözümlenmesinde regresyon analizi ve korelasyon tekniği kullanılmıştır. Eğitim araştırmalarından çoğu zaman verilerin analizinde manidarlık düzeyi 0,05 olarak kabul edilmektedir (Balci, 2004). Bu yüzden; verilerin analizinde önem düzeyi, Özdamar (2001:279) tarafından önerilen $p > 0,05$ önemli değil, $p < 0,05$ önemli aralıkları belirlenmiştir. Ölçekler arası ilişkileri saptamak için Pearson Korelasyon tekniği kullanılmıştır. Korelasyon analizi, iki değişken arasındaki doğrusal ilişkiyi test etmek, varsa bu ilişkinin derecesini ölçmek için kullanılan istatistiksel bir yöntemdir. Korelasyon analizinde amaç; bağımsız değişken değiştiğinde, bağımlı değişkenin ne yönde değişeceğini görmektir (Kalaycı, 2008: 115).

BULGULAR

Öğretmen adaylarının öz düzenleme becerileri ile duygusal zekâları ve epistemolojik inançları arasındaki ilişki

Tablo 1’de öğretmen adaylarının öz düzenleme becerileri ile duygusal zekâ ve epistemolojik inançları alt ölçek puanları arasındaki korelasyon analizi sonuçları verilmiştir.

Araştırmaya katılan öğretmen adaylarının öz düzenleme ölçeğinden elde ettikleri puanlar ile duygusal zekâ ölçeğinin iyimserlik ve ruh halinin düzenlenmesi, duyguların değerlendirilmesi ve duyguların kullanımı alt boyutlarından elde ettikleri puanlar arasında $p < .01$ anlamlılık düzeyinde pozitif yönlü, anlamlı ilişki bulunmuştur. Araştırmaya katılan öğretmen adaylarının öz düzenleme ölçeğinden elde ettikleri puanlar ile epistemolojik inanç ölçeğinin öğrenmenin çabaya bağlı olduğuna inanç, öğrenmenin yeteneğe bağlı olduğuna inanç, tek bir doğrunun var olduğuna inanç alt boyutlarından elde ettikleri puanlar arasında $p < .01$ anlamlılık düzeyinde negatif yönlü anlamlı ilişki bulunmuştur. Elde edilen ve çoğunluğu orta düzeyde olan korelasyonel değerler öz düzenleme becerileri ile duygusal zekâ ve epistemolojik inançlar arasında regresyon analizi yapılabilmemesine yönelik uygunluğu açıklamaya yardımcı olmaktadır.

Tablo 1. Öğretmen Adaylarının Duygusal Zekâ, Epistemolojik İnançlar Ve Öz Düzenleme Becerileri Arasındaki Korelasyon Analizi Sonuçları

Değişkenler	1	2	3	4	5	6	7	8	9	10	11	12
1 BD	1											
2 ÇD	0,56**	1										
3 ZÇD	0,32**	0,47**	1									
4 ÖDB	0,86**	0,88**	0,61**	1								
5 İRHD	0,46**	0,29**	0,14**	0,41**	1							
6 DD	0,26**	0,36**	0,27**	0,37**	0,49**	1						
7 DK	0,08**	0,21**	-0,02	0,14**	0,16**	0,33**	1					
8 DZ	0,41**	0,39**	0,21**	0,44**	0,83**	0,84**	0,50**	1				
9 ÖÇBOİ	-0,35**	-0,23**	-0,08**	-0,31**	-0,56**	-0,22**	-0,11**	-0,45**	1			
10 ÖYBOİ	-0,22**	-0,36**	-0,18**	-0,33**	-0,29**	-0,44**	-0,27**	-0,45**	0,30**	1		
11 TDVOİ	0,01	-0,15**	-0,06*	-0,09**	-0,03	-0,26**	-0,22**	-0,20**	0,05	0,52**	1	
12 Eİ	-0,30**	-0,35**	-0,15**	-0,36**	-0,47**	-0,41**	-0,26**	-0,52**	0,73**	0,79**	0,63**	1

*N=1265, **p<0.01, *p<0.05, BD=Bilişsel Düzenlemeler, ÇD=Çabanın Düzenlenmesi, ZÇD=Zaman ve Çalışmanın Düzenlenmesi, ÖDB=Öz Düzenleme Becerileri, İRHD= İyimserlik ve Ruh Halinin Düzenlenmesi, DD=Duyguların Değerlendirilmesi, DK=Duyguların Kullanımı, DZ=Duygusal Zekâ, ÖÇBOİ=Öğrenmenin Çabaya Bağlı Olduğuna İnanç, ÖYBOİ=Öğrenmenin Yeteneğe Bağlı Olduğuna İnanç, TDVOİ=Tek Bir Doğrunun Var Olduğuna İnanç, Eİ=Epistemolojik İnanç*

Öğretmen adaylarının duygusal zekâ düzeylerinin alt boyutları (iyimserlik ve ruh halinin düzenlenmesi, duyguların değerlendirilmesi, duyguların kullanımı) öz düzenleme becerilerinin bilişsel düzenlemeler, çabanın düzenlenmesi ve zaman ve çalışmanın düzenlenmesi alt boyutlarını anlamlı düzeyde açıklamakta mıdır?

Öğretmen adaylarının duygusal zekâ düzeylerinin alt boyutlarının (iyimserlik ve ruh halinin düzenlenmesi, duyguların değerlendirilmesi, duyguların kullanımı) öz düzenleme becerilerinin alt boyutlarını anlamlı düzeyde açıklayıp açıklamadığının belirlenmesi amacıyla regresyon analizi kullanılmıştır. Analiz sonuçları öz düzenleme becerilerinin alt boyut sıralamasına göre (bilişsel düzenlemeler, çabanın düzenlenmesi ve zaman ve çalışmanın düzenlenmesi) aşağıda verilmiştir.

Öğretmen adaylarının duygusal zekâ düzeylerinin alt boyutları (iyimserlik ve ruh halinin düzenlenmesi, duyguların değerlendirilmesi, duyguların kullanımı) öz düzenleme becerilerinin “bilişsel düzenlemeler” boyutunu anlamlı düzeyde açıklamakta mıdır?

Tablo 2’de görüldüğü gibi; öz düzenlemenin alt boyutu olan bilişsel düzenlemeleri, duygusal zekânın iyimserlik ve ruh halinin düzenlenmesi alt boyutu anlamlı düzeyde etkilemektedir. Duygusal zekânın alt boyutları olan duyguların değerlendirilmesi ve duyguların kullanımı öz düzenlemenin alt boyutu olan bilişsel düzenlemeleri kestirmede (tahminde) etkisi bulunmamıştır. Duygusal zekâ öz düzenlemenin alt boyutu olan bilişsel düzenlemelerdeki değişkenliğin %22’sini açıklamaktadır.

Tablo 2. Duygusal Zekânın Alt Boyutlarının Öz Düzenleme Becerilerinin Bilişsel Düzenlemeler Boyutu Üzerindeki Etkisinin İncelenmesi

Bağımlı değişken	Yordayıcı Değişken	R	R ²	F	Std. β	t	p
Bilişsel Düzenlemeler	İyimserlik ve Ruh Halinin Düzenlenmesi				0,44	15,44*	0,000
	Duyguların Değerlendirilmesi	0,47	0,22	117,04	0,05	1,78	0,075
	Duyguların Kullanımı				-0,01	-0,32	0,750

*p<0.05

Öğretmen adaylarının duygusal zekâ düzeylerinin (iyimserlik ve ruh halinin düzenlenmesi, duyguların değerlendirilmesi, duyguların kullanımı) alt boyutları öz düzenleme becerilerinin “çabanın düzenlenmesi” boyutunun anlamlı düzeyde açıklamakta mıdır?

Tablo 3’de görüldüğü gibi; öz düzenlemenin alt boyutu olan çabanın düzenlenmesini, duygusal zekânın iyimserlik ve ruh halinin düzenlenmesi, duyguların değerlendirilmesi ve duyguların kullanımı alt boyutları anlamlı düzeyde etkilemektedir. Duygusal zekâ öz düzenlemenin alt boyutu olan çabanın düzenlenmesindeki değişkenliğin %15’ini açıklamaktadır. Öz düzenlemenin alt boyutu olan çabanın düzenlenmesine en fazla etkiyi duyguların değerlendirilmesi yapmakta, daha sonra sırasıyla iyimserlik ve ruh halinin düzenlenmesi ve son olarak üçüncü etkiyi ise duyguların kullanımı sağlamaktadır.

Tablo 3. Duygusal Zekânın Alt Boyutlarının Öz Düzenleme Becerilerinin Çabanın Düzenlenmesi Boyutu Üzerindeki Etkisinin İncelenmesi

Bağımlı değişken	Yordayıcı Değişken	R	R ²	F	Std. β	t	p
Çabanın Düzenlenmesi	İyimserlik ve Ruh Halinin Düzenlenmesi				0,15	5,00*	0,000
	Duyguların Değerlendirilmesi	0,39	0,15	76,35	0,25	7,98*	0,000
	Duyguların Kullanımı				0,11	3,97*	0,000

*p<0.05

Öğretmen adaylarının duygusal zekâ düzeylerinin alt boyutları (iyimserlik ve ruh halinin düzenlenmesi, duyguların değerlendirilmesi, duyguların kullanımı) öz düzenleme becerilerinin “zaman ve çalışmanın düzenlenmesi” boyutunu anlamlı düzeyde açıklamakta mıdır?

Tablo 4’de görüldüğü gibi; öz düzenlemenin alt boyutu olan zaman ve çalışmanın düzenlenmesini, duygusal zekânın duyguların değerlendirilmesi ve duyguların kullanımı alt boyutları anlamlı düzeyde etkilemektedir. Duygusal zekâ öz düzenlemenin alt boyutu olan zaman ve çalışmanın düzenlenmesindeki değişkenliğin %9’unu açıklamaktadır. Öz düzenlemenin alt boyutu olan zaman ve çabanın düzenlenmesine en fazla etkiyi duyguların değerlendirilmesi yapmakta daha sonra duyguların kullanımı sağlamaktadır. Duygusal zekânın alt boyutu olan iyimserlik ve ruh halinin düzenlenmesi öz düzenlemenin alt boyutu olan zaman ve çalışmanın düzenlenmesini kestirmede (tahminde) etkisi bulunmamıştır.

Tablo 4. Duygusal Zekânın Alt Boyutlarının Öz Düzenleme Becerilerinin Zaman Ve Çalışmanın Düzenlenmesi Boyutu Üzerindeki Etkisinin İncelenmesi

Bağımlı değişken	Yordayıcı Değişken	R	R ²	F	Std. β	t	p
Zaman ve Çalışmanın düzenlenmesi	İyimserlik ve Ruh Halinin Düzenlenmesi				0,01	0,33	0,739
	Duyguların Değerlendirilmesi	0,3	0,09	39,99	0,31	9,53*	0,000
	Duyguların Kullanımı				-0,12	-4,14*	0,000

*p<0.05

Öğretmen adaylarının epistemolojik inançlarının alt boyutları (öğrenmenin çabaya bağlı olduğuna inanç, öğrenmenin yeteneğe bağlı olduğuna inanç, tek bir doğrunun var olduğuna inanç) öz düzenleme becerilerinin bilişsel düzenlemeler, çabanın düzenlenmesi ve zaman ve çalışmanın düzenlenmesi alt boyutlarını anlamlı düzeyde açıklamakta mıdır?

Öğretmen adaylarının epistemolojik inançlarının alt boyutlarının (öğrenmenin çabaya bağlı olduğuna inanç, öğrenmenin yeteneğe bağlı olduğuna inanç, tek bir doğrunun var olduğuna inanç) öz düzenleme becerilerinin alt boyutlarını anlamlı düzeyde açıklayıp açıklamadığının belirlenmesi amacıyla regresyon analizi kullanılmıştır. Analiz sonuçları öz düzenleme becerilerinin alt boyut sıralamasına göre (bilişsel düzenlemeler, çabanın düzenlenmesi ve zaman ve çalışmanın düzenlenmesi) aşağıda verilmiştir.

Öğretmen adaylarının epistemolojik inançlarının alt boyutları (öğrenmenin çabaya bağlı olduğuna inanç, öğrenmenin yeteneğe bağlı olduğuna inanç, tek bir doğrunun var olduğuna inanç) öz düzenleme becerilerinin “bilişsel düzenlemeler” boyutunu anlamlı düzeyde açıklamakta mıdır?

Tablo 5’de görüldüğü gibi; öz düzenlemenin alt boyutu olan bilişsel düzenlemeleri, öğrenmenin çabaya bağlı olduğuna inanç, öğrenmenin yeteneğe bağlı olduğuna inanç ve tek bir doğrunun var olduğuna inanç anlamlı düzeyde etkilemektedir. Epistemolojik inançlar öz düzenlemenin alt boyutu olan bilişsel düzenlemelerdeki değişkenliğin %15’ini açıklamaktadır. Öz düzenlemenin alt boyutu olan bilişsel düzenlemelere en fazla etkiyi öğrenmenin çabaya bağlı olduğuna inanç yapmakta, daha sonra sırasıyla öğrenmenin yeteneğe bağlı olduğuna inanç ve son olarak üçüncü etkiyi ise tek bir doğrunun var olduğuna inanç sağlamıştır.

Tablo 5. Epistemolojik İnançların Alt Boyutlarının Öz Düzenleme Becerilerinin Bilişsel Düzenlemeler Boyutu Üzerindeki Etkisinin İncelenmesi

Bağımlı değişken	Yordayıcı Değişken	R	R ²	F	Std. β	t	p
Bilişsel Düzenlemeler	Öğrenmenin Çabaya Bağlı Olduğuna İnanç				-0,3	-11,03*	0,000
	Öğrenmenin Yeteneğe Bağlı Olduğuna İnanç	0,38	0,15	71,11	-0,18	-5,54*	0,000
	Tek Bir Doğrunun Var Olduğuna İnanç				0,1	3,36*	0,001

*p<0.05

Öğretmen adaylarının epistemolojik inançlarının alt boyutları (öğrenmenin çabaya bağlı olduğuna inanç, öğrenmenin yeteneğe bağlı olduğuna inanç, tek bir doğrunun var olduğuna inanç) öz düzenleme becerilerinin “çabanın düzenlenmesi” boyutunun anlamlı düzeyde açıklamakta mıdır?

Tablo 6’da görüldüğü gibi; öz düzenlemenin alt boyutu olan çabanın düzenlenmesini, Epistemolojik İnançların alt boyutları olan öğrenmenin çabaya bağlı olduğuna inanç ve öğrenmenin yeteneğe bağlı olduğuna inanç anlamlı düzeyde etkilemektedir. Epistemolojik inançlar öz düzenlemenin alt boyutu olan çabanın düzenlenmesindeki değişkenliğin %15’ini açıklamaktadır. Öz düzenlemenin alt boyutu olan çabanın düzenlenmesine en fazla etkiyi öğrenmenin yeteneğe bağlı olduğuna inanç yapmakta daha sonra öğrenmenin çabaya bağlı olduğuna inanç sağlamaktadır. Epistemolojik İnançların alt boyutu olan tek bir doğrunun var olduğuna inanç öz düzenlemenin alt boyutu olan çabanın düzenlenmesini kestirmede (tahminde) etkisi bulunmamıştır.

Tablo 6. Epistemolojik İnançların Alt Boyutlarının Öz Düzenleme Becerilerinin Çabanın Düzenlenmesi Boyutu Üzerindeki Etkisinin İncelenmesi

Bağımlı değişken	Yordayıcı Değişken	R	R ²	F	Std. β	t	p
	Öğrenmenin Çabaya Bağlı Olduğuna İnanç				-0,14	-4,97*	0,000
Çabanın Düzenlenmesi	Öğrenmenin Yeteneğe Bağlı Olduğuna İnanç	0,38	0,15	72,87	-0,33	-10,34*	0,000
	Tek Bir Doğrunun Var Olduğuna İnanç				0,02	0,80	0,422

*p<0.05

Öğretmen adaylarının epistemolojik inançlarının alt boyutları (öğrenmenin çabaya bağlı olduğuna inanç, öğrenmenin yeteneğe bağlı olduğuna inanç, tek bir doğrunun var olduğuna inanç) öz düzenleme becerilerinin “zaman ve çalışmanın düzenlenmesi” boyutunu anlamlı düzeyde açıklamakta mıdır?

Tablo 7’de görüldüğü gibi; öz düzenlemenin alt boyutu olan zaman ve çalışmanın düzenlenmesini, epistemolojik inançların alt boyutu olan öğrenmenin yeteneğe bağlı olduğuna inanç anlamlı düzeyde etkilemektedir. Epistemolojik inançlaröz düzenleme becerisinin alt boyutu olan zaman ve çalışmanın düzenlenmesindeki değişkenliğin %4’ünü açıklamaktadır. Epistemolojik İnançların alt boyutları olan öğrenmenin çabaya bağlı olduğuna inanç ve tek bir doğrunun var olduğuna inanç öz düzenlemenin alt boyutu olan zaman ve çalışmanın düzenlenmesini kestirmede (tahminde) etkisi bulunmamıştır.

Tablo 7. Epistemolojik İnançların Alt Boyutlarının Öz Düzenleme Becerilerinin Zaman Ve Çalışmanın Düzenlenmesi Boyutu Üzerindeki Etkisinin İncelenmesi

Bağımlı değişken	Yordayıcı Değişken	R	R ²	F	Std. β	t	p
	Öğrenmenin Çabaya Bağlı Olduğuna İnanç				-0,02	-0,82	0,411
Zaman ve Çalışmanın düzenlenmesi	Öğrenmenin Yeteneğe Bağlı Olduğuna İnanç	0,19	0,04	15,53	-0,2	-5,79*	0,000
	Tek Bir Doğrunun Var Olduğuna İnanç				0,04	1,27	0,204

*p<0.05

TARTIŞMA, SONUÇ ve ÖNERİLER

Öğretmen adaylarının öz düzenleme becerileri ile duygusal zekâ düzeyleri arasındaki ilişki

Çalışmamızın araştırmaya katılan öğretmen adaylarının görüşlerin doğrultusunda yapılan analizlerin sonuçlarına göre, öğretmen adaylarının öz düzenleme becerileri ve duygusal zekâları arasında pozitif yönde zayıf düzeyde istatistiksel olarak anlamlı bir ilişki bulunmuştur. Öğretmen adaylarının duygusal zekâ alt boyutlarının (iyimserlik ve ruh halinin düzenlenmesi, duyguların değerlendirilmesi ve duyguların kullanımı) öz düzenleme becerileri alt boyutlarını (bilişsel düzenlemeler, çabanın düzenlenmesi ve zaman ve çalışmanın düzenlenmesi) anlamlı düzeyde açıklayıp açıklamadığının belirlenmesi amacıyla regresyon analizi yapılmıştır.

Araştırmanın bulgularına göre; duygusal zekâ öz düzenleme becerilerini anlamlı düzeyde açıklamakta olup, duygusal zekânın öz düzenleme becerilerini pozitif yönde etkilediği, aralarında anlamlı bir etki sağladığı görülmüştür.

Duygusal zekânın bir bileşeni olan öz yönetimini sağlayan bireyler, gerekeni yapmak için doğru yerde denetimleri eline alabilirler. Fırsatlar oluşturmaya çalışırlar ya da karşılıklarına çıkan fırsatları değerlendirirler. Meydana gelen olay ve sorunlara karşı iyimser olurlar. Sorunlara çözüm üretmeye çalışarak ileriye dönük ümitli tablo çizerler (Goleman, Boyatzis ve McKee, 2002). Araştırmamızda da duygusal zekânın öz düzenleme becerilerini pozitif yönde etkilemesi, öğretmen adaylarının eğitim sistemimizde ileriye dönük öz düzenleme becerisi yüksek ve daha kabiliyetli bireyler yetiştirmelerine olanak sağlamak için duygusal zekâlarının geliştirilmesi gerektiğinin bir tespittir.

Duygusal zekâ boyutlarının öz düzenleme becerisi boyutlarını ne düzeyde açıkladıklarını tespit etmek amacıyla yapılan analiz çalışmalarının bulgularına göre; Duygusal zekânın iyimserlik ve ruh halinin düzenlenmesi ve duyguların değerlendirilmesi alt boyutları ile öz düzenleme becerisinin bilişsel düzenlemeler alt boyutu arasında pozitif yönlü zayıf bir ilişki vardır. Öte yandan duygusal zekânın duyguların kullanımı alt boyutu ile öz düzenleme becerisinin bilişsel düzenlemeler alt boyutu arasında negatif yönlü zayıf bir ilişki vardır. Duygusal zekânın iyimserlik ve ruh halinin düzenlenmesi, duyguların değerlendirilmesi ve duyguların kullanımı alt boyutları ile öz düzenleme becerisinin çabanın düzenlenmesi alt boyutu arasında pozitif yönlü zayıf bir ilişki vardır.

Duygusal zekânın iyimserlik ve ruh halinin düzenlenmesi ve duyguların değerlendirilmesi alt boyutları ile öz düzenleme becerisinin zaman ve çalışmanın düzenlenmesi alt boyutu arasında pozitif yönlü zayıf bir ilişki vardır. Öte yandan duygusal zekânın duyguların kullanımı alt boyutu ile öz düzenleme becerisinin zaman ve çalışmanın düzenlenmesi alt boyutu arasında negatif yönlü zayıf bir ilişki vardır.

Öğretmen adaylarının öz düzenleme becerileri ile epistemolojik inançları arasındaki ilişki

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Epistemolojik inançların öğrenmenin çabaya bağlı olduğuna inanç ve öğrenmenin yeteneğe bağlı olduğuna inanç alt boyutları ile öz düzenleme becerisinin zaman ve çalışmanın düzenlenmesi alt boyutu arasında negatif yönlü çok zayıf bir ilişki vardır. Öte yandan epistemolojik inançların tek bir doğrunun var olduğuna inanç alt boyutu ile öz düzenleme becerisinin zaman ve çalışmanın düzenlenmesi alt boyutu arasında pozitif yönlü çok zayıf bir ilişki vardır.

Araştırma bulgularımızdaki epistemolojik inançlar ile öz düzenleme becerileri arasındaki negatif yöndeki ilişkinin aksine, Izgar ve Dilmaç (2008) tarafından yönetici öğretmen adaylarının epistemolojik inançları ile öz yeterlilik düzeyleri arasındaki ilişkinin incelendiği araştırmada; epistemolojik inançların her üç alt boyutu olan, çabaya bağlı olduğu inanç, yeteneğe bağlı olduğu inanç ve tek bir doğrunun olduğu inanç alt boyutlarının öz yeterlilik algılarıyla pozitif yönlü anlamlı bir ilişki olduğu tespit edilmiştir.

Epistemolojik inançlar, hedefin bilişsel ve duygusal şartlarının bir bileşenidir; hedefler üretilirken konulan standartları etkiler; metabilisin girdisi olarak hizmet eder. Dolayısıyla epistemolojik inançların geliştirilmesinde öz düzenlemeli öğrenme büyük rol oynamaktadır (Muis, 2007).

Sonuç olarak elde edilen bulgular doğrultusunda şu şekilde öneriler verilebilir:

1. Öğretmen adaylarının öz düzenleme becerilerini geliştirmek için eğitim fakültelerinde araştırma ödevleri ve projelere daha sık yer verilmeli, öğretmen adaylarına seminer, kurs, sempozyum gibi etkinlikler verilerek öz düzenleme becerilerinin geliştirilmesine yardımcı olunmalıdır.
2. Eğitim fakültelerinde öz düzenlemeye dayalı ve öğrenme sürecinde öğrencilerin aktif olabileceği öğrenme ortamları oluşturularak öğretmen adaylarının bu ortamlarda öz düzenleme becerilerinin nasıl geliştiği incelenebilir.
3. Eğitim fakültelerinde öğretmen adaylarına duygusal zekâ kavramının önemi anlatılarak kendi öğrencilerinin duygusal zekâ yeteneklerini geliştirebilmek için hangi etkinlikleri yapmaları gerektiği öğretilmelidir.
4. Eğitim ve öğretim ortamlarında önemli bir rol oynadığı bilinen epistemolojik inançlar kullanılarak öğrenme öğretme süreçleri daha etkili ve verimli hale getirilebilir.
- 5.

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OPTIMIZATION OF BRASS CONTENTS FOR BEST COMBINATION OF THERMAL CONDUCTIVITY AND TRIBOLOGICAL BEHAVIOR OF BRAKE LININGS COMPOSITES

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ABSTRACT: The organic friction materials for brake lining are known as complicated formulations composites in order to achieve the desired amalgam of performance properties. Their role is to decelerate and stop vehicles as securely and quickly as possible. Obviously, it requires that the composite exhibits best possible combination of thermal, mechanical and tribological properties as a friction material. In fact low thermal conductivity of composite renders the tribo-surface vulnerable due to the accumulation of frictional heat which leads to degradation of organic ingredients which in turn, affects adversely the braking capability. The optimum combination of various properties should be tailored with right contents of metallic fillers.

The aim of this paper is to study the role of brass fibers, towards friction and wear mechanisms. For this purpose, the experimental approach was based on the development of a simplified formulation called "model" material then the addition of different amount of brass fibers to explore its tribological behavior. Results show that the brake lining with higher weight percentage of brass fibers to exhibit best combination of performance parameters related to friction and wear. Scanning electron microscopy (SEM) is employed to identify and understand wear mechanisms.

Key words: friction material, brass fibers, thermal properties, tribological behavior

INTRODUCTION

The brake lining materials are usually made of organic matrix composites, in which the phenolic resin is mostly used as a binder due to their thermal resistance (Cho et al. 2008). These lining materials must present several physico-chemical, mechanical, and thermal properties, which together interact to correctly respond to mechanical stress-heat solicitations induced by braking. In fact, the complexity of the formulation complicates the understanding of the tribological behavior and the role of each component (Desplanques et al. 2007). Moreover, due to the complicated influence of ingredients on the tribological properties such as their contribution on the mechanisms of friction and wear, where energy dissipation take place (Baklouti et al. 2014), it is mainly necessary to focus on understanding the link between the development of friction materials and braking performances.

In addition, metallic fillers and their amount are important in friction materials since they control the thermal conductivity (TC) of composites and additional functions such as friction. A little is reported on the role of metallic contents in friction materials from friction and wear point of view (Kchaou et al. 2015). Bijwe et al. 2008 confirm that composite with 8% brass fibers (where TC was not highest) proved to exhibit best combination of performance parameters related to friction and wear. Kumar and al. report also that brass fibers not only improve thermo-physical properties but also play an important role to enhance the tribo-performance (Kumar et al. 2011). New researchers studied the fact that their size and shape control the performance of friction materials and confirmed that powdery fillers have a clear edge over fibrous (Kumar and Bijwe. 2013).

In the present work four friction composites were developed by varying the weight percentage of brass fibers (0%, 1.5%, 3% and 4.5%) and barite (inert filler) in a complementary manner keeping other ingredients unaltered. Since influence of thermal conductivity is best reflected in severe operating conditions, tribo-evaluation in wear test under moderated solicitations was selected. Scanning electron microscopy (SEM) and EDX studies were done to understand wear mechanisms.

MATERIALS AND METHODOLOGY

Brake linings formulations

As commercial formulations are very complex with a high number of components, a simplified formulation derived from an industrial brake lining formulation is developed to be used as a reference called “material M”. The simplified formulation contains 6 class of components classified according to their major function regarding their effects on material properties and on friction and wear performances. Their detailed weight percents are given in table 1. Derived from the model one, modified formulation is developed by adding brass fibers. The formulation, designated by M1, M2, and M3 contains respectively 1.5, 3 and 4.5 wt % of brass fibers. The major reason for using a fixed weight fraction instead of volume fraction in this study is that it was found difficult for choosing a fixed volume fraction in maintaining consistent fiber dispersion and packing behavior (due to their large differences in shape, dimensions and distribution) among different fibers as well as among different batches for the same fiber. On the other hand, using a known weight fraction seems straight forward and should lead to more reliable results.

Table 1. Brake linings formulations (wt%)

Classification	Component	M	M1	M2	M3
Binder	Phenolic resin	14	14	14	14
Filler	Barite	45	43.5	42	40.5
Fibers	Rockwool	22	22	22	22
	brass fiber	–	1.5	3	4.5
Lubricant	Graphite	10	10	10	10
Friction modifier	Rubber	7	7	7	7
Abrasive	Alumina	2	2	2	2

Morphological characterization

Microstructures of brake linings M, and M1, M2 and M3 are studied by Scanning Electron Microscopy (Fig.1). The material M consists of components of sizes ranging from micrometric to millimetric. Barite is a friable component having variable size of some micrometers. Rubber and graphite are large particles having a mean size of about 500 µm. Rockwool is composed of shots and fibers. Shots have spherical shape of an average diameter of 400µm. As can be seen from these micrographs, metallic fibers are much larger in diameter than non-metallic fibers. Brass fibers have an average length of 1.5 mm and a diameter of 200-400 µm (Fig. 1b). All components are incorporated within the phenolic resin (Fig.1a). Brake linings with additionnal brass fibers present similar microstructure to M with presence of brass fibres on the sliding surface (circled with interrupted line) (Fig.1b, c and d).

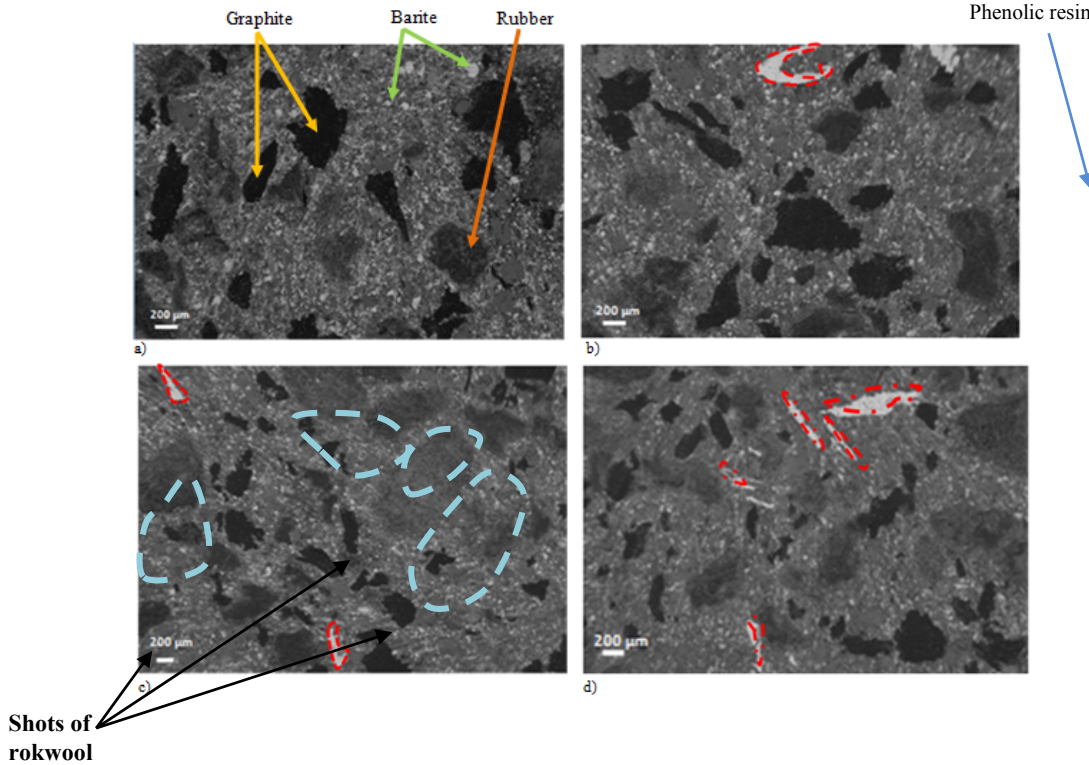


Figure 1. SEM observations of the four brake lining materials, a) M, b) M1, c) M2, d) M3 (brass fibers indicated by red arrows)

Thermo-physical properties

Brake linings were characterized in terms of physical and thermo-physical properties (density, conductivity, specific heat and diffusivity). As seen in Table 2 it was observed that density of composites increased with the addition of metallic contents. This was due to the increase of heavy metallic particles which replaced light weight barite powder. Porosity increased slowly with increase in metallic contents. The thermal conductivity increases from 1.04 W/mK to 1.52 W/mK. Its improvement after brass fiber addition is not due to the thermal conductivity of this component which is lower than barite but it can be related to the change of porosity or the surface roughness (Kim and Jang 2013). The specific heat increases from 673 J/kgK to 854 J/kgK. From these data, diffusivity is calculated: It is the highest for M3.

Table 2 Physical and thermo-physical properties of the brake lining formulations (the standard deviation and the number of tests are indicated in parentheses).

Properties	M	M1	M2	M3
Density (g/cm)	2.17	2.2	2.23	2.25
Thermal conductivity (W/m K)	673 (4,1/5)	793	824 (4,2/5)	854 (4,4/5)
Specific heat(J/kgK)	1.04 (0,01/5)	1.31	1.38 (0,06/5)	1.52 (0,002/5)
Thermal diffusivity(10^{-4} m ² /s)	71	75	76	79

Wear tests

The tribological performance of each material was evaluated by friction-wear tests carried out on a pin-on-disc tribometer (Fig. 2). Pin was cut from the brake pads. Each specimen was of size (diameter 14 mm) and a thickness of 16mm. The grey cast iron disc was used for the counter face. The disc had a radius of 0.8 m and a thickness of 0.15 m.

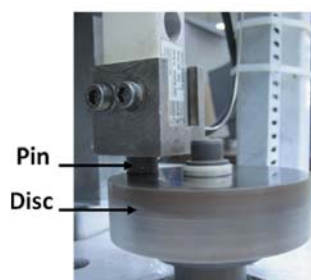


Figure 2. Pin-on-disc tribometer

All the tests were performed at room temperature (without external heating of the samples) in the atmosphere subject to a relative humidity between 50 and 60%. The friction force (and thus friction coefficient) was determined from the output of a strain gauge mounted on the arm carrying the pin. The temperature rises due to friction were measured using K-type thermocouple placed at a distance of 2 mm above the counter-face. The tribological test is defined in the range temperature of 200-250 °C, reached in service during stop braking and leading to a moderate thermal loading of the lining. Before the tribological test, a run-in period is performed, consisting of a succession of friction cycles at low temperature, with a sliding speed of 3 m/s and a pressure of 0.6 MPa until the pin surface was quasi 100% rubbed. At the end of the run-in period, the disc temperature is between 70°C and 100°C. After an air cooling period, tribological tests begin at temperature 200°C with a sliding speed of 6 m/s and a pressure of 1.2 MPa. This period is an “on-contact” period and is followed by an “off-contact” one during which the pin is unloaded and the disc rotation is stopped when temperature is about 250°C. During this “off-contact period”, the temperature of the disc decreases by air cooling. When a decrease of 50 °C is observed, a new on-off contact cycle starts.

The test is stopped after a friction distance equal to 15 km . Figure 3 presents the experimental protocol: during the initiation cycle the temperature rises from 50°C to 200°C, followed by cycles of friction during which the disc-mass temperature is maintained in the range 200-250°C.

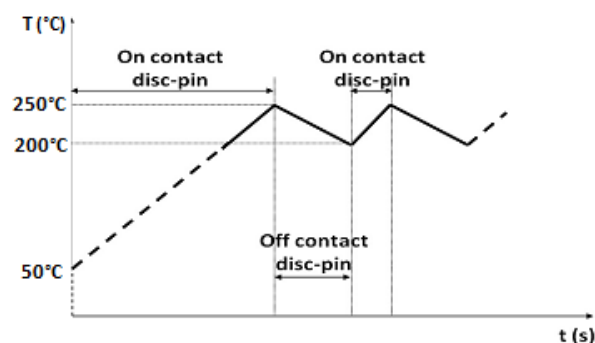


Figure 3. Experimental protocol

RESULTS AND DISCUSSION

Effect of brass on friction characteristic

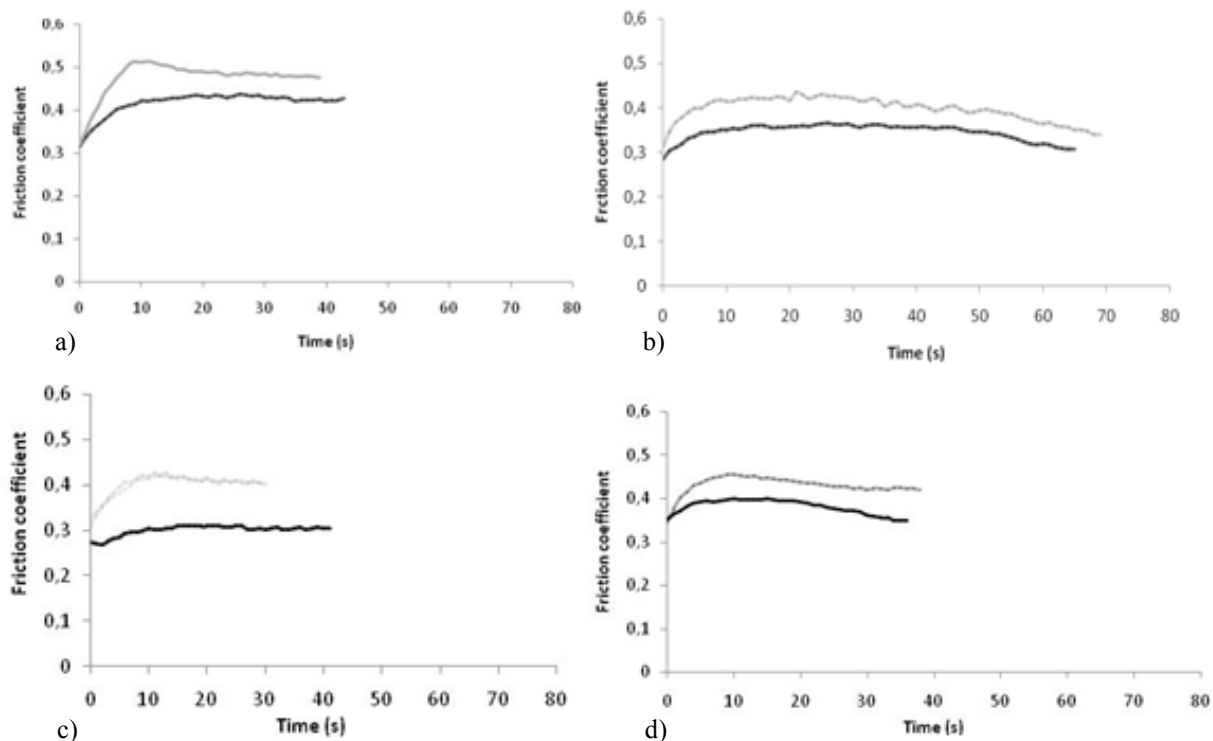


Figure 4. Min and max friction coefficient evolutions: a) M, b) M1, c) M2 and d) M3.

Fig. 4 shows the μ_{min} and the μ_{max} of each composite. Composites M and M3 recorded highest value of μ_{max} , while composites M3 measured low value while the composites M2 measured lowest value. It seems that all these composites showed μ in this range (0.4) except the composite M1 (with 1.5% metal contents). Moreover, we noted that the time necessary for the disc temperature rising to attempt (250°C) are equal for all composites except (M1). It was interesting to note that addition content of metallic fillers less than (4.5 wt%) did not affect efficiency the friction performance of the brake lining material.

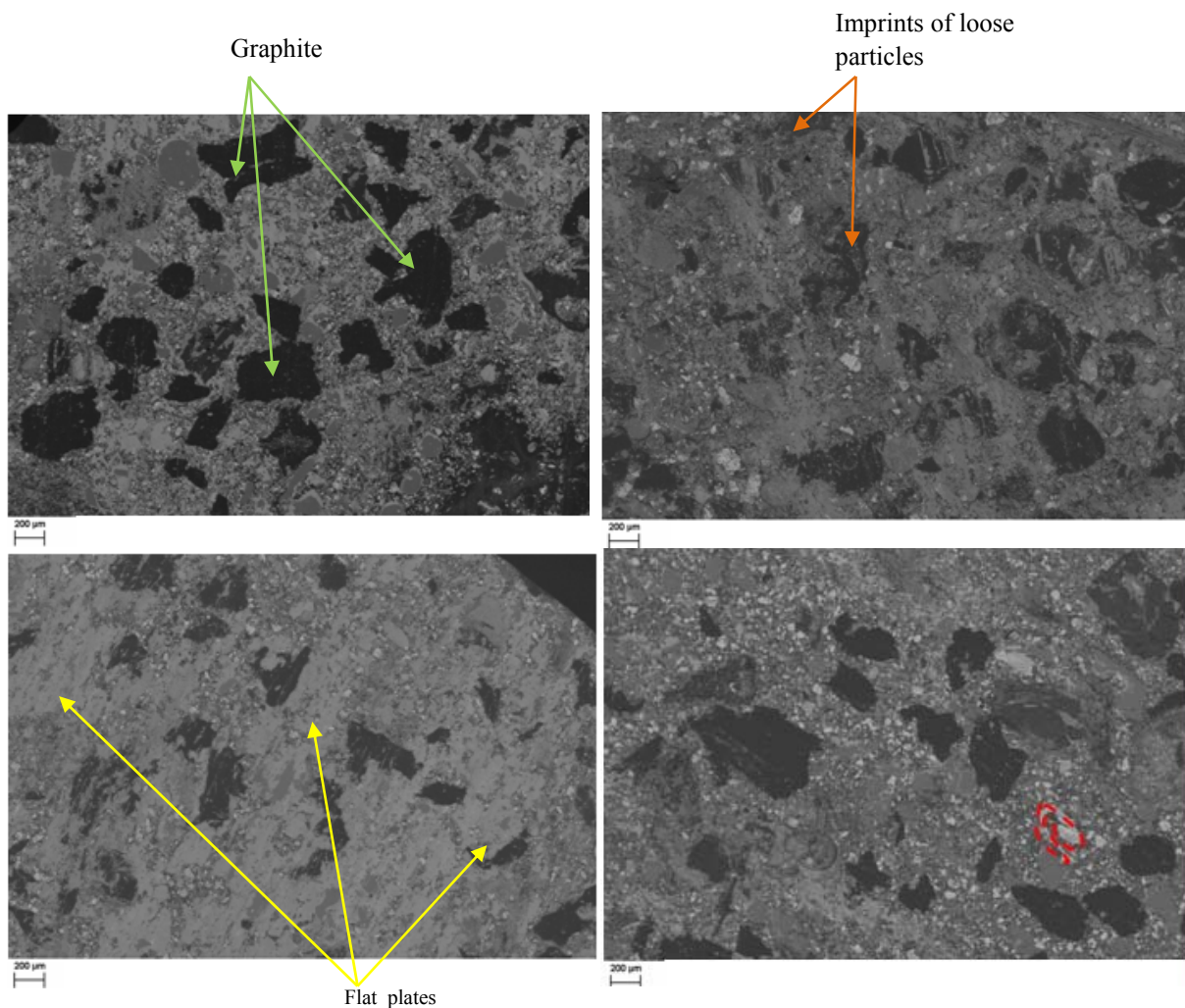


Figure 5. SEM observation of the rubbed surfaces of all composites

Fig. 5 presents the SEM observations made on rubbed surfaces. It reveals various characteristics. The accumulation of third-body powders upstream of the components. The powders were compacted and sheared in the contact, forming flat plates. The accumulation and mechanisms involved in the formation and expansion of the flat plates. In addition to the coalescence of neighbouring plates, the size of the latter increases to several millimeters. These points are in good agreement with results obtained by the authors Y. Desplanques et al. (2006)

The majority of particles rich in carbon which appear on dark grey remain totally or partially uncovered (Fig 5.a). However, they show traces of sliding (Figure 5c). Thus, they contribute to friction but the third body does not adhere to it. These large particles do not form preferential supports of secondary plate development.

Fig. 5c. Shows numerous powder layers that mostly cover the surface. In fact, the rockwool shot and fibers are visible, flattened and maintained to the matrix. They contribute to the formation of the bearing surface by forming the primary support surrounded by compacted powders which constitute secondary plates.

We note that despite the introduction of brass fibers in the composition of M1 and M2, their rubbed surface doesn't show the presence of brass fibers. In fact, caused by their millimetric size, and their few amount in M1 and M2, brass fibers are delaminated and didn't contribute to wear mechanisms. On the other hand, the distinction of brass fibers in the rubbing surface of M3 (Fig 5.d) shows that at this amount (4.5wt %), brass fibers constitute primary plateaus for the expansion of the third body.

CONCLUSION

Based on the present experimental studies conducted in a perspective of better understanding on the role of brass fibers at low amount (1.5, 3 and 4.5 wt%), on friction and wear mechanisms, following conclusions are drawn:

- Inclusion of metallic ingredients in the brake lining affected efficiency the performance properties in a beneficial way. Density, thermal conductivity and thermal diffusivity increased with brass contents.
- The evolutions of μ_{\min} and μ_{\max} showed similar trends up to 3% of brass fibers more regularly rather than 4.5%.
- Increase in brass contents up to 4.5% wt has no significant influence on the tribological properties of the brake lining material because of larger size of metallic ingredients as compared to others components.
- High temperature at the surface of the composite mainly deteriorates the bonding between ingredients and hence leads to easy removal of brass in the form of wear debris even when its size is millimetric and its amount is less than 4.5wt%.

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SMART CITY: DEFINITIONS, COMPONENTS, AND APPLICATION

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ABSTRACT: In many countries, smart cities in the debate on the future of urban transformation project is included in the discussion. Smart cities label the last decades of small or big cities has spread to affect the urban strategy. To create better living conditions in our daily lives, protect the environment, has been adopted by government agencies and citizens to reduce other problems of increasing ensure safety and urban life. Projects for developing technologies for smart cities benefiting from the planning and management of the city began to be developed and implemented. The largest contribution to this development has made cloud technology and sensor network architecture consisting of. Smart cities definitions in this study are mentioned components and applications. An analysis is made for the needs of future smart cities.

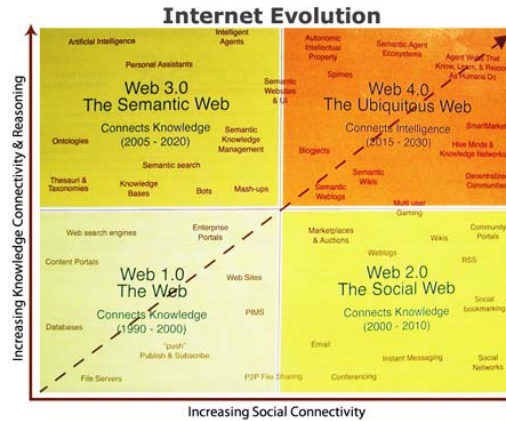
Key words: smart city, project, developing technologies

AKILLI ŞEHİRLER: TANIM, BİLEŞENLER VE UYGULAMALAR

ÖZET: Pek çok ülkede, kentsel dönüşüm projelerin geleceği hakkındaki tartışmalara akıllı şehirler tartışması da eklenmiştir. Son 10 yıldır akıllı şehir etiketi küçük ya da büyük şehirlerin kentsel stratejilerini etkileyecek şekilde yaygınlaşmıştır. Günlük hayatımızda daha iyi yaşam koşulları oluşturmak, çevreyi korumak, güvenliği sağlamak ve kent yaşamının giderek artan diğer problemlerini azaltmak için devlet kuruluşları ve vatandaşlar tarafından benimsenmiştir. Kentlerin planlanması ve yönetimi için gelişen teknolojiye yararlanılarak akıllı şehirler için projeler geliştirilmiş ve uygulanmaya başlanmıştır. Bu gelişime en büyük katkıyı bulut teknolojisi ve sensör ağların oluşturduğu mimari yapmıştır. Bu çalışmada akıllı şehir tanımları, bileşenleri ve uygulamalarından bahsedilmiştir. Gelecekteki akıllı şehirlerin ihtiyaçlarına yönelik bir analiz yapılmıştır.

GİRİŞ

Son 10 yılda akıllı şehir kavramı bilimsel çalışmalarda oldukça popüler bir konu haline gelmiştir. Bu kavram yakın gelecekte mevcut şehirlerin ve kurulacak şehirlerin (Kanal İstanbul Projesi) sosyal, kültürel ve ekonomik açıdan önemli bir etkisi olacaktır. Şehir hayatının zorluklarını yönetmek için yeni çarelerin bulunması gerekmektedir [1]. Teknolojinin hızlı gelişimi ile üretilen akıllı telefonların, evde kullanılan cihazların (klima, çamaşır, bulaşık makinası, fırın vb.), farklı amaçlar için üretilmiş sensörlerin internete bağlanması ile çok farklı uygulamalar geliştirilmeye başlanmıştır. Bu çok farklı uygulamalar internetin evrimine bağlıdır [2]. Şekil 1 internetin evrimini göstermektedir.



Şekil 1 İnternet evrimi (Kaynak: Nova Spivak Radar Networks; John Breslin, Deri; and Mills Davis, Project10x)

İnternet geçmişteki 30 yıl içinde pek çok aşamadan geçmiştir. Başlangıçta sadece son kullanıcılara bilgi vermek için kurulmuştur. Bilginin zenginleşmesi ve internet kullanıcı sayısının hızla artması kullanıcıları sadece bilgiye erişen tüketiciler olmaktan çıkarmıştır. Facebook, myspace gibi sosyal ağlar, ebay, amazon gibi internet alışveriş siteleri ve skype gibi sesli iletişim servisleri sayesinde kullanıcılar tüketiciden daha çok üretici duruma geçmişlerdir [3]. İnternet ve akıllı cihazlar için geliştirilen uygulamalar ev ortamında ya da dış dünyadaki hayatı oldukça kolaylaştırmaktadır. Uygulamaların gerekli verilerine kullanıcı her nerede olursa olsun ve istediği herhangi bir zamanda kolay ve hızlı erişebilmelidir. Geniş bir veri tabanına hızlı ve kolay erişebilmek için imdadımıza bulut teknolojileri yetişmektedir. Bulut teknolojisi internete bağlanma kabiliyetine sahip tüm cihazlar arasında ortak bilgi paylaşımını sağlayan bir hizmettir. Ortak bir veri tabanından bilgilerin paylaşımı sağlanarak internet marifetiyle bu bilgilere erişimin sağlanmasıdır. Bulut ifadesi veri tabanı kaynağının bulunduğu konuma işaret etmektedir. Bu konumu paylaşılabilir bir havuza benzetebiliriz. Bu havuza her türlü bilgi atılabilir ve ortak kullanıma sunulabilir. Bu paylaşılan havuza farklı amaçlar için üretilen sensörlerin algıladıkları verilerin yerleştirilmesi sorunların çözülmesi için kullanılabilir. Çevrenin algılanması ve bu algılanan verilerin bulut teknolojisi ile erişime açılması ile oluşturulan yapı ile akıllı şehirler inşa edilebilir. Bilişim teknolojileri alanında araştırma ve danışmanlık yapan Gartner firmasının hazırladığı bir rapora göre 2020 yılına kadar 30 milyar cihazın internete bağlanacağı tahmin edilmektedir. Bu tahmin kurumlar ve yönetimlere farklı stratejiler geliştirmelerini zorunlu hale getirmiştir [4]. Ayrıca farklı perspektiflerden farklı isimler altında örneğin “Şeylerin İnterneti-Internet of Things” (5), “Gelecekte İnternet-Future Internet” (6) ve “Akıllı Şehirler-Smart City” (7) gibi çalışmalar yapılmasına neden olmuştur. Bu çalışmada Akıllı Şehirlerin tanımları, bileşenleri ve uygulamalarından bahsedilecektir.

AKILLI ŞEHİRLER

6 Kasım 2008 de IBM CEO’su Samuel Palmisano’nun New York’ta Dış İlişkiler Konseyinde “Gelecek Neslin Liderlerinin Ajandası: Akıllı Gezegen” isimli yaptığı konuşma ile gündeme gelmiştir [8]. IBM firmasının akıllı şehir yapısı; Planlama ve Yönetim Hizmetleri, Altyapı Hizmetleri ve Halk Hizmetleri olarak 3 kategoriye ayırmıştır. Şekil 2 IBM akıllı şehir hizmetlerini göstermektedir.



Şekil 2. IBM Akıllı Şehir Hizmetleri

Planlama ve Yönetim Hizmetleri; devlet ve hükümet danışmanlığı, şehir planlama ve operasyonları, halk güvenliği ve binalardan oluşmuştur. Altyapı Hizmetleri ise; enerji, su ve ulaşımdan oluşurken, halk hizmetleri ise sosyal programlar, daha akıllı tedaviler ve eğitimden oluşmaktadır. Her bir başlık için farklı çözümler üretmişlerdir.

Bu konuşmadan yola çıkarak akıllı şehir’ i tanımlayacak olursak: “Akıllı Gezegen“ yaklaşımının belirli bir bölgeye uygulanması ile şehirlerin bilgi ve birleştirilmiş yönetim sağlanmasıdır [9]. Başka tanımlar da vardır.

Bunlardan biri “Altyapı, yollar, köprüler, tüneller, raylar, metrolar, havaalanları, limanlar, iletişim, su, elektrik, hatta büyük binalar dâhil olmak üzere tüm kritik koşulları barındıran ve izleyen, kaynaklarını optimize edebilen, koruyucu bakım faaliyetlerini planlayabilen, vatandaşlarına maksimum hizmet ederken güvenliklerini izleyen bir şehir” [10] tanımlamasıdır. Bir diğer tanımlama da ” Şehir idaresi yönetimi, eğitim, sağlık hizmetleri, kamu güvenliği, gayrimenkul, ulaşım gibi şehrin kritik altyapı hizmetlerini yapmak için Akıllı Bilgisayar Teknolojilerini (daha akıllı, birbirine bağlı ve verimli) kullanan şehir” [11] şeklindedir. Bu tanımlardan yola çıkarak amaç, bilgisayar teknolojilerini kullanarak insanların refah seviyesini yükselterek, kaynakları verimli şekilde kullanarak sürdürülebilir gelişmeyi sağlamaktır. Sürdürülebilir gelişme bugünün ihtiyaçlarını karşılarken, geleceğin kaynaklarını tehlikeye atmamalıdır [12]. Gerçek akıllı şehir, modern bir kentin sosyal, teknolojik, ekonomik ve örgütsel değişiklikleri ile ilgili tüm yenilikçi özelliklerini beraber götüren sürdürülebilir akıllı şehirdir.

Akıllı şehirler, çevre üzerindeki olumsuz etkileri en aza indiren ve enerji kaynaklarının verimli kullanılmasına izin veren yönetim sistemleri ve yeni teknolojiler kullanılarak inşa edilmiş yapılardır [13]. Akıllı şehir, sadece bugünün insanların yaşamını kolaylaştırılmaz. Kaynakların verimli kullanılmasını sağlayarak geleceğin insanların hayatlarına da yatırım yapar. Akıllı şehirler için teknolojinin kullanılması ile elde edilen bazı faydaları şu şekilde sıralayabiliriz [14]:

- ✓ Özellikle enerji ve su gibi kaynakların tüketimini azaltma, böylece CO2 emisyonunun azaltılmasına katkıda bulunma [15].
- ✓ Var olan altyapı kapasitesi kullanımının iyileştirilmesi, dolayısıyla yaşam kalitesini iyileştirmesi ve geleneksel inşaat proje ihtiyaçlarının azaltılması [16].
- ✓ Vatandaşlara ve sürekli yolculuk yapanlara kullanışlı yeni servisler yapmak, örneğin gerçek zamanlı çoklu ulaşım yöntemlerinden nasıl yararlanacaklarına yönelik rehberlik etme gibi.
- ✓ Gerçek zamanlı verilerin yayınlanması ile şehir hizmet işlemlerinde ticari girişimlerin iyileştirilmesi [17].
- ✓ Şehir yöneticilerinin, şehir ölçeğinde enerji, su ve ulaşım taleplerini görünür yapılımasını kolaylaştırması [18].

AKILLI ŞEHİR BİLEŞENLERİ

Uluslararası Standartlar Organizesi - ISO 37120:2014 şehir hizmetleri ve yaşam kalitesi performansını ölçmek için bir dizi standartları şart koşmuştur. Bu şartlara akıllı çözümler üretilmesi, akıllı uygulamalar geliştirilmesi ve her şehirde bu çözüm ve uygulamaların kullanılabilmesi akıllı şehirlerin sayısını artıracaktır. Bazı performans başlıkları; ekonomi, eğitim, enerji, çevre, mali durum (finans), yangın ve acil müdahale, yönetim, sağlık, sosyal alanlar yaratma, güvenlik, korunma, katı atıklar, iletişim ve yenileşim, ulaşım, şehir planlama şeklindedir. Bu başlıklardan bazıları için bulut teknoloji ve sensör ağ mimarisi ile şehir yaşam kalitesi artırılabilir. Akıllı şehir bileşenleri olarak; akıllı ekonomi, akıllı toplum, akıllı yönetim, akıllı çevre, akıllı yaşam, akıllı ulaşım söylenebilir. Şekil 3 akıllı şehir bileşenlerini göstermektedir.



Şekil 3. Akıllı Şehir Bileşenleri

Akıllı Ekonomi

Ekonomi, üretim, ticaret, dağıtım ve tüketim, ithalat ve ihracattan oluşan insan aktivitesidir. Akıllı ekonomi bu aktivitelerin yeni teknolojik gelişmelerle birleştirilmesidir.

Akıllı ekonomi, ekonomide yüksek verim alıp, sürdürülebilir bir ekonomiye sahip olmaktır. İnsanların düşünceleri, üretmeleri ve yeni fikirler ortaya koymaları için imkânlarla ve daha fazla ekonomik haklara sahip olmalarını sağlar. Rekabet ortamının oluşmasına neden olur.

Akıllı ekonomi, küresel rekabet ortamında yerel işletmeleri desteklerken, işletmeler arasında rekabeti artırır. Girişimciliği ve yenilikçiliği destekler. Üretken, verimli, rekabetçi işletmelerin bulunduğu bir ortam sağlar. Başarıya ulaşmak için işbirliğini destekler [19].

Akıllı Toplum

Akıllı toplum, akıllı şehrin temelidir. Akıllı toplum kendi kararını verebilen, bağımsız, açık fikirli, kamusal yaşama katılan, yaratıcı ve yenilikçi insanlardan oluşur. Akıllı toplum bilgiye ve teknolojiye kolay ve güvenli bir şekilde erişebilmelidir.

Akıllı toplumda yerel yönetimler, iş dünyası, kamu kurumları ve vatandaşlar bilgi alışverişi ve birlik içerisinde çalışırlar. Bu ittifak sayesinde teknolojinin de yardımıyla toplum faydasına projeler artar, bireylerin çalışma koşulları iyileşir, refah seviyeleri yükselir, üretkenlik artar.

Akıllı Yönetim

Akıllı yönetim, akıllı şehirlerde insanlara daha iyi hizmet sunabilmek, insanların hayat kalitesini artırmak için yönetim faaliyetleriyle teknolojiyi birleştirmektir.

Akıllı yönetimde vatandaşların yönetime katılımı ve katılımcı yönetim anlayışı teşvik edilir. Böylece daha demokratik, insanların daha değerli olduğu bir toplum oluşur. Şeffaf ve açık yönetim anlayışı benimsenerek zamanında, anlaşılır, nitelikli, güvenilir bilgiye ulaşılması sağlanır. Yollar, köprüler, yeraltı sistemleri gibi altyapı bakımı, güvenli içme suyu ve atık yönetimi gibi kamusal ve sosyal hizmetleri, vatandaşların istediği yer ve zamanda teknolojiye ulaşmasına imkân sağlar.

Akıllı Çevre

Akıllı çevre gerçek dünyanın bilgisayar elemanlarıyla donatılmasıdır. İnsan faaliyetlerinin algılanması, çevrede yaşanan olayların algılanması ve izlenmesi, ekosistemde meydana gelen her türlü olayın sensörler, gömülü sistemler, cihazlar gibi teknolojilerle takip edilmesi, ekolojik denge ve çevreyi bozmadan sürdürülebilirlik ilkesine bağlı kalarak doğal kaynakları yönetmek ve bu doğrultuda toplum yararına uygulamalar geliştirmektir

Akıllı Yaşam

Akıllı yaşam teknolojik dünya ile yaşanan dünyanın uyumudur. Sağladığı sosyal ve kültürel imkanlar (e-hastane, e-kütüphane..), sağlık, eğitim hizmetleri, sosyal hizmetler, güvenlik, konut hizmetleri (akıllı evler), sosyal hayata adapte olma gibi yaşamın olduğu bütün alanlarda insanlara kolaylık sağlar.

Akıllı Ulaşım

Şehirlerde yaşayan insan sayısının ve dolayısıyla araç sayısının ve ulaşım çeşitliliğinin (otobüs, yer altı ulaşımı vs.) artmasıyla en çok problemler ulaşım alanında ortaya çıkmaktadır. Akıllı ulaşım ortaya çıkan bu problemleri donanım, yazılım ve ağ teknolojilerini kullanarak en aza indirmeyi amaçlamaktadır. Bunu yaparken sürdürülebilirlik, ekolojik çevreyi koruma ve güvenlik göz önünde bulundurulmaktadır. Sinyalizasyon sistemleri, elektronik denetleme sistemleri, yaya koruma sistemleri, park yönlendirme sistemleri akıllı ulaşım örneklerindedir.

AKILLI ŞEHİR UYGULAMALARI

Akıllı şehirler, şehirlerin gelişiminde yakın zamanda bir trend oluşturacaktır. Akıllı şehirler için ciddi bir alt yapıya ihtiyaç olmakla beraber geliştirilecek uygulama alanları ve uygulamalar daha altyapının oluşturulmasına temel teşkil edecektir. Aşağıda bazı uygulama alanları ve bu alanlar için çeşitli uygulamalardan bahsedilmiştir.

Ulaşım

- ✓ Kavşak, yol, park düzenlemeleri
- ✓ Kamera ve sensörlerle trafik ve çevre kontrolü
- ✓ Yol, trafik ve çevre durumu hakkında takip sistemleri ve mobil uygulamalar
- ✓ Park yeri uygulamaları
- ✓ Yolcu bilgi sistemleri

Şebeke

- ✓ Akıllı sayaç
- ✓ Uzaktan sayaç okuma
- ✓ Anlık takip sistemleri ile kaynakların verimli kullanılması

Endüstri

- ✓ Stok takibi
- ✓ Endüstriyel alanının sensör sistemleri ile uzaktan durum takibi
- ✓ Filo takibi.

Sağlık

- ✓ Ambulans yönlendirme sistemleri
- ✓ Hasta takibi
- ✓ Hasta bakım hizmetleri

Güvenlik

- ✓ Yüz tanıma programları
- ✓ Şehrin kameralarla izlenmesi
- ✓ Acil durumlarda uyarı sistemleri
- ✓ Afetlerin etkin yönetimi
- ✓ Suç durumunda acil müdahale

Literatür [20] de SmartSantander projesi ile yapılan bazı uygulamalarda şu şekildedir: :

- ✓ İşgal, haritalama, engelliler için yerleri sınırlı park alanlarının kontrolü, trafik yönetim hizmetleri: acil durum araçları için koridorlar oluşturulması (yol açılması), şehrin farklı bölgelerinde kirlilik izlemeye dayalı araçlar için alternatif güzergâhlar öneren eko yollar.
- ✓ Aileleri ya da hekimleri tarafından sürekli izlenmesi gereken kalp hastaları ya da özellikle ruhsal bozuklukları olan engelli insanların izlenmesi ve takibi.
- ✓ Uyarı hizmetleri: e-sağlık, çevre izlemesi trafik kontrol ve haberleşme hizmetleri, farklı kritik durumlarda vatandaşları uyarma.
- ✓ Farklı dillerde görsel ve interaktif deneyimler kullanarak mobil cihazlar aracılığıyla şehrin farklı

- ✓ yerlerinde turizm bilgilendirilmesi.
- ✓ Hava alanları, oteller, tren istasyonları, konserler, stadyumlar gibi halka açık yerlerde, plajlar, trafik alanlarında spesifik olaylar için video izleme.
- ✓ Binalar ve evlerde elektrik enerjisi, su ve gaz tüketimi ve çevresel etkilerinin vatandaşa gerçek zamanlı olarak bildirilmesi.

Akıllı şehirlerde şehir sakinlerinin katılımı ve uygulamalar hakkındaki istekleri, temel olan bu uygulamaların geliştirilebilirliği, sürekliliği ve yeni uygulamaların ortaya çıkması açısından oldukça önemlidir. Bu nedenle bilgi iletişim ağının çok iyi kurulması gerekmektedir.

SONUÇ VE ÖNERİLER

21. yüzyılın sonuna gelindiğinde şehirlerdeki nüfus göçlerin de etkisiyle oldukça artmış olacaktır. Şehir kapasiteleri ise yetersiz hale geleceğinden yapılaşma ve gelişmede durağanlaşacaktır. Şehir hayatını daha yaşanır bir hale getirmek akıllı şehirler sayesinde olacaktır. Akıllı şehirler, değişen hayat şartlarına bağlı olarak zamanın, kaynakların ve kentin verimli kullanılmasıdır. Kaynakların gelecek nesillere aktarılması, sürdürülebilirlik, şehrin daha yaşanabilir olması için akıllı şehir çalışmaları teşvik edilmeli, bu yönde çalışmalar yapan araştırmacılar desteklenmelidir. Özellikle gelişmekte olan ülkelerin inşaat hızı göz önüne alındığında, akıllı şehir kavramı referans alınarak daha teknik/teknolojik yöntemlerle daha kaliteli yaşam koşulları hedefine ulaşmak mümkündür. Akıllı şehirler sadece bilgi teknolojileri sektörünü ilgilendiren bir konu değildir. Aynı zamanda şehirlerin mimarileri, planları, mühendislik, inşaat, işletme ve yönetimlerinde görev alacak birçok uzman arasında işbirliğini gerektirmektedir. Çünkü akıllı şehirler hedefini gerçekleştirmek işbirlikçi çalışmayı gerektiren bir organizasyondur. Şu anda, Türkiye bilgi teknolojisi ve sensör teknolojisi, ağ teknolojisi, fiziksel ağ teknolojisi ve akıllı bilgi işleme teknolojisi de dahil olmak üzere yeterli alt yapıya ve yaklaşık 170 üniversitesi ile yeterli araştırmacıya, TÜBİTAK, Gebze Yüksek Teknoloji Enstitüsü gibi bilimsel araştırma merkezlerine ve yeterli sayıda bilgi teknolojileri alanında girişimci sektöre sahip bulunmaktadır. Kısaca yeterli Ar-Ge altyapısı ve sanayi kapasitesine sahiptir. Yapılması gereken tek şey ekonomik ve sosyal kalkınma için bu yeterli teknik ve personel altyapı ve malzemeleri birleştirerek ülkemizin şehirlerini akıllı hale getirmektir. Böylece ülkemiz insanların günlük yaşamı önemli ölçüde değişmiş olacaktır. Sadece akıllı şehirlere sahip bir ülke değil, akıllı şehirler kuran bir ülke olabiliriz.

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