



**THE
TURKISH ONLINE
JOURNAL
OF
EDUCATIONAL
TECHNOLOGY**

APRIL 2009

Volume 8 - Issue 2

Prof. Dr. Aytekin İşman
Editor-in-Chief

Prof. Dr. Jerry Willis
Editor

Fahme Dabaj
Associate Editor

ISSN: 1303 - 6521

Message from the Editor-in-Chief

Dear Readers,

TOJET welcomes you. This journal is the world's leading periodical publication covering the entire field of educational technology. There are many readers from more than eighty five countries from all over the world. TOJET is a leader at the new trend in the development of educational technology for the past eight years. That is why TOJET is indexed in Social Science Citation Index now.

Although technology use grows very fast in education, some teachers still prefer the old ways. Sometimes school districts don't support teachers to use technology in education. To help diffuse of technology in education, educational technologists should search the reasons of the teachers and school districts of resistance to technology adoption. The teacher and school district must take the first step of understanding why they don't want to use technology. Then, they should explain some solutions to solve the adoption of technology.

TOJET is interested in academic articles on the adoption and abandonment of educational technology in education. The articles should be touched on why teachers and school districts resist technology and give some solutions for the diffusion of educational technology. These articles will aid teachers and school districts to diffuse technology in education.

The reviewers of this issue were Ali Şimşek, Arif Altun, Aytekin İşman, Betül Özkan, Eralp Altun, Collen Sexton, Colin Latchem, Erkan Tekinarslan, Ferhan Odabaşı, Hakan Aydın, Hasan Çalışkan, İsmail İpek, Mübin Kıyıcı, Ozcan, Erkan Akgün, Petek Aşkar, Teresa Franklin, Uğur Demiray & Yavuz Akpınar. TOJET thanks the editorial board of this issue for their valuable contributions.

Prof. Dr. Aytekin İŞMAN
Sakarya University

President

Prof. Dr. Mehmet DURMAN (Sakarya University, Turkey)

Editors

Prof. Dr. Aytekin İŞMAN (Sakarya University, Turkey)

Prof. Dr. Jerry WILLIS (Manhattanville College, USA)

Associate Editor

Senior Instructor Fahme DABAJ (Eastern Mediterranean University, TRNC)

Editorial Board

Prof. Dr. Aytekin İŞMAN (Sakarya University, Turkey)

Prof. Dr. Brent G. WILSON (University of Colorado at Denver, USA)

Prof. Dr. Enver Tahir RIZA (Ege University, Turkey)

Prof. Dr. Petek AŞKAR (Hacettepe University, Turkey)

Prof. Dr. Ülkü KÖYMEN (Çukurova University, Turkey)

Prof. Dr. Ali Ekrem ÖZKUL (Anadolu University, Turkey)

Prof. Dr. Jerry WILLIS (Manhattanville College, USA)

Prof. Dr. Asaf VAROL (Fırat University, Turkey)

Prof. Dr. Murat BARKAN (Eastern Mediterranean University, TRNC)

Prof. Dr. Ali ŞİMŞEK (Anadolu University, Turkey)

Prof. Dr. Uğur DEMİRAY (Anadolu University, Turkey)

Prof. Dr. Marina Stock MCISAAC (Arizona State University, USA)

Prof. Dr. Charlotte N. (Lani) GUNAWARDENA (University of New Mexico, USA)

Prof. Dr. Francine Shuchat SHAW (New York University, USA)

Prof. Dr. Don M. FLOURNOY (Ohio University, USA)

Prof. Dr. Akif ERGIN (Başkent University, Turkey)

Prof. Dr. Arvind SINGHAL (University of Texas, USA)

Prof. Dr. Mehmet GÜROL (Fırat University, Turkey)

Prof. Dr. Buket AKKOYUNLU (Hacettepe University, Turkey)

Prof. Dr. Colleen SEXTON (Governor State University, USA)

Prof. Dr. Ferhan ODABAŞI (Anadolu University, Turkey)

Prof. Dr. Hafize KESER (Ankara University, Turkey)

Prof. Dr. Stefan AUFENANGER (University of Mainz, Germany)

Prof. Dr. Antoinette J. MUNTJEWERFF (University of Amsterdam)

Prof. Dr. Ali Rıza AKADENİZ (Karadeniz Teknik University, Turkey)

Prof. Dr. Ali Paşa AYAS (Karadeniz Teknik University, Turkey)

Prof. Dr. Adnan BAKİ (Karadeniz Teknik University, Turkey)

Prof. Dr. Salih ÇEPNİ (Karadeniz Teknik University, Turkey)

Prof. Dr. Servet BAYRAM (Marmara University, Turkey)

Prof. Dr. Hasan AMCA (Eastern Mediterranean University, TRNC)

Prof. Dr. Ing. Giovanni ADORNI (University of Genova, Italy)

Prof. Dr. Gianni Viardo VERCELLI (University of Genova, Italy)

Prof. Dr. Heli RUOKAMO (University of Lapland, Finland)

Prof. Dr. Halil İbrahim YALIN (Gazi University, Turkey)

Prof. Dr. Rauf YILDIZ (Yıldız Teknik University, Turkey)

Prof. Dr. Colin LATCHER (Open Learning Consultant, Australia)

Associate Prof. Dr. Eralp ALTUN (Dokuz Eylül University, Turkey)

Associate Prof. Dr. Larysa M. MYTSYK (Gogol State University, Ukraine)

Associate Prof. Dr. Rozhan Hj. Mohammed IDRUS (Universiti Sains Malaysia, Malaysia)

Associate Prof. Dr. Mustafa Şahin DÜNDAR (Sakarya University, Turkey)

Associate Prof. Dr. Yavuz AKPINAR (Boğaziçi University, Turkey)

Associate Prof. Dr. C. Hakan AYDIN (Anadolu University, Turkey)

Associate Prof. Dr. Ahmet Zeki SAKA (Sakarya University, Turkey)

Associate Prof. Dr. Arif ALTUN (Nigde University, Turkey)

Associate Prof. Dr. Mehmet ÇAĞLAR (Near East University, TRNC)

Associate Prof. Dr. Hüseyin UZUNBOYLU (Near East University, TRNC)

Associate Prof. Dr. Hasan Hüseyin ÖNDER (Eastern Mediterranean University, TRNC)

Associate Prof. Dr. Teresa FRANKLIN (Ohio University, USA)

Assistant Prof. Dr. Mustafa Murat INCEOGLU (Ege University, Turkey)

Assistant Prof. Dr. Pamela EWELL (Central College of IOWA, USA)
Assistant Prof. Dr. Aaron L. DAVENPORT (Grand View College, USA)
Assistant Prof. Dr. Paula FITZGIBBON (University of Victoria, Canada)
Assistant Prof. Dr. Betül ÖZKAN (University of Arizona, USA)
Assistant Prof. Dr. Hamit CANER (Eastern Mediterranean University, TRNC)
Assistant Prof. Dr. Dale HAVILL (Dhofar University, Sultanate of Oman)
Assistant Prof. Dr. Hüseyin YARATAN (Eastern Mediterranean University, TRNC)
Assistant Prof. Dr. Erkan TEKİNARSLAN (Bolu Abant İzzet Baysal University, Turkey)
Assistant Prof. Dr. Murat ATAİZİ (Anadolu University, Turkey)
Assistant Prof. Dr. Hasan ÇALIŞKAN (Anadolu University, Turkey)
Assistant Prof. Dr. Muhammet DEMİRBİLEK (Süleyman Demirel University, Turkey)
Assistant Prof. Dr. Selma KOÇ Vonderwell (Cleveland State University, Cleveland)
Dr. İsmail İPEK (Bilkent University, Turkey)
Dr. Manoj Kumar SAXENA (Advance Institute of Management - India)
Fahme DABAJ (Eastern Mediterranean University, TRNC)
John FITZGIBBON (Ministry of Education, Jordan)
Dr. Fahriye ALTINAY (Eastern Mediterranean University, TRNC)
Dr. Zehra ALTINAY (Eastern Mediterranean University, TRNC)

TOJET – Volume 8 – Issue 2 – April 2009

Table of Contents

1	A Diagnostic Study of Computer Application of Structural Communication Grid <i>Mehmet BAHAR, Fatih AYDIN, Erol KARAKIRIK</i>	5
2	A Study on Science Teachers' Attitudes toward Information and Communication Technologies in Education <i>Bulent CAVAS, Pinar CAVAS, Bahar KARAOGLAN, Tarik KISLA</i>	20
3	Action Plan on Communication Practices: Roles of Tutors at EMU Distance Education Institute to Overcome Social Barriers in Constructing Knowledge <i>Fahriye A. AKSAL</i>	33
4	Effects of Watching Captioned Movie Clip on Vocabulary Development of EFL Learners <i>Dogan YUKSEL, Belgin TANRIVERDI</i>	48
5	First Report about an E-Learning Application Supporting PBL: Students' Usages, Satisfactions, and Achievements <i>Erol GURPINAR, Nese ZAYIM, Ciler Celik OZENCI, Mustafa Kemal ALIMOGLU</i>	55
6	Gender Differences on Attitudes, Computer Use and Physical Activity Among Greek University Students <i>Evangelos BEBETSOS, Panagiotis ANTONIOU</i>	63
7	Implementing Constructivist Approach into Online Course Designs in Distance Education Institute at Eastern Mediterranean University <i>Zehra A. GAZI</i>	68
8	Investigating Web Sites of Faculties of Education: The Case of Turkey <i>Tamer KUTLUCA, Serhat AYDIN, Adnan BAKI</i>	82
9	Problems Related to Computer Ethics: Origins of the Problems and Suggested Solutions <i>Abdullah KUZU</i>	91
10	Students' Attitudes and Perceptions towards the Effectiveness of Mobile Learning in King Saud University, Saudi Arabia <i>Fahad N. AL-FAHAD</i>	111
11	The Role of Gender and Age on Students' Perceptions towards Online Education. Case Study: Sakarya University, Vocational High School <i>Fahme DABAJ</i>	120
12	Trends and Issues in Educational Technologies: A Review of Recent Research in TOJET <i>Ayfer ALPER, Yasemin GÜLBAHAR</i>	124

A DIAGNOSTIC STUDY OF COMPUTER APPLICATION OF STRUCTURAL COMMUNICATION GRID

Associate Professor Dr. Mehmet BAHAR
Science Education Department, Abant Izzet Baysal University
e-mail: mehmet.bahar@gmail.com

Research Assistant Fatih AYDIN
Science Education Department, Gazi University
e-mail: fatihaydin14@gmail.com

Assistant Professor Dr. Erol KARAKIRIK
Primary School Education Department, Abant Izzet Baysal University
e-mail: karakirik@gmail.com

ABSTRACT

In this article, Structural communication grid (SCG), an alternative measurement and evaluation technique, has been firstly summarised and the design, development and implementation of a computer based SCG system have been introduced. The system is then tested on a sample of 154 participants consisting of candidate students, science teachers and faculty staff members. A comparative study between paper-and-pencil and computerized versions of SCG has been conducted. 154 subjects, consisting of candidate students, science teachers and faculty staff members, have participated in this study. Participants' views are probed by using Software Evaluation Questionnaire and Open-Ended Interview Form. Findings of the study show that i) participants find SCG technique easier to use in computer medium, ii) they have positive attitudes towards this computer software, and iii) they prefer computerized version of SCG technique to the paper-based SCG technique. The findings have been discussed in terms of its contribution to computer aided measurement and evaluation methods by taking similar studies in the literature into account.

Keywords: Structured Communication Grid, Software Evaluation Questionnaire, Measurement and Evaluation

INTRODUCTION

The views of educators towards learning, teaching and evaluation have experienced significant changes in the last thirty years. There has been a shift from behaviorist learning approach to constructivist learning approach, from teacher-centered education to student-centered education, from memorization to meaningful learning. This shift has also been reflected to the measurement and evaluation as being a part of learning and teaching process. Constructivist approach, which argues that individuals actively build their new knowledge upon prior ones in a way distinct to themselves, has questioned the effectiveness of traditional measurement and evaluation techniques that only focus on the learning product, and highlighted the utilization of alternative measurement and evaluation techniques which focus on the learning process.

The Science and Technology, Mathematics, Social Sciences and Turkish curriculums have been redesigned in Turkey in line with the constructivist paradigms. Accordingly, constructivism has been embedded into courses which are to be spirally distributed throughout the school years and an inter-disciplinary approach has been adopted. The most important change, perhaps, has been in the perceptions regarding measurement and evaluation. This change is more apparent in Science and Technology programs (Bahar, 2006).

Multiple choice tests are still most widely used, and at the same time criticized, assesment and evaluation techniques all around the world. The main drawback of a multiple choice test is to inform participants in advance that each question in the test, no matter how many choices it have, has only one correct answer. Participants are required to find the desired answer by eliminating the incorrect choices. Knowing that the question has just one correct answer may lead participants to focus on guessing the answer rather than thinking over the question which contradicts the basic aims of the assessment in the first place. Hence, the usage of new assesment and evaluation techniques have been advocated in the new Turkish curriculum. Structured Communication Grid in this regard has been mentioned under the category of alternative measurement and evaluation in the 2004 Turkish Science and Technology Program (MEB, 2004).

Structured Communication Grid (SCG) Technique

Structured Communication Grid (SCG) technique was proposed and developed as an alternative assesment technique to multiple choice tests by trying to eliminate their drawbacks. SCG differs from traditional multiple choice tests in this regard that participants are not in advance aware of how many correct answers a question

have. Hence, it is very difficult, if not impossible, to reach a correct answer just by guessing in a SCG test. Furthermore, to make guessing much more difficult, SCG tests have more choices than traditional multiple choice tests and the choices are displayed in a grid as the name implies (Bahar et al., 2006). For instance, while a 3x3 SCG has 9 choices a 4x4 SCG has 16 choices (See Figure 1).

First studies about SCG was commenced by Egan (1972) and then has been used by many researchers successfully (Johnstone et al., 2000; Bahar and Hansell, 2000; Bahar, 2001; Özatlı, 2006). In almost all of these studies, it has been emphasized that SCG is an assessment and evaluation technique that measures meaningful learning and helps in diagnosing misconceptions and erroneous information of students.

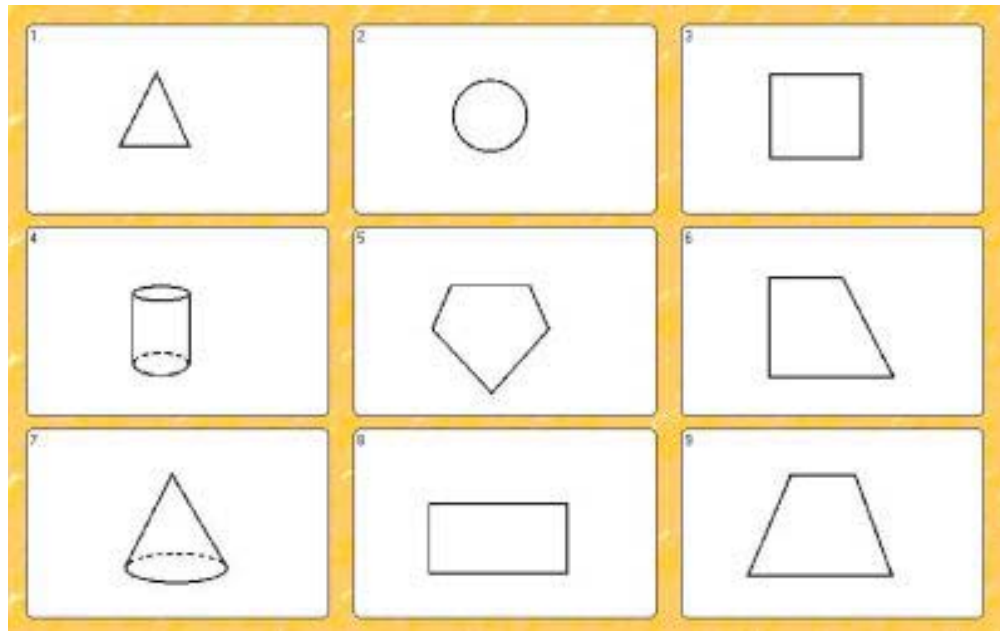


Figure 1: A 3x3 Structured Communication Grid

There is not an optimum grid size for a SCG test. 3x3, 3x4 or 4x4 SCG grids are prepared with respect to the age and school level of the audience and each cell of the grid is numbered in turn (Johnstone et al., 2000). In order to prepare a SCG, the teacher asks a fair question and places its answer randomly into one or a few of the cells. Then s/he asks another question and places its answer into the cells respectively. However, the cells belonging to the correct answer of a question may be amongst the cells for the correct answer of another question. In other words, some part of correct answers of a question may also be part of correct answers to another question. One might ask as many questions for a grid as s/he likes unless filling all the cells of the grid. What is required to complete a SCG successfully may, indeed, resemble to composing a short essay or an article. While composing an essay, the ideas are first put forward and then organized and presented in a logical order and coherent way. While constructing a SCG, likewise, correct answers for each question first put forward and then distributed among the cells of the grid.

There are two types of questions that could be asked in a SCG, namely standard and ordering questions. When it is administered, depending on the type of the question the participants are required either

- a) to select the cells appropriate to be an answer for the question or
- b) to order the cells by enumerating each cell according to their logical and functional relations for a particular criteria (this option may not be suitable for every question of a grid).

As a diagnostic test, scores taken in a SCG test may not be used for a summative evaluation. Separate scoring mechanisms are used for each type of the question. In standard questions, total score of a question is divided into two parts and while 50% of the score comes from selecting correct cells for a question, the remaining 50% of the score comes from not selecting an incorrect cell for the question. In other words, participants are rewarded for each selected correct cell and punished for each selected incorrect cell. In ordering questions, the relative order of the correct cells are also taken into account. An example of SCG scoring mechanism can be seen in the Appendix A.

It will be appropriate here to mention about computer aided measurement and evaluation techniques since the development of a computer based SCG test is aimed in this study. Parallel to technological developments, the utilization of computers during instruction continues to increase; however, similar increase has not been observed in computer aided measurement and evaluation (Schwid & O'Donnell, 1992; Dillon & Clyman, 1992). Underwood and Brown (1997) also argue that while the number of computer aided measurement and evaluation instruments assisting class learning increased, its utilization in educational tests is still quite low.

Thelwall (2000) states that computer aided measurement and evaluation techniques, which might increase the effectiveness of teaching and learning, has a variety of usages: Employment of the diagnostic tests before any teaching activity and employing formative assessment tests during the teaching activities are among them. Bennett (1998), furthermore, states that computer aided measurement and evaluation instruments have brought opportunities for innovation in testing and measurement and evaluation. Computers could be utilised more effectively in evaluating any problem solving activities. Moreover, they are also effective in identifying students' process dependent abilities (Chung and Baker, 1997; Schacter et al., 1999; Stevens et al., 1999). Computer based measurement and evaluation instruments not only are a rich resource for helping participants to assess their process and knowledge level but also provide immediate and personal feedback (Mooney et al., 1998).

It may be argued that the comparative studies addressing the utilization of computerized and paper based tests are inadequate and inconclusive (Burke & Normand, 1987; Mazzeo & Harvey, 1998 as cited in Dillon & Clyman, 1992). While some studies (Hicken, 1993; Vansickle & Kapes, 1993; Finegan & Allen, 1994) report that there is not a significant difference in student performances for these two tests, other studies (Dimock & Cormier, 1991; Mazzeo, 1991) report the contrary. Kapes and Vansickle (1992) report that computer based tests are more meaningful and reliable than the others.

Levine and Donitsa-Schmidt (1997) and Ogunkola (2008) state in their study that widely usage of computers facilitates positive attitudes towards computers. It is thought that several issues such as participants' demographic factors (gender, cultural background, age etc.) (Leutner & Weinsier, 1994) and their previous computer experiences (Maurer, 1994) may affect their performances during computer based measurement and evaluation. Lee (1986), in his study on college students, found that the students who have less experience with computers are less successful than others at computer based mathematics tests. However, it is argued that this inadequacy may be removed by the provision of a minimal computer experience opportunity.

Mazzeo et al (1991), on the other hand, found conflicting results in their studies on English and Mathematics tests. In one of their studies, for instance, the authors observed that there was a negative effect of previous experience with computers, i.e., the less experienced students got higher marks. In another study focusing on the previous computer experiences (Johnson and White, 1980), it has been observed that a group of participants who took a computer course got higher scores than a group of participants who didn't take any computer course before.

THE AIM OF THE STUDY

The paper form of SCG technique has been widely used in many studies. However, there is not any study, authors aware of so far, which utilizes this technique in the computer environment. The aim of this study is, hence,

- i) to develop a computer based environment for the administering and evaluating SCG technique, and
- ii) to collect participants' views about this environment and to determine positive and negative aspects of both SCG technique itself and its computerized version.

METHOD

Participants

One hundred and fifty participants, consisting of 118 candidate elementary school teachers, 24 candidate science teachers at the master program and 12 faculty staff members from the elementary education department of Faculty of Education at Abant Izzet Baysal University, Bolu Turkey, have taken part in this study. All of the participants filled a standard software evaluation questionnaire after using the computerized version of SCG technique. Face-to face interviews were conducted with 26 candidate elementary school teachers, 19 candidate science teachers and 4 faculty staff members in order to probe their views about SCG technique and its adaptation to the computer environment.

None of the participants in the study had reported any difficulty in using computers since they had already taken computer courses at graduate level. The teachers and faculty staff reported that they had their own personal computers and they had been using them as an integral part of their teaching.

Design of SCG Software

A computer system that facilitates the preparing, administering and evaluating a SCG technique has been developed. The system has two different modes, namely design and application modes. While design mode provides tools for the preparation of a SCG test, application mode helps administering a SCG test, collecting user responses and analyzing them instantly.

The design mode has very flexible facilities that ease the creation of a SCG test. There are several buttons on the upper part of the screen that provide easy access to the major functionalities of the system such as adding a new grid or deleting an existing grid, adding a new question for a grid and deleting a question from the grid, navigating between existing grids and questions, changing the question types etc. There is also a menu on top of the system that enables easy access to all the functionalities of the system. There are also several text labels that inform users about the current status of the system such as how many grids, questions it has, and the number of the current grid and the current question, the current question type, how many questions are needed to be answered or needed their correct cells to be assigned etc.

One is firstly required to construct a grid by stating how many cells it will consists of and what type of responses (text or image) it will hold. How many cells a grid contains can not be changed after its construction. If one wants to construct a grid with different number of cells, s/he has to add a new grid with the desired number of cells. However, one can easily change what type of a response each cell of a grid will hold. Some cells of the grid might hold images while some other cells of the same grid might hold text fields. By default, each cell of a newly constructed grid has a default placeholder. It has a specific picture for image cells and a default placeholder text indicating the cell number such as “Item 4” for text cells. One could easily change the content of a cell from a text to an image or from an image to text by pressing a specific key. One could place graphs, charts, pictures etc as an image. One could browse for an image file to load after selecting a cell and converting it to an image by pressing a key if it is a text cell. One could also change the font size, styles, text colours and background colours of cells containing texts. One could also create fixed cells that could be addressed in questions. Fix cells can not be clicked or highlighted during the design or application mode and left part of the cell is shown in red to denote it is fixed. This flexibility of the system makes the preparation of complex grids possible.

After a grid is constructed, one could ask as many questions as s/he wishes for a grid and assign their correct cells. The design mode of the system enables constructing both standard and ordering questions which are called A and B type questions respectively. One could ask just A type, just B type or both A and B type questions. One could change between question types by pressing the buttons labeled as “A” and “B” respectively on the upper left side of the screen and may enter his/her question into the question text field. If A is selected, the question becomes a standard question and if B is selected the question becomes an ordering question. A text field of a question by default contains placeholders for actual questions indicating the question number and the type of the question. For instance for a standard question it contains “This is standard question 1” while it holds “This is ordering question 1” for an ordering question. One could write his/her own questions by deleting these placeholders. If the text field of A or B type of a question is left empty, it is regarded as not having that type of the question and that type of the question is not taken into consideration during the application mode. The cells selected during the preparation of a question are regarded as its correct cells. One could easily change the correct cells of a question anytime during the design mode.

Pressing a mouse button over a cell is automatically selects or de-selects a cell. The cells are automatically sequenced in the order that they are selected. The selection of the cells is done in type A question and the order of the selected cells is changed in type B question. Selection of a cell is shown by highlighting either the actual number in standard questions on the left upper side of cell or the sequence in which it was selected in ordering questions on the left bottom side of the cell. If a change is desired to be done on automatic ordering, part of the cell that shows the number is either to be left-clicked in order to increase order number or to be right-clicked in order to decrease order number.

Grids prepared in design mode could be saved to a text file and could then be re-loaded again in design mode and modifications could be made.

Application mode of the system enables the administering of the prepared files by the system. Application mode starts with the selection of SCG file and entering some identification information about the user such as name, age, gender etc (See Figure 2).

Figure 2: A screenshot of identification information window in the application mode.

However, in application mode one is only allowed to make selections and change ordering of selections and can not modify any other part of the grids or questions. One can not exit the application mode without giving adequate responses for each question in every grid. Hence, there are also additional buttons providing specific functionality for the application mode such as to bypass a question, labeled as “ I do not want to answer this question”, or to go to the next unanswered question or information labels that indicate how many questions are not answered.

Application mode of the system also provides instant analysis of the users responses by both displaying it to the users and saving it to a file. Detailed analysis information about the test results give both participants and researchers instant feedback and provide opportunity for their self evaluation. Analysis of the results both include what responses users gave including correctly and incorrectly selected cells for each question and how long they deal with each question and grid as well as their raw and scales scores for each question. It also provides an average score for standard and ordering questions and produces a test score scaled to 100.

Facilities provided in application mode of the system simplifies the administration of a SCG test which is very difficult to administer and analyze manually by paper-pencil. Hence, the system might make life easier for teachers and enable them to obtain in-depth knowledge about their students.

Some screenshots of the system during the administration of a biology and mathematics tests could be seen in the following figures (Figure 3, Figure 4, Figure 5 and Figure 6).

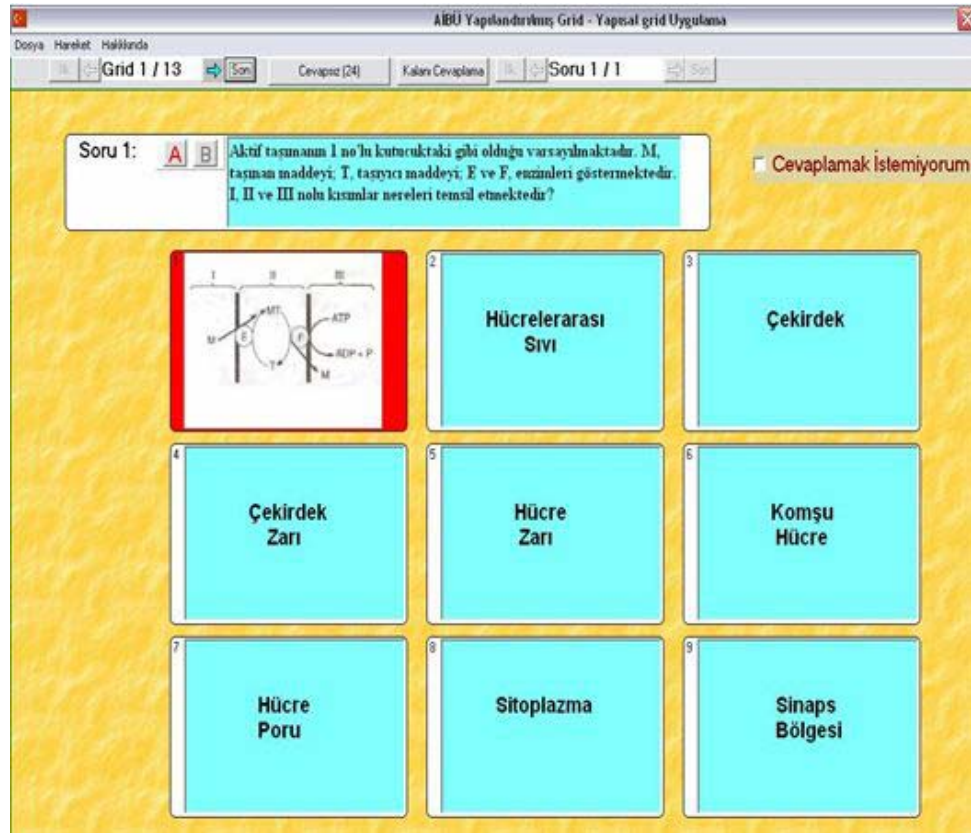


Figure 3: A SCG consisting of 8 text choices and a fixed image cell



Figure 4: A SCG consisting of 9 image choices

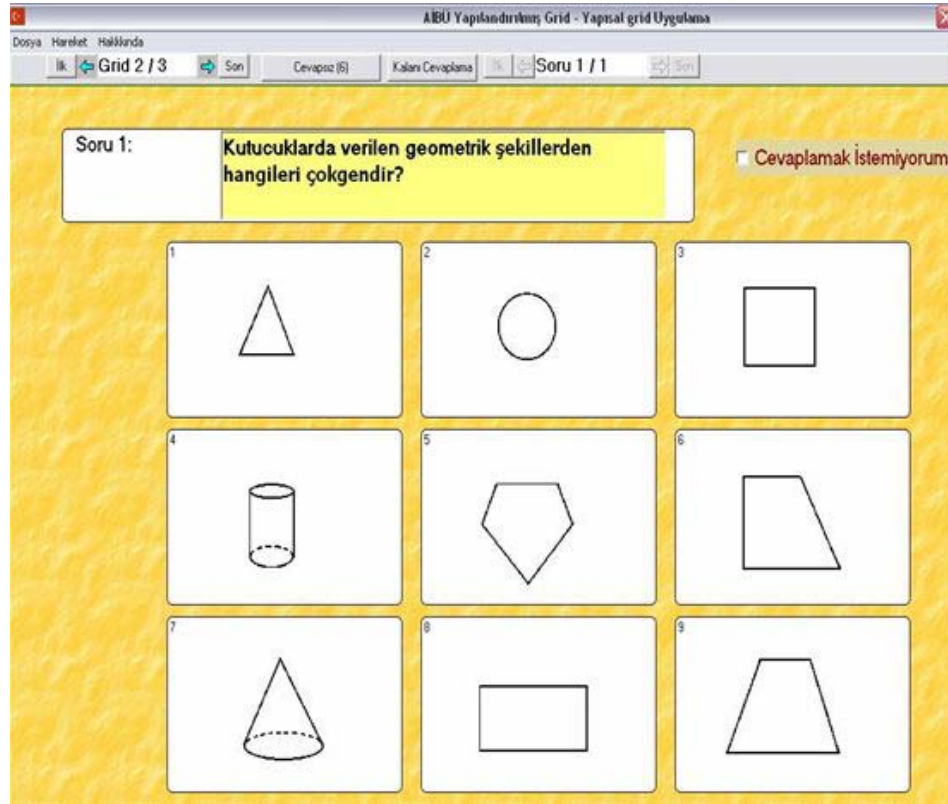


Figure 5: A SCG consisting of 9 geometric figures

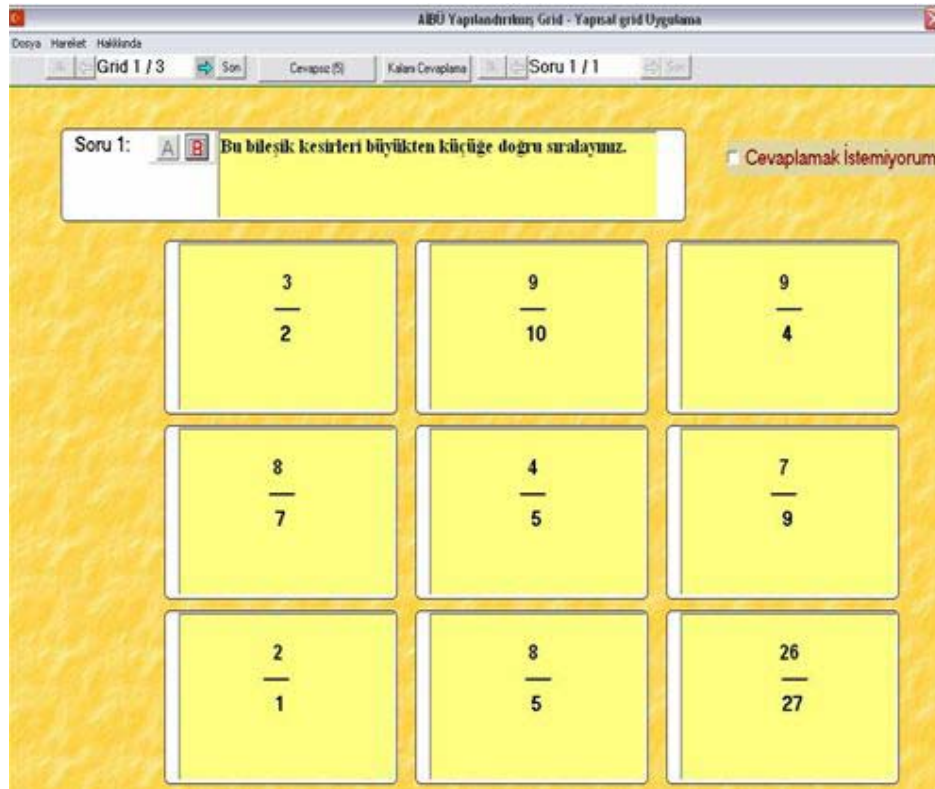


Figure 6: A SCG ordering question with 9 choices

Data Gathering Instruments and Analysis

Two research instruments are utilized in this study to collect data:

- 1) Software Evaluation Questionnaire and
- 2) Open-ended interview form.

Software Evaluation Questionnaire: “Software Evaluation Questionnaire (SEQ)”, addressing to participants’ views about SCG-software, has been adapted by us by using a “prototype software evaluation form” and a “final release evaluation form” (Akpınar, 1999). The SEQ consists of 20 items and 5-Likert Type Scaling was preferred. Its validity was provided by consulting to several experts. An open-ended question was added at the end of the questionnaire in order to provide the participants an opportunity to express their views about the system. Test-retest method was applied in order to determine the instruments’ reliability (Cohen et al., 2005, p. 131; Can, 2000): A group of participants (N=77) were asked to fill the questionnaire after they use the system. The same questionnaire was given to the same participants 3 weeks later. Correlation coefficient was found to be 0.82. Moreover, internal consistency (Cronbach alpha) of the instrument has been found to be 0.90.

The responses given to SEQ were converted to a score for each item. In order to do this, the options were first scaled from 1 to 5 (1- I Strongly Disagree; 5- Strongly Agree). Then participant responses were converted to SPSS format. Average scores for each participant and each item were calculated in SPSS. These scores were re-scaled by assigning equal quantitative ranges to Likert-Type Scaling.

- | | |
|---------------------------------------|-----------------------|
| 1.00-1.79; I strongly disagree | 1.80-2.59; I disagree |
| 2.60-3.39; neither agree nor disagree | 3.40-4.19; I Agree |
| 4.20-5.00; I strongly agree | |

Participants’ responses are intensified in the ranges of 3.40 – 5.00 (I agree – I strongly agree).

Open-ended Interview Form:

In order to obtain participant views, two open-ended question were addressed to the participants:

- 1- *What do you think about positive and negative aspects of structured communication grid technique?*
- 2- *Would you compare positive and negative aspects of paper-based structured communication grids with computer-based structured communication grids?*

The data obtained from the interview forms have been analyzed using descriptive analysis method (Yıldırım & Şimşek, 2000, p. 158). The data have been grouped under different categories and participants’ related views have been gathered together and were analyzed. By means of this, it has been aimed that participant views may be presented in a more coherent way and their positive and negative views about the program may be identified more clearly.

Implementation

SCG technique by paper and pencil, first, has been introduced to the students, teachers and faculty staff at separate sessions (Since the number of students were high, their presentation has been divided into two sessions). Then, they were required to prepare an example SCG test in a week in order to probe their level of understanding and to ensure that they fully understand the technique.

The SCG software has then been introduced to participants with a presentation in a computer laboratory. After the presentation, the students and teachers were required to complete a computer based SCG test consisting of questions from their own subject fields. Faculty staff has not attended this part of study. Researchers prepared the questions employed in the tests themselves and experts’ views about them have been collected. Software evaluation questionnaires were administered to the participants after they complete the test.

FINDINGS AND DISCUSSION

The data gathered from participant responses to SEQ are presented in Table 1. It can be seen from this table that average scores of each group and consequently general average scores for each particular item ranges at the interval of 3.40 – 5.00 (I agree- I strongly agree). Moreover, the participants have, in average, strongly agreed (4.20-5.00) with twelve of twenty items. These findings suggest that the computer software prepared for SCG technique is sufficient in terms of the items addressed to participants.

It can also be seen from Table 1 that the average scores of the students and science teachers are slightly lower than the average scores of faculty staff for the item numbers 7 (The quantity of knowledge presented on the screen is enough), 8 (Transitions between screens are completely probable), and 10 (System errors, whose source is unknown, are not encountered). It may be argued that the reason for this difference may be due to the nature of these items which may necessitate more expert knowledge than the other items in the SEQ.

However, students' and teachers' views about these items may be taken into account and therefore the quantity of knowledge presented on the screen may be increased and the number of screen transitions and problems perceived as system errors may be minimized. Every software development processes is circular and definitely need feedback from end-users to make further revisions.

Another noticeable statement which has high average score in Table 1 is item number 20 (It can be used for program measurement and evaluation purposes). This is an expectable result for SCG technique due to its characteristics such as the provision of an opportunity for evaluating partial knowledge, decreasing chance factor by questioning meaningful learning as a result of its selection and ordering features, and maintaining immediate feedback (such as scoring, number of incorrect and correct answers, saving information etc.).

Table 1: Average score for participant responses to questionnaire items

	Students	Science Teachers	Faculty Staff	Average
	\bar{X}	\bar{X}	\bar{X}	
01- Screen layout of the program is clear and understandable..	4.16	4.20	4.66	4,34
02- Screen design helps understanding the program fully.	4.04	3.91	4.08	4,01
03- It is easy to learn how to use the program.	4.28	4.16	4.16	4,20
04- It is esy to remember how to use the functions and operations in the program.	4.11	3.83	4.33	4,09
05- It is easy to use the functions in the program.	4.24	4.12	4.50	4,28
06- Function names and their functions are consistent with each other.	4.11	3.91	4.41	4,14
07- The quantity of knowledge presented on the screen is enough.	3.81	3.45	4.33	3,86
08- Transitions between screens are completely probable.	3.63	3.91	4.33	3,95
09- The program is fast.	4.19	4.41	4.66	4,42
10- System errors, whose source is unknown, are not encountered	3.58	3.87	4.33	3,92
11- The program is appealing.	4.17	4.45	4.75	4,45
12- The program is motivating.	4.10	4.16	4.66	4,30
13- The program has characteristic to help in construction of knowledge.	4.02	3.95	4.16	4,04
14- Communication characteristic of the program is strong.	4.03	3.95	4.25	4,07
15- It is beneficial that the program saves the results.	4.45	4.58	4.75	4,59
16- The program is beneficial in terms of providing teachers opportunity to develop themselves.	4.18	4.29	4.50	4,32
17- It is convenient to study this program.	4.26	4.20	4.33	4,26
18- The program is in a characteristic that it can be controlled at any time..	4.33	4.33	4.33	4,33
19- Feedback characteristic of the program is beneficial.	4.26	4.29	4.66	4,40
20- It can be used for program measurement and evaluation purposes.	4.43	4.41	4.41	4,42

Especially high average score of faculty staff shows that this software meets experts' expectations of a computerized version of SCG. This finding shows that it is consistent with the usability criteria of a measurement instrument as Lien suggested (1976). Mooney et al. (1998) claim that computer aided measurement and evaluation techniques provide instant and individualized feedback as well as assisting evaluation of knowledge and process levels of students. Sluijsmans et al. (1998) and Bond (1995) claim that while self-evaluation may not be a new evaluation strategy, it is an effective way to increase a student's role as an active participant during self-learning. Both of these views are parallel to the questionnaire results about evaluation of a

computer based SCG technique and its feedback provision mechanism. That is, this mechanism provides feedback in a multidimensional format and saves it to a file which is very helpful in students' self-evaluation and reflection about the process.

In order to support the consistency of the findings in the SEQ qualitatively, participants' responses to open-ended interview forms have been provided below.

It has been seen that the participants mostly expressed positive views about 1st question in the open-ended interview form (What do you think about positive and negative aspects of structured communication grid technique?). Positive views are more apparent in the statements of faculty staff as well. The positive views may be categorized as "effectiveness of this technique as a measurement and evaluation tool", "assessment of partial knowledge", replacement of assessment of rote learning with assessment of meaningful learning", and "knowledge endurance". Some examples selected from participant views may be seen below:

"...it is difficult from the teachers' perspective since it requires much higher quality questions; however, it is a good way of evaluating the learning of students. As a candidate teacher, I am satisfied with it. It aims to facilitate meaningful learning of students. It will provide knowledge endurance since in case the students give correct answer, it makes them question why it is correct; that means it leads students to the discovery, contemplating, and analyzing. I like to use this method at the school that I will teach" (A student's view)

"...this is a nice method to assess the students who have prior knowledge and correctly evaluate their knowledge level. However, it may be difficult to implement at first. It is also very good in terms of providing alternative method to multiple-choice tests..." (A teacher's view)

"...SCG technique is excellent for elementary school and secondary school evaluations and especially for more precise examinations like UDS and KPDS. I think it is a multidimensional technique since it increases teachers' and students' motivation, gives students an opportunity to correct their mistakes, to complete their missing knowledge, and strengthen their correct understandings."

Some negative statements, besides to positive ones, have also been expressed by some students as can be seen from open-ended interview forms. These negative statements can be grouped into two categories: Lack of time issue during the preparation of the technique and restrictions due to the nature of the specific subjects. Some excerpts about students' negative views are below:

"...it requires too much time to prepare questions in SCG technique. Teachers' thinking time gets longer. In order to give it an exam status, the numbers of questions are to be increased; however, this also increases its cost. Moreover, there may be some operational mistakes during the evaluation, which in turn affects the assessment..."

"...it may be restricted to specific subjects. It may be impossible to prepare both standard and ordering questions and just ordering questions for each subject. I mean it may be difficult to apply in every subject."

According to 2nd question of open-ended interview form (Would you compare positive and negative aspects of paper-based structured communication grids with computer-based structured communication grids?), all participants expressed that computer-based SCG had more advantages than the paper and pencil version. These include the factors such as its user-usability, provision of fast and effective feedback, quick and easy scoring, attractiveness of design with different colours and shapes. Some statements about them are presented below:

"...you don't have to know the software in detail. It is nice to answer the questions with a few clicks or using keyboard, without dealing with paper and pencil. It is also nice that the answers are supported visually" (A Student's view)

"...its utilization by means of computer makes the process faster. It facilitates quick thinking. While using paper-based method, we may sometimes forget what we thought. This computer software, I think, is good from this point." (A teacher's view)

"The utilization of computer based type of SCG technique is quite appropriate for secondary and higher education...The most important aspect of these grids is its transfer of the principal "the more senses are addressed during the education, the more learning occurs" into the measurement and evaluation dimension of learning." (A Faculty staff's view)

While these positive thoughts have dominated participant views, they have also expressed concerns about the importance of computer laboratories and computer literacy of students and teachers for a successful application of computer-based SCG. Most of the participants agree with the following view:

“This software may be quite attractive for students; however, the preparation of an adequate SCG test requires a teacher both to be good at using computers and having enough time to prepare it. Therefore, I think, the utilization of it in Turkey may only be possible after years of endeavours since in our schools there is not enough computer equipment. However, if we somehow achieve to use this technique, I think it will be enjoyable for students and the concepts will be more durable since it addresses to visual senses...” (A teacher’s view)

“Most of our teachers even don’t know how to use computers. Due to this, it is too early to use this software. However, we may think is as a big step to increase education level...” (A student’s view)

“The students are to be able to use computer to the some degree in order to use the software efficiently. I mean, objective results may not be obtained if it is used with the individuals who are reluctant to use or afraid of using computers.” (A faculty staff’s view)

The views of participants about computer literacy of students/teachers and technological infrastructure of schools, of course, are not to be overlooked. However, inadequacy in using computers is not only restricted to SCG technique. It is also applicable for all software programs utilized in computer-aided teaching. The studies about the effects of previous computer experience, however, give conflicting results. Most of the studies (for ex. Johnson and White, 1980; Mazzeo et al., 1991) show that computer experience influence achievements in computer aided programs or tests. However, some studies (e.g., Lee, 1986) suggest that computer experience does not have direct influence on achievement in computer-aided studies. The SCG technique used in our study does not require high level of computer literacy and a minimum level of experience may be enough in order to use it. It is observed that the participants had already that experience. The points raised on this issue may apply to those individuals who have no computer experience at all. However, if one takes probable widely usage of computers at our schools and homes in near future into account, it may be concluded that this concern is temporary.

As it has been mentioned in the introduction part, while some studies suggest that there are no differences in student performances for computer-based exams and paper-based exams (Hicken, 1993; Vansickle & Kapes, 1993; Finegan & Allen, 1994), others suggest that there are significant differences between them (Dimock & Cormier, 1991; Mazzeo, 1991). In our study, we have not reported participant performance for computer-based tests and paper-based tests; however, participants’ views about major issues such as usability, provision of fast and effective feedback, easy and quick scoring mechanism, and attractive design with different colours and figures suggest that computer-based SCG technique may bring more success than its paper-based counterpart addressing the same subject.

Although there are some negative participant views about the feasibility of computer-based SCG, such as lack of computer literacy, positive participant views outnumbers the negative ones and the issues raised could be resolved over the time. This makes computer-based SCG technique a positive view dominated technique. Moreover, if one takes the studies indicating that computer-based tests are significantly more reliable than paper-based tests (Kapes and Vansickle, 1992) into account, it may easily be appreciated why computerized SCG technique is more favourable to paper-based one. If one compares the responses obtained by means of open-ended interview questionnaire with the ones obtained from SEQ, it may be concluded that they support each other. This also shows that they are consistent with each other.

Another point that is worthy of discussion concerning this subject is about the place of SCG technique during assessment of process among other alternative measurement and evaluation techniques mentioned in 2004 Turkish Science and Technology Program. There are, of course, many advantages of both paper-based and computerized SCG technique such as assisting assessment of partial knowledge, decreasing chance factor in reaching to correct answer, diagnosis of misconceptions or erroneous conceptions of students by means of incorrectly selected cells, identifying defected aspects of cognitive schemata of students, giving opportunity to fill and replace the cells with words, figures, numbers, equations, formulas by means of what visual and verbal thinking abilities of students enhanced. While these advantages are quite important, can SCG be thought to be in the same category with the process evaluation techniques such as portfolio and projects assessment, which address all characteristics of formative evaluation? Logical and operational sequencing of the selected cells in SCG technique may demonstrate that the process is an important aspect of it; however, we think that it may be more appropriate to regard SCG technique in the middle of traditional and alternative measurement and evaluation techniques.

As Bennett (1998) stated, computer-aided measurement and evaluation provides innovations for tests, and measurement and evaluations. The SCG technique, which highlights both diagnostic and formative aspects of assessment, and evaluates both the product and partially the process, is quite feasible area to be applied and developed by researchers at various areas.

REFERENCES

- Akpınar, Y. (1999). *Bilgisayar destekli öğretim ve uygulamalar*. Anı Yayıncılık, Ankara.
- Bahar, M. (2001). Çoktan seçmeli testlere eleştirel bir yaklaşım ve alternatif metotlar. *Kuram ve Uygulamada Eğitim Bilimleri Dergisi*, 1(1), 23–38.
- Bahar, M. & Hansell, M. H. (2000). The relationship between some psychological factors and their effect on the performance of grid questions and word association test. *Educational Psychology*, 20(3), 349–364.
- Bahar, M. (2006). 4-8. sınıflar fen ve teknoloji öğretim programına genel bir bakış (Ed.) M. Bahar *Fen ve teknoloji öğretimi içinde* (s. 433-450). Ankara, PegemA Yayıncılık.
- Bahar, M., Nartgün, Z., Bıçak, B. & Durmuş, S. (2006). *Geleneksel ve alternatif ölçme ve değerlendirme öğretmen el kitabı*, 1. Baskı. Ankara: Pegem A yayıncılık.
- Bennett, R. E. (1998). *Reinventing assessment: speculations on the future of large-scale educational testing*. Princeton, NJ: Educational Testing Service, Policy Information Center.
- Bond, D. (1995). *Enhancing Learning Through Self-Assessment*. London: Kogan Page.
- Burke, M.J. & Normand, A.L. (1987) Computerized psychological testing: overview and critique. *Professional Psychology Research and Practice*, 18, 42–51.
- Can G. (2000). Ünite 13. Eğitimde ölçme ve değerlendirme (Ed.) M. Gültekin. *öğretimde planlama ve değerlendirme içinde* (s.207-222). Eskişehir: Anadolu Üniversitesi Yayınları.
- Cohen, L., Manion, L., & Morrison, K. (2005). *Research methods in education*. Routledge Falmer.
- Chung, G. K. W. K. & Baker, E. L. (1997). *Technology in action/Year 1 technology studies: implications for technology in assessment (CSE Technical Report No. 459)*. Los Angeles, CA: University of California, National Center for Research on Evaluation, Standards, and Student Testing.
- Dillon, G.F. & Clyman, S.G. (1992). The computerisation of clinical science examinations and its effect on the performance of third year medical students, *Academic Medicine*, 67, 66–68.
- Dimock, P.H. & Cormier, P. (1991). The effects of format differences and computer differences on performance. *Measurement and Evaluation in Counselling and Development*, 24, 119–126.
- Egan, K. (1972). Structural communication – A new contribution to pedagogy. *Programmed Learning and Educational Technology*, 1, 63–78.
- Finegan, J.E. & Allen, N.J. (1994). Computerised and written questionnaires: are they equivalent?, *Computers in Human Behaviour*, 10, 483–496.
- Hicken, S. (1993). Administering comprehensive examinations using computers, *Collegiate Microcomputer*, 11, 194–198.
- Johnson, D., & White, C. (1980). Effects of training on computerized test performance in the elderly. *Journal of Applied Psychology*, 65, 357–358.
- Johnstone, A. H., Bahar, M., Hansell, M. H. (2000). Structural communication grids: A valuable assessment and diagnostic tool for science teachers. *Journal of Biological Education*, 34(2), 87-89.
- Kapes, J.T. & Vansickle, T.R. (1992). Comparing paper and pencil and computer-based versions of the Harrington O'Shea career decision making model. *Measurement and Evaluation in Counselling and Development*, 25, 5–13.
- Lee, J. (1986). The effects of past computer experience on computerized aptitude test performance. *Educational and Psychological Measurement*, 46, 727–733.
- Levine, T., & Donitsa-Schmidt, S. (1997). Commitment to learning: effects of computer experience, confidence and attitudes. *Journal of Educational Computing Research*, 16(1), 83–105.
- Leutner, D. & Weinsier, P.D. (1994). Attitudes towards computers and information technology at three universities in Germany, Belgium and US. *Computers in Human Behaviour*, 10, 569–591.
- Lien, A. J. (1976). *Measurement and evaluation of learning, Third Edition*, Wm. C. Brown. Company Publisher, USA.
- Maurer, M.M. (1994). Computer anxiety correlates and what they tell us: a literature review. *Computers in Human Behaviour*, 10, 369–376.
- Mazzeo, J. (1991). *Comparability of computer and paper and pencil scores for two CLEP general examinations*. College Board report no. 91–95 (New York, College Board Publications).
- Mazzeo, J. & Harvey, A. (1988). The equivalence of scores from automated and conventional educational and psychological tests: *A Review of the Literature*. College Board Report 88–8 (New York, College Entrance Examination Board).
- Mazzeo, J., Druesne, B., Raffeld, P., Checketts, K., & Muhlstein, A. (1991). *Comparability of computer and paper-and pencil scores for two CLEP general examinations (College Board report No. 91–5)*. Princeton, NJ: Educational Testing Service.
- Millî Eğitim Bakanlığı (2004). *İlköğretim fen ve teknoloji dersi öğretim programı ve kılavuzu (4–5. Sınıflar)*. Ankara. MEB yayınları.
- Mooney, G. A., Bligh, J. G., Leinster, S. J. (1998). Some techniques for computer based assessment in medical education. *Medical Teacher*, 20(6), 560-566.

- Ogunkola, B. J. (2008). Computer attitude, ownership and use as predictors of computer literacy of science teachers in Nigeria. *International Journal of Environmental & Science Education*, (inpress), 3(2), 53-57.
- Özatlı, N. S. (2006). *Öğrencilerin biyoloji derslerinde zor olarak algıladıkları konuların tespiti ve boşaltım sistemi konusundaki bilişsel yapılarının yeni teknikler ile ortaya konması*. Doktora Tezi, Balıkesir Üniversitesi Fen Bilimleri Enstitüsü.
- Schacter, J., Herl, H. E., Chung, G. K. W. K., & O'Neil, H. F. (1999). Next generation performance assessments: Reporting performance and process data together using computationally designed assessments [Special issue]. *Computers in Human Behaviour*, 15(3-4), 403-418.
- Schwid, H.A. & O'Donnell, D. (1992). Anaesthetologists' management of simulated critical incidents. *Anaesthesiology*, 76, 495-501.
- Stevens, R., Ikeda, J., Casillas, A., Palacio-Cayetano, J., & Clyman, S. (1999). Artificial neural network-based performance assessments. *Computers in Human Behaviour*, 15(3-4), 295-313.
- Sluijsmans, D., Dochy, F. and Moerkerke, G. (1998). Creating a learning environment by using self-peer and co-assessment. *Learning Environment Research*, 1(3), 293-319.
- Thewall, M. (2000). Computer-based assessment: a versatile educational tool. *Computers & Education*, 34, 37-49.
- Underwood, J. D. M., & Brown, J. (1997). *Integrated learning systems: potential into practice*. London: Heineman.
- Vansickle, T.R. & Kapes, J.T. (1993) Comparing paper-pencil and computer based versions of the Strong-Campbell interest inventory. *Computers in Human Behaviour*, 9, 441-449.
- Yıldırım, A., & Şimşek, H. (2000). *Sosyal bilimlerde nitel araştırma yöntemleri*. Seçkin Yayıncılık, Ankara.

APPENDIX A

A Sample of Structured Communication Grid Test and Its Scoring Mechanism

A structured communication grid test focusing on the subject of vertebrate and invertebrate animals is presented below. Please use the numbers assigned to each cell of a grid in order to answer the questions prepared for that grid. Each cell may be used as an answer of one or more questions.

1 Gnat	2 Dolphin	3 Butterfly
4 Crab	5 Trout	6 Lizard
7 Goshawk	8 Worm	9 Salamander

- Q1-** Which of the cells above include vertebrate animal names?
a) Select appropriate cells. (Correct Answer: 2, 5, 6, 7, 9)
b) Sequence the cells you selected in part a in the order of Fish, Amphibians, Reptiles, Birds, Mammals. (Correct Answer: 5, 9, 6, 7, 2)
- Q2-** Which of the cells above include invertebrate animal names?
- Q3-** Which of the cells above include the name of animal whose appearance and actions seems like a fish however it is categorized under mammals?
- Q4-** Which of the cells above show the names of the vertebrate/invertebrate animals that live on land?
- Q5-** Which of the cells above show the names of the vertebrate/invertebrate animals that live in water?

Scoring

Scoring mechanism of SCG technique will be shown here for an example question, namely Q1. Q1 has two parts: Part A is a standard question while part B is an ordering question.

Let us firstly illustrate the scoring of a standard question, Part A. In standart questions, total score of a question is divided into two parts and while 50% of the score comes from slecting correct cells for a question, the remaining 50% of the score comes from not selecting a incorrect cell for the question. In other words, participants are rewarded for each selected correct cell and punished for each selected incorrect cell. Table 1 shows the formula for getting the raw score of a standard question.

Table 2: Scoring mechanism of a standard question

$$\frac{C1}{C2} - \frac{C3}{C4}$$

C1= The number of cells selected correctly

C2= Total number of correct cells

C3= The number of cells selected incorrectly

C4= Total number of incorrect cells

The formula above gives a raw score between -1.0 and +1.0. In order to convert it to a scale of 10, we first add it with 1 and then multiply it with 5.

As it has been stated above, the correct cells for Part A of Q1 are 2, 5, 6, 7, and 9. Suppose that a participant selected the cells 2,4,6,7 and 8 for the Part A. Then, one could compute his/her scores as follow:

Correct cells are 2, 5, 6, 7 and 9 and the total number of correct cells are 4 (**C2=5**).

Cells selected correctly are 2, 6 and 7, and the number of cells selected correctly are 3(**C1=3**).

Incorrect cells are 1, 3, 4 and 8 and the total number of incorrect cells are 4 (**C4=4**).

Cells selected incorrectly are 4 and 8 and the number of cells selected incorrectly are 2 (**C3=3**).

$$\text{Raw Score for Part A} = \frac{3}{5} - \frac{3}{4} = \frac{12-10}{12} = \frac{2}{12} = 0,10$$

If one would like to convert it to a scale of 10, then one should add 1 to the raw score and multiply it with 5.

$$\text{Score for Part A at a scale of 10} = (0,10 + 1).5 = (1,1).5 = 5,5$$

Let us then illustrate the scoring of an ordering question, Part B of Q1. In ordering questions, the relative order of the correct cells are also taken into account. It is difficult to score an ordering question. One could select all the cells correctly but put them in a wrong order. One could ask two Yes or No ordering question for every consecutive pairs of the correct cells and determine how many consecutive cells are in the right position. If one of the consecutive cells is not selected or if two consecutive cells are selected but the order is not right, two No responses is returned for two ordering questions. If two consecutive cells are selected and their order is correct but they are not consecutively selected, one Yes and one No responses is returned for two ordering questions. Hence, the raw score of an ordering question is computed by proportioning the number of Yes questions over the total number of Yes questions for the right positions of consecutive pairs in the correct order.

$$\text{Row Score for an Ordering Question} = \frac{\text{Total Number of Ordering Questions}}{\text{Total Number of Yes responses}}$$

Please pay attention to the fact the number of Yes or No questions doubles as the number of correct cells in an ordering question increase. However, it is enough to multiply by 10 to scale this raw score to 10.

As it has been stated above, the correct sequence of order for Part B of Q1 is 5, 9, 6, 7 and 2. Suppose that a participant selected the cells 9, 6, 5, 7 and 4 in sequence for the Part B. Then, one could compute his/her scores as follow:

Following 4 consecutive pairs are found for Part B of Q1. (5,9), (9,6), (6,7) and (7,2).

One could ask the following 8 ordering Yes or No questions whether or not the right positions for each consecutive pair exist in the response.

Q1: Is number 5 selected before number 9? **Q2:** If it is, are they ordered consecutively?

Q3: Is number 9 selected before number 6? **Q4:** If it is, are they ordered consecutively?

Q5: Is number 6 selected before number 7? **Q6:** If it is, are they ordered consecutively?

Q7: Is number 7 selected before number 2? **Q8:** If it is, are they ordered consecutively?

Our participant gets the following results for the above ordering questions. Note that if first part of the question is incorrect, then the second part is not taken into account.

Q1:	No	(5 after 9)	Q2:	No	(-)
Q3:	Yes	(9 before 6)	Q4:	Yes	(9 and 6 are consecutively selected)
Q5:	Yes	(6 before 7)	Q6:	No	(6 and 7 are not consecutively selected)
Q7:	No	(2 is not selected)	Q8:	No	(-)

Total Number of Ordering Questions is 8.

Total Number of Yes responses are 2.

$$\text{Row Score for Part B} = \frac{\text{Total Number of Ordering Questions}}{\text{Total Number of Yes responses}} = \frac{2}{8} = 0,25$$

If one would like to convert it to a scale of 10, one should multiply this score by 10.

$$\text{Score for Part B at a scale of 10} = (0,25).10 = 2,5$$

Total score of the question could be computed by taking the average of the standard and ordering questions. Hence,

$$\text{Total Score for Q1} = \frac{(\text{Score for Part A} + \text{Score for Part B})}{2} = \frac{(5,5 + 2,5)}{2} = 4$$

ACKNOWLEDGMENT

Correspondent Author:

Fatih AYDIN

Gazi University

Faculty of Education

Science Education Department

e-mail: fatihaydin14@gmail.com

A STUDY ON SCIENCE TEACHERS' ATTITUDES TOWARD INFORMATION AND COMMUNICATION TECHNOLOGIES IN EDUCATION

Bulent CAVAS

Dokuz Eylul University, İzmir-Turkey
cavasbulent@yahoo.com

Pinar CAVAS

Ege University, İzmir-Turkey

Bahar KARAOGLAN

Ege University, İzmir-Turkey

Tarik KISLA

Ege University, İzmir-Turkey

ABSTRACT

Integration of Information and Communication Technologies (ICT) into education has been an important concern in many countries. Recently, Turkish Ministry of Education has also done great efforts and major financial investments to implement ICT into teaching and learning environments. However, as in many developing countries, ICT tools are provided to teachers without considering their attitudes toward ICT. The purpose of this study was to reveal Turkish primary science teachers' attitudes toward ICT in education and then explore the relationship between teachers' attitudes and factors which are related to teachers' personal characteristics (gender, age, computer ownership at home, and computer experience). In order to collect data, an instrument (STATICTE) was developed by researchers and administered to 1071 science teachers almost uniformly distributed in 7 geographic regions of Turkey. In data analyses, descriptive statistics were used to describe and summarize the properties of the mass of data collected from the respondents. The results indicate that Turkish science teachers have positive attitudes toward ICT and although teachers' attitudes toward ICT do not differ regarding gender, it differs regarding age, computer ownership at home and computer experience. It is hoped that the outcomes of this study can be used in shaping innovational practices in the Turkish Educational System.

Key words: science teacher, attitudes, ICT in education.

INTRODUCTION

The integration of ICT into education has been assumed as the potential of the new technological tools to revolutionize an outmoded educational system (Albrini, 2006). In the last 20 years, initiatives, projects and implications related to use of Information and Communication Technologies (ICT) into education motivate teachers to gain necessary knowledge and skills in using ICT in their instruction. Pelgrum (2001) has noted that ICT is "not only the backbone of the Information Age, but also an important catalyst and tool for inducing educational reforms that change our students into productive knowledge workers" (p. 2).

ICT plays a critical role in information societies' educational systems. In these societies, the stakeholders of educational policy, redesign and reconstruct their educational systems based on the new educational paradigms such as constructivist theory so that both teachers and students develop the necessary knowledge and skills sought in this digital age. Hence, most countries around the world are focusing on approaches to integrate ICT in learning and teaching to improve the quality of education by emphasizing competencies such as critical thinking, decision-making, handling of dynamic situations, working as a member of a team, communicating effectively (Anderson & Weert, 2002). Also governments especially in developing countries have tried to improve their national programs to integrate ICT into education. According to Benzie (1995), national programs have not been so successful to implement ICT into educational systems because they were formulated in non-educational realms and they were not supported with educational research (Albrini, 2006).

The involvement of ICT in Turkish education policies has a very recent past. The first attempt to introduce computers to Turkish schools was done in 1984 by the initiation of a Computer-Aided Education (CAE) Project. Ministry of National Education (MoNE) aimed at spreading computer literacy and the use of computers among teachers to improve quality of learning environment. The MoNE considers the use of new technologies in education as vital and has financed number of projects for supporting the use of ICT in education. Even though, there have been some projects and attempts since 1984, the real consideration of ICT in education policies starts with "e-government" project in 2003 (Bayrakçı, 2005). With this approach, MoNE has conducted major projects some of which are: "Catching the Epoch 2000", "Improvement Project of National Education" supported by

World Bank, “Basic Education Project, Phase-I” and “MoNE Internet Access Project” (MoNE, 2007). Within the scope of these projects, 2837 technology classrooms were founded in 2451 schools and 2837 server computers, 42205 students computers, 2460 computers for teachers, 2370 administrative computers were bought. And also over 10.000 schools and 300.000 computers have been connected to Internet (MoNE, 2007). In the national policy documents, ICTs was seen as an essential part of lifelong learning in 2004 (European Commission, 2005). The main purposes of using ICT in education were management, teaching and learning facilities (European Commission, 2005). The implementation of technology into the Turkish educational system has not been taken into consideration by enough research projects. It has been observed that in most ICT implementation cases “teachers’ attitudes” have not been investigated sufficiently in the early stages. According to Rogers’s theory of diffusion of innovation, teachers’ attitudes are indispensable to the innovation-decision process (Rogers, 1995). This situation shows similarity with the other developing countries (Koochang, 1989; Selwyn, 1997; Albirini, 2006; Tella et al. 2007).

The new Turkish Science & Technology curriculum requires all science teachers to have necessary knowledge and skills not only on the issues of science, but also on technology as well. Since the tendency in favor of or against using ICT in teaching and learning strongly depends on the attitudes of science teachers, the present study aims at investigating Turkish science teachers’ attitudes toward ICT in education.

REVIEW OF THE LITERATURE

In the literature, while there are many definitions of ICT, it can be broadly defined as “technologies that facilitate, by electronic means, the acquisition, storage, processing, transmission, and disseminating of information in all forms including voice, text, data, graphics and video” (Michiels & Van Crowder, 2001; De Alcantara, 2001). This definition mainly focuses on the importance of the intersection of information technology, information content and telecommunications in enabling new forms of knowledge production and interactivity. ICT allows many people to generate and disseminate information, thus playing an active role in the process of interaction between professionals, learners, policy makers, peers and etc. (Leach, Ahmed, Makalima & Power, 2005) In the definition of the ICT in education, four main elements can be taken into consideration; ICT as an object that refers to learning about ICT, an assisting tool, a medium for teaching and learning and finally a tool for organisation and management in schools (Monnen & Kommers, 1995; SER, 1998, Pilot, 1998; cited in Jager & Lokman, 1999).

ICT has very strong effect in education and it provides enormous tools for enhancing teaching and learning. There have been many studies that have highlighted the various ways that ICT may support teaching and learning processes in a range of disciplinary fields such as the construction of new opportunities for interaction between students and knowledge; accessing information and etc. ICT can have a useful effect on teaching and learning if it is used under right conditions including suitable sources, training and support. ICT also offers the potential to meet the learning needs of individual students, to promote equal opportunity, to offer learning material, and also promote interdependence of learning among learners (Leach, Ahmed, Makalima & Power, 2005).

Roblyer and Edwards (2000) suggested that there are five important reasons for teachers to use technology in education: (1) motivation, (2) distinctive instructional abilities, (3) higher productivity of teachers, (4) essential skills for the Information Age, and (5) support for new teaching techniques (cited in, Samak, 2006). In order to use of technology in the classroom effectively, teachers’ attitude toward technology should be positive and they should be trained in using the modern technologies in the field of education. Chin and Hortin (1994) stated that the teacher clearly must act as the “change agent” in the relationship between technology and the student.

Over the past 25 years, there have been many studies in local, national and international scopes to integrate ICT in education. These studies aim to improve the effects of teacher training (Cox, Rhodes & Hall 1988), levels of resources (Cox, 1993), teachers’ pedagogies and practices (Watson, 1993), and the effects of computers on students’ achievement (Cox, Preston, & Cox, 1999; Cavas, 2005). However, the early studies in this field have ignored teacher attitudes toward computer (Harper, 1987). Recent studies indicate that teachers’ attitudes toward computers have significant implications for their behaviours in the use of computers for teaching (Davis, 1989; Francis, Katz, & Jones 2000; Kellenberger & Hendricks, 2003; Lawton & Gerschner 1982; Troutman 1991). During the process of combining ICT with education, teachers’ attitude towards using knowledge besides their talent and desire will be a crucial point affecting the results of application. The basic agent for establishing and working this system is teachers. It is argued that successful integration of ICT in education enables teachers to transform instruction from teacher-centered to student-centered where learners may interact with their peers and use the computers and Internet for their own learning needs. However, many teachers do not regard themselves

fully-equipped, comfortable and sufficient in using ICT in educational settings, and they feel more confident with their traditional teaching styles (Hawkins, 2002).

Many researchers were interested in developing reliable and comprehensive instruments to measure teachers' attitudes towards the use of computers and these scales differ in many ways in the past 25 years. Some of these instruments are: *The Attitudes Toward Computers (ATC)* (Raub, 1981), *The Attitudes Toward Computers Scale* (Reece & Gable, 1982), *The Computer Use Questionnaire* (Griswold, 1983), *The Computer Attitude Scale* (Gressard & Loyd, 1986), *The Computer Anxiety Rating Scale (CARS)* (Heinssen, Glass, & Knight, 1987), *ATSC The Attitude Toward Computer Scale* (Francis, 1993), *The Computer Attitude Measure (CAM)* (Kay, 1993), *The Computer Attitude Questionnaire (CAQ)* (Knezek & Miyashita, 1993), *The Computer Attitude Items* (Pelgrum, Janssen Reinen, & Plomp, 1993), *The Computer Attitudes Scale for Secondary Students (CASS)* (Jones & Clarke, 1994). One of the well-known instruments in this field is "Computer Attitude Scale (CAS)" and this scale was developed by Loyd & Gressard in 1984. This instrument is seen as providing an appropriate metric for assessing attitudes toward computer use by many researchers (Shapka & Ferrarib, 2003; Oosterwegel, Littleton & Light, 2004). The original version of this scale consists of three subscales, each consisting of 10 items. These subscales are: Computer Anxiety, Computer Liking, and Computer Confidence. CAS have been studied and applied in many cultures (Berberoglu & Calikoglu, 1993; Francis, Katz & Jones, 2000). Another widely used instrument in this field is Teachers' Attitudes toward Computers Questionnaire (TAC) developed by Christensen and Knezek in 1996. The major aim of this scale is to measure teachers' attitudes. The TAC was originally constructed as a 10-part composite instrument that included 284 items spanning 32 Likert subscales.

In spite of the fact that there are many studies that attempt to develop instruments for measuring teachers' attitudes toward using computers in general, only a few of them focus specifically on measuring teachers' attitudes toward the use of computers in schooling for instructional and management purposes (Bannon, Marshall, & Fluegal 1985; Allen 1986; cited in, Sadik, 2006). For example, Singapore teachers' attitudes toward using computers in schooling were assessed by Ching (1999) using Selwyn's CAS (1997). Allan and Will (2001) also measured Chinese teachers' attitudes toward the pedagogical use of computers within the theoretical framework proposed by Selwyn. These attitudes also play an important role in the effective investment in computer technology to support instruction and successful integration of computers in teaching (Lawton & Gerschner 1982 and Koohang 1989).

The literature indicates that there are no consistent results on the gender issues (Shapka & Ferrarib, 2003). While some studies suggest that male teachers tend to show slightly more favorable attitude toward computer use than do females (Dupagne, & Krendi, 1992; Ertmer, Addison, Lane, Ross, & Woods, 1999), other studies, however, report little or no differences in teacher attitudes on the basis of gender (Gressard & Loyd, 1986; Kramer, P.E., & Lehman, 1990; Woodrow, 1992; Koszalka, 2001).

For the age variable, many studies indicate that there is no significant relationship between age and attitudes (Massoud, 1991; Woodrow, 1992; Handler, 1993). However some studies address that teachers' age have important effects on the attitudes (Chio, 1992; Blankenship, 1998). A study carried out by Chio (1992) revealed that older teachers in the study had more positive attitudes toward computers, had less computer literacy than the younger teachers. Deniz (2005) determined that teachers' age was significantly related to teachers' attitudes and he reported the age of 36 as a "breaking point" for the positive attitudes of primary school teachers.

Computer experience has been the most commonly cited variable correlated to positive attitudes (Dupagne & Krendel, 1992; Woodrow, 1992; Chou 1997; Levine & Donitsa-Schmidt 1998; Ropp 1999; Yang, Mohamed, & Beyerbach, 1999; Winter, Chudoba & Gutek, 1998; Smith, Caputi & Rawstorne, 2000; Yildirim, 2000; Gaudron & Vignoli 2002). For example, Woodrow (1992) reported correlations between computer experience and attitudes toward technology. Chou (1997) also highlighted that computer experience influenced teacher attitudes toward computers. Ropp (1999) found that there is significant relationship between computer access & hours of computer use per week and computer attitudes.

The effects of computer ownerships on the teachers' perceived computer competence, concentration on improving the quality of current practice and computer attitudes have been investigated in many studies (for example: Wood, Putney & Cass, 1997; Monk, Swain, Ghrist & Riddle, 2003; Roussos, 2007; Sadik, 2006). In summary, computer ownership has been consistently correlated to attitudes toward computers and positive effects for preparing teaching and learning materials.

A considerable study about teachers' attitudes towards technology use in Turkey has been conducted by many researchers (Akkoyunlu, 1996; Altun, 2003; Asan, 2003; Bayhan, Olgun & Yelland, 2002; Cavas & Kesercioglu,

2003; Deniz, 2005; Gomleksiz, 2004). In these studies, relationships between attitude toward technology and teachers' characteristics were investigated. In Asan's (2003) study, primary teachers' perceptions and awareness level about specific technologies, and about the role of technology in education, and how they see the technological problems that are faced by basic education school systems in Turkey were investigated. The results showed that many teachers were not computer users and lacked a functional computer literacy background upon which to build new technology and skills. The study also indicated that the use of computer and related technologies was not routine part of their teaching and learning environment (Asan, 2003). Another study conducted by Cavas and Kesercioğlu (2003) aimed to investigate the science teachers' attitudes toward computer assisted learning (CAL). The results showed that the majority of science teachers had positive attitudes toward CAL and no gender difference exists between science teachers' computer-assisted learning attitudes. Altun (2003) found that pre-service teachers' cognitive styles were not affected by their attitudes toward computers. Gulbahar (2008) reported that lack of in-service training and insufficient technological infrastructures were the factors that have a significant influence on the effective use of technology by instructors. Deniz (2005) indicated that male teachers have more positive attitudes than their female counterparts. According to Akkoyunlu (1996), there was a meaningful relationship between pre-service teachers' knowledge about technology and their attitude towards technology. She also found that pre-service teachers with more information about technologies have more positive attitude towards the use of technologies in teaching and learning environments. A study carried out by Ocak & Akdemir (2008) revealed that science teachers' computer literacy level is related to their computer use. And also computer literacy level of the teachers increases their integration of computer applications in their teaching. In the study, most of the teachers use Internet, email, and educational software CDs as computer applications in the classrooms. They found statistically differences in the integration of computer applications as an instructional tool.

PURPOSE OF THE STUDY

In the light of research literature on importance of teachers' attitudes toward information and communication technologies in education, the main aim of this study was to find out Turkish primary science teachers' attitudes toward ICT in education and then explore the relationship between teachers' attitudes and other variables which are related to teachers' personal characteristics: gender, age, computer ownership at home and computer experience.

METHODOLOGY

Sampling

The target population for this study was Turkish science teachers enrolled in primary schools during the school year 2004-2005. Stratified sampling was used to obtain data from 1071 science teachers of primary. Three cities from each of seven geographic region of Turkey were selected with three levels (high, medium, low) of socio-economic status reported by Turkish State Planning Organization (<http://ekutup.dpt.gov.tr/bolgesel/gosterge/2003-05.pdf>). An official permission is attained from the Turkish MoNE and the questionnaires were officially posted to schools by the Directorate of City National Education of the selected cities. In some cities where the Directorate of City National Education was not cooperative and we had to find a responsible person to administer the questionnaires. The questionnaires were administered to 70 science teachers in each city, thus giving a total sample of 1470 primary science teachers for this study. A total of 1071 questionnaires (giving a return rate of 80 %) were returned from either the responsible person or the Directorate of City National Education to be used in data analysis.

Instrument

The survey instrument was developed by the researchers after an extensive review of literature and scales used in different educational backgrounds guided by the theoretical base of the study. This instrument was sent to seven experts who were working in the field of ICT in education in different Turkish universities to determine its face and content validity. The instrument was improved in the light of the feedback from these experts. A pilot study was conducted with 151 volunteer science teachers to establish its internal consistency and reliability. After analyzing the data resulting from the pilot study, three items were removed from the instrument. The final instrument consists of three parts. The first part, which consist 23 questions, focuses on the demographic information about science teachers including gender, age, length of teaching experience, school type, etc. The second part consists of 11 questions related to using computers and teachers' experience with ICT. The last part is the Science Teachers' Attitudes toward ICT in Education (STATICTE) scale with 31 Likert-type items (Likert, 1932) developed to measure attitudes of science teachers toward ICT in education. This scale consists of two subscales which are "Effect of ICT on Teaching and Learning" and "Obstacles to ICT Implementation". In order to determine reliability of the STATICTE instrument, Cronbach alpha coefficients were calculated and are as shown in Table1.

Table 1. Cronbach's-alpha reliability for the scales

Subscale	Scale Label	N	A	Mean
1	Effect of ICT on Teaching and Learning	20	0.92	4.20
2	Obstacles to ICT Implementation	11	0.79	3.73
	Total	31	0.91	4.04

Data Analysis

The data were analyzed via SPSS 13.0 for Windows. Descriptive statistics were used to describe and summarize the properties of the mass of data collected from the respondents. Parametric statistics like ANOVA and t-test pair-wise comparison were conducted to analyze any differences between teachers' attitudes and other dependent variables. A level of 0.05 was established a priori for determining statistical significance

Factor Analysis

The 31-item scale was designed to measure science teachers' attitudes toward ICT. The subjects were asked to respond using a five-point scale (strongly agree, agree, neutral, disagree, and strongly disagree). The score 1 represented the option "strongly disagree" while score 5 on the scale represented the category "strongly agree". 11 of the items were negatively worded and the rest were positively worded. For the analysis of the data, all negatively worded items were reversed so that a higher numbered response on the Likert scale would represent positive attitudes.

The 31 items of the attitude scale was analyzed using principal component analysis (PCA) method from SPSS. Prior to performing PCA, the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser-Meyer-Olkin value was 0.95, exceeding the recommend value of 0.6 and the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix. An inspection of the scree plot revealed a clear break after the second component. Using Catell's (1966) scree test, it was decided to retain two components for further investigation. To aid in the interpretation of these two components, Quartimax rotation was performed. The two factor solution explained a total of 39.7 % of the variance, with Factor 1 contributing 29 % and Factor 2 contributing 10.7.

The data revealed that Turkish science teachers have a favorable attitude towards ICT ($M=4.04$). The teachers agreed with the 20 positively statements about the effect of ICT on teaching and learning statements (e.g. "I believe that the students will be more interested in the courses that are implemented with ICT", "I believe that audio-visual tools enhance the learning permanence"). They disagreed with all 11 "negative" value statements (e.g. "I think that the usage of ICT restricts the creativity of the students", "The usage of ICT in the courses brings too much overload"). Science teachers got highest scores from Effect of ICT on Teaching and Learning factor ($M=4.20$) and moderately high from Obstacles to Implementation of ICT factor ($M=3.73$). Detailed results are summarized in Table 2. All items indicate largely positive attitudes toward the use of ICT in education.

Table 2. Descriptive Statistics, Factor Loadings and Item-Total Correlations of STATICTE Scale

Factors	Items	Mean	SD	Factor Loadings	Correlations
F1	1.	4.4439	.6460	.548	.4607
	3.	4.2653	.7558	.674	.5664
	4.	4.3988	.7193	.676	.5833
	8.	4.2560	.6940	.692	.6179
	9.	4.4243	.6787	.664	.5568
	10.	4.3546	.6911	.783	.6697
	11.	4.2032	.7906	.722	.6409
	12.	4.2968	.6636	.776	.6500
	13.	4.3112	.7392	.653	.5930
	15.	4.2015	.7637	.655	.5812
	18.	4.4260	.7273	.594	.5172
	19.	3.7806	.9540	.458	.3683
	20.	4.2679	.7030	.595	.5284
	23.	4.0306	.7293	.658	.6091
	24.	4.2764	.6724	.726	.6510
	25.	4.0009	.7790	.647	.6022
	27.	4.0867	.7212	.666	.5983
	28.	3.7764	1.0503	.452	.3284

	29.	4.1488	.7246	.686	.6082
	30.	4.0808	.7986	.516	.4445
	2. *	3.4490	1.0896	475	.3551
	5. *	3.7959	1.0376	493	.3518
	6. *	3.4592	1.0232	604	.3458
	7. *	3.7696	1.0316	613	.4541
	14. *	3.9549	.9740	521	.4848
F2	16. *	3.9014	1.0049	557	.2971
	17. *	3.7160	1.0102	503	.4647
	21. *	4.0153	.9325	537	.4658
	22. *	3.7364	1.1864	414	.2537
	26. *	3.7509	.9580	565	.4545
	31. *	3.5111	.9614	553	.4738

Note: * Represent negative items.

FINDINGS

One of the objectives of this study was to describe the demographic characteristics of science teachers. These characteristics are presented Table 3. As seen in Table 3, almost half (41.6%) of the teachers' ages change between 26-35 and over half are male. 71.7% of these teachers possessed the bachelor's degree while only 6.1 hold master's degree. Almost all (85 %) of the science teachers instructed in the state schools. Only 7.5 % of the teachers have administrative duty in their schools.

Table 3. Characteristics of the participants

	%
Gender	
Male	56.9
Female	43.1
Ages	
Less than 25	13.9
26-35	41.6
36-45	20
46 and above	24.1
School type	
Private	6
State	85
Other	3
Years of teaching experience	
Less than 4	22.9
5-9	21.4
10-14	24.1
15-19	6
20 and above	24.7
Highest Degree Held	
Bachelors (graduated from faculty of education)	48.3
Bachelors (graduated from other faculties like science)	23.4
Masters	6.1
Institutions of Education(two- or three-year higher education institutions)	21.6
Administrative duty in the school	
Yes	7.5
No	90.7

The second aim for this study was to investigate the science teachers' ICT experiences. Nearly half of the science teachers have attended in-service training regarding ICT; 84 % of them have shown willingness to participate if an ICT training course was to be organized; 63 % of the teachers have computer laboratories in their schools; 48% of them use computers in their courses. Although almost half of the teachers felt confident in using tools such as Word, PowerPoint and Excel, the figure falls to about 20% in using graphic programs such as Paint, Photoshop, etc. Most teachers had access to the Internet from their homes (52%) and from their schools (53%) while 61.8% of the teachers had e-mail addresses and 8 % of them had their own web pages.

An independent sample t-test was conducted to compare the mean scores of Factor 1, Factor 2 and overall attitude by gender (male vs. female teachers). As seen in Table 4, there were no significant differences between females' and males' mean scores of F1, F2 and STATICTE.

Table 4. Independent-samples t-test: Attitudes towards ICT by Gender

Scales	Gender	N	Mean	SD	t	P
F1*	Male	507	4.17	0.458	-1.774	.076
	Female	664	4.22	0.499		
F2*	Male	507	3.73	0.552	0.65	.234
	Female	664	3.74	0.576		
Overall Attitude	Male	507	4.02	0.439	-1.191	.948
	Female	664	4.05	0.459		

* Subscales, F1= Effect of ICT on Teaching and Learning, F2=Obstacles to ICT Implementation

A one-way between-groups analysis of variance was conducted to explore the impact of age on levels of attitudes towards ICT and results are presented in table 5. Subjects were divided into three groups according to their age (Group 1: 20 to 35; Group 2: 36 to 49; Group 3: 50 and above). Means and standard deviations comparing Science Teachers' ages are shown at Table 6.

Table 5. Means and Standard Deviations Comparing Science Teachers' Ages

Age	N	F1 Mean	SD	F2 Mean	SD	Overall Attitude Mean	SD
20-35	654	4.23	.445	3.78	.536	4.07	.426
36-49	443	4.17	.528	3.67	.636	3.99	.480
50-+	75	4.15	.508	3.68	.614	3.98	.463
Total	1172	4.21	.482	3.73	.583	4.04	.451

As it can be seen from Table 6, there was statistically significant difference at the $p < .05$ level in total attitude and F2 subscale scores for the three age groups. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 1 was significantly different from Group 2 and Group 3 regarding F2 and overall attitude. However it was not found any difference in F1 scores regarding teachers' age.

Table 6. Comparisons Science Teachers' Mean Scores According to Their Ages

Scales	df	SS	MS	F	P	Significant difference
F1						
Between groups	2	1.164	.582	2.51	.082	-
Within groups	1169	271.564	.232			
Total	1171	272.728				
F2						
Between groups	2	3.286	1.643	4.87	.008	20-35/36-49 20-35/50+
Within groups	1169	394.593	.338			
Total	1171	397.879				
Overall Attitude						
Between groups	2	1.766	.883	4.37	.013	20-35/36-49 20-35/50+
Within groups	1169	236.238	.202			
Total	1171	238.004				

An independent-samples t-test was conducted to compare science teachers' attitudes towards ICT by computer ownership at home. As seen in Table 7, there was significant difference in scores for computer ownership and non-computer ownership. For the factors, we found significant difference in Factor 1 whereas we did not find any significant difference in Factor 2. The magnitude of the differences in the means was small (eta squared=.01). It also means, only 1 percent of the variance in attitudes is explained by computer ownership.

Table 7. Independent-samples t-test: Attitudes towards ICT by Computer Ownership at home

Scales	Ownership	N	Mean	SD	t	P
F1*	Yes	845	4.24	.476	4.175	.000**
	No	315	4.11	.488		
F2*	Yes	845	3.74	.585	1.522	.128
	No	315	3.69	.581		
Overall Attitude	Yes	845	4.06	.445	3.593	.000**
	No	315	3.96	.456		

* Subscales, F1= Effect of ICT on Teaching and Learning, F2=Obstacles to ICT Implementation, ** $p < 0.05$

ANOVA test were used to analyze the differences between computer experience groups and their ICT attitudes. Computer experience scores were categorized into four groups: Group 1: 0-1 years; Group 2: 1-3 years; Group 3: 3-5 years and Group 4: 5 years and up. Means and standard deviations comparing Science Teachers' computer experiences are shown at Table 8.

Table 8. Means and Standard Deviations Comparing Science Teachers' Computer Experience

Computer Experience	N	F1 Mean	SD	F2 Mean	SD	Overall Attitude Mean	SD
0-1 Years	124	4.16	.419	3.59	.559	3.96	.394
1-3 Years	325	4.19	.429	3.71	.584	4.02	.398
3-5 Years	280	4.21	.499	3.70	.568	4.03	.463
5 Years and up	321	4.28	.484	3.86	.588	4.13	.469
Total	1050	4.22	.465	3.74	.584	4.05	.441

Comparisons of Science Teachers' mean scores according to computer experience are shown at Table 9. There was statistically significant difference at the $p < .05$ level in STATICTE and F2 scores for the four groups. Despite reaching statistical significance, the actual difference in mean scores between the groups was quite small. The effect size, calculated using eta squared, was .02. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 4 was significantly different from Group 1, Group 2 and Group 3. The results showed that teachers' computer experience affected ICT attitudes.

Table 9. Comparisons Science Teachers' Mean Scores According to Computer Experience

Scales	df	SS	MS	F	P	Significant difference
F1						
Between groups	3	1.848	.616	2.855	.056	
Within groups	1046	225.667	.216			
Total	1049	227.525				
F2						
Between groups	3	8.556	2.852	8.536	.000	0-1 / 5-+
Within groups	1046	349.486	.334			1-3 / 5-+
Total	1049	358.041				3-5 / 5-+
Overall Attitude						
Between groups	3	3.667	1.222	6.365	.000	0-1 / 5-+
Within groups	1046	200.838	.192			1-3 / 5-+
Total	1049	204.505				3-5 / 5-+

CONCLUSIONS AND RECOMMENDATIONS

In this study, we investigated the Turkish science teachers' ICT experiences, attitudes toward ICT and relationships between teachers' attitudes and the selected variables such as gender, age, computer ownership and computer experiences.

In many studies, "computer experience" has been found as an important factor for influencing teachers' instructional computer use (Asan, 2002; Braak, 2001; Jenson, Lewis, & Smith, 2002; Zhao & Cziko, 2001, Sahin & Thompson, 2006). Teachers' computer knowledge and experience are especially important for effective usage of ICT in their classroom. Because, generative learning begins at the knowledge stage of diffusion, which is the first stage (Rogers, 1983, p. 165). In the present study, approximately 80 percent of science teachers were at least 1-3-years computer user. This result can be interpreted that most science teachers have enough experience in computer use and they can be expected to adopt computer technologies into their instruction.

The results of the study showed that almost half of the Turkish science teachers use computers in their courses and they had high levels of computer access, especially in their school and at their homes. Computer access in classrooms is important for the successful adoption of computers in using instructional purposes (Sahin & Thompson, 2006; Tella et al, 2007). According to Medlin (2001) and Surendra (2001), the accessibility and availability of computers was an important factor affecting the use of computers for instructional purposes. Rogers (2003) indicated that trialability and observability are the two attributes of an innovation that might increase the rate of adoption of innovations. If science teachers are aware of computer technologies and have opportunity to access computers, their level of using technology in their courses might be rise.

According to Loyd & Gressard (1986), positive attitudes towards computers are positively correlated with teachers' extent of experience with computer technology (cited in Christensen, 2002). This result could be anticipated due to the importance placed on the use of technology in all parts of our life. Several studies conducted in other countries also found similar findings about teachers' attitudes toward ICT in education (Albirini, 2006; Sadik, 2006; Samak, 2006; Yunus, 2007). In our study, almost all Turkish science teachers have showed positive attitudes toward ICT in education. This situation can be explained by the fact that almost 65% of the Turkish primary science teachers consist of young individuals who are below the age of 35. One might expect that younger teachers will be open to the use of ICT and have experienced ICT during their education. Although there seems some problems with using ICT in classrooms like insufficient ICT tools, teachers' lack of computer confidence in teaching (Asan, 2003) and etc. teachers' positive attitudes are promising for Turkey

The science teachers reported that they (almost half of them) had enough opportunity to attend in-service training related to use of ICT in classroom. It is the responsibility of administration to provide school with a social environment that includes these attributes of innovations. The science teachers (83% of them) reported that they would like to attend a course related to ICT in education. This outcome is a kind of important point for Rogers' (2003) trialability and observability attributes of innovations. The findings revealed the need for training in the integration of technology in curriculum.

The findings of the study revealed no significant differences between ICT attitudes of Turkish science teachers in terms of gender. This would suggest that male and female science teachers in Turkey have the same perception about the use of ICT in education. There are some research reports that bring to light gender differences in ICT attitudes (Shapkaa & Ferrarib, 2003). While some studies have found no gender differences in attitudes towards computers (Gressard & Loyd, 1986; Woodrow, 1992), the results of other studies found that females manifested higher levels of anxiety in relation to computers than males (Sadik, 2005; Samak, 2006). According to North & Noyes (2002), using ICT tools is widely perceived as a masculine activity and their research provided evidence for a linkage between gender and technophobia (cited in, Samak, 2006). Female teachers have been found to be more anxious and less confident computer users in most of the studies. In addition, male teachers have been found to have more prior experience with computers and to be much more likely to implement computer use in their classrooms than female teachers.

In the research literature, there are different findings from different studies in terms of teachers' attitudes and teachers' age. For example, while some studies found that there is no significant relationship between teacher's age and attitudes (Massoud, 1991; Woodrow, 1992 & Handler, 1993), other studies found that teachers' ages have critical effects on the teachers' attitudes (Chio, 1992; Blankenship, 1998). In our study, statistically significant difference was found between teachers' age and attitudes. Young Turkish science teachers in the group 1 (age group:20-35) have more positive attitudes and significantly differ than the teachers in other groups (36-49 / 50- +). The mean scores of the science teachers gained from Effect of ICT on Teaching and Learning subscale does not significantly differ with their ages. This result can be an indicator that all science teachers aware of the importance of ICT usage in teaching and learning environments. However, Chio (1992) shown that old teachers have more positive attitudes toward computer use in education than young teachers but he found that young teachers are more computer literate people than the old teachers. Deniz (2005) has also found that the age of 36 is the breaking point for the positive attitudes of primary school teachers. We consider the fact that science teachers in Turkey are coming from a young population as an important factor in the outcome of their positive attitudes towards the use of ICT in the classrooms.

There are many studies that investigate the relationship between teachers' personal computer ownership and various variables. According to Wood, Putney & Cass (1997) study, computer ownership and access to computers were the best predictors of perceived computer competence. Monk, Swain, Ghrist & Riddle (2003) found that Egyptian teachers with personal computers have tended to concentrate on improving the quality of current practice, through better preparation and student testing, rather than introducing major, paradigmatic,

changes to their teaching. Roussos (2007) found that computer ownership had a significant effect on the participants' computer attitudes. In particular, significant differences were evident for those who owned a computer in terms of positive computer attitudes. In the Sadik's study (2006), it is found that the majority of the Egyptian teachers did not own a computer and for this reason, high usage of computers for low-level purposes (such as word processing and playing audio records) was seen. In our study, we found that the Turkish science teachers who own computers had more positive attitudes than those that did not.

In the literature, positive correlations have been shown between various computer experiences and attitudes (Dupagne & Krendel, 1992; Levine & Donitsa-Schmidt 1998; Winter, Chudoba & Gutek, 1998; Smith, Caputi & Rawstorne, 2000; Yıldırım, 2000; Gaudron & Vignoli 2002). According to Gardner, Dukes & Discenza (1993), computers can play important role to reduce computer anxiety which is seen as a teacher resistance to integrate ICT in teaching and learning environment. Yang, Mohamed, & Beyerbach (1999) searched the relationship among computer experience and various demographic variables, specifically learning style, age, gender, ethnicity/culture, subject area, educational level, and type of school. They found that teachers' negative attitudes towards computers change after receiving formal training about computer use (Dupagne & Krendel, 1992; Koohang, 1987). In our study, we found that science teachers' attitudes toward ICT differs with computer experience and prior computer experience is one of the important factors that effects teachers attitudes toward ICT in education. We also found that teachers in the fourth group (5 years and up) have more positive attitudes than the teachers in the other groups.

Using ICT in education should not be understood as using it as a tool to transfer instructional material and rehearsal but as a medium for learning, discovering, sharing and creating knowledge. However, the infrastructure issues are given more importance than in improving learning and teaching (Becta, 2008) and often investment are done in the latest technologies without considering the target group's needs and interests (Albirini, 2006; Usun, 2004). Being the prime actors in implementing ICT in learning and teaching, teachers should be in the center of attention. They should be involved in all stages of the implementation and meanwhile be assured that this approach is advantageous over the previous one, is compatible with their teaching practices and they will be given any technical help and training. As a consequence of integrating ICT in education a change is expected to occur in the style of teaching and learning as noted by Harris et al (2002) "... it is not necessarily the technology that has to be innovative, but the approach to teaching and learning must be" (p. 35). For this to be realized the teachers must be supported with instructional materials and teaching models. Courses related to instructional technologies at the faculties of education should be re-constructed and made compulsory. Finally, further researches that specifically use qualitative methods are needed to validate and elaborate quantitative findings. We think that this study will enlighten projects developed by the Ministry of Education in order to use ICT in education besides expecting it to serve as a reference for different studies in this field.

ACKNOWLEDGEMENTS

This study was funded by The Scientific and Technical Research Council of Turkey (SOBAG-104K034) and Ege University, Science and Technology Application and Research Center (2005/BIL/027).

REFERENCES

- Akkoyunlu, B. (1996) Öğrencilerin bilgisayara karşı tutumları. *Eğitim ve Bilim*. 20(1), 15-29.
- Albirini, A. (2006) Teachers' attitudes toward information and communication technologies: the case of Syrian EFL teachers. *Computers and Education*, 47(4), 373–398
- Allan, Y., Will, M. (2001). Teachers' computer attitudes: Factors influencing the instructional use of computers. Paper presented at the International Conference on Computers in Education, Seoul, Korea.
- Altun, A. (2003) Öğretmen adaylarının bilişsel stilleri ile bilgisayara yönelik tutumları arasındaki ilişkinin incelenmesi. *The Turkish Online Journal of Educational Technology*. 2(1), Retrieved from www.tojet.net
- Altun, T. (2007). Information And Communications Technology (ICT) In Initial Teacher Education: What Can Turkey Learn From Range of International Perspectives? *Journal of Turkish Science Education*, 4 (2), 45-60.
- Anderson, J., Weert, V, T. (2002). *Information and Communication Technology in Education. A Curriculum for schools and Programme of Teacher Development*. Division of Higher Education. UNESCO.
- Asan, A. (2002). Preservice teachers use of technology to create instructional materials: A school-college partnership. *Journal of information Technology for Teacher Education* 11(2), 217–232.
- Asan, A. (2003) Computer Technology Awareness by Elementary School Teachers: A Case Study from Turkey. *Journal of Information Technology Education*. 2, 150-163.
- Bayhan, P., Olgun P. & Yelland, J. N. (2002). A study of pre-school teachers' thoughts about computer-assisted instruction, *Contemporary Issues in Early Childhood*, 3(2), 298-303.

- Bayrakçı, M. (2005). Avrupa Birliği ve Türkiye Eğitim Politikalarında Bilgi ve İletişim Teknolojileri ve Mevcut Uygulamalar. Retrieved from <http://yayim.meb.gov.tr/dergiler/167/index3-bayrakci.htm>
- Becta, (2008). Harnessing Technology Review 2008: The role of technology and its impact on education, BEC1-15587. Retrieved: <http://publications.becta.org.uk/display.cfm?resID=38751&page=1835>
- Berberoglu, G., and G. Calikoglu. (1993). Factorial validity of the Turkish Computer Attitude Scale. *Studies in Educational Evaluation* 19(3), 257-63.
- Blankenship, S. E. (1998). Factors related to computer use by teachers in classroom instruction. Doctoral Dissertation, Virginia Polytechnic Institute and State University.
- Braak, J.V. (2001). Individual characteristics influencing teachers' class use of computers. *Journal of Educational Computing Research*, 25(2), 141-157.
- Cagiltay, K., Cakiroglu, J., Cagiltay, N. and Cakiroglu, E. (2001). Teachers' perspectives about the use of computers in education. *Hacettepe Universitesi Egitim Fakultesi Dergisi*, 21, 19-28.
- Catell, R.B. (1966). The scree test for the number of factors. *Multivariate behavioral research*, 1, 245-276.
- Cavas, B. (2005) Designing Learning Environment Integrated with Technology. Unpublished Doctoral Thesis. Institute of Educational Sciences, Dokuz Eylul University.
- Cavas, B. and Kesercioglu, T. (2003). Primary Science Teachers' Attitudes toward Computer Assisted Learning. *Ege Journal of Education*, 3(2), 35-43.
- Ching, O. (1999). *Assessment of staff attitudes towards computers and its implications on the use of IT in school*. Suntec City, Singapore: Ministry of Education.
- Chio, Y. K. (1992). Attitudes toward and knowledge of microcomputers used for instruction among commercial high school teachers in Korea. Unpublished EDD dissertation. University of Georgia. AAT 9316322.
- Chou, T. R. (1997). The relationships among computer usage, experience with the computer, computer anxiety, and attitudes toward computers for secondary agricultural education teachers in the United States. Mississippi State University: Dissertation.
- Christensen, R. (1998). Effect of Technology Integration Education on the Attitudes of Teachers and their Students. Doctoral dissertation, University of North Texas. Retrieved from <http://www.tcet.unt.edu/research/dissert/rhondac>.
- Christensen, R. (2002). Effect of Technology Integration Education on the Attitudes of Teachers and their Students. *Journal of Research on Technology in Education*, 34 (4), 411-433.
- Christensen, R. and Knezek, G. (1996) Constructing the Teachers' Attitudes Toward Computers (TAC) Questionnaire. (ERIC Document Reproduction Service No. ED398244).
- Cox, M.J., Preston, C., and Cox, K. (1999) What Motivates Teachers to use ICT? Paper presented at the British Educational Research Association Conference. Brighton. September
- Davis, D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly* 13 (3): 319-40.
- Deniz, L. (2005). İlköğretim Okullarında Görev Yapan Sınıf ve Alan Öğretmenlerinin Bilgisayar Tutumları. *The Turkish Online Journal of Educational Technology*. 4(4). Retrieved from www.tojet.net
- Dupagne, M., and Krendel, K. A. (1992). Teachers' attitudes towards computers: A review of literature. *Journal of Research on Computing in Education*, 24(3), 420-429.
- European Commission (2005) "Implementing the Education and Training 2010 Work Programme". European Commission. Retrieved: http://europa.eu.int/comm/education/news/what/index_en.html
- Francis, J. (1993). Measuring attitude toward computers among undergraduate college students: The affective domain. *Computers and Education*, 20(3), 251-55.
- Francis, L., Y. Katz, and S. Jones. (2000). The reliability and validity of the Hebrew version of the Computer Attitude Scale. *Computers and Education*, 35(2), 149-59.
- Gardner, D. G., Dukes, R. L. and Discenza, R. (1993). Computer Use, Self-Confidence and Attitudes: A Causal Analysis. *Computers in Human Behavior*. 9(3), 427-440.
- Gaudron J.-P. and Vignoli E. (2002) Assessing computer anxiety with the interaction model of anxiety: development and validation of the computer anxiety trait subscale. *Computers in Human Behavior* 18, 315-325.
- Gomleksiz, M. N. (2004). Use of education technology in English classes. *The Turkish Online Journal of Educational Technology*. 3(2). Retrieved from www.tojet.net
- Gressard, C. P., and Loyd, B. H. (1986). Validation studies of a new computer attitude scale. *Association for Educational Data Systems Journal*, 18, 295-301.
- Griswold, P. A. (1983). Some determinants of computer awareness among education majors. *Association for Educational Data Systems Journal*, 16(2), 92-103.
- Gulbahar, Y. (2008). ICT Usage in Higher Education: A Case Study on Preservice Teachers and Instructors. *The Turkish Online Journal of Educational Technology*. 7(1). Retrieved from www.tojet.net
- Handler, M.G. (1993). Preparing new teachers to use computer technology: Perceptions and suggestions for teacher educators. *Computer Education*, 20(2), 147-156.

- Harper, D. O. (1987). The creation and development of educational computer technology. In R. M. Thomas, and V. N. Kobayashi (Eds.), *Educational technology – its creation, development and cross-cultural transfer* (pp. 35–64). Oxford: Pergamon Press.
- Harris, S., Kington, A., Lee, B. (2001) ICT and innovative pedagogy: examples from case studies in two schools collected as part of the Second Information Technology in Education Study (SITES) in England. British Educational Research Association Annual Conference, University of Leeds.
- Hawkins, R. (2002) Ten Lessons for ICT and Education in the Developing World. World Links for Development Program The World Bank Institute. 38-43
- Heinssen, R. K., Jr., Glass, C. R., and Knight, L. A. (1987). Assessing computer anxiety: Development and validation of the computer anxiety rating scale. *Computers in Human Behavior*, 3, 49-59.
- Jager, A.K., Lokman, A.H. (1999) Impacts of ICT in education. The role of the teacher and teacher training. European Conference on Educational Research, Lahti, Finland 22 - 25 September 1999
- Jenson, J., Lewis, B., & Smith, R. (2002). No one way: Working models for teachers' professional development. *Journal of Technology and Teacher Education*. 10(4), 481–496.
- Jones, T., and Clarke, V. A. (1994). A computer attitude scale for secondary students. *Computers Education*, 22(4), 315–318.
- Kay, R.H. (1993). An exploration of theoretical and practical foundations for assessing attitudes toward computers: The computer attitude measure (CAM). *Computers in Human Behavior*, 9, 371-386.
- Kellenberger, D., and S. Hendricks. (2003). Predicting teachers' computer use for own needs, teaching, and student learning. Paper presented at Hawaii International Conference on Education,
- Knezek, G., Miyashita, K. (1993). Handbook for the Young Children's Computer Inventory. Denton, TX: Texas Center for Educational Technology.
- Koohang, A. (1989). A study of attitudes toward computers: Anxiety, confidence, liking and perception of usefulness. *Journal of Research on Computing in Education* 22(2), 137-50.
- Koohang, A. A. (1987). A study of the attitudes of pre-service teachers towards the use of computers. *Educational Communication and Technology Journal*, 35(3), 145-149.
- Lawton, J., and T. Gerschner. (1982). A review of the literature on attitudes towards computers and computerized instruction. *Journal of Research and Development in Education* 16(1), 50-55.
- Levine T. and Donitsa-Schmidt S. (1998) Computer use, confidence, attitudes and knowledge: a causal analysis. *Computers in Human Behavior* 14, 125–146.
- Likert, R.A. (1932) A Technique for the measurement of attitudes. *Archives of Psychology*, 140, 1-55.
- Loyd, H., and P. Gressard. (1984). Reliability and factorial validity of computer attitude scales. *Educational and Psychological Management*. 44, 501-505.
- Massoud, S. L. (1991). Computer attitudes and computer knowledge of adult students. *Journal of Educational Computing Research*, 7(3), 269-291.
- Medlin, B.D. (2001). The factors that may influence a faculty member's decision to adopt electronic technologies in instruction (Doctoral dissertation, Virginia Polytechnic Institute and State University, 2001). *ProQuest DigitalDissertations*. (UMI No. AAT 3095210).
- Michiels, S.I. and Van Crowder, L. (2001). *Discovering the "Magic Box": Local appropriation of information and communication technologies (ICTs)*. Sustainable development Department, Food and Agriculture Organisation of the United Nations (FAO).
- MoNE (2007) MEB İnternete Erişim Projesi. Retrieved: http://www.meb.gov.tr/ADSL/adsl_index.html
- Monk, M., Swain, J., Ghrist, M., Riddle, W. (2003) Notes on Classroom Practice and the Ownership and Use of Personal Computers Amongst Egyptian Science and Mathematics Teachers. *Education and Information Technologies*, 8(1).
- Ocak, M. A. and Akdemir, O. (2008). An Investigation of Primary School Science Teachers' Use of Computer Applications. *The Turkish Online Journal of Educational Technology*, 7(4), Retrieved from www.tojet.net
- Oosterwegel, A., K. Littleton, and P. Light. (2004). Understanding computer-related attitudes through an idiographic analysis of gender- and self-representations. *Learning and Instruction* 14(2), 215-33.
- Pelgrum, W.J., Janssen Reinen, I.A.M, Plomp, Tj (1993). Schools, teachers, students, and computers: A Cross-national perspective. Twente, Netherlands: I.E.A.
- Raub, A. C. (1981). Correlates of computer anxiety in college students. Unpublished doctoral dissertation, University of Pennsylvania, Philadelphia.
- Reece, J., and K. Gable (1982). The development and validation of a measure of general attitudes toward computers. *Educational and Psychological Measurement* 42, 913-916.
- Rogers, E. M. (1983). *Diffusion of innovations* (3rd ed.). New York; London: Free Press
- Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York; London: Free Press
- Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.). New York, London: Free Press
- Ropp, M. M. (1999). Exploring individual characteristics associated with learning to use computers in preservice teacher preparation. *Journal of Research on Computing in Education*, 31(4), 402-425.

- Roussos, P. (2007) The Greek computer attitudes scale: construction and assessment of psychometric properties. *Computers in Human Behavior*. 23(1), 578-590
- Sadik, A. (2005). Factors influencing teachers' attitudes towards personal use and schools use of computers: New evidence from a developing nation. *Evaluation Review*, 2(1), 1-29.
- Sadik, A. (2006) Factors Influencing Teachers' Attitudes toward Personal use and school Use of Computers New Evidence From A Developing Nation, *Evaluation Review*, 30(1), 86-113
- Sahin, I. and A. Thompson (2006). "Using Rogers' Theory to Interpret Instructional Computer Use by COE Faculty." *Journal of Research on Technology in Education*. 39(1), 81-104.
- Samak, Z. A. (2006) An Exploration of Jordanian English Language Teachers' attitudes, Skills, and Access As Indicator of Information and Communication Technology Integration in Jordan. Unpublished Doctoral Thesis. Florida State University.
- Selwyn, N. (1997). Students' attitudes toward computers: Validation of a computer attitude scale for 16-19 education. *Computer and Education* 28(1), 35-41.
- Shapkaa, J., and M. Ferrarib (2003). Computer-related attitudes and actions teacher candidates. *Computers in Human Behavior* 19(3), 319-34.
- Smith B., Caputi P. and Rawstorne P. (2000) Differentiating computer experience and attitudes toward computers: an empirical investigation. *Computers in Human Behavior* 16, 59–81.
- Surendra, S. S. (2001). Acceptance of Web technology-based education by professors and administrators of a college of applied arts and technology in Ontario (Doctoral dissertation, University of Toronto, 2001). *ProQuest DigitalDissertations*. (UMI No. AAT NQ58603).
- Tella, Adeyinka., Tella, Adedeji., Toyobo, O.M., Adika, L.O., Adeyinka, A.A. (2007). An Assessment of Secondary School Teachers Uses of ICT's: Implications for further Development of ICT's Use in Nigerian Secondary Schools. *The Turkish Online Journal of Educational Technology*. 6(3). Retrieved from www.tojet.net
- Troutman, A. 1991. Attitudes toward personal and school use of computers. *Technology and Teacher Education Annual* 284-87.
- Usun, S. (2004) Factors Affecting the Application of Information and Communication Technologies (ICT) in Distance Education. *Turkish Online Journal of Distance Education*, 5(1), Retrieved: <http://tojde.anadolu.edu.tr/tojde13/articles/usun.html>
- Watson, D.M. (Ed.) (1993) *IMPACT - An evaluation of the IMPACT of the Information Technology on Children's Achievements in Primary and Secondary Schools*. King's College London
- Winter S., Chudoba K. and Gutek B. (1998) Attitudes toward computers: when do they predict computer use? *Information and Management* 34, 275–284.
- Wood, T. L., P, D., Cass, M. A. (1997) Accessibility: The Main Factor Influencing Special Education Teachers' Perceived Level of Computer Competence. *Journal of Computing in Teacher Education*, 13(4), 20-24.
- Woodrow, J. E. (1992), The influence of programming training on the computer literacy and attitudes of pre-service teachers. *Journal of Research on Computing in Education*, 25(2), 200-218.
- Yang, H. H., Mohamad, D. A., and Beyerbach, B. A. (1999). An investigation on computer anxiety among vocational-technical teachers. *Journal of Industrial Teacher Education*, 37, 64-72.
- Yildirim, S. (2000). Effects of an educational computing course on pre-service and inservice teachers: A discussion and analysis of attitudes and use. *Journal of Research on computing in Education*, 3, 479-495.
- Yunus, M. M. (2007). Malaysian ESL teachers' use of ICT in their classrooms: expectations and realities. *ReCALL*, 19(1), 79-95.
- Zhao, Y., & Cziko, G. A. (2001). Teacher adoption of technology: A perceptual-control-theory perspective. *Technology and Teacher Education* 9(1), 5–30.

ACTION PLAN ON COMMUNICATION PRACTICES: ROLES OF TUTORS AT EMU DISTANCE EDUCATION INSTITUTE TO OVERCOME SOCIAL BARRIERS IN CONSTRUCTING KNOWLEDGE

Fahriye A. AKSAL

Educational Sciences Department, Faculty of Education,
Eastern Mediterranean University
fahriye.altinay@emu.edu.tr

ABSTRACT

The research involved an action plan for the improvement of the quality of the Distance Education Institute of Eastern Mediterranean University and based on EUA norms. This research is part of a work based learning process to enhance the contribution of online pedagogy and teaching process for online tutors. The research aimed to stress the importance of communication process and investigate roles of tutors in facilitating communication to overcome social barriers in constructing knowledge in online learning-teaching process. The research has an inductive nature and an action research approach was employed to change professional practices through collaborative activities. Therefore, focus group, trainings, in-depth interviews, and research diary were used as data collection techniques in this qualitative research. Content analysis was implemented to triangulate the data. The research results revealed that tutors were novices in online pedagogy and they had no prior knowledge on the importance of communication and socialization to help students construct knowledge in their learning process. The research puts forward an in-depth understanding on how to teach online courses based on Salmon's five stage model through the action research activities. The work-based project provided change and development which contributed to the professional development of the tutors in online pedagogy. As online pedagogy is one of the critical factors to reach out quality improvements, the research puts forward to filling the gap on the roles of tutors in facilitating communication to construct knowledge by practical and collaborative work of the professionals. In this respect, researcher and the participants gained reward of the professional learning and experiences from the learning cycle of the participatory action research.

KEYWORDS: communication, online pedagogy, roles, work based project

1. INTRODUCTION

As the quality refers having product or service differentiation within a competitive environment, higher education institutions need to be involved in quality improvements by service differentiation to gain competitive advantage. Higher education institutions have started to use distance education practices as an innovative approach by expanding their capacity and relations with multicultural, external environments to gain reputation. In this regard, distance education practices become popular for the universities who need to extend its capacity and standards inline with global agenda. As these practices have an impact on innovation and quality in higher education, there is intensified need to consider distance education institutes' performances by its both pedagogical and organizational aspects. In respect to worthwhile reality on the status of distance education institutes, proposing change-oriented actions for the development of working practice is crucial. Therefore, professional studies through work based projects put an emphasis for high-level practical action, resulting in significant change or development in an organization or community of practice (Lester, 2004). In this respect, bringing knowledge and practice in the workplace empowers the development of institutions. These practical action efforts help institutions to establish a culture of organizational learning. As action learning is types of work based learning styles as an educational strategy, it is used in a group setting to generate learning from human interaction arising from engagement in the solution of real-time work problems (Raelin, 2008).

The knowledge age is characterized by challenge and change. The impact of technology takes human beings in competitive arena and necessitates adapting the changes by increasing capacity to know and to do things for catching quality. Technology links people around, the globe is pulled together. Therefore human thought and actions change from the global, competitive, technological developments and shifted to the combination of flexible, lifelong learning (Roes, 2001). By these changes, education characterizes its future in the way of being interactive, real time, on-demand, learner-centered, authentic and learner constructed events (Simonson, Smaldino, Albright, Zuacek, 2003). Universities have started to practice online learning and teaching in order to reach the contemporary standards of education context by the notions of quality.

In this respect, European University Association unites all educational institutions based on particular norms in order to be in harmonic picture for quality outcomes. Regarding the norms of EUA, universities has started to put forward distance education practices based on change and development. Therefore, action learning types of

work based projects are gained importance to reach out understanding on social construction of institutions based on change and development.

Quality is viewed as “transformative”, in terms of a qualitative change or form, to include cognitive transcendence, where in education is believed to be an ongoing process of transformation that includes empowerment and enhancement of the customer (Sahney, Banwet, Karunes, 2004). In this case, implementation of online learning and teaching practices is one of the crucial factors to gain value addition in educational institutions. Innovations of communication and information technology provide potential benefits on the practices of online learning and teaching in the education context.

The dynamic and interactive aspects of quality in education refer to quality education that educational cultures characterized by increased customer satisfaction through continuous improvement in which all employees and students actively participate. The continuous improvement by the dynamic and interactive aspects of quality in education relies on facilitating communication networks. Developing a culture within educational institutions is strongly related to the amount of communication and the manner in which this communication is exercised by the involvements of participants. Therefore, constructive communication climate is essential which refers to the atmosphere in an organization regarding accepted communication behaviour by focusing on information flow. Based on description of communication climate within educational institutions, it is to be expected that constructive communication climate will positively influence knowledge sharing and the construction of knowledge (Srikanthan, Dalrymple, 2004). As learner satisfaction based on their active participation is one of the proposed instruments to catch the quality, therefore it is crucial to examine satisfaction in e-learning by considering communication facilitation.

Communication plays an important role for the changes in the teaching, and learning experiences. Increasingly, changes in information technology and communication make the clear stance of distance education. It requires learning about teaching and learning in the online (Meyer, 2002). As online education relies on the acquisition of knowledge and skills through mediated information and instruction, it encompasses all technologies and supports the pursuit of life long learning (Gilbert 2001). The study of Tynjala, Hakkinen (2005) examines the importance of the developing innovative pedagogical practices by the efforts of engaging in deeper level learning and interaction. The increasing focus of creating powerful learning and communication environment by integrating collaborative learning makes the significance of the dialogue. Researches examine the challenges as the lack of personalization, the lack of collaboration, interactivity. The study enlightens to enhance both individual and organizational learning and the development of e-learning solutions by stressing the support both individual reflection and collaborative knowledge building, the integration of theoretical knowledge with participants' experience, encouragement of collaboration and knowledge exchange between different group of people and having a real dialogue (Tynjala, Hakkinen, 2005).

Online education is defined as an approach to learning and teaching that utilizes new technology to communicate and collaborate in an educational context (Piezon, Donaldson, 2005). The process of online communication enables the learners to actively construct their own perspectives which they can communicate to a small group. Learners engage in active, constructive, intentional, authentic and collaborative learning. Enabling the groups to socially construct knowledge through communicating and collaborating with others is an important element of constructivist-based online learning and teaching (Meyer, 2002).

Therefore, facilitating communication among participants in an online learning environment raises the importance of considering the capacity of the learning management to support interaction between and among learners and tutors to foster a collaborative approach to learning. In fact, the role of the tutor changes from transferring knowledge to students to being a facilitator in the students' construction of their own knowledge (Fung, 2004).

Engaging students in online communication has been the focus of many studies in the recent decade (Prammanee, 2003; Bryun, 2004; Hodgkinson, Mostert, 2005). Describing why this is so important, Harasim et al, (1995, p 29) say: “Active participation strengthens learning. Putting ideas or information into written form requires intellectual effort and generally aids comprehension and retention”. Hiltz (1994) concurs and argues that although students may derive some benefit from simply reading materials online, engaging students in online communication can only provide its full potential benefits if students actively contribute to a group learning experience. She also warns that “active participation is an objective that may be difficult to elicit from all students.”

The question of how to effectively engage students in online activities is complex and as not yet well understood (Mason, 2002). Investigating online interactions in three undergraduate courses in a university in Seoul, South Korea, Jung et al (2002, p 160) found evidence supporting the popular belief that ‘small-group activities are important in WBI [web-based instruction] to enhance learning motivation’. They found that the cohort involved in collaborative interaction ‘expressed the highest level of satisfaction with their learning process.’ The studies of Teles, Ashton, Roberts, Tzoneva (2001), Liu, Lin, Wang (2003), Sims (2003) also found that facilitating communication is a crucial success factor in order to enhance collaborative online learning that computer-supported collaborative learning allows students to become active and reflective learners. However, collaborative learning is a matter to make students comfortable with the teaching environment in online courses.

There are many studies in the literature highlighting the emerging importance of tutors in creating active and collaborative learning environments (Coppola, Hiltz, Rotter, 2002; Easton, 2003; Lim, Cheah, 2003; Sims, 2003; Pan, Sullivan, 2005). Laurillard (2002) says of computer-mediated communication CMC that ‘the pedagogical benefits of the medium rest entirely on how successfully it maintains a dialogue between tutor and students, or between students. This is determined to a great extent by the role the tutor plays’ (2002, p 148).

Indeed, this is the central point of Salmon’s (2002) book, *E-Moderating*. Laurillard (2002, p. 151) summarizes

‘With the appropriate planning and moderating, text-based computer conferencing offers and opportunity for articulation and for reflection on participants’ contributions, and helps to build a sense of a scholarly community. The success is totally dependent on a good moderator’

There are studies which emphasize the importance of student and tutor interaction in online learning (Swan, 2002; Prammanee, 2003; Bryun, 2004; Hodgkinson, Mostert, 2005). Webb, Jones, Barker and Schaik (2004) argue that e-learning dialogues between students and teachers enhance student participation and learning. Fung (2004) advocates that tutors facilitate students’ construction of their own knowledge through interaction. Although considerable researches have been devoted to understand the key roles of tutors in online learning (Teles, Ashton, Roberts, Tzoneva, 2001; Maor, 2003; Packham, Jones, Thomas, Miller, 2006), less attention has been paid to the role of tutors within online learning and teaching in facilitating communication to overcome social barriers for the enhancement of collaborative online learning.

As Salmon (2002) has framed the roles for online tutors which are understanding of the online process, technical skills, online communication and moderation skills, content expert, confidence and motivation to teach online, adopting these new roles is essential to catch quality online education regarding to facilitating communication to overcome social barriers and enhancing to construct knowledge for students (Salmon, 2002). This is, however, a field of research that has yet to produce further insights into the role of tutors in facilitating communication (between themselves and among students), overcoming social barriers in constructing knowledge.

The social interaction provides great insights for the development of distance education institutes in order to enhance quality in online learning and teaching (Srikanthan, Dalrymple, 2004; Frahm, 2006). In this respect, it is therefore important to learn continuously to become more dynamic in an adapted manner by concentrating on the consciousness and roles of tutors in facilitating communication. As EUA report put emphasis on the changes on distance education practices of Distance Education Institute by conducting research projects in the context of Eastern Mediterranean University, this work based project focuses on action learning process for enhancing teaching practice of online tutors. In this respect, it is significant to consider the roles of tutors to overcome social barriers in constructing knowledge through work-based project in order to contribute better working practice at work context.

2. AIM OF THE RESEARCH

Work based research projects are the formats of preferences to establish an appropriate organizational culture. They enable process of organizational learning through change and actions. Through this way, knowledge transfer and competence development are enhanced (Railen, 2008). Educational institutions have practiced a process of organizational learning based on EUA norms through research projects. This work based research project aimed to investigate the impact of communication practices within organizational change and development in distance education institute at Eastern Mediterranean University which is the innovative and strategic unit of higher education to reach out quality and global standards. Significantly, the main aim of research project was to create an action plan for the development of Distance Education Institute based on European University Association Standards by focusing on the roles of tutors in facilitating communication to overcome social barriers in constructing knowledge.

As Distance Education Institute's practices need to be enhanced, in this project, current roles of the online tutors and changes on the roles after the training based on participatory action research were examined. Further to this, the impact of social presence and facilitation role of the tutor in the construction of knowledge was explored within the research. In this respect, the research process provided to develop working practice and at the same time academic agenda could gain insights from proposed action plan and process.

The research was significant by aiming to reach the following listed objectives;

- ✓ To provide in gaining awareness on the relevance of communication, organizational climate in Distance Education Institute and online learning and teaching in order to focus on social interaction
- ✓ To provide trainings on the roles of tutors and create a consciousness on their roles in online learning and teaching process
- ✓ To enhance online socialization of students by overcoming social barriers
- ✓ To increase professional development of tutors on how to teach online courses.
- ✓ To create an organizational culture to Distance Education Institute by focusing on communication practices between tutors and among students

2.1 Research focus and questions

As Distance Education Institute puts an emphasis on change and development based on European University Association norms, this work based research project became a part of action plan for the quality improvement. In this respect, this work based project focuses on exploring the awareness of Distance Education Institute about relevancy of communication flow within organization and investigating the roles of tutors in facilitating communication in order to construct knowledge within online learning-teaching process. The following research questions were framed to reach out focus of research project depending on work based project and action research cycle.

1. To what extend, does Distance Education Institute perform relevant communication flow as an organizational climate within organization?
2. To what extend, do online tutors have awareness on their roles in online learning-teaching process?
3. To what extend, do online tutors perform their roles within online learning and teaching process?
4. How do tutors facilitate online socialization for active participation in constructing knowledge?
5. What roles do tutors play in facilitating communication in collaborating learning to overcome social barriers and thus contributing to construct the knowledge?

2.2 Research Context

Eastern Mediterranean University is a state university, established in 1979. Eastern Mediterranean University offers programs fully recognized by Council of Higher Education in Turkey. The University owns unprecedented campus facilities, and creates a multicultural environment with students coming from 68 countries and highly qualified faculty members from 35 different nations. There was a rapid growth of the university that strives to be a pioneering force with all its innovative ideas. EMU initiated a series of university wide reforms aimed at developing its quality to the highest European standards in all area from research, learning, and academic programs, to management structures; at broadening and increasing its work in the service of and increasing its work in the service of local and regional development and quality. Eastern Mediterranean University prepared action plans within their institutions for its development. According to report of EUA, capacity for change of the Eastern Mediterranean University has stressed and major suggestions as actions were underlined for the institutional development of the university. The review team considered especially important for EMU to develop a university-wide research policy by defining the areas where research efforts should be concentrated. Especially EUA report stressed the importance of distance education. Conducting research projects about the developments of distance education practices becomes crucial to accomplish priority of strategic planning of the university. Therefore, this work based project was one of the research projects that is taken place in Distance Education Institute by stressing the communication and also in pedagogical implication in how to teach online courses for the benefits of tutors, institution and the university in relation to the requirements of EUA standards.

2.3. Limitations

Although the research had the following limitations, the researcher successfully managed process to achieve research outcome that provide success in working practice.

- The research was conducted to Eastern Mediterranean University Distance Education Institute in 2008-2009 Academic Year.
- Being worker researcher created challenge to manage huge work loads within the research process.

- Participants had no prior knowledge and experience on online pedagogy which covers roles of tutors and online socialization.
- There were fourteen members as volunteer participants involved in research process.
- Researcher and participants involved in participatory action research as it was the first experience for the researcher and the participants.
- Within the research process, participatory action research covered series of activities that focus group, in-depth interviews, trainings, and the research diary were used as multiple data collection techniques.

3. METHOD

3.1 Research Design

The research project was involved in generating meanings, the collaboration of participants and the researcher by being familiar with context, subject, the inductive process throughout research that represented the project's nature in order to change policies in tutor roles' within online pedagogy for best working practices in distance education institute. Conducting research in educational practice which is united in the purpose of getting people to learn for institutional development and knowledge encapsulates professional practice of teachers as researchers as an instrumental activity in order to manage a situation, guide certain aims within educational institutions. As educational practices grasp a group of people to improve practices for the development and maintenance of institutional knowledge, understanding the interpretation of people which they give of what they are doing is important (Cohen, Manion, Morrison, 2000). Therefore, filtering the experiences of people by point out the importance of subjective interpretations for change oriented actions becomes heart of work based practices by inductive emphasis.

Qualitative research entails anti-positivist tradition by focusing on inductive process on research that emphasized subjectivity where there is personal involvement of the researcher. Qualitative research genres have become increasingly important modes of inquiry for the social sciences and applied fields such as education, social work, community development and management that is pragmatic, interpretive and ground in the lived experiences of people (Silverman, 2000).

As a qualitative research design deploy wide range of interconnected interpretive practices, it is justified to use this side of coin in this work based project in order to reflect sensitivity to the value of multi-method approach by being committed to the naturalistic perspective and to the interpretive understanding of human experience. In this respect, answering the question of "how social experience is created and given meaning emphasize the justification of using qualitative research design in this work based project as being practitioner researcher (Denzin, Lincoln, 2003). By the inductive reasoning based on qualitative research design, project aims to put an emphasis on development of online tutors in online teaching and enhance communication flow.

3.2 Research Approach

Action research approach was employed in this work based project as it allows the researcher to use as a method in setting where a problem involving people, tasks and procedures cries out for solution, or where some change of feature results in more desirable outcome. Action research is used as an evaluative tool, which can assist in self-evaluation for an individual or an institution (Johnson, 2002; Mills, 2003). It was thought that action research approach would make an environment of improving the rationality and justice of professional practices within self-reflective, self-critical context that relies on improving practice (Lomax, 1996). In addition, it is the tool to bring theory and practice for change and innovation (Cotton, Griffiths, 2007). As action research is the professional development process aiming to change professional practices through collaborative activities, intervention, group support and collection assessment (Whitehead, 2005; Williams, 2007). In this respect, action research was chosen in this work based research project to promote action learning within work based learning process of the research in order to broaden online tutors views on online pedagogy within online teaching process.

As action research approach is socially responsive, it is a popular method of professional development for teachers to improve the quality of teaching, learning process in specific work context, it was appropriate approach for this project through aiming at creating action plan for the development of Distance Education Institute based on European University Association Standards by focusing on the roles of tutors in facilitating communication to overcome social barriers. It was the relevant approach to improve institute's and colleague's practices within learning process which is finding a starting point, clarifying situation, developing action strategies, making teachers' knowledge public. As the Eastern Mediterranean University has its quality mission within its practices, considering the significance of distance education with the quality mission of university became apparent by the report of European University Association. Therefore, revamping the distance education practices of Distance Education Institute through online courses development and considering its organizational

structure became rationale stance of work based project. As the nature of this inquiry relies on organizational change and providing new actions about new approaches on the pedagogical sides of online education to online tutors and institution as a group of people, phenomenological stances of critical theory and interpretive paradigms with action research approach became essential for the research process. Conducting research to the group of people by using trainings in order to transform new knowledge to their pedagogical knowledge and to shape their behaviours through collaboration provided clear cut on research paradigm.

The focus of work based project and its actions are framed that research focus is about creating an action plan for the development of Distance Education Institute based on European University Association Standards. It was the participatory action research process to identify and change the working practices. Ledwith (2007) proposed emancipatory action research as it is participatory, critical reflective process for change. It is the experiential, practical process which is the alternative approach to investigate work context aiming at improvement (Beatty, et al., 2008; Moore, 2004; Williams, 2007).

3.3 Participants

Fourteen tutors participated to the research project to establish change and development for Distance Education Institute through action learning process. Director of Tourism Hospitality and Management, five tutors from the School of Tourism Hospitality and Management, five tutors from English Preparatory School, one tutor from Economics Department, one tutor from Architecture Department, and one tutor from General Education Department became research participants. They participated to the research voluntarily that purposive sampling was used in the research project.

3.4 Data Collection Techniques

Capturing the rich complexity of social situations relies on anti-positivist arguments. It mounts necessity to discover “details of the situations to understand reality or perhaps a reality working behind them (Saunders, Lewis, Thornhill, 2000). As qualitative research design focuses on interpretive, dense, rich data through human experiences within a pragmatic, constructive manner, employing multiple research techniques provides researcher to realize same phenomenon in different stand points (Denzin, Lincoln, 2003). Action research approach provides an environment of collectivity in the way of change and actions. Therefore, the action researcher takes an activist, critical and emancipatory stance to gain different views from different participants to set reflections on the action research (Marshall, Rossman, 1999; Mills, 2003). In this respect, having reliable and valid results in the research could be enhanced through multiple qualitative data collection techniques and triangulation based on inductive reasoning (Bogdan, Biklen, 1992; Denzin, Lincoln, 2003; Fraenkel, Wallen, 2000).

The data collection techniques chosen for work based project were focus groups, in-depth interview, trainings which all of these techniques were considered to be relevant to gain dense information about each action of research. Although using multiple data collection techniques provides rich and dense information about investigated research focus, each source of information from each action in the research provides to examine alternative interpretations of phenomenon by incorporating different forms of evidences from different actions.

3.5 Data Analysis

Data analysis is the systematic elicitation process of incorporating the mass of collected data. Undertaking data collection and analysis in a systematic and well-planned manner, it is able to analyze data rigorously and to draw verifiable conclusions (Denzin, Lincoln, 2003; Marshall, Rossman, 1999).

Altinay, Paraskevas (2008) stated qualitative data analysis as:

“it is the conceptual interpretation of the dataset as a whole, using specific analytic strategies to convert the raw data into logical description and explanation of the phenomenon” (Altinay, Paraskevas, 2008, p.167).

As the roots of research project was stance on qualitative inquiry based on inductive reasoning based on meanings expressed through words, experiences, collected data was interpreted in inductive nature by the use of conceptualization and researcher’s categorization (Bogdan, Biklen, 1992; Denzin, Lincoln, 2003; Marshall, Rossman, 1999).

It was considered that action research improves quality of human interaction, is participatory which is methodologically eclectic by seeking to understand the process of change within system and using feedback from data in an ongoing cyclical process (Cohen, Manion, Morrison, 2000). Therefore collected data were

managed through triangulation that worker as researcher had a sufficient knowledge about qualitative analysis to consider data organization, theme development and interpretation (Saunders, Lewis, Thornhill, 2003). Researcher as worker has balanced efficiency consideration and design flexibility by focusing on series of action and data collection techniques in this project in order to reflect valid and reliable findings (Marshall, Rossman, 1999). This research project had series of actions that different forms of qualitative data were gathered from constructed feasible actions by multiple data collection techniques within research process. As triangulation is the classic sense of seeking convergence of results, it was considered to manage collected qualitative data to complement weaknesses of each data collection technique. In other words, worker researcher used data triangulation to better comprehend a phenomenon of being explored.

The multiple data collection techniques and triangulation were shaped with the nature of work-based project. Management and analysis of qualitative data process from multiple data collection techniques were accomplished using content analysis. As content analysis is the research tool used to determine the presence of certain words or concepts within texts or sets of texts in relation to the focus. Within inductive approach to a qualitative data analysis, coding, conceptualization and ordering were undertaken in this research project. Researcher as worker categorized the themes of each action in order to conceptualize and order collected data. Therefore, conceptual analysis was employed in this project in relation to themes of each action. Conceptual analysis can be seen as identifying in a text the existence and the frequency of concepts, whether in simple words or in phrases. In this type of analysis, researcher choose a concept for examination and then looks at the documents which researcher has available for analysis in order to identify the occurrence of terms related to this concept.

3.6 Ethics

Qualities that make a successful qualitative researcher are revealed through sensitivity to the ethical issues. The researcher's role within research process became essential that researcher enters into the lives of participants and share participants' experiences. Therefore, stressing researcher's role by technical and interpersonal considerations enhances the degree of trust, access in the research. Having time to focus issues, considering resources are not enough to be qualitative researcher that qualitative researcher needs to be active, patient, thoughtful listener, have emphatic understanding and respect (Hubbard, Power, 1993).

In this respect, ethics in work based project is crucial that there is an intensified need to concentrate on conditions and guarantees proffered for school based research project. In this project, the principles which are remaining anonymous, treating with the strictest confidentiality, verifying statements when the research draft form, submitting final copy of final report, benefiting report to school were the initial considerations before making research into practice. Feedback was guaranteed by researcher in order to increase confidentiality and building trust between researcher and participants.

4. RESEARCH FINDINGS

4.1 Interpretations of Research Activities

In this qualitative research, participatory action research was employed to promote change in working practices as an inductive process in relation to deliberate research activities. Research findings revealed that participatory action research as work-based project has significant role to propose change and development on the roles of tutors in facilitating communication to overcome social barriers in constructing knowledge during online learning process. The large amount of data was obtained from research activities that are focus group, trainings, in-depth interviews and the research diary. Gathered data was triangulated to increase the credibility of the findings.

In an inductive process, research firstly aimed to explore to what extend Distance Education Institute perform relevant communication flow as one of the element of organizational climate within organization. In this respect, focus group activity was implemented and fourteen participants as three focus groups voluntarily participated to the process. This activity revealed that tutors had no experience efficient communication flow within the institute. Focus group activity also provided to gain awareness on the importance of communication within work context.

Furthermore, in-depth interviews were conducted to online tutors to explore to what extend online tutors have awareness on their roles and perform their roles in online learning-teaching process. In other words, it was aimed to explore consciousness of tutors on online pedagogy, online socialization in online teaching-learning process. Twelve online tutors voluntarily became part of the in-depth interviews. In-depth interview findings showed that tutors are novice on how to teach online courses. In this respect, trainings were implemented to fourteen online tutors in order to extend their knowledge on online pedagogy, roles and online socialization for better learning

and construction of knowledge. Through the training feedback forms, tutors reported that training was the significant activity to internalize online pedagogy and Salmon Five Stage Model (See Appendix A). This activity also provided to involve in collegial activities through negotiation and discussion on the process thereby increased awareness on being critical friends for their professional growth. After the training, there was an action process to integrate gained knowledge and experience into practice. The research process and activities revealed that work-based project became efficient to reach out expected research outcome. The researcher diary confirmed the research outcomes that can be listed as different tutors from different departments and backgrounds gained pedagogical knowledge and reflection about online education; tutors gained consciousness on the roles through training thereby increase their personal and professional development; collaboration and negotiation were created among online tutors in order to develop their collegiality and critical friendship for organizational knowledge and development; strong communication flow was established within Distance Education Institute to create an organizational climate; process enhanced quality mission of the Eastern Mediterranean University regarding the Distance Education Institute practices based European University Association; project became beneficial to working context and it could be shared with other working practices.

4.2 Self-Evaluation on Action Research

Action research is an approach that relies on commitment, collaboration and actions for change. In this respect, work based learning and work based project can be enhanced and richness by action research practices. It is an approach that makes researcher and its context to be engaged with ongoing process and supports the development of research contexts. In this work based research project, action research was chosen to empower professional development of online tutors on online pedagogy and put emphasis on the role of communication in having organizational climate. As this work based research project supported the strategic plan of the Distance Education Institute based on EUA standards, research project became a part of action plan of the institute. Therefore, several activities were set for the work based research project that was aimed to make better working practice. While making effort to create better working practice through action research, researcher gained reflections on how to be a worker and researcher at the same time. Experience from action research practice provided work based learning through activities that learning by doing was enhanced.

During the research process, the researcher is involved series of activities (See Appendix B). Each activity made memorable experience for the researcher that both theoretical and practice knowledge on research methodology were renewed. Although researcher became a leader in action research, having different responsibilities in the research made a challenge on causing stress. Making mutual understanding also made the essential success factors in action research. Therefore, researcher made good flow of communication with the key players in the research. By the action research practice, researcher experienced various data collection techniques that all of them provided to construct knowledge. For example, in the implementation of focus group activity, managing cultural barrier of research participants enhanced the ability of researcher in crisis management, managing events and dialogues. On the other hand, empathic perceptions were used as researcher in order to understand others and interpret worlds of others. This perception was used to implement action research activities in a coherent way.

Action research provided to realize how significant to interpret “two plus two equals to five” that synergy in activities and among researcher and participants played great role to achieve research’s goal and objectives. Experiencing the action research process empowered the belief of life long learning and professional development of research. As action research practice provided advantages to researcher, it also made significant support to research participants. Research participants gained insights on how to teach online course through training and other activities that they learnt to negotiate and communicate with their colleagues and students. They enhanced their reflections for their professional developments.

Being researcher in action research provided great insights to interpret how to be worker researcher. It became a real sense of insider researcher by having responsibility to make better working practice. Researcher became self-reflective, persuasive, critical friend for colleagues, guide for students that negotiation, communication were enhanced. Further to this, researcher conducted professional study to extend professional knowledge and construct organizational knowledge to others. The abilities of setting priorities, reflection, managing time and networking were provide by being action researcher. Moreover, the researcher enhanced project and time management skills that scheduling events, being strategic were the basis of success for work based learning in this work based project.

5. CONCLUSION

The research aimed to investigate the role of the tutors in facilitating communication and active participation to construct knowledge in online learning and teaching process at Eastern Mediterranean University. The research regarding to research focus proposed collaborative, change oriented actions for the development of the working practice in distance education institute. In this respect, participatory action research was employed for the research project which confirmed the change and development in online pedagogy for better working practice.

The research project mainly covered investigation on the impact of communication practices as one of the critical element of the organisational climate for organizational change and development. In respect to this broader aim of the project, the research put forward to quality improvements that distance education institute is the innovative and strategic unit of university to reach out quality and global standards. In relation to that worthwhile reality, current roles of the online tutors and changes on the roles through participatory action research were examined. Additionally, the impact of social presence and facilitation role of the tutor in the construction of knowledge were explored within the study. Thereby, research provided to develop working practice and give insights to academic agenda that action plan and work based projects help higher education institutions improve their performances for the quality. In this respect, project covered to implement action plan for the development of Distance Education Institute based on European University Association Standards by focusing on the roles of tutors in facilitating communication to overcome social barriers in constructing knowledge. The research is significant with its action plan which provided success on creating awareness on the relevance of communication, organizational climate in Distance Education Institute; gaining insights on the roles of tutors in online learning and teaching process; enhancing online socialization of students by overcoming social barriers; creating an organizational culture to Distance Education Institute by focusing on communication practices between tutors and among students.

Higher education institutions have started to work on quality improvements by considering service differentiation to gain competitive advantage within competitive environment. In this respect, online education practices and the distance education institutes become innovative approach to expand service capacity and reach out multicultural and external environments to increase the reputation of the institution. Therefore, proposing change oriented actions for both pedagogical and organisational aspects of online education practices become inevitable to have better working practice and act for the quality (Sahney, Banwet, Karunes, 2004; McPherson, Nunes, 2006). This research project provided practical implementation on change and development within distance education institute regarding to online pedagogy for better working practice.

Developing a culture within work context is strongly based on the communication, the knowledge sharing and the interaction of the members. In this respect, it is significant to exercise communication and interaction within work environment to propose better working practice and contribute professional learning of each others. In other words, constructive communication flow in organisations positively influence knowledge sharing and better performance of the work (Srikanthan, Dalrymple, 2004). In this regard, this research project covered creating awareness on the importance of communication for knowledge sharing in better performance, thus increasing collegiality among institute's members. Therefore, focus group activity helped examine the awareness of the tutors as members of the institute about the role of communication and the dimensions of the organisational climate in better working practice as a base line measurement. This activity showed that tutors had no in-depth understanding and practice on communication within the work context that they gained in-depth insights on this focus through focus group activity based on negotiation and discussions. In other words, this activity provided them knowledge transfer and construction on the importance of communication within working practice.

Communication and the facilitation play also an important role in online learning and teaching process (Meyer, 2002). For deep level learning and interaction of the students in online context, considering innovative pedagogical practices is crucial (Gilbert, 2001; Tynjala, Hakkinen, 2005). In this respect, creating powerful learning and communication environment in online education through collaborative knowledge building, interactive learning and facilitation of the tutors becomes significant dialogues in academic agenda. As online education is an approach to learning and teaching that utilizes new technology to communicate and collaborate for constructing knowledge, the process of online communication need to help learners actively construct knowledge in small group through the facilitation of the tutors (Piezon, Donaldson, 2005). Leading and facilitating the groups to socially construct knowledge through communicating and collaborating with others is an critical success factor of the online pedagogy which propose a step for the quality in online learning and teaching (Meyer, 2002).

Therefore, facilitating communication among participants in an online learning environment raises the importance of considering the effective online pedagogy regarding to roles of the tutors in online socialisation and learning process (Fung, 2004). There are many studies in the literature highlighting the emerging importance of tutors in creating active and collaborative learning environments to help students construct knowledge by considering online socialisation (Coppola, Hiltz, Rotter, 2002; Salmon, 2002, Easton, 2003; Maor, 2003; Lim, Cheah, 2003; Pan, Sullivan, 2005). Additionally, Salmon (2002) has framed the roles for online tutors in online process as technical skills, online communication and moderation skills, content expert, confidence and motivation to teach online which these are essential to facilitate communication to overcome social barriers in enhancing construction of knowledge for students. Also, Salmon (2002) propose five stage model in online pedagogy that are access and motivation; online socialisation; information exchange; knowledge construction; development in order to create active and productive learning and teaching environment. Furthermore, Berge (1999), Maor (2003), Bryun (2004) provided a theoretical framework to the research by putting the emphasis on online communication, tutoring and social presence through defining the role of the tutors by simple metaphor as four hats including pedagogical, social, managerial and technical roles. This is, however, this research that has yet to produce further insights into the role of tutors in facilitating communication (between themselves and among students), overcoming social barriers in constructing knowledge by practical work.

In this research project, in-depth interviews were conducted to the tutors in order to explore the consciousness of the tutors on online pedagogy and their roles. This showed that tutors had no preliminary knowledge and sufficient experience on online pedagogy, roles. Furthermore, trainings on online pedagogy and the practice of the roles contributed tutors to internalize their roles and pedagogy. After the training, action process provided to practice transferred knowledge from the training. Researcher diary and the process showed the outcome of the research that tutors gained insights on online pedagogy, practiced their roles as managerial, technical, pedagogical and social. In addition, they promoted online socialisation and facilitation to the students which resulted in satisfaction and better learning of the students. Significantly, tutors demonstrated the practice of the Salmon's five stage model that contributed best practice on online pedagogy.

Regarding to participatory action research process, this research project resulted in success for change and development on online pedagogy. At the end of the project, different tutors from different departments and backgrounds gained pedagogical knowledge and reflection about online education, have consciousness on the roles of online tutors. In addition, collaboration and negotiation created among online tutors that help develop their collegiality and critical friendship for organizational knowledge and development. In a broader sense, the quality mission of the Eastern Mediterranean University regarding the Distance Education Institute practices based European University Association was reached out.

In summary, the research project revealed following conclusions:

- Communication in institute: Tutors gained in-depth insights on the importance of communication and knowledge sharing which this established collegial activities among them. In addition, tutors intensively interpreted the dimensions of the organisational climate in research process that contributed them to increase their professional learning on constructive communication and knowledge sharing for organisational change and development.
- The roles of tutor: Tutors internalized and practiced their managerial, pedagogical, social and technical roles in online learning and teaching process. They learned how to teach online courses by having deeper understanding on online pedagogy.
- Online socialisation: Tutors acted to promote online socialisation for students through group works and reflective activities to prevent social barriers in constructing knowledge.
- Facilitation: Tutors reflected facilitator role which promoted active participation to the course and resulted in constructing knowledge and satisfaction of the students.

Participatory action research is the stance of the research project that researcher and the tutors work together to promote better working practice. In this action learning process, research covered critical activities which help achieve success on the research. In this regard, participatory action research was implemented that bring brilliant achievements on how to teach online course and how to internalize online pedagogy based on practical work (See Appendix B).

5.1 Some Analytical Generalizations

In relation to conclusions of the research project and insights from the participatory action, some analytical generalizations can be listed as following:

- Participatory action research contributes to change and development in working practice regarding to the roles of tutors in facilitating communication and active participation to construct knowledge. At the same time, it provides collegiality between participants which contributes professional development.
- The online education practices are the innovation strategy of the higher education institutions for quality improvements.
- Communication has great role to construct organisational climate within working practice.
- Online pedagogy is the critical success factor of the online education to reach out quality.
- Tutors need to attend regular trainings, seminars and conferences on online pedagogy to extend their knowledge and experiences.
- Tutors need to pay attention to social barrier which may create challenge in constructing knowledge.
- There are four hats metaphor that tutors need to perform pedagogical, managerial, social and technical roles in a harmony to help students construct knowledge in online courses.
- In online learning and teaching process, access and motivation; online socialization; information exchange; knowledge construction; development are the essential steps.
- In online learning and teaching process, students need to be encouraged for active participation by tutors as facilitators.
- Tutors need to develop learning community and encourage group discussions for constructing knowledge and online socialization.
- In facilitation, tutors need to have appropriate questioning, listening and feedback skills, the ability to provide direction and support to learners, the ability to manage online discussion, ability to build online teams, a capacity for relationship building and ability to motivate students.
- Preparing learning support agreement with students contributes to build trust between tutor and the students.
- Asking learning community expectations increase the quality of the online course.
- Thinking development process of the students through discussions, negotiations and group works is relevant for the assessment in online courses.

6. MAJOR IMPLICATIONS

The research aimed to investigate the roles of online tutors in facilitating communication and active participation to construct knowledge within online teaching and learning process. In relation to that focus, it is significant by putting emphasis on change oriented actions by participatory action research for better working practice. As the online pedagogy is one of the critical factors to reach out quality improvements within online practices, the research puts forward to filling the gap on the roles of tutors in facilitating communication and active participation to construct knowledge by practical and collaborative work of the professionals. In this respect, it is the best practical work that researcher and the participants gained reward of the professional learning and experiences from the learning cycle of the participatory action research that resulted in success. In addition, research opens an academic debate on implementing practical work as participatory action research for online pedagogy and practices quality improvements which best practice models could be shared with other higher education institutions.

6.1 Implications for Practice

- Research put forward to that participatory action research is a significant research approach to propose change and development for better working practice.
- The research project helped participants gain in-depth insights on pedagogical and organizational developments within online education for quality.
- The research process provided participants to gain consciousness on dimensions of organizational climate.
- Research participants gained in-depth insights on online pedagogy.
- Research participants extended their knowledge and experience on how to teach online courses by having awareness on the roles and online socialization.
- Research participants gained reward from action learning as professional learning and experiences.

6.2 Implications for Further Researches

- For further studies, social barriers and online socialization could be investigated as research focus within specific context.
- Comparative case study could be implemented in further research to do comparison on the roles of tutors from different institutes.
- In addition, mixed approach could be used to complement disadvantages of qualitative and quantitative research design for the validity and reliability of the research.

ACKNOWLEDGEMENTS

Work based research project was funded by Ministry of Education. I would like to thank to Dr. David Officer for his guidance within research process for the Doctorate of Professional Studies Programme at Middlesex University. In addition, I would like to thank Distance Education Institute of Eastern Mediterranean University, online tutors as research participants, consultants who voluntarily participated to this research.

REFERENCES

- Altinay, L., Parakevas, A. (2008). *Planning research in hospitality and tourism*. Oxford: Elsevier.
- Beatty, R., Bedford, J., et al. (2008). Recording action research in a classroom: singing with chickadees. *Educational Action Research*, 16(3), 335-345.
- Berge, Z. (1995). The role of the online instructor/facilitator. *Educational Technology*, 35(1), 22-30.
- Bogdan, R., C., Biklen, S., K. (1992). *Qualitative research for education*. Boston: Allyn and Bacon.
- Bruyn, L. L. (2004). Monitoring online communication: Can the development of convergence and social presence indicate an interactive learning environment? *Distance Education*, 25(1), 67-81.
- Cohen, L., Manion, L. & Morrison, K. (2000). *Research methods in education*. London: RoutledgeFalmer.
- Coppola, N. W., Hiltz, S.R., Rotter, N.G. (2002). Becoming a virtual professor: Pedagogical roles and asynchronous learning networks. *Journal of Management Information Systems*, 18(4), 169-189.
- Cotton, T., Griffiths, M. (2007). Action research, stories and practical philosophy. *Educational Action Research*, 15(4), 545-561.
- Denzin, N. K., Lincoln, Y. S. (2003). *Collecting and interpreting qualitative materials*. London: SAGE.
- Easton, S. (2003). Clarifying the instructors' role in online distance learning. *Communication Media*, 52(2), 87-105.
- Fraenkel, J. R., Wallen, N. E. (2000). *How to design & evaluate research in education*. Boston: McGraw-Hill.
- Frahm, J. (2006). Developing communicative competencies for a learning organization. *Journal of Management Development*, 25 (3), 201-212.
- Fung, Y. H. Y. (2004). Collaborative online learning: interaction patterns and limiting factors. *Open Learning*, 19(2), 135-149.
- Gilbert, S. D. (2001). *How to be successful online student?* San Francisco: McGraw-Hill.
- Hiltz, S. R. 1994. *The virtual classroom: learning without limits via computer networks*. Norwood NJ: Ablex.
- Hodgkinson, C., M., Mostert, M. (2005). Online debating to encourage student participation in online learning environments: A qualitative case study at a South African University. *International Journal of Education and Development using Information and Communication Technology*, 1(2), 94-104.
- Hubbard, R. S., Power, B. M. (1993). *The art of classroom inquiry*. USA: Heinemann.
- Johnson, A. P. (2002). *A short guide to action research*. Boston: Allyn & Bacon.
- Jung, I., Choi, S., Lim, C. & Leem, J. (2002). 'Effects of Different Types of Instruction on Learning Achievement, Satisfaction and Participation in Web-Based Instruction', *Innovations in Education and Teaching International*, 39(2), 153-162.
- Laurillard, D. (2002). *Rethinking university teaching: a conversational framework for the effective use of learning technologies*. London: RoutledgeFalmer.
- Ledwith, M. (2007). On being critical: uniting theory and practice through emancipatory action research. *Educational Action Research*, 15(4), 597-613.
- Lester, S. (2004). Conceptualising the practitioner doctorate. *Studies in Higher Education*, 29 (6), 750-777.
- Lim, P. C., Cheah, P. T. (2003). The role of tutor in asynchronous discussion boards: A case study of a pre-service teacher course. *Education Media International*, 40(1/2), 33-47.
- Liu, Y., Lin, F., & Wang, X. (2003). Education practice and analyzing behavior of students in a web-based learning environment: An exploratory study from China. *Online Information Review*, 27(2), 110-119.
- Lomax P., McNiff J., Whitehead J. (1996). *You and your action research project*. London: Routledge.
- Marshall, C., Rossman, G. B. (1999). *Designing qualitative research*. Thousand Oaks: SAGE.
- Maor, D. (2003). The teachers' role in developing interaction and reflection in an online learning community. *Education Media International*, 40(1/2), 127-137.
- Mason, R. (2002). 'E-learning: what have we learnt?' in Rust, C. (ed) *Improving Student Learning Using Learning Technology*, proceedings of the 2001 9th International Improving Student Learning Symposium. Oxford Centre for Staff and Learning Development, Oxford.
- McPherson, M., Nunes, M. B. (2006). Organisational issues for e-learning: Critical success factors as identified by HE practitioners. *International Journal of Educational Management*, 20 (7), 542-558.
- Meyer, K. (2002). *Quality in distance education*. San Francisco: Wiley Periodicals.
- Mills, G. E. (2003). *Action research: a guide for the teacher researcher*. Ohio: Pearson Education.
- Moore, J. (2004). Living in the basement of the ivory tower: a graduate student's perspective of participatory action research within academic institutions. *Educational Action Research*, 12(1), 145-163.

- Packham, G., Jones, P., Thomas, B., Miller, C. (2006). Student and tutor perspectives of on-line moderation. *Education+Training*, 48 (4), 241-251.
- Pan, C. C., Sullivan, M. (2005). Promoting synchronous interaction in an e-learning environment. *THE Journal*, 33(2).
- Piezon, S. L., Donaldson, R. L. (2005). Online groups and social loafing: Understanding student-group interactions. *Online Journal of Distance Learning Administration*, 8 (4).
- Prammanee, N. (2003). Delivering learning on the Net: The why, what & how of online education. *Educational Technology & Society*, 6(1), 125-126.
- Raelin, J., A. (2008). *Work-based learning: Bridging knowledge and action in the workplace*. San Francisco: Jossey-Bass.
- Roes, H. (2001). Digital libraries and education: Trends and opportunities. *D-LibMagazine*, 7(7/8).
- Sahney, S., Banwet, D.K., Karunes, S. (2004). Conceptualizing total quality management in higher education. *The TQM Magazine*, 16(2), 145-59.
- Salmon, G. (2002). *E-moderating: the key to teaching and learning online*. London: Kogan Page.
- Saunders, M., Lewis, P., Thornhill, A. (2000). *Research methods for business students*. London: Prentice Hall.
- Silverman, D. (2000). *Doing qualitative research*. London: SAGE.
- Simonson, M., Smaldino, S., Albright, M. & Zvacek, S. (2003). *Teaching and learning at a distance*. Columbus: Pearson Education.
- Sims, R. (2003). Promises of interactivity: Aligning learner perceptions and expectations with strategies for flexible and online learning. *Distance Education*, 24(1), 87-103.
- Srikanthan, G., Dalrymple, J. (2004). A Synthesis of a quality management model for education in universities. *International Journal of Educational Management*, 18(4), 266-79.
- Swan, K. (2002). Building learning communities in online courses: The importance of interaction. *Education, Communication and Information*, 2(1), 23-49.
- Teles, L., Ashton, S., Roberts, T., Tzoneva, I. (2001). The role of the instructor in e-learning collaborative environments. *TechKnowLogia*, 46-50.
- Tynjala, P., Hakkinen, P. (2005). E-learning at work: Theoretical underpinnings and pedagogical challenges. *Journal of Workplace Learning*, 17(5/6), 318-336.
- Whitehead, D. (2005). Project management and action research: Two sides of the same coin?. *Journal of Health Organization and Management*, 19(6), 519-531.
- Williams, L. (2007). A contemporary tale of participatory action research in Aotearoa/New Zealand: applying a power-culture lens to support participatory action research as a diverse and evolving practice. *Educational Action Research*, 15(4), 613-631.

APPENDICES

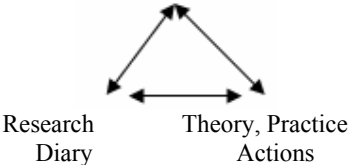
APPENDIX A

Salmon's Five Stage Model

STAGE	STUDENT ACTIVITIES	TUTOR ACTIVITIES
Stage 1 Access and motivation	Setting up system and accessing	Welcome and encouragement Guidance on where to find technical support
Stage 2 On-line socialization	Sending and receiving messages	Introductions Ice-breakers Ground rules Netiquette
Stage 3 Information exchange	Carrying out activities Reporting and discussing findings	Facilitate structured activities Assign roles and responsibilities Support use of learning materials Encourage discussions Summarize findings and/or outcomes
Stage 4 Knowledge construction	Conferencing Course-related discussions Critical thinking applied to subject material Making connections between models and work-based learning experiences	Facilitate open activities Facilitate the process Asking questions Encourage reflection. Tutor is very active at this stage.
Stage 5 Development.	Use of conferencing in a strategic way Integration of CMC into other forms of learning Reflection on learning processes Students become critical of the medium	Support Respond only when required Encourage reflection Tutor is less active and hands over to the students

Salmon (2002)

APPENDIX B

Step of Actions in Work based Project	Action Research Cycle	Components of Action Research
Action 1. Institute Members Technique: Group interviewing (Focus Groups) Focus: Providing consciousness on the role of communication Data Analysis: Content Analysis	1. Identifying an area of focus, asking Questions 6. To what extend, does Distance Education Institute perform relevant communication flow as an organizational climate within organization? 7. To what extend, do online tutors have awareness on their roles in online learning-teaching process? 8. To what extend, do online tutors perform their roles within online learning and teaching process? 9. How do tutors facilitate online socialization for active participation in constructing knowledge? 10. What roles do tutors play in facilitating communication in collaborating learning to overcome social barriers and thus contributing to construct the knowledge?	Research Planning Discussing, negotiating, exploring opportunities, assessing possibilities, examining constraints in project-General Idea
Action 2. Online Tutors Technique: 60 minutes in-depth interview Focus: Providing consciousness on the changing roles of tutors Data Analysis: Content Analysis	2. Collecting data Focus groups, In-depth interview, Self-report-documents	Acting Step of Actions in Work based Project
Action 3. Action Process Training Focus Groups Online Tutors Action 4. Online Tutors Technique: Focus Group Focus: Gathering data on the process Data Analysis: Content Analysis	3. Analyzing and interpreting data Content Analysis 4. Reflecting Research Diary	Observing Monitoring actions Replanning, understanding and learning Reflecting Evaluation of Step of Actions
Action 5. Research Diary Action 6. Triangulation Data Collection Techniques  Research Diary Theory, Practice Actions Action 7. Outcomes of Actions	5. Action Planning, plan action steps Trainings 6. Positive actions for change Trainings Project Report	

EFFECTS OF WATCHING CAPTIONED MOVIE CLIP ON VOCABULARY DEVELOPMENT OF EFL LEARNERS

Assist.Prof.Dr. Dogan YUKSEL & Assist.Prof.Dr. Belgin TANRIVERDI
doganyuksel@gmail.com

ABSTRACT

The current study examined the effects of watching a closed-captioned movie clip on incidental vocabulary learning in a pre-test post-test experimental design. 120 college students from a college preparatory class, who were learning English as a foreign language (EFL), participated in the study. Two weeks before the treatment, all of the participants completed a 20-item vocabulary knowledge scale (VKS) that was adopted from Wesche and Paribakht (1996). One month after the treatment, they were given another VKS with 20 words. The participants were randomly assigned to one of the two groups: Group A (movie clip with captions); Group B (movie clip without captions). T-test analyses were conducted to examine development between and within each group. Results revealed that both groups demonstrated significant gains based on the VKS, and Group A improved more in the post-test. However, the development between the groups was not significant. Pedagogical implications of the study are discussed in the end.

Key Words: Use of technology in EFL, captions, English-as-a-foreign-language, teaching vocabulary.

INTRODUCTION

Using captions and/or subtitles to facilitate the comprehension of video materials is taken for granted by many teachers and researchers. Moreover, many educators believe that television programs with captions seem to provide a rich context for foreign language acquisition. It is also argued that viewers are, generally, quite motivated to understand what is shown and said on television when the captions are provided (Danan, 2004). Many educators recommend their students to watch TV and movies with captions in the belief that being exposed to the target language in this way will increase the language proficiency level of their students. However, the number of the studies that specifically examined the functions of captioned movies in second/foreign language learning is few compared to the popularity of the assumption regarding the effectiveness of the captioned movies in language development. To fill in the gap in literature, this study investigated the effects of closed-captioning on incidental vocabulary acquisition.

LITERATURE REVIEW

Most of the previous research concerning the use of captions and subtitles while watching videos supported the value of using captions for facilitating language skills. Earlier studies on this topic usually focused on the effects of captions and subtitles on the development of listening (Garza, 1991; Huang & Eskey, 2000; Markham, 1999; Markham & Peter, 2003) and reading comprehension (Garza, 1991; Goldman & Goldman, 1988; Koskinen, Wilson & Jensema, 1985).

In one of the first experimental studies on this topic, Garza (1991) examined the effects of captions in a study of adult language learners who were studying English as a second language (ESL) and native English learners of Russian. Based on the findings of his study, Garza argued that captions had a significant effect on reading/listening comprehension. Similarly, Huang and Eskey's (2000) study investigated the effects of closed-captioned TV (CCTV) on the listening comprehension of intermediate ESL students. Their study revealed that captions improved not only listening comprehension skills of college-level ESL students but also their general comprehension and vocabulary development. In another study on the effects of captions, Markham (1999) investigated the effects of captioned videotapes on second language listening word recognitions skills. He reported that the presence of captions significantly improved the adult ESL learners' listening word recognition of English language regardless of the level of pictorial support of the video.

Another line of studies investigated the effects of captioned and subtitled TV programs on the acquisition of vocabulary (Goldman & Goldman, 1988; Koolstra & Beentjes, 1999; Koskinen et al., 1985; Markham & Peter, 2003; Neuman & Koskinen, 1992). Koolstra and Beentjes' study focused on elementary-level Dutch-speaking students, and investigated the level of improvement in reading vocabulary knowledge by watching Dutch-subtitled English language television programs at home. In another study, Neuman and Koskinen's middle school-level ESL students increased their English language reading vocabulary knowledge significantly after lengthy exposure to the target language captions. Both of these studies involved the use of extended exposure to the target language videos with captions and/or subtitles, and yielded favorable implications about the effects of captions. In another study, Koskinen et al. chose their participants from the residents of a correctional facility. In their study, the researchers examined the effects of captioned videos on incidental reading vocabulary

knowledge. Based on their findings, Koskinen et al. argued that captioned videos substantially improved the incidental reading vocabulary knowledge of adult non-native English speakers. Similar results on the favor of captions were reported in Goldman and Goldman's and Markham and Peter's studies.

Vocabulary Acquisition

Vocabulary acquisition is one of the central components of developing successful communication and literacy skills, and has been seen as an integral part of language by both researchers and teachers. Many researchers working on vocabulary acquisition claim that acquiring a word requires numerous encounters with the word in different forms (Horst, Cobb, & Meara, 1998; Nation, 1990; Schmidt, 2001). One of the most commonly accepted views of vocabulary acquisition is that it occurs along a continuum of development, similar to the example below.

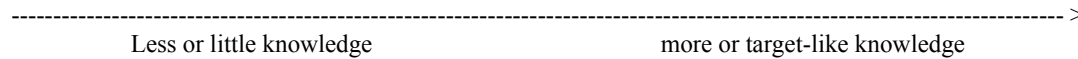


Figure 1. A scale or continuum of knowledge

It is also argued that “combining text with visuals is more effective in facilitating vocabulary learning than providing only definitions of words” (Akbulut, 2007, p. 5). This assumption is in line with the current conceptualization of teaching vocabulary. Teaching vocabulary implicitly, and creating instances for the incidental acquisition of vocabulary has been highlighted in recent reviews of vocabulary teaching (Hunt & Beglar, 1998; Nagy, 1997) following the argument that “first-language learners pick up most vocabulary from the context” (Lee, 2004). Based on the ideas of Krashen (1983), especially the distinction between acquisition and learning he proposed, many teachers try to assist the implicit and incidental acquisition of vocabulary instead of explicitly teaching them. Similarly, as Duquette and Painchaud (1996) argued, “current pedagogical trends emphasize incidental or indirect learning by resorting to contextual cues” (p. 143).

Situation in Turkey

With the belief that EFL learners depend “heavily on visual clues to support their understanding” (Çakır, 2006, p. 2), watching different types of videos, with or without subtitles, has been recommended as a pedagogical tool for foreign language learners and teachers. However, there are not any studies, to our best knowledge, that are set in Turkish context that examined the effects of the captioned or non-captioned videos on language development in general or vocabulary learning in particular.

In Turkish mainstream TV channels, foreign-language programs are mostly dubbed. There are only limited numbers of channels which broadcast foreign videos subtitled in Turkish. The only way to find videos subtitled in English or no subtitle on TV is to pay for some channels since they are broadcasted via satellites. In other words, even though related literature studies indicate that subtitled television programs make a contribution to foreign language learners on vocabulary acquisition, there are almost no facilities for language learners to find subtitled films in English.

Purpose of the Study

Use of authentic videos and incorporating the target words into a context might be a way of facilitating vocabulary acquisition, and can be quite rewarding in a foreign language learning setting, considering the low frequency of instances that learners are exposed to target language outside the classroom. Moreover, current understanding of the vocabulary development holds the belief that acquiring a word should be viewed on a continuum of knowledge level (Nation, 1990; Schmidt, 2001; Wesche & Paribakht, 1996), where numerous encounters to a target item are needed for acquisition.

The main aim of this study was to examine the effects of using English captions on intermediate-level English as a Foreign Language students' vocabulary acquisition of a video episode as measured by a vocabulary test. Specifically, it investigated how English language material (i.e., a movie clip) with or without English language captions would affect vocabulary development of the foreign language learners in a Turkish university setting.

The previous studies on captions and/or subtitles in language learning either focused on listening or reading comprehension of the passages, or investigated vocabulary acquisition in lengthy exposures of TV programs. No other study, to our best knowledge, examined the vocabulary acquisition of foreign language learners who are given a relatively short piece of video recording. Another innovation in this study was implementing a process oriented vocabulary knowledge scale rather than a discrete multiple choice test that was mostly used in previous studies on this topic (Koolstra & Beentjes, 1999; Markham, 1999; Markham & Peter, 2003).

METHODOLOGY

Participants

The study was conducted with 120 intermediate university-level students enrolled in preparatory classes at Kocaeli University, Turkey. The participants of the study were taking intensive English language courses before their undergraduate education to fulfill the language requirements of their programs. There were 20 hours of English courses in a week, and the students had to attend 80% of the classes. The participants were majoring in different fields such as Finance, Business Administration, Engineering, Journalism, or Education. 41 of the participants were male and 47 were female. Six of the participants did not specify their gender in the background questionnaire. Because all of the participants were recent graduates of high school, further questions regarding their ages were not posed. All of the participants were at similar English proficiency levels (i.e., Intermediate) at the time of the study based on an in-house proficiency test conducted by the University. The proficiency test involved questions in reading comprehension, vocabulary, grammar, and writing.

Each participant was randomly assigned to captions or no-captions groups. Fourteen of the students from both captions and no-captions groups failed to take one or more of the tests or the treatment. Due to this, their results of the tests were removed from the data pool. Statistical analyses were conducted with 104 participants (N=53 in captions group and N=51 in no-captions group) who completed all of the phases of the study.

Design of the Study and Procedures Followed

In this study, a pre-test post-test experiment and control group design was used. The participants were randomly assigned to each group: Group A included students who watched the movie clip with captions, and Group B with students who watched the movie clip without captions. Both of the groups took the same pre and post tests (Vocabulary Knowledge Scales) prior to and after the treatment. Table 1 illustrates the design of the study.

Table 1. Design of the Study

Pretest	Treatment	Post-test
VKS is given to both groups	Group A (movie clip with caption) Group B (movie clip without caption)	VKS is given to both groups

All of the tests and treatments were given in a Multimedia Room that was available in the building where students had their regular classes. It was reported that the participants used this classroom from time to time to watch movies in the target language. An LCD projector and a laptop were already available for use in the Multimedia Room. VLC player, free software that enables the incorporation of the captions into motion picture, was used to play the movie clip. Prior to the study, the participants were informed that their participation to the study was voluntary, and their answers would not affect their course grades in any way.

Materials Used and Target Vocabulary

A popular American TV series, Seinfeld, was chosen as the stimulus material for this study. It is one of the most popular television shows in the 1990s, and was available in Turkish TV channels until recently. The episode chosen was 'The jacket' which evolved around the main character's newly-bought expensive jacket. The treatment involved students in all groups watching the first 9 minutes and 14 seconds of the episode, twice. Twenty target words from the episode were chosen based on the proficiency level and background of the students, and pilot tests were conducted with similar groups from the same university to determine the appropriateness of the vocabulary. All of these words belonged to the same word category (i.e., noun). After the pilot tests, the researchers decided to keep ten of the twenty target vocabulary based on the performances of the participants. Please refer to Appendix A to see the items used in the pilot test. In Appendix B the list of target words is provided.

Wesche and Paribakht's (1996) scale of vocabulary knowledge to measure the development was utilized in the study. This scale is one of the most commonly used Vocabulary Knowledge Scales (VKS), which specifies the stages of vocabulary acquisition from first exposure to output. Turkish translations of the following five steps were given in the VKS provided to the participants:

- I I don't remember having seen this word before.
 - II I have seen this word before, but I don't know what it means.
 - III I have seen this word before, and I think it means (synonym or translation)
 - IV I know this word. It means ... (synonym or translation)
 - V I can use this word in a sentence: (Write a sentence)
- (If you do this section, please also do Section IV.)*

Figure 2. Wesche & Paribakht's (1996) Vocabulary Knowledge Scale

Coding

The coding of the participant responses was quite straightforward. The researchers scored participants' answers based on the level they chose for each word on Wesche and Paribakht's (1996) Vocabulary Knowledge Scale. However, when the participant choices needed some form of production, the researchers had to check the accuracy of their answers and mark their choices as they were, if their choices were correct. If the responses of the participants were incorrect, then the participant's choice was downgraded one level. For example, if a participant chose *Level III* for a word, his/her answer was marked as *Level III* if his/her response were accurate, if it were not, then the researchers marked his/her answer as *Level II*.

RESULTS

To see the general distribution of the data and average scores, the researchers conducted descriptive statistics on SPSS. As Table 2 shows, the highest mean value lies in the posttest of the Group A (Mean= 2.76). Also the averages in pretests in both groups were very close (Group A = 1.85, Group B = 1.74). The t test between groups analysis on the pretests demonstrated that there was no significant difference between the groups ($p=.082$). This finding demonstrated that both groups had similar knowledge about the target words prior to the treatment.

Table 2. Minimum and Maximum Scores Attained in Each Group and Averages

	N	Minimum	Maximum	Mean	Std. Deviation
GroupAPretest	53	1.44	2.56	1.8575	.26272
GroupAPosttest	53	2.00	3.56	2.7697	.40799
GroupBPretest	51	1.00	2.89	1.7433	.37363
GroupBPosttest	51	2.00	3.33	2.5650	.33189
Valid N (listwise)	51				

After conducting descriptive statistics, t-test was used to measure the development in each group. The t-test results revealed that both group had significant gains from pretest to posttest. Participants in Group A improved on an average of .91221 from pre-test to posttest whereas their peers in the no captions group (Group B) progressed .82168 point averagely. As Table 3 demonstrates, both of the improvements were significant at a .01 level ($p < .01$).

Table 3. Summary of One-Sample Test T-test Results

	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
	Lower	Upper	Upper	Lower	Upper	Lower
Gains for Group A	15.923	52	.000	.91221	.7972	1.0272
Gains for Group B	12.186	50	.000	.82168	.6863	.9571

The researchers conducted further analysis to see if one of the groups improved significantly better than the other. T-test was used for this purpose. Before this, the homogeneity variances were checked. Here, Levene Statistic was not significant ($p=.537$), which indicated there was no sign of homogeneity (Note 1). On average, Group A had improved slightly better than Group B. However, the t-test results revealed that there was no statistical significant difference between the two groups' improvement ($p=.307$) (Table 4).

Table 4. Summary of T-test Results for the Gains between Two Groups (Independent Samples Test)

	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
	Lower	Upper	Upper	Lower	Upper	Lower
Equal variances assumed	1.026	102	.307	.09052	-.08449	.26554
Equal variances not assumed	1.023	98.759	.309	.09052	-.08504	.26609

DISCUSSION

The results of our study revealed that both groups (i.e., captions and no captions) improved significantly from pretest to posttest in the self-reported Vocabulary Knowledge Scales. Moreover, the captions group performed a little better than the group who viewed the movie clip without the captions (Group A gains $M = .91221$, Group B gains $M = .82168$). However, the difference between groups in terms of gains was not statistically significant. Therefore, it can be argued that watching the movie clips facilitated the development of the vocabulary knowledge of the students regardless of the captions.

As it was stated before, both groups' initial knowledge about the target words were similar (i.e., slightly below Level II) at the beginning of the study (please refer to Figure 2 to see the VKS used in this study). In other words both groups had seen most of the words before but had not known what they meant. After viewing the movie clip twice, both groups improved to above Level two and a half (2.5) when the average of all words was taken into consideration (captions group posttest $M = 2.7697$, no captions group posttest $M = 2.5650$). The improvement of the students' vocabulary knowledge indicates that both groups not only remembered seeing the words but also they could accurately guess at least half of the words and provide the Turkish translations or synonyms of them.

The researchers believe that the development in the knowledge of the target words stemmed from the importance of encountering the words in the context. Overall, our study supported the belief that most vocabulary is learned from context (Sternberg, 1987). Because the researchers did not provide any information about the target words, the participants were not even aware of the focus of the study until the debriefing done after the posttest. Based on the previous studies on vocabulary development, one might argue that contextualization in vocabulary teaching might be a source of improvement. Our study might have provided evidence to the assumption that incidental or indirect learning of vocabulary can be achieved by resorting to contextual cues (Duquette & Painchaud, 1996). This calls for an important pedagogical implication for teacher about using contextual communication materials to assist students' vocabulary learning instead of explaining the words in an isolated manner.

The tool that was used for the measurement of vocabulary development was a self-report scale that has been used extensively in recent vocabulary teaching studies (Huang & Luoi, 2007; Nassaji, 2004; Wu, Chang, Liu & Chen, 2008; Zareva, 2005). However, self-report scales have been devalued by some scholars due to their limitations. For example, Read (2000) argued that self-report scales in general, and the Vocabulary Knowledge Scale that was used in this study in particular, might not provide an accurate picture of learner development because "it is doubtful whether learners' developing knowledge of second language words can be meaningfully represented by a single linear scale" (p. 136). Self-report scales might be also problematic because they may not reflect the actual knowledge level of the students since it is based on the students' statements. To overcome this problem, the accuracy of the student choices was also controlled when some form of output production was necessary in the level that participants chose (i.e., when students were asked to provide the synonyms of the target words or produce a sentence).

CONCLUSION

When the findings of our study are interpreted, it can be argued that viewing the movie clip has helped the participants of the current study develop their vocabulary knowledge regardless of the absence or presence of captions. This is important information in favor of incidental learning. As the results of the study revealed, the participants made significant progress in their vocabulary knowledge after viewing the movie clip while focusing on the meaningful flow of conversations. The development that was observed supported the idea that vocabulary acquisition is a process that occurs along a continuum (Wesche & Paribakht, 1996; Schmidt, 2001). However, one should not forget that learning a word necessitates multiple exposures to the word in different forms (Horst, Cobb, & Meara, 1998; Nation, 1990; Schmidt, 2001).

The main focus of the study was the development of some specific vocabulary items after watching a target language movie clip with or without captions. Further research can be conducted to examine the effects of watching target language movie clips with or without captions on other aspects of language, especially on listening skills. Captions paired with movie clip soundtrack might be a good opportunity to develop listening skills and comprehension of listening materials. Also, nouns were chosen as the target word group for this study. Other word groups (i.e., verbs, adjectives, etc) can be chosen for a further study, and effects of captions can be examined by taking saliency of the target words as a variable.

NOTES

1. You can check the scores of test of Homogeneity of Variances in Table 5.

Table 5. Test of Homogeneity of Variances (Gains)

Levene Statistic	df1	Df2	Sig.
.383	1	102	.537

REFERENCES

- Akbulut, Y. (2007). Variables predicting foreign language reading comprehension and vocabulary acquisition in a linear hypermedia environment. . *The Turkish Online Journal of Educational Technology- TOJET*, 6(1), article 5. Retrieved January 1, 2009, from <http://www.tojet.net/articles/615.htm>
- Çakır, İ. (2006). The use of video as an audio-visual material in foreign language teaching classroom. . *The Turkish Online Journal of Educational Technology- TOJET*, 5(4), article 9. Retrieved January 1, 2009, from <http://www.tojet.net/articles/549.htm>
- Danan, M. (2004). Captioning and subtitling: Undervalued language learning strategies. *Meta*, XLIX (1), 67-77.
- Duquette, L., & Painchaud, G. (1996). A comparison of vocabulary acquisition in audio and video contexts. *The Canadian Modern Language Review*, 53 (1), 143-172.
- Garza, T. (1991). Evaluating the use of captioned video materials in advanced foreign language learning. *Foreign Language Annals*, 24, 239-258.
- Goldman, M., & Goldman, S. (1988). Reading with closed-captioned TV. *Journal of Reading*, 31, 458-461.
- Horst, M., Cobb, T., & Meara, P. (1998). Beyond a Clockwork Orange: Acquiring second language vocabulary through reading. *Reading in a Foreign Language*, 11(2), 207-223.
- Huang, H., & Eskey, D. (2000). The effects of closed-captioned television on the listening comprehension of intermediate English as a second language students. *Educational Technology Systems*, 28, 75-96.
- Huang, H., & Liou, H. (2007). Vocabulary learning in an automated graded reading program. *Language Learning & Technology*, 11(3), 64-82.
- Hunt, A., & Beglar, D. (1998) Current research and practice in teaching vocabulary. *The Language Teacher Online*, 22(1), 1-9.
- Krashen, S. (1983). *The natural approach*. San Francisco: Alemany Press.
- Koolstra, C. & Beentjes, W. (1999). Children's vocabulary acquisition in a foreign language through watching subtitled television at home. *Educational Technology, Research, and Development*, 47, 51-60.
- Koskinen, P, Knable, J., Markham, P., Jensema, C., & Kane, K. (1996). Captioned television and the vocabulary acquisition of adult second language correctional facility residents. *Journal of Educational Technology Systems*, 24, 359-373.
- Koskinen, P., Wilson, R., Jensema, C. (1985). Closed-captioned television: A new tool for reading instruction. *Reading World*, 24, 1-7.
- Lee, S. (2004). Teaching lexis to EFL students: a review of current perspectives and methods. *ARECLS E-Journal*, 1(1).
- Markham, P. (1999). Captioned videotapes and second language listening word recognition. *Foreign Language Annals*, 32, 321-328.
- Markham, P., & Peter, L. (2003). The influence of English language and Spanish language captions on foreign language listening/ reading comprehension. *J. Educational Technology Systems*, 31(3), 331-341.
- Nagy, W. (1997). On the role of context in first- and second-language vocabulary learning. In N. Schmitt and M. McCarthy (Eds.), *Vocabulary: description, acquisition and pedagogy*. Cambridge: Cambridge University Press.
- Nassaji, H. (2004). The relationship between depth of vocabulary knowledge and L2 learners' lexical inferencing strategy use and success. *Canadian Modern Language Review / La Revue Canadienne des Langues Vivantes*, 61(1), 107-134.
- Nation, I. S. P. (1990). *Teaching and learning vocabulary*. Boston: Heinle & Heinle.
- Neuman, S. B., & Koskinen, P. (1992). Captioned television as comprehensible input: Effects of incidental word learning from context for language minority students. *Reading Research Quarterly*, 27(1), 95-106.
- Read, J. (2000). *Assessing vocabulary*. Cambridge, MA: Cambridge University Press.
- Schmidt, R. (2001). Attention. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 332). Cambridge: Cambridge University Press.
- Sternberg, R. J. (1987). Most vocabulary is learned from context. In M.G. McKeown & M.E. Curtis, (Eds), *The nature of vocabulary acquisition*, (89–105). Hillsdale, NJ: Lawrence Erlbaum.

- Wesche, M. & Paribakht, T.S. (1996). Assessing second language vocabulary knowledge: Depth versus breadth. *The Canadian Modern Language Review*, 53 (1), 13-40.
- Wu, C., Chang, C., Liu, B., & Chen, G. (2008). Improving vocabulary acquisition by designing a storytelling robot. *Advanced Learning Technologies*, 498-500.
- Zareva, A. (2005). Models of lexical knowledge assessment of second language learners of English at higher levels of language proficiency. *System*, 33(4), 547-562.

APPENDIX A

1. Outfit
2. Closet
3. Solid
4. Inn
5. Idiot
6. Palm
7. Buffer
8. Suede
9. Ballpark
10. Stripe
11. Lining
12. Clients
13. Composer
14. Puppet
15. Confidence
16. Secure
17. Challenge
18. Dove
19. Cab
20. Candidate

APPENDIX B

1. Outfit
2. Dove
3. Candidate
4. Challenge
5. Buffer
6. Client
7. Puppet
8. Suede
9. Vacation
10. Closet

FIRST REPORT ABOUT AN E-LEARNING APPLICATION SUPPORTING PBL: STUDENTS' USAGES, SATISFACTIONS, AND ACHIEVEMENTS

Erol GURPINAR

Akdeniz University Faculty of Medicine Department of Medical Education 07059 Dumlupinar Bulvari Campus,
Antalya TURKEY.

e-mail: erolgurpinar@akdeniz.edu.tr

Nese ZAYIM

Akdeniz University Faculty of Medicine Department of Biostatistics and Medical Informatics Antalya TURKEY

Ciler Celik OZENCI

Akdeniz University Faculty of Medicine Department of Histology and Embriology Antalya TURKEY

Mustafa Kemal ALIMOGU

Akdeniz University Faculty of Medicine Department of Medical Education Antalya TURKEY

ABSTRACT

The purpose of the study was to determine applicability of e-learning in problem based learning (PBL) by investigating its usage and acceptability among students and its effect on academic achievement.

The study was carried out among first year medical students of Akdeniz University, Turkey. A web-based learning environment (WBLE) including various learning resources was prepared for students to use throughout self-study period of a PBL module carried out in 2006-2007 academic year. Data were collected to determine WBLE usage rates, its effect on academic achievement, and satisfaction with it. First, computer log files were examined to determine “users” and “nonusers” of the WBLE and its usage frequency per student. Second, a questionnaire was delivered at the end of the PBL module to determine acceptability of WBLE among students. Finally, PBL exam scores of the WBLE users and nonusers were compared to investigate the effect of WBLE on academic achievement.

Of the 174 first year medical students, 137 used the WBLE in their self study period throughout the PBL module. Mean login number per student was 16.8. The questionnaire was completed by 94.8% of the students. Sixty six percent of the participants were satisfied with the WBLE. End-of-module PBL exam scores of WBLE users were found slightly but not significantly higher than those of nonusers.

This the first study investigating applicability of e-learning in PBL modules. High usage rates and student satisfaction in our study may be encouraging and promising for wider application of e-learning in future PBL performances.

Keyword: Medical education, E-learning, Problem based learning, Web-based Learning.

INTRODUCTION

There are some corner stones in the history of medical education such as start of discipline based education (PBL) in 1910s, system based education in 1950s and problem based learning (PBL) in 1970s (Boelen, 2002; Gurpinar, 2005; Hamad, 1994). Since 1990s, a new approach called “e-learning” is gradually being adopted by higher education institutions including medical schools (Ruiz et al., 2007). E-learning is defined as realizing the teaching and learning process, while teacher and students are in different places, with the help of internet and computer technology (Bayram, 2008; Grundman et al., 2000). E-learning aims to enhance self responsibility to learn and also supports individuals to gain lifelong learning attitudes (Cook, 2006). Today in medical education, e-learning is used to support other instructional methods asynchronously (Jorge, 2006).

Initial applications of e-learning in medical education were in teaching basic sciences. In the course of time, clinical departments such as the Departments of Radiology or Emergency Medicine have started to use e-learning in their instructions as a supportive method and this application has become more popular in clinical teaching (Heidi, 2002). The first paper in this field was on an e-learning application in Public Health training, which was published in 1992. Since then, hundreds of descriptive and comparative studies have been reported in the literature. The results of previous studies have generally shown that e-learning makes a contribution to student learning (Clyde, 2006). Motivation to learn and student performances among medical students are also known to be higher in e-learning based training methods in medical education (Jorge et al, 2006). There are some studies showing that the knowledge gained by e-learning is better embedded in learner's memory and used more properly than the knowledge gained by traditional ways (Jorge et al, 2006). Previous comparison studies

also suggest that students supported with e-learning activities show higher academic performance than students in traditional teaching (Ridgway et al, 2007; Taradi et al, 2005; Horton, 2000).

The literature shows that medical students are also highly satisfied with e-learning and they wish to see this method as a part of their education. In addition to satisfaction, some of the advantages of e-learning mentioned by the students in the literature are its contribution to student self development, self assessment opportunities, and faster access to educational resources (Citak et al, 2007; Edirippulige et al 2006; Corte et al 2005; Thakore et al 2006; Gotthardt, 2006; Yaghoubi, 2008).

Although the literature is rich in terms of the articles describing e-learning applications in basic sciences and clinical clerkships, the information about e-learning activities in PBL process is missing. However, PBL is a method harmonizing preclinical and clinical information together; therefore it deserves a separate point of view. Regarding the fact that PBL is totally student centered any application that facilitates accessing knowledge and self- studying should be highly appreciated by the students. In order to test this hypothesis, students were provided with a WBLE throughout a PBL module and answers were sought to the following research questions:

What are the students' usage patterns, satisfaction level and perceptions of the WBLE?
What is the effect of the WBLE on students' academic achievement?

METHODS

Setting

A hybrid curriculum as a mixture of PBL modules and traditional classes has been followed in the first two years of medical education in Akdeniz University School of Medicine since 2002. Basic medical sciences are being taught in an integrated programme composed of five thematic blocks in each year. The courses of different disciplines are integrated on the organ system based themes in these blocks. Each block takes 8 weeks and the first weeks are allocated to PBL modules. PBL weeks are totally devoted to PBL activities and free of other traditional classes. A "module committee" composed of experts of different disciplines which are associated with topics of the module is assigned for each module. Three half-day PBL discussion sessions in small groups, laboratory and field studies, clinical skill practices, and supportive theoretical conferences take place throughout the PBL week. In the time remaining from afore mentioned activities, students try to achieve theoretical information to solve problems they faced in the discussion sessions. With this purpose, the most common resources they use are electronic or printed books and journals recommended by the module committee. At the end of each PBL module, the module committee prepares an examination including multiple choice and clinical reasoning questions and the students sit for this exam a few days later than the last PBL discussion session.

A WBLE was developed to be used in the last PBL module of year 1. The main theme of the block was *urogenital system* and the clinical case mentioned in the PBL scenario was an *infertility case*. The module committee determined the content of the WBLE and prepared and/or provided relevant resource documents to be used in students' self-study process. The WBLE composed of six main sections:

- Online documents (text, lecture notes and presentations),
- Links to websites including some relevant audiovisual material,
- Online dictionary of medical terms, online atlas of anatomy and histology,
- A special section called "Ask an expert" was available for students to ask some questions to clarify some points or deepen their understanding on the topic,
- Links to general search engines such as "Pubmed" or "Google".
- Test yourself

The WBLE was accessible from both inside and outside of the campus via internet. Students used their student identification number to login the learning environment. This made it possible to record students' usage logs of the learning environment.

The researchers informed the students about how to access, login and use the WBLE. It was also emphasized that the students were free to use or not to use the learning environment.

Subjects

A total of 174 first year medical students were asked to complete a questionnaire including items on usefulness of substructures of the WBLE and perceptions of the students on it. The students, who completed the questionnaire properly, formed the study group. Owners of the incomplete questionnaires were ignored in all calculations except for academic achievement comparisons.

Materials

Students completed a questionnaire composed of two main sections. In the first section, some independent variables that might be effective on students' satisfaction with their e-learning experience were asked such as gender, availability of computers and internet connection in living place, frequency and affinity of computer use in daily life, and frequency and overall duration of reference to the current e-learning programme. The second section of the questionnaire was composed of 16 statements to be responded to on a 5-point scale (1= strongly disagree, 5=strongly agree). Students' satisfaction level of the WBLE was determined regarding their agreement level with the statement "I'm satisfied with the WBLE" inside the 16-item questionnaire. The reliability coefficient of the questionnaire was 0.81.

In order to investigate the effect of the WBLE on students' academic achievement, the current (the fifth) PBL exam score of each student was compared to mean score of previous four PBL exams in that academic year. Additionally, the students who did or did not use the WBLE were determined from log files and the current PBL exam scores of users and nonusers were compared. Student-*t* test, paired samples *t* test and Mann Whitney U test were used in all statistical comparisons.

RESULTS

The results of the study are presented in three sections: a) students usage patterns of the web-based learning environment, b) students' satisfaction with and perceptions of web-based learning c) effect of the WBLE on students' academic achievement.

a) Students' usage patterns of the WBLE

The WBLE was visited 2303 times by the study group. Total number of the students visiting the WBLE is 137 and the mean number of visits per student is 16.8. On the other hand 37 (21.2%) of the participating students never visited the web page of the programme. Based on the analysis of the log records, "Documents" and "Web Sites" sections were the most visited sections whereas "Ask an Expert" section was the least visited section of the WBLE (Table 1).

b) Students' Satisfaction and Perceptions of the WBLE.

A total of 165 students (study group) properly completed the questionnaire to declare their views on e-learning application. Participation rate was 94.8% and 63.4% of the study group were male. Approximately half of the participants (50.3%) live in a separate house, while the remaining live in private or public dormitories. Majority of the students (85.5%) have a computer and (55.6%) have internet connection facilities in the place they live. A considerable number of the participants (87.9%) enjoy dealing with computers and internet, and (50.9%) use computers regularly in their daily life (Table 2).

Consistent with the results of the log records analysis, "The documents" and "links to websites" sections of the WBLE were the most frequently rated sections as useful with a ratio of 68.3% and 65.8% respectively. "Ask an expert" was rated as the least useful section of the e-learning application (Table 3).

The overall mean satisfaction score was 3.65 (SD \pm 1.22). While, 66.0% of the students strongly agreed or agreed, 15.0% were neutral with the statements. None of the students' demographics (gender, living place, computer ownership, etc.) was found effective on students' satisfaction with web-based learning environment. The satisfaction level of the students who referred to the sections "The documents", "links to websites", "online dictionary and atlas" and "search engines" were found higher than those of the students who did not refer to these sections (Table 4).

The distribution of the answers to the other statements is shown in table 5. The first three statements receiving most "agree" or "strongly agree" ratings from the students are "*my knowledge and skills on computers and internet were enough to use the e-learning programme effectively*" (80.4%), "*I would like to benefit from similar e-learning programmes in future PBL modules*" (79.2%), and "*After this experience, I will use internet more often to access scientific information*" (75.7%) (Table 5).

c) Effect on academic achievement.

The mean scores attained from the current PBL exam by users and nonusers of the WBLE were 125.53 (\pm 13.82) and 121.45 (\pm 14.15) respectively and there was no statistically significant difference between them ($t=-1.582$ $p=0.115$). The mean scores attained from the previous four PBL examinations and from the current PBL exam were 114.0 ± 10.0 and 125.53 ± 13.82 in users and 113.28 ± 9.58 and 121.45 ± 14.15 in nonusers respectively. There was a significant difference between the mean scores of previous and the current PBL exam scores (respectively, $t=10.269$, $p=0.00$ and $t=3.189$, $p=0.00$).

DISCUSSION

In the current study, a positive effect of e-learning on student learning performance was observed via exam scores. It was found that the exam performance of the students in the PBL module supported by e-learning was significantly higher when compared to previous performances in PBL modules without e-learning support. The mean score of the e-learning users was found slightly higher than that of non-users in the examination performed at the end of studied PBL module; however the difference was not statistically significant. One of the reasons for positive support of e-learning to student performance may be higher learning motivation among the study group. Since great majority of the students enjoy spending their time with computers and internet, studying with the tools they like and competently use, could increase their motivation to learn.

Adults are commonly well satisfied with education methods supported by e-learning facilities possibly due to their appropriate nature to adult learning principles. Consequently, e-learning based education is generally preferred to other traditional methods by the individuals who had an experience with e-learning (Jorge et al, 2006; Horton, 2000). In the present study, two third of the students were highly satisfied with their e-learning experience. Their satisfaction may be explained by selections they made on some statements in the questionnaire. For example the statements “*it was easier to access knowledge via website than searching it in the library via books*”, “*the WBLE was helpful to reach my learning objectives*” and “*it was enjoyable to learn via the website*” were agreed by 71.2%, 64.9% and 60.1% of the students respectively. Additionally more than half of the study group found e-learning time saving and contributing to exam success. In summary, possibility of accessing more knowledge easily and enjoyably in a shorter time period without any dependence to classroom, teacher and certain time schedules might have caused high student satisfaction with the WBLE.

As expected, the most common visited section of the WBLE was “*The documents*” section, since it serves the purpose of the programme as the main source of knowledge and information. Consistent with the results of the other studies (Koontz 2006), “test yourself” section was commonly visited by the students. The lowest concern was to “*Ask an expert*” section. The reason for this may be the students’ suspect to receive prompt answers from the experts or their preferences of different online communication facilities such as synchronous tools.

The reason for 37 students who never visited the WBLE may be lack of computers or internet connection in their living places, shortage of computers in *Faculty of Medicine*. Although majority of the students used the e-learning application effectively and wished to see similar applications in the future, we believe that some more investments are needed to give equal opportunities to all students, since current computer and internet facilities in the university do not exactly meet the demand. Generalization of the current findings and application of e-learning in problem based medical education are highly questionable because of differences between resources of the universities, student profiles, computer and internet services. However, the results of the study encourage that e-learning applications can be used effectively to support students’ learning in PBL.

The first limitation of the study is about the classification of the participants as “programme users” and “non-users”. These groups in the present study were formed spontaneously without any intervention. This was a risk, since non-user group might have been composed of students who generally showed less interest to all kind of training activities and who demonstrated lower levels of academic achievement. Consequently, the end of course exam scores of these two groups would be naturally different. In order to cope with this problem, the previous and current PBL exam scores of the students were also compared. The other obvious limitation was the inequality of opportunity among students, which arose from lack of enough number of computers. More controlled and detailed experimental research is needed to gain more evidence about the effects of the WBLEs on learning and perspectives of medical students in PBL.

ACKNOWLEDGMENTS

The authors thank to Akdeniz University Research Fund for financial support.

REFERENCES

- Bayram S, Deniz L, ErdoğanY (2008). The role of personality traits in web based education. The Turkish Online Journal of Educational Technology, 7(2), 5
- Boelen, C. (2002). A new paradigm for medical schools a century after flexner’s report. Bulletin Of The World Health Organization, 80, 592-594.
- Clyde, WH, & Anita, L. (2006). Defining, assessing, and promoting e-learning success: an information systems perspective. Decision Sciences Journal of Innovative Education, 4, 67-85.
- Cook, DA. (2006). Where are we with web-based learning in medical education? Medical Teacher, 28(7), 594-598.

- Citak M, Haasper C, Behrends M, Kupka T, Kendoff D, Hufner T, Matthies HK, & Krettek, C. (2007). A web-based e-learning tool in academic teaching of trauma surgery: first experiences and evaluation results. *Unfallchirurg*, 110(4), 367-372.
- Corte, DF, Mura, LF, & Petrino, R. (2005). E-learning as educational tool in emergency and disaster medicine teaching. *Minerva Anesthesiol*, 71, 181-195.
- Edirippulige, S., et al. (2006). E-learning experience of medical students: results of a survey in Sri Lanka. *Apru Dli*, 2, 127-137.
- Hamad, B. (1994). What is community-based education? Evolution, definition and rationale. *Handbook of community-based education: theory and practices*. Netherlands: Network publication.
- Heidi, S, Chumley, J, Alison, D, & Cynthia, LA. (2002). Web-based learning: sound educational method or hype? a review of the evaluation literature. *Academic Medicine*, 77, 10:86-93.
- Horton, W. (2000). *Designing Web-Based Training*. New York: John Wiley Sons. Grundman, J, Wigton, R, & Nickol, D. (2000). You have got mail: Distance education. *Academic Medicine*, 75(10), 47-49.
- Gotthardt et al. (2006). How to successfully implement e-learning for both students and teachers. *Academic Radiology*, 13(3), 379-390.
- Gurpinar E, Musal B, Aksakoglu G, Ucku R. (2005). Comparison of knowledge scores of medical students in problem-based learning and traditional curriculum on public health topics. *BMC Medical Education*, 5, 7.
- Jorge, GR, & Michael, JM, & Rosanne, ML. (2006). The impact of e-learning in medical education. *Academic Medicine*, 81(3), 207-212.
- Koontz FR, & Compura DP. (2006). *Designing effective online instruction*. Toronto: Rowman & Littlefield Education.
- Ridgway, F, Sheikh, A, Sweeney, JK, Evoy, D, McDermott, E, Felle, P, Hill, A, & Higgins, J. (2007). Surgical e-learning: validation of multimedia web-based lectures. *Medical Education*, 41, 168- 172.
- Ruiz, JG., Candler, C, & Teasdale, TA. (2007). Peer reviewing e-learning: opportunities, challenges, and solutions. *Academic Medicine*, 82(5), 503-507.
- Taradi, KS, Taradi, M, Radic, K, & Pokrajac N. (2005). Blending problem-based learning with web technology positively impacts student learning outcomes in acid-base physiology. *Advances in Physiology Education*, 9, 35-39.
- Thakore, H, & McMahon, T. (2006). An interactive e-tutorial in pathology. *Medical Education*, 40, 1123-1147.
- Yaghoubi J, Malekmohammadi I, Iravani H, Attaran M, Gheidi A (2008). Virtual students' perceptions of e-learning in Iran. *The Turkish Online Journal of Educational Technology*, 7(3), 10.

Table 1. Students' Usage Patterns of the WBLE according to Log Records.

Web-Based Learning Resources	Number of Visits	% Total
Documents	710	44.3
Web Sites	361	22.7
Search Engines	109	6.7
Online Atlas, Dictionaries	139	8.7
Ask an expert	84	5.3
Test Yourself	197	12.3
Total	1600	100.0

Table 2. Demographics of the Participants

Variables	n	%
Gender		
Male	104	63.4
Female	60	36.6
Living place		
Home with family	41	24.8
Separate house	83	50.3
Dormitory	41	24.8
Availability of a computer in the living place		
Available	141	85.5
Unavailable	24	14.5
Availability of internet connection in the living place		
Available	90	55.6
Unavailable	72	44.4
Frequency of computer use		
Everyday	84	50.9
More than once a week	67	40.6
A few times in a month	11	6.7
Never	3	1.8
I like computers and internet		
Yes	145	87.9
No	20	9.7

Table 3. Students' Perceptions on Usefulness of Resources in the WBLE

Sections	Useful (%)	Not sure (%)	Not useful n (%)	Total n
Documents	110 (68.3)	8 (5.0)	43 (26.7)	161
Links to web sites	106 (65.8)	12 (7.5)	43 (26.7)	161
Test yourself	102 (63.8)	46 (28.8)	12 (7.4)	160
Links to Search engines	70 (43.8)	10 (6.3)	80 (50.0)	160
Online dictionary-atlas	39 (24.7)	15 (9.5)	104 (65.8)	158
Ask an expert	11 (7.0)	13 (8.3)	133 (84.7)	157

Table 4. Relation between independent variables and student satisfaction with WBLE

Variables	Satisfaction score over 5 (mean± SD)	t	p
Gender			
Male	3.47±1.21	-2.342 ^a	0.086
Female	3.94±1.18		
Living place			
Home with or without family	3.63±1.21	-0.331 ^a	0.741
Dormitory	3.71±1.29		
Availability of a computer in the living place			
Available	3.68±1.21	-0.75 ^b	0.453
Unavailable	3.47±1.27		
Availability of internet connection in the living place			
Available	3.52±1.29	-1.452 ^a	0.149
Unavailable	3.81±1.11		
Frequency of computer use			
Once a week or less	3.64±1.22	-0.587 ^b	0.557
More than once a week	3.81±1.25		
I like computers and internet			
Yes	3.67±1.22	-0.830 ^b	0.406
No	3.46±1.18		
Documents			
Used	3.87±1.17	-3.066 ^a	0.003
Unsure or not used	3.17±1.20		
Links to websites			
Used	3.92±1.23	-4.004 ^a	0.000
Unsure or not used	3.02±1.12		
Online dictionary-atlas			
Used	4.05±1.11	-2.355 ^a	0.020
Unsure or not used	3.52±1.18		
Ask an expert			
Used	4.30±1.22	-1.933 ^a	0.053
Unsure or not used	3.60±0.94		
Links to Search engines			
Used	3.97±1.18	-3.110 ^a	0.000
Unsure or not used	3.34±1.20		

a Student- t test

b Mann-Whitney U test

Table 5. Students' Perceptions Regarding the WBLE

Statements	Strongly Agree + Agree n (%)	Neutral n (%)	Disagree + Strongly Disagree n (%)	Total n
My knowledge and skills on computers and internet were <u>enough</u> to use the WBLE programme effectively	123 (80.4)	10 (6.5)	20 (13.1)	153
I would like to benefit from similar e-learning programmes in <u>future</u> PBL modules	122 (79.2)	11 (7.1)	21 (13.6)	154
After this experience, I will use internet more often to access scientific information	115 (75.7)	19 (12.5)	18 (11.8)	152
I have <u>already used</u> internet resources to reach learning objectives in previous PBL modules.	116 (75.3)	13 (8.4)	25 (16.2)	154
I would like to benefit from similar e-learning programmes <u>in courses other than PBL</u> modules.	113 (73.4)	14 (9.1)	27 (17.5)	154
It was <u>easier</u> to access knowledge via website than searching it in the library via books	109 (71.2)	25 (16.3)	19 (12.4)	153
I experienced some <u>technical difficulties</u> while using this programme	103 (67.3)	12 (7.8)	38 (24.8)	153
I am <u>satisfied</u> with the WBLE.	101 (66.0)	23 (15.0)	29 (19.0)	153
The WBLE was <u>helpful</u> to reach my learning objectives	100 (64.9)	24 (15.6)	30 (19.5)	154
It was <u>enjoyable</u> to learn via the WBLE.	92 (60.1)	33 (21.6)	28 (18.3)	153
I used some <u>additional resources</u> (library, books, journals etc.) other than the WBLE to reach my learning objectives	86 (56.6)	19 (12.5)	47 (30.9)	152
The WBLE enhanced my <u>motivation</u> to learn	73 (47.7)	47 (30.7)	33 (21.6)	153
The resources inside the WBLE were <u>enough</u> to reach my learning objectives.	67 (43.8)	40 (26.1)	46 (30.1)	153
It was <u>stressful</u> to find a computer	33 (22.0)	20 (13.3)	97 (64.7)	150
It took too <u>much time</u> to learn via the WBLE	28 (18.4)	35 (23.0)	89 (58.6)	152
The WBLE <u>will not</u> contribute to my exam success	26 (15.8)	38 (23.0)	89 (53.9)	153

GENDER DIFFERENCES ON ATTITUDES, COMPUTER USE AND PHYSICAL ACTIVITY AMONG GREEK UNIVERSITY STUDENTS

Evangelos BEBETSOS¹ & Panagiotis ANTONIOU
Dept. of Phy. Ed. & Sport Science
Democritus University of Thrace, Komotini, Hellas

* Address correspondence to: Dr. Evangelos Bebetos, Lecturer, Democritus University of Thrace, Dept. of Phy. Education & Sport Science, Komotini 69100, Hellas, or e-mail: empempet@phyed.duth.gr.

ABSTRACT

The aim of this study was to discover any possible relation(s) between the subject of computer, the involvement in physical activity examine and the attitudes of Greek Physical Education students, divided by gender. The sample consisted of 165 freshmen students, 93 males and 72 females. They completed: a) the "Computer Attitude Scale" questionnaire (Selwyn, 1997), and b) the "Planned Behavior Theory" questionnaire (Ajzen & Madden, 1986; Theodorakis, 1994; Theodorakis, et al., 1995). The results indicated gender differences on two factors, "affect" and "perceived usefulness". No gender differences were indicated on the sample attitudes towards PA.

Key words: attitudes, computers, physical activity.

INTRODUCTION

Attitudes are a personal factor and they are referring to one's positive or negative judgement about a concrete subject. Attitudes are determined by the analysis of the information regarding the result of an action and by the positive or negative evaluation of these results (Ajzen & Fishbein, 1980). Ajzen (1988) specifies the word 'attitude' as an inclination which can be taught and can make people react to a matter either in a positive or negative way. Attitudes can be taught either through imminent experience or by other people. They reflect the way people think of, feel and intend to react under certain circumstances. The development of different human activity sectors and consequently behavior, are effected by computers and information communication technology in general. Past research indicated that computer confidence and computer attitudes (Smith, Caputi, Crittenden, Jayasuriya, & Rawstorne, 1999). Garland and Noyes (2005) pointed out that in the educational context, confidence should lead to more positive attitudes towards computers, and this will enhance learning and associated activities. Woodrow (1994) mentioned that the primary goal behind the implementation of computers in education is the utilisation of them by the students.

Additionally, information technology and computers dexterities constitute a major part of educational programs (Thomas & Stratton, 2006). Previous research in relation to gender differences in computer-related attitudes in general, has shown that male students have more positive attitudes towards computers, including anxiety, confidence, and liking, than female students (AiJabri, 1996; Tsai, Lin, & Tsai, 2001). Another study indicated that most females tend to view technology as a tool while males tend to view technology as a toy. Men try to compete and win, while women use the computer only to help them attain their goal (Eck, Hale, Ruff, & Tjelmeland, 2002). Nigg (2003) indicated that technological advantages have helped the development of highly physical activity interventions, allowing large populations to participate in them.

Physical activity (PA) also is an integral part of education. According to the curriculum, one of its main aims is to get students to have positive attitudes towards PA so that they will adopt a permanent athletic lifestyle. The theories about attitudes mentioned above (Papaioannou, Theodorakis & Goudas 1999) explain to us how students can adopt a healthy way of life.

Kruscas' (1999) survey, aimed on the examination of senior high school students' attitudes towards physical education (PE) programme. Another aim was to specify these program points which seem to contribute to the development of the positive and negative attitudes towards PE and PA, in senior high school. Results showed that the positive attitudes towards PE and PA were decreased between the last class of primary school (around 12 years old) and the second class of junior high school (around 14 years old). Such a result was more obvious to girls rather than boys.

The surveys conducted in the field of PE and PA are influenced by the field of technology. Access to World Wide Web (www) and personal computers highlight the meaningfulness of this development (Nigg, 2003). Nigg (2003) examined the influence of technology on different aspects regarding physical activity. After retrospection in bibliography, it was shown that technology contributed to a temporary decrease in the occupation with

physical activity. However, technology plays an important role in the field of business, as far as physical activity is concerned. There are several web pages which are occupied with issues about health and physical activity. Hence the role of technology is important since it offers information about physical activity and a healthy lifestyle.

Samouel and Lee (2001) conducted a survey whose target was to determine the models of personal computers' usage among adolescents in Hong Kong and to examine whether it is connected to less PA and less occupation with the social relations among adolescents. A number of 2.110 junior high school students were questioned. The results of the survey showed that the male students who used a computer in order to do their homework or school projects and have access to the Internet were occupied with physical activities in the form of team sports. On the other hand, those who used a computer to play computer games were not social enough and did not work out very often. As far as the female students were concerned, their occupation with computers did not influence their lifestyle.

Finally, another research was conducted by Selwyn (1997) and its aim was to develop and testify a theoretical parameter concerning students' attitudes towards personal computers. There was shaped a scale which consisted of four sub-scales: a) the emotional factor, b) the perceiving usage, c) the perceiving control and d) the behavioural element. The results of the research showed that the scale had a high-level internal credibility and validity. The researcher claims that the scale can be used for the record of the attitudes towards computers in different fields of education. Moreover it can be used for the tracking down of the main differences among the children's attitudes, regarding their sex and socioeconomic status.

The aim of the present survey was twofold: (a). To examine the university students' differences on attitudes towards computers, and (b). To examine whether or not the use of new technologies (computers) affect students' attitudes towards physical activity.

MATERIALS AND METHODS

Sample

The sample consisted of 165 freshmen university students, 93 males and 72 females between the ages of 18-22 ($M \pm 19.3$).

Instruments

1) The questionnaire 'Computer Attitude Scale' (Selwyn, 1997) was allocated to all students. The questionnaire was translated into Greek in an earlier study (Antoniou, Patsi, Bebetos, & Ifantidou, 2006). Because the students belonged to the Physical Education Department, it was made clear to them that physical activity included activities only in their free-time (after university class hours).

The questionnaire 'Computer Attitude Scale' consisted of four sub-scales. They included:

- 1) 6 questions about "affect" (emotions about computers), (eg. Using a computer does not scare me at all).
- 2) 5 questions about "perceived usefulness" (opinions and information regarding computers), (eg. Computers help me organise my work better).
- 3) 6 questions about "perceived control" (intentions and actions in which there is shown a respect towards computers) (eg. I can make the computer to do what I want it to) and,
- 4) 4 questions about "behavioral" (perceiving inactivity or difficulty in using a computer), (eg. I will use computers regularly throughout college).

The answers were given on a 5-point scale, ranging from 1=Strongly Disagree to 5=Strongly Agree.

2) Planned Behavior was assessed using the questionnaire based on Planned Behavior Theory (Ajzen & Madden, 1986; Theodorakis, 1994; Theodorakis, et al., 1995). The questionnaire included: four questions on Attitudes with responses rated on a 7-point scale, on four bipolar adjectives "For me to use a computer instead of doing a physical activity, is" 7=good to 1=bad, 1=foolish to 7=smart, 7=useful to 1=unuseful, 7=pleasant to 1=unpleasant; three questions on Intention were responses to the first question rated on a 7-point scale from 1=very unlikely to 7=very likely "I intend to use a computer instead of doing a physical activity", while a 7-point scale with endpoints labelled 1=definitely no to 7=definitely yes, was used for the other two questions "I will try to use a computer instead of doing a physical activity"; four questions on Role Identity with responses rated on 7-point scales from 1=strongly disagree to 7=strongly agree "Generally I'm the type of a person who uses a computer instead of doing a physical activity" (Theodorakis, 1994).

Procedure

The questionnaires were handed in all students. The students filled in the questionnaire and returned them straightaway. Researchers informed all subjects their participation was completely voluntary and their responses would be held in strict confidence.

Statistical analyses

There were used the following analyses: Reliability analysis, and univariate analysis in order to find any possible gender differences on attitudes towards computers and physical activity.

RESULTS

Psychometric characteristics

Using the Cronbach coefficient α internal consistency, the results showed that for “Effect” was .83, for “Perceived Usefulness” was .72, for “Perceived Control” was .76, for “Behavioral” was .79, for “Attitudes” .88, for “Intention” .92, and for “Role Identity” .86. All values are over .70 so reliability is accepted.

Gender Differences on attitudes towards computers

Univariate analyses were conducted in order to find any gender differences. The analyses revealed statistical significant gender differences:

(a) For the variable of *affect*: $F(1,159)=5.43, p<.01$. Men had higher scores ($M=5.44, SD=.68$) than women ($M=5.03, SD=.72$).

(b) For the variable of *perceived usefulness*: $F(1,159)=4.47, p<.05$. Men had higher scores ($M=4.12, SD=.59$) than women ($M=3.91, SD=.61$).

Gender Differences on attitudes towards physical activity

Univariate analyses conducted in order to find any gender differences. The analyses revealed no statistical significant differences in any of the variables of “Planned Behavior Theory”.

DISCUSSION

The aim of the present survey was twofold: (a). To examine the students’ differences on attitudes towards computers, and (b). To examine whether or not the use of new technologies (computers) affect students’ attitudes towards physical activity.

The analyses in the present study have shown that there were statistical significant differences on two variables due to gender, perceived usefulness and affective. More specifically, men were more positive in the idea to use computers than women. Previous research has shown mixed results. Robertson, Calder, Fung, Jones and O’Shea (1995) identified that female students had less positive attitudes towards computers. Such attitudes include anxiety liking and confidence. Schumacher and Moharan-Martin (2001) underlined that women generally have less computer experience than men, with result to have negative attitudes towards computers. Also, Ho and Lee (2001) concluded that male students have more computer experience than female students, and boys tend to have less computer anxiety, more positive attitudes toward computers and higher computer confidence than girls. In an earlier study, Nash and Moroz (1997) found out that the gender of a person does not have an effect on the persons’ attitudes towards computers, rather than his/her actions do have the effect. Tsai and his colleagues (2001) indicated that computer experience and more specifically internet experience were positively related to students’ affection, control and behavior. Their results indicated that male students had more positive attitudes than female. Finally, a previous study with a sample of Greek high school students, Antoniou, Patsi, Bebetos and Ifantidou (2006) found no gender differences.

The results of the present study have also shown that there was no variation between the two genders in the attitudes towards exercise. More specifically, no differences were indicated in any of the “Planned Behavior” questionnaire’ variables. A possible explanation for these results may be the fact that both men and women being Physical Education students adopt the same positive attitude towards physical activity.

Nonetheless sometimes the frequent occupation with computers affects negatively the occupation with sports. Probably, students prefer surfing the Net and playing computer games to doing any exercise. However, the variation between the two activities, i.e. computers and PE, was not large. According to Nigg (2003), technology has played a role in the temporary decrease in the occupation with physical activity. In addition, the survey conducted by Stranger and Gridina (1999) has reached the conclusion that children aged from 2 to 17 were occupied with computers for about 1 hour and 37 minutes daily. Yet there have not been conducted any surveys on whether or not the time spent in computers puts aside other activities, such as watching TV programmes, playing sports and having social relationships (Subrahmanyam, Greenfield, Kraut & Gross, 2001).

Research has shown the direct relationship between the use of computers and physical activity. Thomas and Stratton (2006) in their study on the importance of use of information communication technology in physical education classes showed that Physical Education teachers had very positive opinion on the integration of information communication technology into their classes and believed that the use of technology as is a valuable tool in promoting effective teaching and learning. Nigg (2003) argued that the use of technology is related to a decline in physical activity. However, he made some very important points on how technology can influence positively physical activity. He pointed out that technology can help on the large of recruitment of populations, can individualize interventions and promote different physical activity interventions on large populations in different ways.

Other research supported the opinion that computer use can enhance physical activity. Ho and Lee (2001) in their research on computer use and its relation to adolescent lifestyle in Hong Kong found some very interesting results. Their sample consisted of 2110 secondary school students. The results indicated that the total amount of time spent on computers was not associated with any social or physical lifestyle. More specifically, their data showed that computers users have more active lifestyle including more exercise and recreational activities. Additionally, they found out that the boys who were heavier computer users, exercise more than boys who just use computers to play games. Koezuka, Koo, Allison, Adlaf, Dwyer, Faulkner, and Goodman (2006) supported the above results. Their results showed that computer use was a protective factor against inactivity among males and was not significantly related to physical inactivity among females. More specifically, males using computers for less than six hours/week, were about 40% less likely to be inactive compared to nonusers. Their results suggest that the time spent on computers may not necessarily replace time spent on physical activity.

CONCLUSIONS

Overall, the study indicated possible gender differences. As Christensen, Knezek and Overall mentioned in an earlier study (2005), educators must monitor very closely equity issues within the education system. The instructional model must include many types of female preferences. Possible limitations should be mentioned. The sample of the study was university students and more specifically students at a Physical Education Department. Future research should continue investigating similar and other aspects that effect students' attitudes towards computer use and physical activity.

REFERENCES

- Ajzen, I. (1988) *Attitudes, personality, and behavior*. Bristol: Open University Press.
- Ajzen, I., and Fishbein, M. (1980) *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice- Hall.
- Ajzen, I., & Madden, T. J. (1986) Predictions of goal-directed behavior: Attitudes, intentions and perceived behavioral control. *Journal of Experimental Social Psychology*, 22, 453-457.
- AlJabri, I. M. (1996) Gender differences in computer attitudes among secondary school students in Saudi Arabia. *Journal of Computer Information Systems*, 37, 70-75.
- Antoniou, P., Patsi, H., Bebetos, E., & Ifantidou, G. (2006) Validity of scale and evaluation of students' attitudes toward computers. Compare with students' attitudes toward physical education and physical activity. *Inquiries in Sport & Physical Education*, 4 (1), 114-124.
- Christensen, R., Knezek, G., & Overall, Th. (2005) Transition points for the gender gap in computer enjoyment. *Journal of Research on Technology in Education*, 38, 23-37.
- Eck, J., Hale, M., Ruff, S., & Tjelmeland, M. (2002) *An educator's guide to access issues* [Online document]. Available: <http://lrs.ed.uiuc.edu/wp/access/index.html>.
- Garland, K. J., & Noyes, J. M. (2004). Computer experience: a poor predictor of computer attitudes. *Computers in Human Behavior*, 20(6), 823-840.
- Garland, K. J., & Noyes, J. M. (2005) Attitudes and confidence towards computers and books as learning tools: a cross-sectional study of student cohorts. *British Journal of Educational Technology*, 36, 85-91.
- Ho, S. M. Y., & Lee, T. M. C. (2001) Computer usage and its relationship with adolescent lifestyle in Hong Kong. *Journal of Adolescent Health*, 29, 258-266.
- Koezuka, N. M., Koo, M., Allison, K. R., Adlaf, E. M., Dwyer, J. J. M., Faulkner, G., & Goodman, J. (2006) The relationship between sedentary activities and physical inactivity among adolescents: Results from the Canadian Community Health Survey. *Journal of Adolescent Health*, 39, 515-522.
- Krouscas, J. A. (1999). Middle school student's attitudes toward a physical education program. Doctorate of Philosophy in Curriculum and Instruction. Virginia.
- Nigg, C. N. (2003) Technology's influence on physical activity and exercise science: the present and the future. *Psychology of Sport and Exercise*, 57-65.
- Papaioannou, A., Theodorakis, G., and Goudas, M. (1999) *For a better teaching of Physical*

- Education*. Thessaloniki. Salto. (In Greek).
- Roberton, S., I., Calder, J., Fung, P., Jones, A., & O'Shea, T. (1995) Computer attitudes in an English secondary school. *Computers & Education*, 24, 73-81.
- Samouel, M. Y. and Lee, T. M. C. (2001) Computer usage and its relationship with Adolescent lifestyle in Hong Kong. *Journal of adolescent health*, 258-266.
- Selwyn, N. (1997) Students' attitudes toward computers: validation of a computer attitude scale for 16-19 education. *Computers education*, 35-41.
- Schumacher, P., & Moharan-Martin, T. (2001) Gender, Internet and computer experiences. *Computers in Human Behavior*, 17, 95-110.
- Smith, B., Caputi, P., Crittenden, N., Jayasuriya, R., & Rawstorne, P. (1999). A review of construct of computer experience. *Computers in human Behavior*, 15, 227-242.
- Stranger, J.D. and Gridina, N. (1999) *Media in the home 1999: The fourth annual survey of parents and children*. Norwood, NJ: Annenberg Public Policy Center of the University of Pennsylvania.
- Subrahmanyam, K., Kraut, R., Greenfield, P. and Gross, E. (2001) The impact of computer use on children's and adolescents development. *Applied Developmental Psychology*, 7-30.
- Theodorakis, Y. (1994) Planned behavior, attitude strength, self-identity, and the prediction of exercise behavior. *The Sport Psychologist*, 8, 149-165.
- Theodorakis, Y., Bagiatas, K., & Goudas, M. (1995) Attitudes toward teaching individuals with disabilities: application of planned behavior theory. *Adapted Physical Activity Quarterly*, 12, 151-160.
- Thomas, A., & Stratton, G. (2006) What we are really doing with ICT in physical education: a national audit of equipment, use teacher attitudes, support, and training. *British Journal of Educational Technology*, 37 (4), 617-632.
- Tsai, C., Lin, S. S. J., & Tsai, M. (2001). Developing an internet attitude scale for high school students. *Computers & Education*, 37, 41-51.
- Woodrow, J. E. J. (1994) The development of computer-related attitudes of secondary students. *Journal of Educational Computing Research*, 11, 307-338.

IMPLEMENTING CONSTRUCTIVIST APPROACH INTO ONLINE COURSE DESIGNS IN DISTANCE EDUCATION INSTITUTE AT EASTERN MEDITERRANEAN UNIVERSITY

Zehra A. GAZI

Educational Sciences Department, Eastern Mediterranean University

Email: zehra.altinay@emu.edu.tr

ABSTRACT

Change and development in work settings for better working practice through projects has become essential. And, in this context, learning through working practice is constructed by participatory action research. This work-based research has a significant role to contribute innovative practice of Distance Education Institute at Eastern Mediterranean University by EUA norms. The research aimed to investigate implementing constructivist approach into online course designs to develop learning and skills of the online students based on teamwork inspiration within the institute. Action research approach employed in this qualitative research in order to provide insights on how to prepare and design online courses based on constructivist approach. Training, in-depth interviews, documentary analysis, focus group, research diary and semi-structured interviews were employed as data collection techniques to gather large amount of data from online tutors, and members of institute in relation to their collaborative efforts within the process. Furthermore, triangulated data were analyzed based on content analysis in this inductive journey. The results revealed that members and the tutors had no prior knowledge and experience on team work culture and the principles of constructivist approach into online course designs. In this respect, collaborative efforts and synergy power of the tutors within participatory action research resulted in better working performance for change and development research actions. This research is significant for considering change and development in working practice in relation to implementing constructivist approach into online course designs as it is one of the critical success factor for the quality in online practices. In addition, the research opens an academic debate which work based projects through participatory action research need to function in working practices to propose change and development for the quality improvements within higher education institutions.

KEYWORDS: constructivism, course design, online education, work based project

1. INTRODUCTION

Quality can be pursued by continuous improvements based on change oriented actions. In addition to that reality, gaining a competitive advantage lead higher education institutions differentiate their services due to the competitiveness and quality improvements in academia. In this respect, work-based projects become the need for constructing learning to be ongoing. Work based projects seek to merge theory with practice, knowledge with experience within the professional leadership (Doncaster, Lester, 2002). Without new or adapted knowledge, it is not possible to change either the meanings are attached to actions or the actions themselves (Raelin, 2008). Therefore, learning through experiences is centered around reflection on work practices for continuous improvements based on change. Regarding to EUA standards and the necessity of distance education practice in higher education policies, there is considerable need to handle a change and development of pedagogical and organisational aspects of these institutes' working practices through work based team projects. Therefore, universities seek to find out alternative methods such as distance education applications to differentiate service and promote dual mode as innovative quality strategy for the development. Distance education institutes become popular behind the reality of being quality strategy for higher education institutions.

The quality of the academic programs relies on the design of the courses within the program (Duffuaa, Turki, Hawsawi, 2003). In designing courses and the program by a new approach which requires innovation, change and adaptation, it is significant to consider committed decisions of the teachers who voluntarily involve in teams and act for better practices (Houston, 2008; Leinonen, Bluemink, 2008). As Passfield (2002) put an emphasis on action learning within institutions' members for outstanding success on course or program design, this opened a debate on teamwork and committed, shared decision making process to propose new practices within courses based on collaboration and involvement of the teachers as practitioners and also underlined course design as critical success factor for the quality in program development (Ho, 2006).

Good course design is a critical ingredient for developing and supporting deep learning (Ramsden 1992). It is argued that this involves formulating the intended learning outcomes carefully, designing learning activities that adequately enable students to achieve the learning outcomes, and implementing assessment activities that adequately measure the learning outcomes. Further, he stresses that these three aspects of the course design process should be 'constructively aligned', i.e., to be consistent with each other. Poor course design, on the other

hand, will often lead to student dissatisfaction and may even hinder learning (Ramsden, 1992). Not surprisingly then, researchers in online learning agree that good course design is critical in the success of online courses (Salmon, 2002; Laurillard, 2002). But what constitutes 'good' online course design? There is general agreement that online design should support participative, student-centred learning (Salmon, 2002; Hall, 2002; Laurillard, 2002). Active participation in online discussions does not occur by itself, but must be intentionally designed into a course (Salmon, 2002; Laurillard, 2002). Based on constructivist framework, supporting learners, designing authentic tasks, constructing an environment for learner reflection and incorporating collaboration are key features to encourage participation and enhance learning (Merrill, 1992; Savery, Duffy, 2001).

Research on online learning and teaching, agree that course design based on a constructivist framework is critical to the success of online practices based on constructivist framework (Gold, 2001; Ausburn, 2004; Salter, Richards, Carey, 2004; Wiesenber, Stacey, 2005). A constructivist pedagogy enables students to manage their own learning through meta-cognitive, self-reflective and collaborative processes. Constructivist pedagogy is a significant element in the design of collaborative online practice which enhances the quality of learning and teaching online. The study of Salter, Richards, Carey (2004) provides an insight into the complex problem of designing pedagogically sound online course components that support the creation of a learning environment through a collaborative constructivist approach to online learning. The collaborative learning process allows students to construct a scaffold for critical thinking and provides immediacy of feedback in which peers give and receive help, exchange resources and information, give and receive feedback, challenge and encourage each other and jointly reflecting on progress and process (Curtis, Lawson, 2001). Making students who present their views and critically analyze the views of others is the essence of collaborative online learning within to the notion of constructivist pedagogy. Therefore, the theoretical framework for this study arises out of the analysis of issues about collaborative learning process within constructivist pedagogy.

Ausburn (2004) found evidence supporting the belief that course design has great impact on students' learning by investigating the most valued course design elements, namely options, personalization, self-direction, variety and a learning community. A number of arguments have been put forward by researchers that constructivist pedagogy accompanies collaborative online learning in order to foster skills (Wang, Poole, Harris, Wangemann, 2001; Huang, 2002; McLoughlin, Luca, 2002; Harris, Bretag, 2003; McLuckie, Topping, 2004). With regard to existing research on collaborative online learning based on constructivist framework, Huang (2002) provides an insight into how constructivist principles create a more learner-centred collaborative environment and support critical reflection and experiential process. McLoughlin, Luca (2002) argue strongly that collaborative learning is an effective pedagogy to foster skills of analysis, communication and higher order thinking of online students. Furthermore, Harris, Bretag (2003) argue for an increased emphasis on collaborative teaching to enhance both the communication skills of students and their learning outcomes. The study of Wang, Poole, Harris, Wangemann, (2001) puts an emphasis on the promotion of collaborative learning for the improvement of students' communication skills, awareness of the value of team work, development of effective presentation skills and competences in using tools.

Aside from the considerable academic debate surrounding various issues related to collaborative learning, there is sustainable gap in understanding the role of constructivist based course design in the enhancement of collaborative online learning and the development of critical thinking skills of students. Thus, Hughes, Daykin (2002), Morrison (2003) and Fisher, Baird (2005), Neo (2005) provide an insight into the impact of designing constructivist online learning to enhance the learning of students, they stay partial by not stressing the significant relationship between the role of course design in the practice of collaborative online learning based on a constructivist approach to develop critical thinking skills of students in relation to work based project team efforts within specific context through action learning. As constructivism revolves around the issue of how the collaborative process makes learners present their views and critically analyze the views of others, there is a need to extend our knowledge on what elements in course design constitute collaborative online learning which specifically develops the critical thinking skills of students within an action learning process of the tutors' commitment and collaboration.

The online course design based on constructivist approach is the success factor of the quality in online learning and teaching. Therefore, there is intensified need to create an action plan on online course designs that is one of the fundamental element to have qualified practice in distance education institutes based on committed decisions and actions (Elbaum, McIntyre, Smith, 2002). Team work implementation has been accepted as a disciplined management process in higher education to focus on quality (Gunasekaran, McNeil, Shaul, 2002). By the participative management understanding, it is expected to increase quality in higher education programs by using distance education applications as quality strategy based on change management (Sohail, Daud, Rajadurai, 2006; Go'mez, et. al, 2007). In order to reach long run achievements based on vision and mission of higher education;

flexibility, teamwork and commitment on decisions are the hot issues that need to be discussed within distance education institutes to achieve desirable goals. Within this perspective, change and development in the online course design by constructivist approach to develop learning and skills of the online students is significant research focus that needs to be investigated to propose better working practice based on action learning and team inspiration. In relation to issues raised by literature and, European Universities Association report on status of distance education institute at Eastern Mediterranean University and research activities; focusing on implementing constructivist approach into a course design in order to develop learning and skills of the online students based on commitment of staff in distance education institute at Eastern Mediterranean University is crucial as worthwhile research topic and a demand for better institutional practice.

2. AIM OF THE RESEARCH

Work-based projects become the engine of organizational learning to furnish the developmental activities and educational efforts. As people need to learn in order to make self actualization, to conduct with their environment, to grow and become through these experiences, organizations need to learn to maintain themselves and also to develop their actions for the quality (Railen, 2008). Therefore, educational institutions have started to make continuous improvements actions based on European University Association norms. This work based research project aimed to make an action plan for the quality improvements in the Distance Education Institute at Eastern Mediterranean University. This research had a purpose of establishing commitment within decision making process for change and development in Distance Education Institute within the vision of the university to reach out global standards. In this respect, creating awareness on constructivist approach in online course designs; increasing the consciousness of members for committed decisions and actions for change; providing trainings to the staff about constructivist approach, preparing handbook by the outcome of action plan were the aims of this research that made contributions to the strategic plan of the institute and meeting the requirement of EUA report.

As the research mainly relied on creating the consciousness on collaboration, committed decision to change the course designs and integrating constructivist approach into course designs in developing learning and skills of the online students, it aimed to accomplish following objectives;

- To create the awareness of the Distance Education Institute members on team work for decision making about course designs
- To create consciousness on the constructivist approach in online education by the trainings
- To integrate constructivist approach into online course designs for developing critical thinking skills of online students
- To contribute organizational change in terms of the instructional design within distance education practices

2.1 Research Focus and Questions

In respect to change and innovation in the Distance Education Institute based on European University Association norms, research focus relied on the creation of consciousness on team work implementation in Distance Education Institute for online course designs and investigation on implementing constructivist approach into online course designs in developing learning and critical thinking skill of the online students regarding to action plan. The following research questions were answered based on participatory action research as it represents the nature of work based project:

- Q1. To what extend, does Distance Education Institute perform team work implementation in designing online course?
- Q2. To what extend, do online course designs of Distance Education Institute practice the notions of constructivist approach?
- Q3. How does constructivist based collaborative learning perform in online program?
- Q4. To what extend, does constructivist based online course design foster/limit skills development of students?
- Q5. Based on the constructivist approach, what online course design elements creates the environment for collaborative learning and thus contributes to the development of critical thinking skills?

2.2 Research Context

Eastern Mediterranean University is one of the biggest higher education institutions in North Cyprus. It serves international, global education policies to students who are from sixty eight countries. The university promotes quality vision to gain competitive advantage. Eastern Mediterranean University is in the Bologna process and it is evaluated by European Universities Association in order to increase the quality in educational practice. EUA

reported on research activities and distance education practices which are accepted as major tools to help university expand its capacity and catch the quality vision.

Considering the EMU's limited resources to face the challenge of globalisation or to meet the needs of the Lisbon objectives on the development of an energetic society of knowledge in Europe, the report underlines that university needs to develop a university wide research policy, researcher collaboration and synergy between members by fostering in collaboration between different departments. The report significantly underlines the importance of work based projects within the institution to help departments which need to be improved.

EUA also reported on distance education and e-learning practices that these could help university gain competitive advantage by promoting lifelong learning culture in the region. In line with report on research activities, EUA confirms the necessity of distance education and the research policy in distance education practices to be improved it. In addition, report underlines that distance education institute needs to be improved as it could provide competitive advantage to the university with its practices. EUA report confirmed that experts in the field of distance education who are the part of the institute as worker researcher need to turn attention conducting to work based projects for change and innovation. As various research projects within the institute need to be undertaken to improve the institutional practice, this research was one of the work based projects that was taken place in Distance Education Institute at Eastern Mediterranean University in order to provide a change in the team inspiration of online tutors and develop their knowledge and practice on how to design online course based on constructivist approach.

2.3 Limitations

Although the research had following limitations, researcher successfully managed process to reach out credible research outcome.

- The research was conducted to Eastern Mediterranean University Distance Education Institute in 2008-2009 Academic Year.
- Researcher has dual roles as worker and the researcher which created huge loads within the research process.
- Participants had no prior knowledge and experience on online pedagogy.
- There were sixteen members as participants involved in research process based on voluntarism.
- Participatory action research was used as research approach that it was the first experience for the researcher and the participants.
- In a participatory action research, series of actions were implemented that in-depth interviews, trainings, semi-structured interviews, documentary analysis, focus group, and research diary were used as multiple data collection techniques.

3. METHOD

3.1 Research Design

The anti-positivist movement is flexible and evolving process that tends to employ qualitative research design based on inductive reasoning. Qualitative inquiry is well documented that deals with meaning and aims to investigate what is happening in particular context based on the role of the motivated insider as researcher (Bogdan, Biklen, 1992). Denzin, Lincoln (2003) developed a generic description of qualitative research; such that:

“it involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them” (Denzin, Lincoln, 2003, p.5)

Qualitative inquiry for practitioner research as it is set of interpretive activities to understand the socially constructed meanings was chosen as research design in this research. As the overall aim of this project is implementing constructivist approach to the online course designs to develop skills of online students in distance education institute at Eastern Mediterranean University, it requires an in-depth investigation on constructed meanings and experiences of institute members to acquire a better understanding of complex elements of constructivist based online course designs and skills development of online students within particular context. A qualitative research journey is the appropriate research design to in-depth investigation within particular workplace as research context to explore the meanings and experiences and derive better practice within context based on change and innovation. In an inductive process, project aims to explore collaboration among members for online course designs, then implement constructivist approach to online course designs and evaluate the perceptions of tutors and the students regarding to constructivist based course design and its effect to skills development of the students.

3.2 Research Approach

Participatory action research was chosen as appropriate research approach to this work based project as it is the intervention and subsequent evaluation to contribute to exiting knowledge, deal with a problematic situation for change and innovation within organization through collaborative efforts (Gill, Johnson, 1997).

In this approach, the primary importance to educational research in institutions is such that:

“to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework” (Gill, Johnson, 1997, p. 62).

Gonzalez, Hernandez, Kusch, Ryan (2004) defines action research as the heart of interpretation to understand the practices that may result in change. In addition, Cook (2004) pointed out that it is innovative, interagency, reflective practice of working together for change. In this respect, action research in practice aims to solve specific managerial problems, to generalize from the specific and to contribute to theory based on the collaboration and intervention of the organizations’ members. In other words, action research is the systematic inquiry to diagnose a problem within a specific context and seek solutions for solutions based on change and learning cycle.

Action research is a continual learning process which organizations, especially the educational institutions need to adopt for being a part within a competitive market. In this respect, individuals within the organizations tend to stand for questioning insight for problem solving and development regarding to collaboration, reflection transformation of learning into practice. Therefore, the collectivity for change and innovation within educational practices is the crucial element in action research process (Lomax, McNiff, Whitehead, 1996). In action research process, practitioner researcher need to desire by putting action into ongoing action research efforts for change as a self-critical, reflective researcher (Schön, 1991; Pring, 2000).

Action research is one of the most popular methods of professional development for teachers which provides a practical way to uncover complexities of teaching process thereby to improve the quality of learning (Altrichter, Posch, Somekh, 1993). In this respect, this project proposed to improve the practices of the online course design by new approach based on learning and development cycle. The project followed the process as finding a starting point, clarifying situation, developing action strategies and outing them into practice, making teachers; knowledge public.

3.3 Participants

Sixteen institute members became part of the research project to contribute change and development for better working practice. Director of Distance Education Institute, technical staff, Director of Tourism Hospitality and Management, five tutors from the School of Tourism Hospitality and Management, one tutor from Economics, one tutor from Architecture, five tutors from English Preparatory School and one tutor from General Education Department voluntarily participated to the research. Regarding to voluntarism, purposive sampling was used in the research.

3.4 Data Collection Techniques

Action research covers series of action based on multiple data collection techniques, keeping research diary, theoretical and practical activities to aim at improvement. It is inquiry that embraces collaboration of members as group of people to change practices depending on their reflectivity and systematic learning process in relation to the future oriented collective efforts. As this research is a form of disciplined inquiry, in which a personal attempt is made to understand, improve and reform practices within work setting, qualitative data were collected through in-depth interviews, focus groups, documentary analysis and semi-structured interviews, research diary that these multiple data collection techniques were employed in research project.

3.5 Data Analysis

Qualitative data analysis is the search among data to identify content for research questions and focus, for participants’ truth (Denzin, Lincoln, 2003; Marshall, Rossman, 1999). In addition, data analysis is also inductive process in qualitative inquiry which is the process of systematically searching and arranging materials that researcher accumulate to increase own understanding of them and to enable researcher what researcher have discovered to others. In this research, research is grounded on qualitative inquiry to investigate the implementing constructivist approach into online course designs in order to develop the learning and skills of the online students through participatory action research regarding to being demanded project for the university based on EUA report. As research relied on inductive process by qualitative research, qualitative data refer meanings,

experiences expressed through words. In addition, qualitative data collection results in non-standardized data requiring classification into categories. Therefore, qualitative analysis conducted through the use of conceptualization (Saunders, Lewis, Thornhill, 2000). In this research, qualitative data treated based on reduction and interpretation regarding to feasible actions of action research process. This process covered series of action based on action research as it is participatory research through which people work towards the improvement of their own practices in inductive learning cycle (Cohen, Manion, Morrison, 2000).

In this project, conceptual analysis was undertaken that researcher worker set and categorized themes of actions in the research. Also it is known as thematic analysis that is on looking at the occurrence of selected terms within a text or texts, although the terms may be implicit as well as explicit. To attempt to limit the subjectivity, limit problems of reliability and validity, categorization of themes in each feasible action was used based in the project (Altinay, Paraskevas, 2008; Bryman, 2004; Saunders, Lewis, Thornhill, 2000). In this research project, worker researcher imposed order by categorizing data regarding to themes for each actions from multiple data collection and included own ideas, impressions within research process. In this respect, triangulation was conducted to complement weaknesses of the each data collection techniques and verify huge amount of data for credible qualitative research.

3.6 Ethics

Ethics is considered as critical factor within the research. Ethics refers to the terms of anonymity, confidentiality, trust, willingness, transparency, dignity in the research for gaining the valid, reliable results. Ethical principles should be associated to research focus, interrelations of research stages, confidentiality of participants which results in credible research (Marshall, Rossman, 1999; Cohen, Manion, Morrison, 2000).

Insider researcher considered time, resources for the research feasibility, establishing warm contacts with stakeholders based on negotiations, preparing research package to inform participants about purpose of research project and its potential benefits to the organization, having permission and proposing confidentiality through consent forms, keeping sensitivity on data collection and analysis, giving guarantee to the participants about the feedback, sharing research outcomes by handbook in order to prevent ethical pitfalls in action research process.

4. RESEARCH FINDINGS

4.1 Interpretations of Research Actions

Through the inductive process in work-based project; there are deliberate actions within participatory action research that proposed change and development on course designs through the reflective, collaborative insights of researcher and the participants. Research findings are revealed by analysis and the interpretations of the data collection techniques which were in-depth interviews, semi-structured interviews, documentary analysis and the research diary, trainings as milestones of the research process. The accuracy and the reliability of the data were verified by data triangulation.

In this inductive inquiry, the first action covered to what extend Distance Education Institute performs team work implementation in designing online course. In this respect, in-depth interviews helped to gain insights on team work culture within the institute through the experiences and perceptions of the members. Sixteen institute members became part of the first action. In-depth interviews showed that institute members had no prior knowledge and experience on team work and collaboration for online course designs within the institute.

Second action in participatory action research covered training inline with the results of the in-depth interviews to increase the awareness on team work inspiration among members for collaborative decision making on online course designs. Training became significant step to extend knowledge on team work culture. In relation to feedback form about the training, members reported that this activity helped them increase the awareness on team work culture. In addition, members internalized significance of team work and collaboration for decision making process in online course designs. Furthermore, members stated that training provided to enhance professional experience and learning on teamwork within the organisation. Regarding to research focus, team work culture and collaboration among institute members were established which helped contribute further step as implementing constructivist approach into online course designs based on negotiation and collaboration of online tutors.

In this respect, the third action was semi-structured interviews which were used to explore consciousness of the online tutors on constructivist approach and its implications in order to understand how constructivist approach performs in online program. Inline with semi-structured interviews, fourth action was documentary analysis that helped analyze the online course designs based on the principles of the constructivist approach in order to explore the consciousness of the tutors on constructivist approach. Semi-structured interviews and documentary

analysis on course designs showed that tutors had no preliminary knowledge and experience about constructivist approach in online education. Therefore, training was implemented as fifth action to increase the awareness on constructivist approach and help them internalize applying constructivist approach into online course designs. In other words, training provided to change and develop teaching philosophy thereby enhances professional growth.

After the training, there was integration and adaptation process which tutors worked collaboratively to implement constructivist approach into online course designs as project teams. During this process, focus groups activity as sixth action was conducted to be proactive for any immediate changes during the adaptation process. This activity provided significant evidence on collaboration and negotiation of tutors about implementing constructivist approach into online course designs. This also revealed that tutors enhanced their collegial activities through sharing knowledge and experience on implementing constructivist approach into online course designs.

The research actions and process revealed that implementing constructivist approach into online course design enhanced learning of the students. In addition, process contributed to increase communication, teamwork, critical thinking, self-responsibility skills of the online students. Furthermore, research process contributed professional development of the tutors on how to prepare and design online courses based on team work culture. Researcher kept research diary during the process that underlined research outcomes. Through the work-based project, the research report can be listed as team work culture was established within the institute; tutors gained pedagogical insights on how to prepare and design online courses; significantly, researcher and the participants gained professional experience on change and development in online course designs through action research process; research project supported institutional action plan related to quality improvements of Eastern Mediterranean University in line with European Universities Association standards; prepared handbook will be shared with other higher education institutions as good practice for better working contexts.

4.2 Self Appraisal on Action Research

Participatory action research is the collaborative effort that researcher and participants offer each other and through which much attention to change and development within working practice arises jointly. In this respect, this research project provided a significant example of the participatory action research which it resulted in change and development within working practice regarding to how to prepare and design online courses based on constructivist approach. It was a good practice of the research project as research journey that could be shared with other higher education institutions for change and development of their online education practices. The research journey was experienced based on action research cycle (See Appendix). This learning cycle from work itself provided professional learning and experience to the researcher and the participants which could be named as reward of the project.

The first phase of the action research cycle reflected asking questions which covered planning of the process. In this phase, researcher attempted to implement in-depth interviews to the institute's members and training on teamwork inspiration within work environment. During this phase; negotiations, discussions and renaissance with participants helped researcher explore the current situations of the institute on how to act as a team for collaborative decision making process for online course designs. This phase through collected data and researcher observations, reflections on process revealed that teamwork culture need to be developed in the institute which training helped get success on enhancing teamwork culture in work setting.

The second phase of the cycle was collecting data which included action process in getting data from participants about the research focus. In this respect, semi-structured interviews with tutors, documentary analysis of online course designs to examine the consciousness of online tutors, focus group activity in adaptation process, diary to analyze the changes from adaptation process as the outcome of the research process was successfully completed by preparing a hand book to the participants from the research project.

The next phase was the formulating of hypothesis and reflecting that research implemented this activity through reflecting on the each step of actions within this journey by research diary. Following to the reflecting phase, there was planning in actions that trainings provided researcher to rethink on every action. In the phase of positive actions for change; trainings, informal meetings and collaborative efforts of researcher and the participants contributed change and development within working practice.

The success of the action research cycle depends on collaborative efforts of researcher and the participants that collaboration enhanced professional learning for both parties. This participatory actions research was the first experience as a research approach for the researcher and the research context. Although it was thought that it could be challenge of the process, researcher and participants showed much efforts and enthusiasm to be part of

this experience and at the same time to act collaboratively for change and development in order to create better working practice.

Further to this, this research experience provided participants learn from collaborative process, gain in-depth insights on action research, extend knowledge on how to prepare and design online courses based on constructivist approach. In addition to this, action research provided great contributions to the researcher that researcher developed project management, leadership, communication, crisis management and research skills. Also, the researcher well interpreted how to be an action researcher within active experimentation process at work context to propose change and development in working practice. In relation to that, researcher developed self-reflective during the research diary and writing process of the project which reflection is crucial skill to transfer life-long learning process. In summary, using action research approach made researcher interpret active role as worker researcher and gained insight from the essences of work based learning. Researching through a work-based research project suggested high level of responsibility created research atmosphere based on collaborative efforts that also provided pedagogical developments and professional learning experiences to the participants.

5. CONCLUSION

The research aimed to investigate the implementation of constructivist approach into online course designs in Distance Education Institute at Eastern Mediterranean University based on team work inspiration. In this respect, participatory action research was employed for this work based project to propose change and development regarding to the research aim and objectives. The project considered creating the consciousness on collaboration, team work in decision making process for online course designs and implementing constructivist approach into online course designs to develop learning and transferable skills of the online students. For this broader aim, the research project covered particular research objectives such as: creating the awareness of the Distance Education Institute members on team work for decision making about course designs; creating consciousness on the constructivist approach in online education; integrating constructivist approach into online course designs for developing critical thinking skills of online students; contributing organizational change in terms of the course design within online education practices. In relation to gaining success on research project for better working practice, participatory action research approach was employed through series of deliberate actions in the research process that provided best practice for change and development in work context.

In respect to globalisation and technological developments in academic world, the rapid diffusion of knowledge and alternative ways of the education turn our attention to consider online education practices as competitive advantage factor (McPherson, Nunnes, 2006). Therefore, higher education institutions put forward to quality improvements action which online education practices become priority to be one step behind in a competitive world.

Regarding to EUA standards and the higher education policies on quality through change and development on online practices, distance education institutes become a strategic unit which they need to consider both pedagogical and organisational change and development through collaborative projects. While implementing change and development in any specific program and courses, considering team work and collaboration is significant attempt in academic agenda (Duffuaa, Turki, Hawsawi, 2003). Therefore, committed decisions and collaboration of the colleagues for innovation and change within project teams act for better practices in work setting (Houston, 2008). Involvement of the teachers, practitioners in an action learning process for the quality of program development and changes on course design through team work result in better working practice (Passfield, 2002; Ho, 2006). In this respect, this research project confirmed that team work and collaboration are the significant success factors to propose change and development for course designs and program development through action learning in work context. For this outcome, the research process covered base line measurement through in-depth interviews to investigate the consciousness of the institute members' on team work inspiration that this showed the lack of consciousness among the members for collaborative decision making on the course design and program development. In this respect, trainings increased the attention on the necessity of being project teams and created the awareness on team work culture within the institute that result in success for better working practice.

The course design is the critical success factor of the online practices which need to promote learning and skills development of the students (Salmon, 2002; Laurillard, 2002). There is general agreement that online course design need to cover participative, authentic, student-centred learning atmosphere to promote better learning and skills development (Salmon, 2002; Hall, 2002; Laurillard, 2002). In this respect, constructivist approach has framework for supporting learners, designing authentic tasks, constructing an environment for learner reflection

and incorporating collaboration that it is the good alternative for the online practices to encourage participation and enhance learning (Merrill, 1992; Gold, 2001; Savery, Duffy, 2001; Ausburn, 2004).

Constructivist pedagogy as the critical element of collaborative online course designs is also a successful factor in enhancing the quality of learning and teaching online (Salmon, 2002). Within this pedagogy framework, there are eight set of design principles which are: learning should take place in authentic and real-world environments; learning should involve social negotiation and mediation; content and skills should be made relevant to the learner; content and skills should be understood within the framework of the learner's prior knowledge; students should be assessed formatively, serving to inform future learning experiences; students should be encouraged to become self-regulatory, self-mediated, and self-aware; tutors serve primarily as guides and facilitators of learning, not instructors; tutors should provide for and encourage multiple perspectives and representations of content. Especially, social constructivism which views all knowledge as socially constructed through interactions with other individuals and the environment and maintains an emphasis on language use, provides insights on how to prepare and design online courses for deep learning and skills development of the students. In a collaborative, constructivist learning environment, students have chance to develop higher order thinking, reflection, communication, research, team work skills through managing their own learning within learning community. This helps them to be critical learners in life long learning process (Curtis, Lawson, 2001; Huang, 2002; McLoughlin, Luca, 2002; Harris, Bretag, 2003; McLuckie, Topping, 2004). As Hughes, Daykin (2002), Morrison (2003) and Fisher, Baird (2005), Neo (2005) provide an insight into the impact of designing constructivist online learning to enhance the learning and skills development of students, this research project filled the gap on how constructivist approach in online course design promote learning and develop communication, research, reflection, critical thinking and presentation skills of the online students through the collaborative efforts of the tutors by practical work. The success on this practical work relies on series of actions within participatory action research. The base-line measurement through semi-structured interviews with tutors and documentary analysis on course designs provided to examine the consciousness of tutors on constructivist approach. The base-line measurement showed that tutors had no preliminary knowledge and experience on constructivist approach. Therefore, trainings were conducted to tutors in order to extend their knowledge on how to prepare and design online courses based on constructivist approach. Furthermore, tutors were implemented this approach into their online course designs through negotiation, discussion with their project teams. Research project supported that implementing constructivist approach into online course designs enhance learning and develop skills of the online students.

In summary, integration of constructivist approach into course designs in developing learning and transferable skills of the online students explored within a participatory action research that resulted in promoting better working practice. In addition, project put forward to worthwhile insights on performance improvements by action plan which other institutions can share it as a good practice. The research project revealed following conclusions:

- ✓ Team work culture: Team work and collaboration was practiced within the research process as the critical success factor for the innovation and change. Project teams were functioned properly to propose change on course design and implement constructivist approach to promote learning and skills development of the students. In this respect, tutors gained pedagogical insights on course design and developed their professional learning through collaboration. In addition, team work culture was established that provided institute to act together for the quality mission.
- ✓ The role of course design: Course design based on constructivist approach in this practical work demonstrated that collaborative works, research activities, communication and negotiation, integration of learning and experiences with real life experiences within the courses are the inevitable elements for deep, active learning and skills development.
- ✓ Learning and skills: Course design based on constructivist approach provided to have in-depth knowledge and experience on subject matter within the courses. It also enhanced deep and active learning and this course design resulted in developing higher order thinking, critical analytical thinking, research, communication, reflection, collaboration and presentation skills of students.

As this research project grounded on participatory action research, it covered action research cycle that tutors as professionals acted collaboratively to propose change and development for better working practice. In this respect, researcher followed series of actions which incorporated actions helped reach out achievement on research outcome. In this practical work, participatory action research model was employed which resulted in best practice on change and development in online course design by participatory action research.

5.1 Some Analytical Generalizations

Regarding to experiences on participatory action research and conclusions of the research project, some analytical generalizations can be listed as following:

- Participatory action research provides to change and develop better working practice through collaborative efforts of the professionals in relation to implementing constructivist approach into online course design in developing learning and skills of online students.
- The distance education institutes are the strategic unit of the higher education institutions to cope with quality improvements in competitive agenda.
- Innovation and change for quality in online education practices can be reached out through deliberate action plan that professionals need to work together.
- Institute members need to seek support from the institute which significantly they should offer a team work with others; develop policies and procedures within the institute based on collaboration; provide or involve in training on pedagogical and technical developments on online practices.
- In planning ongoing quality assurance while delivering online course, tutors need to create standards; encourage students feedback; assess performance through questionnaire, interviews, etc.; be welcome a mentor or peer; keep journal of teaching experience.
- Online delivery is affected by student characteristic, technology, tutor and the course design.
- Course design need to fit to curriculum and it need to be learner focused, accessible, relevant content, collaborative, interactive. It needs to target small group size as it is cohesive, and it needs to address learning style and culture.
- Constructivist approach for the online course design is the most appropriate approach to promote learning and skills development of the students.
- The principles of the constructivist approach need to practice in course objectives, course activities and learning outcome. In this respect, tutors need to consider that learning should take place in authentic and real-world environments; learning should involve social negotiation and mediation; content and skills should be made relevant to the learner; content and skills should be understood within the framework of the learner's prior knowledge; students should be assessed formatively, serving to inform future learning experiences; students should be encouraged to become self-regulatory, self-mediated, and self-aware; tutors serve primarily as guides and facilitators of learning, not instructors; tutors should provide for and encourage multiple perspectives and representations of content.
- In a constructivist learning environment, group activity and collaboration increases social interaction and thus enhance learning.
- Course content, learning activities and interaction in online courses increase self-reflective skill of the students.
- Constructivist learning experience increases problem based learning when tutors provide chance to develop multiple perspectives.
- Constructivist learning environment helps students gain research, reflection and critical thinking skills.
- Group learning activities provide positive results on learning and team work skill.
- Collaborative learning provides peer facilitation that increases communication and reflection skills.
- Online students can take their own learning responsibility in online context.
- Students have positive attitude on constructivist learning environment which is different from their traditional classroom experiences.
- Course design elements that are design options, personalization, variety, self-direction, learning community effect students learning.
- Communication tools such as chat, discussion boards, email increases collaboration.
- Communication, problem solving, team building, reflective thinking are the developed skills in constructivist online learning context.

6. MAJOR IMPLICATIONS

The research investigated the role of the online course design based on constructivist approach in enhancing learning and skills of the online students. It is significant by considering change and development in working practice in relation to implementing constructivist approach into online course designs as it is one of the critical success factor for the quality in online practices. The research puts forward to proposing innovation and change through collaborative efforts of the professionals in a participatory action research. In this respect, it is the first and the best practice of the participatory action research in work context which project resulted in better performance of team work within the institute regarding to committed decisions of the members for online course designs. Thereby, research project as best practice model could be shared with higher education institutions to change and develop their performances on online course designs for the quality improvements. In

addition, the research filled the gap on the literature regarding to implementing constructivist approach into online course designs in developing learning and skills of the online students based on practical work. It opens an academic debate which work based projects through participatory action research need to function in working practices to propose change and development for the quality improvements within higher education institutions.

6.1 Implications for Practice

- Research revealed that participatory action research contributes change and development within working practice.
- The research project provided participants to have deeper understanding on pedagogical and organizational aspects of the online education.
- The collaborative research process provided participants to gain consciousness on the importance of team work culture in working practice.
- Professionals as participants gained in-depth insights on principles of constructivist approach for online course designs.
- Institute members extended their knowledge and experience on how to prepare and design online courses based on constructivist approach.
- Research participants involved in action learning within participatory action research which this enhanced their professional growth.

6.2 Implications for Further Researches

- For further studies, comparative case study could be used to examine the performances of the different institutes from different higher education institutions in implementing constructivist approach into online course designs within their working practices.
- In addition, each principles of the constructivist approach within online course designs could be research focus which needs to be deeply investigated in practice.
- Further researches could cover mixed approach to integrate qualitative and quantitative research design for the validity and reliability of the research.

ACKNOWLEDGEMENTS

This research is part of work based research project that was funded by Ministry of Education. I would like to thank to Dr. David Officer for his supervision during research process for the Doctorate of Professional Studies Programme at Middlesex University. In addition, I would like to thank Director of Distance Education Institute, consultants and research participants who voluntarily become part of this research journey for better working practice.

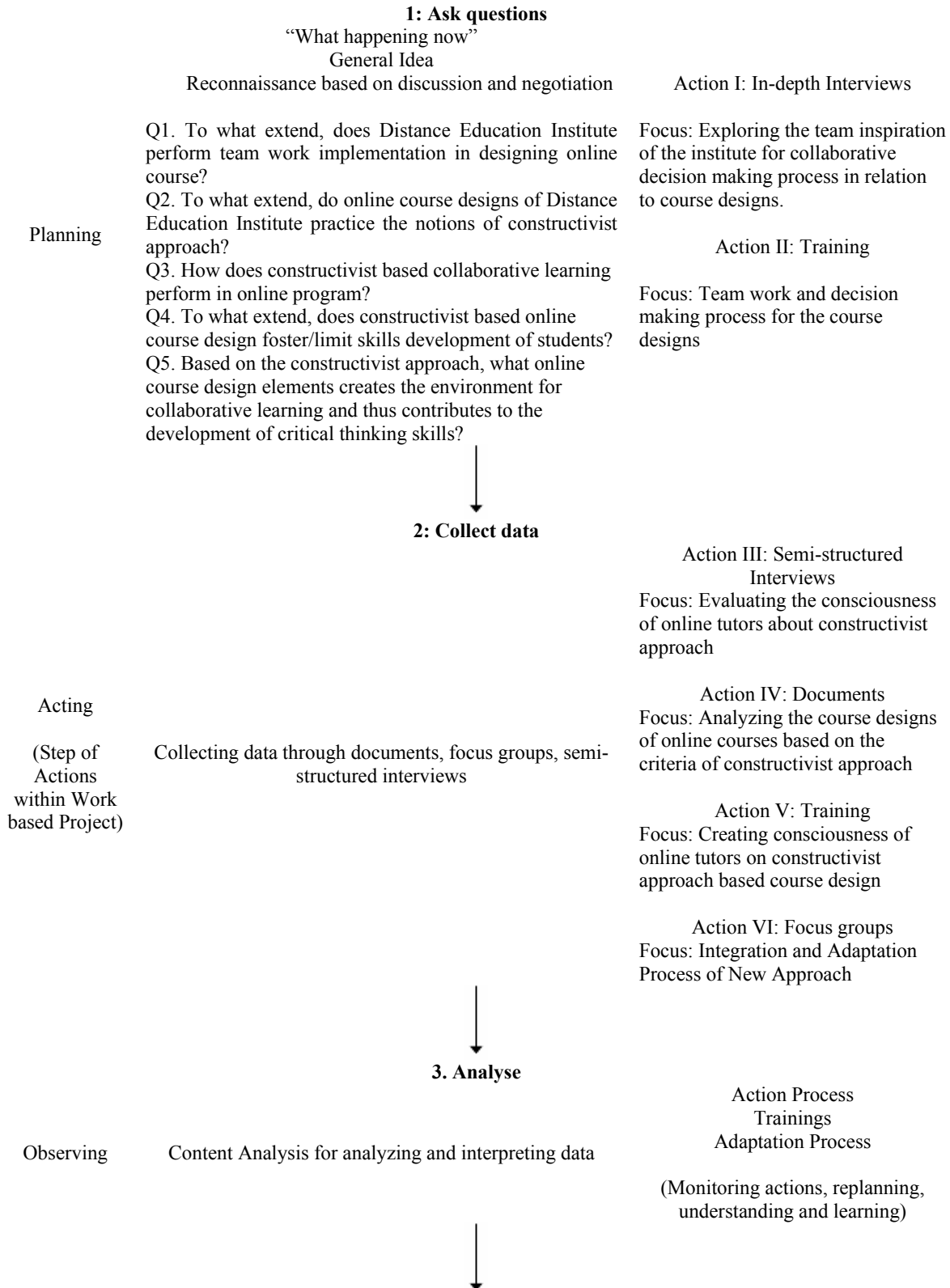
REFERENCES

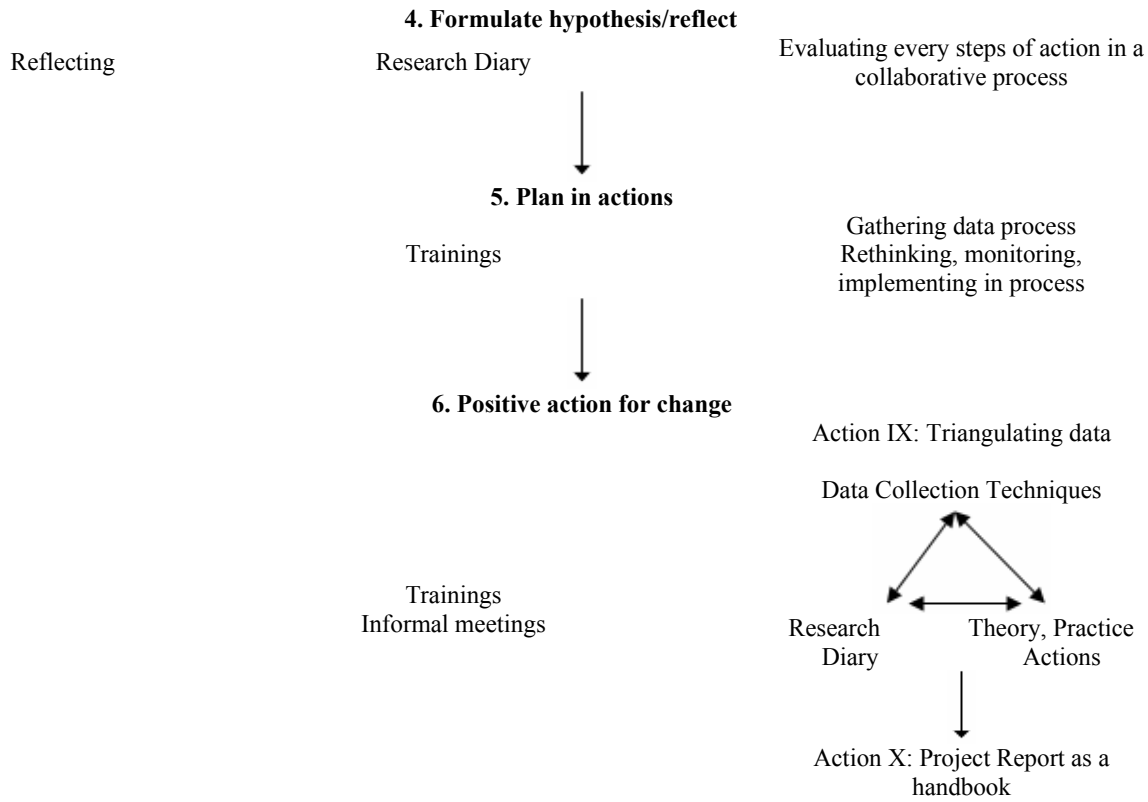
- Altinay, L., Parakevas, A. (2008). *Planning research in hospitality and tourism*. Oxford: Elsevier.
- Altrichter, H., Posch, P., Somekh, B. (1993). *Teachers investigate their work*. London: Routledge.
- Ausburn, L.J. (2004). Design components most valued by adult learners in blended online education environments: an American perspective, *Educational Media International*, 41(4), 327-337.
- Bogdan, R., C., Biklen, S., K. (1992). *Qualitative research for education*. Boston: Allyn and Bacon.
- Bryman, A. (2004). *Social research methods*. Oxford University Press.
- Cohen, L., Manion, L. & Morrison, K. (2000). *Research methods in education*. London: RoutledgeFalmer.
- Cook, T. (2004). Reflecting and learning together: action research as a vital element of developing understanding and practice. *Educational Action Research*, 12(1), 77-99.
- Curtis, D. D., Lawson, M. J. (2001). Exploring collaborative online learning. *Journal of Asynchronous Learning Networks*, 5(1), 21-34.
- Denzin, N. K., Lincoln, Y. S. (2003). *Collecting and interpreting qualitative materials*. London: SAGE.
- Duffuaa, S. O., Al-Turki, U. M., Hawsawi, F. M. (2003). Quality function deployment for designing a basic statistics course. *International Journal of Quality & Reliability Management*, 20(6), 740-750.
- Doncaster, K., Lester, S. (2002). Capability and its Development: experiences from a work-based doctorate. *Studies in Higher Education*, 27(1), 91-101.
- Elbaum, B., McIntyre, C., Smith, A. (2002). *Essential elements: prepare, design, and teach your online course*. Madison: Atwood publishing.
- Fisher, M., Baird, D. E. (2005). Online learning design that fosters student support, self-regulation, and retention. *Campus-Wide Information Systems*, 22(2), 88-10.
- Freebody, P. (2003). *Qualitative research in education: interaction and practice*. London: SAGE.
- Gill, J., Johnson, P. (1997). *Research methods for managers*. London: Paul Chapman.
- Gold, S. (2001). A constructivist approach to online training for online teachers. *Journal of Asynchronous Learning Networks*, 15(1), 35-57.

- Go'mez, P., Gonza'lez, M. J., Gil, F., Lupia'n'ez, J. L., Moreno, M. F., Rico, L., Romero, I. (2007). Assessing the relevance of higher education courses. *Evaluation and Program Planning*, 30, 149-160.
- Gonzalez, C. B., Hernandez, T., Kusch, J., Ryan, C. (2004). Planning as action research. *Educational Action Research*, 12(1), 59-77.
- Gunasekaran, A., McNeil, R. D., Shaul, D. (2002). E-learning: research and applications. *Industrial and Commercial Training*, 34(2), 44-53.
- Hall, R. (2002). Aligning learning, teaching and assessment using the web: An evaluation of pedagogic approaches. *British Journal of Educational Technology*, 33(2), 149-158.
- Harris, H., Bretag, T. (2003). Reflective and collaborative teaching practice: working towards quality student learning outcomes. *Quality in Higher Education*, 9(2), 179-185.
- Ho, E. S. (2006). Educational decentralization in three Asian societies: Japan, Korea and Hong Kong. *Journal of Educational Administration*, 44(6), 590-603.
- Houston, D. (2008). Rethinking quality and improvement in higher education. *Quality Assurance in Education*, 16(1), 61-79.
- Huang, H. M. (2002). Toward constructivism for adult learners in online learning environments. *British Journal of Educational Technology*, 33(1), 27-37.
- Hughes, M., Daykin, N. (2002). Towards constructivism: Investigating students' perceptions and learning as a result of using an online environment. *Innovations in Education and Teaching International*, 39(3), 217-224.
- Laurillard, D. (2002). *Rethinking university teaching: a conversational framework for the effective use of learning technologies*. London: Routledge.
- Leinonen, P., Bluemink, J. (2008). The distributed team members' explanations of knowledge they assume to be shared. *Journal of Workplace Learning*, 20(1), 38-53.
- Lomax P., McNiff J., Whitehead J. (1996). *You and your action research project*. London: Routledge.
- Marshall, C., Rossman, G. B. (1999). *Designing qualitative research*. Thousand Oaks: SAGE.
- McLoughlin, C., Luca, J. (2002). A learner-centred approach to developing team skills through web-based learning and assessment. *British Journal of Educational Technology*, 33(5), 571-582.
- McLuckie, J., Topping, K. J. (2004). Transferable skills for online peer learning. *Assessment & Evaluation in Higher Education*, 29(5), 564-584.
- McPherson, M., & Nunes, M.B. (2006). Organisational issues for e-learning critical success factors as identified by HE practitioners. *International Journal of Educational Management*, 20(7), 542-558.
- Merrill, M. D. (1992). Constructivism and Instructional Design. In Duffy, T., Jonassen, D. H. (Ed.). *Constructivism and the technology of instruction: a conversation* (pp. 99-114). London: Lawrence Erlbaum Associates.
- Middlesex University Module Guide Handbook. (2008).
- Mills, G. E. (2003). *Action research: a guide for the teacher researcher*. Ohio: Pearson Education.
- Morrison, D. (2003). Using activity theory to design constructivist online learning environments for higher order thinking. A retrospective analysis. *Canadian Journal of Learning and Technology*, 29(3), (Special Issue).
- Neo, M. (2005). Web-enhanced learning: engaging students in constructivist learning. *Campus-Wide Information Systems*, 22(1), 4-14.
- Passfield, R. (2002). Creating innovation and synergy through a parallel action learning structure. *The Learning Organization*, 9(4), 150-158.
- Pring, R. (2000). *Philosophy of educational research*. London: Biddles Ltd.
- Raelin, J., A. (2008). *Work-based learning: Bridging knowledge and action in the workplace*. San Francisco: Jossey-Bass.
- Ramsden, P. (1992). *Learning to teach in higher education*. London: Routledge.
- Salmon, G. (2002). *E-moderating: the key to teaching and learning online*. London: Kogan Page.
- Salter, D., Richards, L. & Carey, T. (2004). The 'T5' design model: An instructional model and learning environment to support the integration of online and campus based courses. *Educational Media International*, 41(2), 207-217.
- Saunders, M., Lewis, P., Thornhill, A. (2000). *Research methods for business students*. London: Prentice Hall.
- Savery, J., Duffy, T. M. (2001). *Problem based learning: an instructional model and its constructivist framework*. Centre for Research on Learning and Technology: Bloomington.
- Schön, D. (1991). *The reflective practitioner*. Avebury: Ashgate Publishing.
- Sohail, M. S., Daud, S., Rajadurai J. (2006). Restructuring a higher education institution: A case study from a developing country. *International Journal of Educational Management*, 20(4), 279-290.
- Wang, M., Poole, M., Harris, B., Wangemann, P. (2001). Promoting online collaborative learning experiences for teenagers. *Education Media International*, 38(4), 203-215.
- Wiensenberg, F. Stacey, E. (2005). Reflections on teaching and learning online: Quality program design, delivery and support issues from a cross-global perspective. *Distance Education*, 26(3), 385-404.

APPENDIX

Action Research Cycle





(Adapted from Middlesex University Handbook; Freebody, 2003; Mills, 2003).

INVESTIGATING WEB SITES OF FACULTIES OF EDUCATION: THE CASE OF TURKEY

Tamer KUTLUCA

Karadeniz Technical University, Institute of Natural Sciences, Trabzon/TURKEY
tkutluca@ktu.edu.tr

Serhat AYDIN

Karadeniz Technical University, Institute of Natural Sciences, Trabzon/TURKEY
acserhat@ktu.edu.tr

Prof. Dr. Adnan BAKI

Karadeniz Technical University, Fatih Faculty of Education, Trabzon/TURKEY
abaki@ktu.edu.tr

ABSTRACT

The purpose of this paper is to explore the current status of the web sites of the Faculties of Education (FOEs) in Turkey. Bearing this in mind, a “Web Site Assessment Form” comprising thirty-seven items was developed and the web sites of the FOEs were evaluated with respect to “Content”, “Currency”, “Structure and Navigation” and “Visual Design” categories. The study was administered using a survey technique in sixty-seven FOEs affiliated to The Council of Higher Education of Turkish Republic.

The data obtained were analysed using frequencies and percentages for each item and the results were presented in tables. Our exploration has brought the following points to the ground: out of the web sites of the FOEs, most were judged to be user friendly; communicate information about the faculty, faculty members and administration; post recent news and announcements; have a good deal of color management; be free of redundant details and operate consistently. In contrast, most sites had no search engine; had outdated pages; did not contain any information regarding the dates of initial set-up and last update; didn't publish the English-versions for entire Turkish content. Finally, several recommendations were made in order to streamline the web sites of FOEs.

Key Words: Faculty of education, World wide web, Web site, Web page.

INTRODUCTION

Recent rise of new knowledge, rapid developments in and widespread use of technology lead to considerable changes in education systems. Such changes impel the use of technology in education systems. With the development of high technology, social, political and educational aspects of life become affected. Like the learning and behavior styles of the individuals, theories, approaches that should involve into education change (İşman, 2005; İşman et al., 2004). In this information age, it is inevitable to bring about individuals knowing how to use and share the knowledge. Employers are increasingly demanding a workforce armed with technological know-how. This implies that technology should become an integral part of education.

Computers pioneered the common technologies in education practices. The increase in the number of computers in educational settings led to widespread use of Web-based education. The most comprehensive field of application for the computer-network-based technologies is the World Wide Web. The concept of the World Wide Web was invented by Tim Berners-Lee, and then it was formalized at CERN in 1989 and 1990. The World Wide Web Consortium, founded by Berners-Lee, defines the World Wide Web as “the universe of network-accessible information, an embodiment of human knowledge”. Recently, web gained a dimension ruling over all the remaining education technologies that aid the teacher (Şimşek, 1999). IT has evolved dramatically since the onset of World Wide Web (Hackett and Parmanto, 2005). Current improvements in technology and the successive innovations changed the way school systems are viewed. Today, web site of a university has become an integral part of a virtual campus in which students, academics and millions of people around the world share knowledge (Acartürk, 2004).

Following the increase in internet usage, the most preferred tools in the field of education turned out to be web sites (Abdullah, 1998). Having gained increased significance in terms of education, web sites provide rich learning environments by incorporating audio and visual instruments, interactive interfaces, communication tools and giving links to other web pages (Uzunboylu and Ballı, 2004). Burgstahler et al. (1997) assert that the World Wide Web provides a huge network of educational resources (Lilly, 2001). Web is a medium which provides

rich learning opportunities for the individuals. Web provides a global learning environment for people from different time zones and speaking various languages (Uzunboylu, 2005).

Several studies highlighted the importance of defining an audience, identifying their needs and targeting that segment of users (Muller, 1996) and suggested that addressing only a specific group of clients would increase the effectiveness of a web site (Abels, White and Hahn, 1999).

Irgat and Kurubacak (2002) note that a web page may push the boundaries of place and time, provide multifarious interaction among individuals and organizations and support the spread and share of knowledge. Knowledge exchange and communication is highlighted in current education systems and the importance of web design is increasing. Web sites of the FOEs are important tools in revealing the infrastructure, the accreditation and services of the faculty at home and abroad. They also carry an important responsibility to implement the information services via internet. They are the windows of the faculties opening to the outer world. In this regard the web sites of the FOEs contribute to the positive image of the organization as well as providing effective IT services for the users.

When we had a quick look at the design of the web sites of the faculties of education in Turkey, we observed that they were not uniform in regard to content, currency, structure & navigation and visual design. In this context, we thought that investigating the web sites of faculties of education in Turkey would be beneficial.

LITERATURE REVIEW

Although examination and assessment of web pages is a current field of study in a variety of disciplines (Atakan, Atılgan, Bayram and Arslantekin, 2008; Clausen, 1999; Clyde, 1996; Hackett and Parmanto, 2005; Irgat 2002; Irgat ve Kurubacak, 2002; Kurulgan ve Bayram 2006; Rotem and Oster-Levinz, 2007; Schmetzke, 2001; Tillotson, 2002), too few studies focused on evaluating web pages of faculties of education (Dağdeviren et al., 2007; Erginer and Erginer, 2003).

Akıllı (2005) analyzed user satisfaction with the web site of a university and suggested that conducting comparative studies among web sites of educational institutions in terms of usability would be useful. More comprehensive comparative studies encompassing other criteria such as content, navigation and design will also be useful.

Erginer and Erginer (2003) conducted an inquiry in 2002 demonstrating brief introductory knowledge about the web pages of the faculties of education in Turkey. This study examined the web sites of fifty-nine faculties, though, couldn't access web sites of a number of faculties and did not reveal any explanation at all about seven faculties. We think that the web sites of both the departments and main science divisions might have experienced some changes from 2002 through 2008. Dağdeviren et al. (2007) compared the web sites of faculties of education regarding *format and content*. Their study covered fifty-seven state and five private, total sixty-two faculties. The results of that study pointed to considerable similarities and differences in terms of content and format among the web sites of the compared faculties. Most of the faculties presented sufficient coverage related to academic staff, administrative staff, and management, whereas few launched a search engine, a site map and orientation in their web sites. Yiğit et al. (2007) devised a scale for evaluating educational web sites. This scale consists of three main titles as: *design, content and enhancing learning* and under these categories eight subtitles as: *graphics, color, text, author, objective, knowledge, ease of use and evaluation*.

It's trivial that every web site is not a valuable and reliable resource. The following list of features was proposed to be a summary of criteria for evaluating whether a web site is worthy of using: the more criteria a site meets, the more likely it is considered as a valuable resource: *technical considerations, purpose, content, authorship/sponsorship, functionality, design/aesthetics* (Abdullah, 1998). Irgat (2002) interviewed twenty-eight faculty members in a study to call for their opinions about "how the web site of a university should be". After the analysis of the data the researcher has encoded the views of the faculty members under five categories of *appropriateness, credibility, update, accessibility and navigation*. As a result of this study, he concluded that the web sites of the universities should meet the needs of the target population, the content should be current and authentic, the pages should be simple yet aesthetic and the site should have an in-site search engine for easy navigation, there should be English-versions for all pages in Turkish and the design task should be implemented by experts. Finally, he commented that users would not get lost in a well-designed and well-organized university web site that has no dead links.

Another study compared the web sites of university libraries and institutions. Clausen (1999) evaluated Danish academic library web pages on the World Wide Web. The main conclusion of his study was that the web sites of

the Danish academic libraries in question were found to be of a relatively higher quality in general when compared with other Danish and foreign web sites. Clyde (1996) examined school and public library web pages across countries. Dewey (1999) analyzed the Find Ability of Links on CIC University Libraries' web Pages. However, other cross cultural library web site studies are not easily found in the literature. In their study on accessibility of consumer health web sites, Zeng and Parmanto (2004) found that governmental and educational web sites are the two best categories of web sites that are relatively accessible compared to other categories such as e-commerce, corporate, community, and portal. Hackett and Parmanto (2005) looked at the current level of accessibility for 108 consumer health information web sites and evaluated the relationship between web accessibility and three variables: the category of the web site, the popularity of the web site based on Alexa daily traffic-ranking data, and the importance of the web site based on the Google PageRank. The quality of information for a web site is another matter of ongoing debate (Clausen, 1999).

Another more recent study conducted by Schmetzke (2001) evaluated the university of Wisconsin's 13 campuses for web page accessibility over three years on three sets of web pages: general campus pages, library pages and academic department pages. Using Bobby, Schmetzke found that over this three year period ending in 2001, the web site accessibility percentages increased, but the numbers of accessible pages are still low. The accessible campus pages went from 48 % in 1999 to 43 % in 2000, to 52 % in 2001. The accessible academic department pages went from 27 % in 1999 to 32 % in 2001. Anderson (1997) noted that some policies should be made in web design and included in those policies are criteria under the headings of *quality of content, some degree of consistency and general direction*. Basically, the policies should address page content, overall responsibility, potential contributors, quality, technical standards, student protection, server access, and ownership and responsibility. There have been a number of general guidelines written on the subject of web site design and usability some of which are *high quality content, frequency of update, minimal download time and ease of use* according to Nielsen (Pisanski and Zumer, 2005).

Kurulgan and Bayram (2006) analyzed web sites of 77 university (state and private) libraries in terms of content and form. In their study, evaluation criteria obtained through content analysis were measured by visiting each library web site and measures are given as frequency distribution and percentage analysis. As a result of the study, it was determined that the web sites of the libraries of state universities use Internet opportunities more effectively than the web sites of libraries of private universities. They suggested that web pages should be designed according to users' needs, permanently considering the dynamic structure of university library web sites. Similarly, Çakıroğlu and Akkan (2008) proposed a set of criteria to determine the standardization of educational web sites and those criteria involved the categories of *pedagogy, content, design, interface, technology and security*. Then they assessed seven educational web sites using those criteria. Their evaluation disclosed that the educational web sites are insufficient in view of pedagogy, they have average-quality technological features and in general, the sites were insufficient regarding the expected criteria. On the other hand, Çalışkan et al. (2002) inquired how the students evaluated the web sites of Open University in terms of *content level, visual representation level, technical level and sufficiency level of services* to determine whether those students make use of those sites effectively or not. For this aim, they developed a survey tool including 23 questions and implemented the tool to 1831 students. They concluded that often there are no problems in the web sites of Open University technically or visually, however, the content and the web services should be streamlined for effectiveness in terms of quality and number. In one study, Uzunboyulu and Ballı (2004) evaluated a number of web sites on mathematics education which used Turkish as language of publication. For this aim they developed a data collecting tool considering key tenets of the web sites and used this tool to evaluate 10 mathematics education web sites. They showed that the web sites under investigation were insufficient in terms of purpose, educational objectives, lecture notes, online courses, lesson plans, dictionaries, discussion boards and so forth.

THE PURPOSE OF RESEARCH

These studies show that educational and in a sense organizational web sites were elected as research topics in the literature. Our study will address the web sites of educational faculties in terms of not only format and content but also currency, structure and navigation. These kinds of studies are most likely to play a crucial role in evaluation of the existing structures in faculties of education. In this context, with the purpose of determining the current status of the web sites of faculties of education, a Web Site Assessment Form has been developed and the web sites of choice were evaluated as regards *content, currency, structure & navigation and visual design* categories.

The quality of the content of a web site has to be measured in other ways. As has been described by Skov (1998), the aids and tools available for assessing good information quality on the WWW differ widely. Skov advocates the view that there must be a positive correlation between reliability of content, and organization and design of a

resource: “If a site is poorly designed, if misspelled words and grammatical errors march along, if the screen is completely jammed with frames or loaded with irrelevant graphics, if sophisticated software is needed to decipher the message, I become suspicious: A creator that doesn’t bother to follow the rules for good web-publishing is unlikely to provide reliable information.”

METHOD

Research Design

This study was designed as a quantitative survey research. Survey research can be defined most simply as a means of gathering information, usually through self-report, using questionnaires or interviews. Survey research is not a design, per se; instead surveys are more commonly considered the medium used for data collection. However, most survey research falls within the framework of nonexperimental or correlational research designs in which no independent variable is experimentally manipulated (deMarrais and Lapan, 2004, p.285).

Sample

The web site of Higher Education Council contains links to 61 state and 5 private, total 66 faculties. Only web site of one faculty (i.e. Artvin Faculty of Education, KTU) couldn’t find its way in the list above. The data we examine come from these 67 web sites. We included the web site of Artvin Faculty of Education in our study for the sake of our research purpose. The researchers examined the web sites of 67 faculties on the net and gathered data relevant to the departments and main science divisions. The list of the faculties that couldn’t be accessed is presented in Table 1.

The development of the Web Site Assessment Form

Web sites of the FOEs were initially examined during March – May 2006 as a preliminary pilot study. Then, the data collected were transcribed. Afterwards, these data were analyzed and some notes were taken. After examining the pilot study and carrying out a comprehensive literature review and examining the data collecting tools in the related studies, the “Web Site Assessment Form” was laid out. We submitted the form to peer review to researchers in the Fatih Faculty of Education to ensure content validity. Then we made out the final draft of the form following the feedbacks received. The form comprises of 18 items in “Content” category, 5 items in “Currency” category, 5 items in “Structure and Navigation” category and 9 items in “Visual Design” category which add up to total 37 items in four categories. All items in the form might be answered with one of three possible answers: Yes, Partly and No.

Data Collection and Analysis

The data about the web sites of the FOEs were collected during September – October 2007 using our form. The answers to the items in the form were coded as Yes (2), Partly (1) and No (0). In the analysis phase of the study, frequencies and percentages for each item were calculated and presented in tables.

FINDINGS

In this part of the study, first we determined the faculties whose web sites were inaccessible, and handled the quantitative data collected from the web sites of the FOEs. These data were analyzed under four categories “Content”, “Currency”, “Structure and Navigation” and “Visual Design” and the frequency and percentages associated with the findings were presented in tables.

Table 1. The Inaccessible Web Sites

Affiliated University	FOEs (Faculties of Education) in Turkey
Afyon Kocatepe University	Uşak FOEs
Fırat University	Muş FOEs
Niğde University	Aksaray FOEs
100. Yıl University	100. Yıl FOEs
100. Yıl University	Hakkari FOEs

In Table 1, the universities and the relevant faculties of education whose web sites couldn’t be accessed among the 67 faculties were presented. From the 67 faculties, the web sites of Uşak, Aksaray, 100. Yıl, Muş and Hakkari Faculties of Education (FOEs) couldn’t be accessed.

Findings from Content Dimension

Table 2. Findings from Analysis of the Web Sites of the FOEs in Content Dimension

CONTENT	Yes		Partly		No	
	f	%	f	%	f	%
Is there any knowledge on the history of the faculty?	37	60	12	19	13	21
Is there any knowledge concerning the board of the faculty?	53	85	4	6	5	8
Are the vision and the mission of the faculty covered?	21	34	7	11	34	55
Is there any introductory knowledge about the faculty?	44	71	12	19	6	10
Is there any knowledge concerning the academic staff?	52	84	7	11	3	5
Is there any knowledge concerning the administrative staff?	36	58	9	15	17	27
Are there any Web pages appertaining to the departments?	38	61	12	19	12	19
Are there any Web pages appertaining to the main science divisions?	29	47	15	24	18	29
Is there any introductory knowledge about the departments?	26	42	18	29	18	29
Is there any introductory knowledge about the main science divisions?	25	40	17	27	20	32
Is there an academic calendar?	31	50	3	5	28	45
Is there room for social and cultural activities?	9	15	11	18	42	68
Is the site linked to the journal of faculty?	21	34	3	5	38	61
Is there any knowledge regarding the Erasmus and Socrates programs?	13	21	1	2	48	77
Is there any implication regarding the Webmaster(s) of the site?	20	32	5	8	37	60
Are there any pages targeting the students?	25	40	16	26	21	34
Is there any introduction about the city of the faculty?	9	15	0	0	53	85
Are there English-versions of web pages in Turkish?	18	29	2	3	42	68

Table 2 shows that from the FOEs 95 % involved academic staff knowledge, 92 % administrative board knowledge, 90 % introductory knowledge about the faculty and 79 % history of the faculty. From the FOEs 80 % have web pages of the departments and main divisions of science and these pages included introductory knowledge. In contrast, among the FOEs, 85 % didn't introduce the city, 68 % didn't talk about social and cultural activities 55 % didn't address the vision and mission of the faculty.

Besides, we found that 77 % of the FOEs did not contain knowledge about Erasmus and Socrates programs, 68 % did not have sufficient foreign-language-based web sites and 61 % did not give links to the journals of the faculties. When we have an overall look at the items in the content dimension we see that over one half of the faculties have not put content knowledge on their sites.

Findings from Currency Dimension**Table 3. Findings from Analysis of the Web Sites of the FOEs in Currency Dimension**

CURRENCY	Yes		Partly		No	
	f	%	f	%	f	%
Is it known when the site was set up?	25	40	0	0	37	60
Are the update times known?	3	5	0	0	59	95
Are current knowledge and announcements covered?	38	61	2	3	22	35
Is design process still in progress?	12	19	4	6	46	74
Are there any outdated pages?	37	60	4	6	21	34

When Table 3 is checked we can see that 65 % of the faculties cover current knowledge and announcements but 95 % do not update their web sites, there are outdated pages in 66 % and the date of set up is not obvious in 60 %. When the answers to the items in the currency dimension are evaluated generally, we can see that more than half of the web sites of the FOEs did not gain sufficient consideration. This is not a desired situation in the web site of a faculty of education.

Findings from Structure and Navigation Dimension

Table 4. Findings from Analysis of the Web Sites of the FOEs in Structure and Navigation Dimension

STRUCTURE AND NAVIGATION	Yes		Partly		No	
	f	%	f	%	f	%
Is the site user friendly?	47	76	10	16	5	8
Do all the pages in the site operate properly?	47	76	3	5	12	19
Is the organization of knowledge in the site fuzzy?	2	3	6	10	54	87
Is navigation between pages comfortable?	40	65	12	19	10	16
Is there a search engine in the site?	12	19	0	0	50	81

As seen in Table 4 in 97 % of the web sites, organization of knowledge is not complicated, 92 % are easy to use, in 84 % the transition between pages is smooth and in 81 % the pages operate properly. Yet we found that in 81 % of the web sites of faculties of education, there's no search engine at all. When the items in Structure and Navigation dimension are evaluated generally, one can say that faculties of education take the criteria in this dimension into account.

Findings from Visual Design Dimension

Table 5. Findings from Analysis of the Web Sites of the FOEs in Visual Design Dimension

VISUAL DESIGN	Yes		Partly		No	
	f	%	f	%	f	%
Are the font types and sizes consistent in all pages?	59	95	3	5	0	0
Is a virtual campus tour covered?	25	40	6	10	31	50
Are the appearances of the Web pages of the departments/main science divisions the same?	43	69	5	8	14	23
Are there any pages that are inoperative or inaccessible?	30	48	1	2	31	50
Are there any animations in the pages?	15	24	6	10	41	66
Are there unnecessary details in the pages?	0	0	3	5	59	95
Are too many colors used in the pages?	1	2	0	0	61	98
Is the color harmony in the site accommodated?	57	92	1	2	4	6
Are there any pages under construction?	23	37	3	5	36	58

In Table 5 most of the FOEs used same type and sized fonts throughout the site (100%), did not use color variation in the site (98%), paid attention to color harmony (94%), did not give too much details (95%) and did not use animations in the site (66%). Besides, in some of the web sites of FOEs, there are no pages under construction (58%), whereas in some (50%) there are a number of pages under construction. When the items under the Visual Design dimension are evaluated generally, it is shown that the web sites of the FOEs have taken the criteria about visual design into account.

DISCUSSION, RESULTS AND RECOMMENDATIONS

The web sites of the faculties of education were evaluated in terms of content, currency, structure & navigation and visual design categories. We couldn't access web sites of five faculties. These are Uşak Faculty of Education, Muş Faculty of Education, Aksaray Faculty of Education, 100. Yıl Faculty of Education and Hakkari Faculty of Education. We think that, these faculties should initiate their web sites immediately and they should give place to the introduction of their faculties in these web sites.

There should be enough content to make visiting these sites worthwhile. Information on how often a site is visited may indicate its usefulness (Abdullah, 1998). In content dimension, we concluded that web sites of the FOEs generally involved introduction of the faculty, administrative board and academic staff, whereas they did not entail any knowledge regarding social and cultural activities, the presentation of the city and they did not disclose the vision and mission of the faculty. These latter types of information will help the users that are seeking information about the faculty.

When we have an overall look at the items in the content dimension we see that FOEs covered content knowledge on their sites. Another crucial point is the need for the personal web pages of the academic staff. These personal pages serve any number of purposes such as communicating with peers and students, presenting personal information and biographies or giving information about the courses. Too few academicians are really capable of preparing and continuously updating her/his web page. Moreover, the existing personal pages of academicians are not satisfactory in terms of web design principles and usability.

Likewise, Dağdeviren et al. (2007) reported that most of the FOEs incorporated sufficient knowledge about academic staff, administrative staff and administration. Besides, we observed that some FOEs did not publish English-versions of corresponding Turkish pages whereas some FOEs use English as the sole language of publication. Across the web sites of total 62 FOEs in Turkey, only 20 offered the option of language selection for the users. In this case these sites would be accessible only to those whose native language is English and some users in our country who don't have an appropriate level of English would not make use of the site. To overcome this issue, we think that the main language of publication in these web sites should be Turkish, and English should be used as supplementary. The web sites should be prepared by considering a wide range of audiences such as researchers, teachers, students and others who want to be informed.

Another important finding in content dimension is that many sites lack giving links to the journal of the faculty. Some of the FOEs which give link to the journal of the faculty also publish their journal online. Some faculties explain publication principles and guidelines for authors, though, do not publish their journals online. The faculties should count on the ease of use in sharing knowledge online and immediately deliver their journals on the WWW. Users should access the sought information in the web sites of FOEs as fast and accurate as possible. Easy access for the users is an indicator of effectiveness for a web site (Kurulgan and Bayram, 2006).

In currency dimension, we found that most of the FOEs cover current knowledge and announcements in their web sites. However, there are outdated pages, the piece of knowledge about when and how these sites were prepared and the date of last update are not clear. Yet this deficiency might have a negative impact on anyone who seeks knowledge. A body of evidence suggests that web sites should be regularly updated and the latest update times and frequencies should be revealed (Abdullah, 1998; Everhart, 1997; Tweddle et al., 1998; Yiğit et al., 2007).

Researches show the importance of good navigation and recommend using a navigation bar and a logical structure (Misic and Johnson, 1999; Van der Merwe and Bekker, 2003). In structure and navigation dimension we found that web sites of most of the FOEs are easy to use, transitions between pages are smooth, and pages operate properly but do not have a search engine. In visual design dimension, font types and sizes are found often consistent among pages, color variety is not redundant, color harmony is accommodated and there aren't any unnecessary details. Besides, while there are no pages under construction in the web sites of some FOEs, some faculties have pages that are inoperative or inaccessible.

In most of the web sites there's a redundant use of images. In most of the web pages instead of giving text links to e-mail addresses, some images occupying a space of 3 – 10 kb are used (Cebeci, 1999). These extra bytes may increase the download times of these pages. To decrease the download times of these pages, images should be used only when necessary. At one end of the equilibrium, if visuals are used scarcely in a site design, the site may not be appealing for the users. At the other end, if too many visuals are consumed both the site appears complicated and download times increase (Irgat, 2002). Researchers recommend minimizing the use of graphics, or small font sizes for text, avoiding pop-up windows, separate browser windows, or cascading menus, and minimizing the number of links on a page for easy navigation (Ivory, 2003, quoted in Oppenheim and Ward, 2006).

Another concern in web design is color harmony. Colors can convey images to users and influence their perception. For example, white is associated with purity, cleanliness, lightness and emptiness, purple conveys wealth and sophistication, and blue conveys truth, dignity and power (Oppenheim and Ward, 2006). In his study, Karataş (2003) underscores the significance of the readability of a web site, the color harmony in the background, graphics and the content. For this reason the color range should be determined previously and color harmony should outweigh the personal preferences in color management. Some studies suggest that the font color(s) should contrast to background color(s) (Yates, 2005; Tweddle et al., 1998; Irgat and Kurubacak, 2002). Colors, fonts and graphics should be suitable and relevant to the web site (Baron, 1998). Similarly, Abdullah (1998) states that both warm colors (e.g., red, orange, yellow) and cool colors (purple, blue, green) should be used in the same web design. The color scheme should not be too gaudy and hurtful to the eye. Most experts recommend that a site contain no more than four colors, with a limit of seven throughout the site. In this way, readability may be boosted and knowledge may be more accessible. For this reason, to retain the integrity between pages the font types and colors should be chosen cautiously. Hence faculties of education may be advised to keep these points in mind when editing or updating their sites. On the other hand, using these principles may also be beneficial in preparing a web site for a faculty of education from scratch.

One of the most important tools of distance education is the use of web sites. The design of the web site is as important as the content to draw the attention of the users and to keep them tuned (İşman et al., 2004). A successful web site should have a similar look and feel to other web sites. This is because customers “spend most of their time on other sites,” so widespread design elements should be incorporated into the design (Nielsen, 1999, quoted in Oppenheim and Ward, 2006). However, one should be cautious and balanced in using design tools. As web page designers have included more of these complex web design components such as images and streaming audio and video, it has become less accessible for many users with disabilities (Amtmann et al., 2000; Bucy et al., 1999). Needs of users with disabilities should not be ignored. There are several guidelines for setting a user-with-disability-friendly web site. But this is beyond the scope of our paper. Web sites of some FOEs seem to be prepared with great effort both in department and main science division levels. However, others seem problematic and some pages seem to be prepared sloppily. In particular, some pages appear to involve redundant details, use too many colors and animations, have dead links, are outdated, lack necessary contact knowledge, do not meet the web design criteria in terms of page setup and color management. An outdated web page would not be effective for users. Such defects should be fixed immediately.

In this study we attempted to evaluate the web sites of FOEs affiliated to The Council of Higher Education of Turkey. Future studies may explore the web sites of the education institutions affiliated to the Turkish Ministry of National Education.

REFERENCES

- Abels E. G., White, M. D. and Hahn, K. (1999). A User-Based Design Process for Web Sites. *OCLC Systems & Services*, 15 (1), 35–44.
- Abdullah, M. H. (1998). Guidelines For Evaluating Web Sites, ERIC Digest, This Digest was created by ERIC, The Educational Resources Information Center, ERIC Clearinghouse on Reading English and Communication Bloomington IN. ED426440.
- Acartürk, C. (2004). Üniversite Web Sayfalarında Kullanılabilirliğin Önemi ve Kullanılabilirlik Testleri, *Akademik Bilişim Sempozyumu, 11-13 Şubat*, Karadeniz Teknik Üniversitesi, Trabzon.
- Akıllı, G. A. (2005). User Satisfaction Evaluation of an Educational Website. *The Turkish Online Journal of Educational Technology-TOJET*, 4 (1), 85-92.
- Amtmann, D., Johnson, K. and Cook, D. (2000). Making Web-Based Tables Accessible For Users of Screen Readers. *Library Hi Tech*, 20, 221-231.
- Anderson, M. A. (1997). Developing Web Page Policies or Guidelines. *Technology Connection*, 4 (3).
- Atakan, C., Atılğan, D. Bayram, Ö. and Arslantekin, S. (2008). An Evaluation of the Second Survey On Electronic Databases Usage At Ankara University Digital Library. *The Electronic Library*. 26 (2), 249-259.
- Baron, A. (1998). Designing Web-based Training. *British Journal of Educational Technology*, 29 (4), 355–370.
- Brown, D. and Warschauer, M. (2006). From the University to the Elementary Classroom: Students’ Experiences in Learning to Integrate Technology in Instruction. *Journal of Technology and Teachers Education*, 14 (3), 599-621.
- Bucy, E.P., Lang, A., Potter, R.F. and Grabe, M.A. (1999). Formal Features of Cyberspace: Relationships between Web Page Complexity and Site Traffic. *Journal of the American Society for Information Science*, 50 (13), 1246-1256.
- Cebeci, Z. (1999). Web Sayfası Tasarım ve Yazım İlkelerine Genel Bir Bakış, *1. İstatistik Kongresi, 5-9 Mayıs*, Türk İstatistik Derneği ve İstatistik Mezunları Derneği, Belek, Antalya.
- Clausen, H. (1999). Evaluation of library Web sites: the Danish case. *The Electronic Library*, 17 (2), 83-87.
- Clyde, L. A. (1996). The Library as Information Provider: The Home Page. *The Electronic Library*, 14 (6), 549-558.
- Çakıroğlu, Ü. and Akkan, Y. (2008). Web Tabanlı Öğretim Amaçlı Hazırlanan Sitelerdeki Ortak Sorunlar ve Çözüm Önerileri. *2nd International Computer & Instructional Technologies Symposium, 16-18 April*, Ege Üniversitesi, Kuşadası, Aydın.
- Çalışkan, S., Yılmaz, Ü. and Yılmaz, R. (2002). Açıköğretim Web Sitelerinin Etkinliği, *Açık ve Uzaktan Eğitim Sempozyumu 23-25 Mayıs*, Anadolu Üniversitesi, Eskişehir. http://aof20.anadolu.edu.tr/bildiriler/Rusen_Yilmaz.doc.
- Dağdeviren, İ., Eren, G., Ersoy, M. and Işık, Ö. (2007). Türkiye’deki Eğitim Fakültelerinin “Web Sayfalarının” Karşılaştırılması, *16. Ulusal Eğitim Bilimleri Kongresi, 5-7 Eylül*, Gaziosman Paşa Üniversitesi, Tokat.
- deMarrais, K. and Lapan, S. D. (2004). *Foundations for Research: Methods of Inquiry in Education and the Social Sciences*. Lawrence Erlbaum Associates, NJ: Mahwah.
- Dewey, B. I. (1999). In Search of Services: Analysing the Find Ability of Links on CIC University Libraries’ Web Pages. *Information Technology and Libraries*, 18 (4), 210-213.

- Erginer, E. and Erginer, A. (2003). Türkiye’deki Eğitim Fakültelerinin Web Siteleri. *İlköğretim-Online Dergisi*, 2 (1), <http://www.ilkogretimonline.org.tr/vol2say1/index.htm> (20.02.2006 tarihinde erişilmiştir).
- Everhart, N. (1997). Web Page Evaluation: Views From The Field. *Technology Connection*, 4 (3).
- Hackett, S. and Parmanto, B. (2005). A Longitudinal Evaluation of Accessibility: Higher Education Web Sites. *Internet Research*, 15 (3), 281-294.
- Irgat, E. (2002). *Bir Üniversite Web Sayfasını Tasarlama ve Geliştirme: Üniversite Öğretim Elemanlarının Üniversite Web sayfalarına İlişkin Görüşleri*, Yayınlanmamış Yüksek Lisans Tezi, Anadolu Üniversitesi Eğitim Bilimleri Enstitüsü, Eskişehir.
- Irgat, E. and Kurubacak G. (2002). Üniversite Web Sayfalarında Yer Alması Gereken Özellikler, *VIII. Türkiye’de İnternet Konferansı 19-21 Aralık*, <http://inet-tr.org.tr/inetconf8/bildiri/48.doc>. (03.10.2006 tarihinde erişilmiştir).
- İşman, A. (2005). Technology and Technique: An Educational Perspective. *Eurasian Journal of Educational Research*, 19, 194-206.
- İşman, A., Dabaj, F., Gümüş, A., Altınay, F. and Altınay, Z. (2004). Web Page Design in Distance Education. *The Turkish Online Journal of Educational Technology-TOJET*, 3 (2), 78-82.
- Karataş, S. (2003). Öğretim Amaçlı Web Sayfası Tasarımında Renk Kullanımı. *Gazi Eğitim Fakültesi Dergisi*, 23 (2), 139-148.
- Kurulgan, M. and Bayram, F. (2006). Üniversite Kütüphaneleri Web Sitelerinin Biçim ve İçerik Analizi: Türkiye’deki Uygulamaya İlişkin Bir Araştırma. *Türk Kütüphaneciliği*, 20 (2), 141-172.
- Lilly, E. B. (2001). Creating Accessible Web Sites: An Introduction. *The Electronic Library*, 19 (6), 397-404.
- Misic, M. M. and Johnson, K.L. (1999). Benchmarking: A Tool For Web Site Evaluation And Improvement. *Internet Research*, 9 (5), 383-392.
- Muller, M. J. (1996). Defining and Designing the Internet: Participation by Internet Stakeholder Constituencies. *Social Science Computer Review*, 14 (1), 30-33.
- Oppenheim, C. and Ward, L. (2006). Evaluation of Web Sites for B2C e-Commerce. *Aslib Proceedings: New Information Perspectives*, 58 (3), 237-260.
- Pisanski, J. and Zumer, M. (2005). National Library Web Sites in Europe: An Analysis. *Program: Electronic Library and Information Systems*, 39 (3), 213-226.
- Rotem, A. and Oster-Levinz, A. (2007). The School Website as a Virtual Learning Environment. *The Turkish Online Journal of Educational Technology-TOJET*, 6 (3), 145-156.
- Schmetzke, A. (2001). Web Page Accessibility of University of Wisconsin Campuses: 2001 Survey Data. available at: www.library.uwsp.edu/aschmetz/Accessible/uwcampuse/Survey2001/contents2001.htm.
- Skov, A. (1998) Separating the Wheat From the Chaff: Internet Quality. *Database*, 21 (4), 38-40.
- Şimşek, A. (1999). Üniversitelerde Çok Ortamlı Öğrenme Merkezlerinin Oluşturulması, *Eğitimde Yansımalar V. 21. Yüzyılın Eşiğinde Türk Eğitim Sistemi Ulusal Sempozyumu*, Hüseyin Hüsni Tekişik Eğitim Araştırma-Geliştirme Merkezi Yayını, Ankara.
- Tillotson, J. (2002). Web Site Evaluation: A Survey of Undergraduates. *Online Information Review*, 26 (6), 392-403.
- Tweddle, S., Avis, P., Wright, J. and Waller, T. (1998). Towards Criteria For Evaluating Web Sites. *British Journal of Educational Technology*, 29 (3), 267-270.
- Uzunboylu, H. (2005). The Frequency of Visits to Different Content Web Sites and the Effect of the Gender Factor of Teacher Candidates. *Eurasian Journal of Educational Research*, 19, 112-123.
- Uzunboylu, H. and Ballı, Ö. (2004). Matematik Eğitimiyle İlgili Web Sitelerinin Değerlendirilmesi, *XII. Eğitim Bilimleri Kongresi Bildiri Kitabı*, Cilt II, s. 1051-1063, Gazi Üniversitesi, Ankara.
- Van der Merwe, R. and Bekker, J. (2003). A Framework and Methodology For Evaluating E-Commerce Web Sites. *Internet Research: Networking Applications and Policy*, 13 (5), 330-341.
- Yates, R. (2005). Web Site Accessibility and Usability: Towards More Functional Sites For All. *Campus-Wide Information Systems*, 22 (4), 180-188.
- Yiğit, N., Altun, T., Alev, N., Dertlioğlu, K. and Bülbül, M. Ş. (2007). Öğretim Amaçlı Web Sitelerinin Değerlendirilmesine Yönelik Bir Ölçek Tasarımı, *I. Ulusal İlköğretim Kongresi, 15-17 Kasım*, Hacettepe Üniversitesi, Ankara.
- Zeng, X. and Parmanto, B. (2004). Web Content Accessibility of Consumer Health Information Web Sites for People with Disabilities: A Cross-Sectional Evaluation. *Journal of Medical Internet Research*, Vol. 6 (2), e19.

PROBLEMS RELATED TO COMPUTER ETHICS: ORIGINS OF THE PROBLEMS AND SUGGESTED SOLUTIONS

Assist. Prof. Dr. Abdullah KUZU
Anadolu University Faculty of Education
Department of Computer Education and
Instructional Technologies
Eskişehir, Türkiye
E-mail: akuzu@anadolu.edu.tr
Phone: (90) 222-335 0580 #3519

ABSTRACT

Increasing use of information and communication technologies (ICTs) help individuals to solve several everyday problems, which used to be harder, more complicated and time consuming. Even though ICTs provide individuals with many advantages, they might also serve as grounds for several societal and ethical problems which vary in accordance with the contexts and purposes of ICT use. The most evident of these problems are privacy of personal information in the virtual environment, accuracy of the information used, intellectual property rights and equal access rights (Moor, 1985). These much ignored problems grow larger gradually, which requires ICT using individuals to be aware of ethical problems and urges practitioners to discuss these problems in a way to create a consensus that sustains equality and justice with regard to access, storage and distribution of information (Charlesworth, 2000). In this regard, the current study aimed to determine problems related to computer ethics with a reference to privacy, accuracy, property and accessibility; to investigate the origins of such problems; and to propose suggestions regarding these problems through the help of practitioners who had an ICT background. Qualitative data were collected through semi-structured interviews from a purposeful sample of K-8 computer teachers in Eskişehir, software experts in Anadolu University Division of Computer Based Instruction, and software experts in Anadolu University Computer Center. After reliability and validity measures were taken, content analysis was conducted followed by the interpretation of findings along with direct quotations from the data. Findings revealed that ICT professionals were not sure of a working definition of computer ethics, and described the concept through providing unethical computer using behavior examples. They all agreed on a consensus regarding the importance of the issue, but considered computer ethics primarily as a component of Internet ethics. They provided several precautions to prevent unethical computer using behaviors. Implementations and suggestions for further research were provided.

Keywords: Computer ethics, intellectual property, accuracy, privacy, accessibility

INTRODUCTION

The increasing choices and opportunities provided by information technologies have been an important step in the interpretation of ethics in recent years. In most developing countries, individuals like to have advanced technologies parallel to technological developments. Among these, computers and Internet have been adopted in all areas of the society bringing them to an influential and unique position in these areas (İşman et al, 2004; Yaman, 2007). Using computers to store and process information and using the Internet to access information have become rapidly developing habits in society. In this regard, developing and sharing policies to implement these technologies carry utmost importance as they are quite influential in individuals' current practices and future lives. Manipulating technology in a way to use information correctly and realize information flow effectively is a necessity (Moor, 2004). However, ineffectiveness of policies to guide individuals while using computers to serve for the greater good allows unique ethical problems to emerge. Such problems urge all individuals to consider computer ethics in a more meticulous way.

Computer Ethics

Incorrect use of information technologies in a way to disturb privacy and property create several ethical dilemmas, which lead to ethical problems regarding technology use. Ethical problems stemming from computer technologies are basically investigated within the framework of computer ethics. This term was first used in the middle of the '70s as an application field of professional ethics, which was transformed and somewhat deteriorated through the appearance of computers (Maner, 1996). Computer ethics can be defined as a dynamic and complicated field of study involving facts, concepts, policies and values regarding rapidly increasing computer technologies. The notion was not considered as an entity of either computer technology or computer sociology till the '90s. However, recent years have witnessed a transformation in our understanding of computer ethics which has led the field to involve applied ethics, computer sociology, technological values, computer crimes and many related fields. In this regard, computer ethics does not involve a set of rules to follow. Computer ethics is neither a list of ethical principles to obey, nor a technology deprived of certain values while implementing those principles. Thus, computer ethics urges scholars to revisit computer technology and its

values. Even though computer ethics is a field related to and in between science and ethics, it is a unique and holistic discipline providing principles for understanding, conceptualization and computer technology use.

Computer ethics focuses on human endeavors influenced or directed by use of computer technologies (Kizza, 2002). Computers have a commonplace influence on decision-making processes assumed by most individuals. Sending an e-mail, writing a program script, creating a database, generating graphics, designing software, processing information and buying software are such behaviors carrying ethical problems within their natures.

Computer technology is a rapidly developing field which makes it difficult to predict what is coming next. However, it is clear that the information society and individuals within this society will go on confronting radical technological and societal developments leading them to generate new patterns of behavior to accommodate these developments (Namlu & Odabasi, 2007). In this regard, while shaping these behavior generation processes, the notion of computer ethics should be emphasized as well as the notion of professional ethics (Kilicer & Odabasi, 2006). In addition, the concept of computer ethics should not be examined within the framework of ICT-related professional ethics. Rather, it should be examined within the framework of personal ethics to be followed by all individuals of the information society (Bowyer, 1996; Namlu & Odabasi, 2007).

Ethical Problems of the Information Society

Development and competition in an information society is maintained by individuals' ability to access information rapidly and easily. In addition, the consumption, production and interpretation of information carry importance. In this regard, information access tools have a crucial place in information societies. Information technologies not only influence and transform the way individuals live, but also the way societal rituals are realized. There are both pessimists and optimists regarding this transformation. There are those who believe that there is a reciprocal relationship between technology and society leading to the assumption that technology might be used for either positive or negative purposes. It is clear that technology provides individuals and the society with several benefits accompanied by serious ethical problems. When ignored or neglected, these accompanying problems might even interfere with the societal values and moral mechanisms.

Mason (1986) lists four ethical issues of the information age: privacy, accuracy, property and accessibility (PAPA). The growth of the information technologies with their capacity for control, communication, information processing, storage and retrieval; and the increased value of information in decision-making might lead decision makers to try to acquire our personal information by invading our privacy. Accuracy is related to the correctness of information delivered through ICTs. Information might be used to mismanage people's lives particularly when the party using inaccurate information has more power and authority (Mason, 1986). The most confronted and complicated of ethical issues is the question of intellectual property rights. Information can be quite costly to produce in the first instance. Transmission and reproduction of the information might be problematic as it could invade the rights of the producers. In addition, there might be problems in allocating the access to this information. Finally, accessibility refers to the conditions under which a person or an organization can have a right or privilege to obtain information. These principles constitute the starting point. It is necessary to determine rules and principles and to create a consensus within the society through conducting evaluations based on these principles,

RELATED RESEARCH

This section discusses research findings on computer ethics. This discussion is followed by the influence of specific background variables on perceptions related to computer ethics. Particularly, the influence of age, gender, computer experience and socioeconomic status is examined, and the gap in the computer ethics literature is illustrated.

Multifarious research studies on computer ethics have been conducted in Turkish higher education institutions in comparison to other indicators of ICTs. Uysal (2006) administered the Unethical Computer Using Behavior Scale (UECUBS) developed by Namlu and Odabasi (2007) to 559 pre-service teachers enrolled in a Turkish education faculty. Findings revealed that pre-service teachers described their computer and Internet using behaviors as ethical. It was observed that participants' perceptions regarding intellectual property and net integrity were weaker in comparison to other constructs. It was revealed that unethical computer using behaviors varied according to gender and program of study. More specifically, women reported to be more ethical in terms of all constructs of the scale. In addition, teacher trainees in the department of computer education and instructional technologies had lower scores in terms of the items addressing information integrity.

Akbulut, Uysal, Odabasi and Kuzu (2008a) used the dataset of Uysal (2006) to investigate whether gender, program of study and PC experience had an impact on ethical judgments of undergraduate students regarding

ICTs. Findings did not reveal any significant differences among different programs of study and between high and low experienced PC users. As mentioned above, the significant difference between males and females remained. Interestingly, findings revealed an interaction between gender and program of study indicating that the difference between males and females did not follow a similar pattern across different programs of study. More specifically, females' judgments regarding computer ethics were found to be consistent across different programs of study while males' judgments varied according to the field of study.

Some studies focused on the triggering role of Internet on academic misconduct whose theoretical background in Turkey was established by Birinci and Odabasi (2006). Following the idea that Internet served as a ground for academic misdemeanors, Akbulut et al. (2008b) investigated the extent of involvement of Turkish university students in academic dishonesty practices facilitated through Internet. A measurement tool named Internet-Triggered Academic Dishonesty Scale (ITADS) was developed through the help of guidelines proposed by Anadolu University Scientific Ethics Committee (BEK, 2003) and The Scientific and Technological Research Council of Turkey (TUBITAK, 2006). After administering the scale to 349 pre-service teachers in a relatively populated Turkish state university, researchers conducted two factor analyses. The former led to the constructs constituting common types of e-dishonesty which were named as fraudulence, plagiarism, falsification, delinquency and unauthorized help. The second analysis revealed individual and contextual factors triggering e-dishonesty which were named as individual factors, institutional policies and peer pressure.

As one of the preliminary research regarding computer ethics in Turkey, Çevik and Kuzu (2006) investigated problems experienced in K-12 computer laboratories regarding computer security along with solutions proposed by computer teachers. The most cited computer security problems were unauthorized access to others' personal files (92%), and removing somebody else's files from a shared computer (82%). Findings suggested that K-12 students were not informed sufficiently about ethical issues regarding ICTs. Types of unethical computer using habits were also investigated in business settings. For instance, Mollavelioglu (2003) investigated the ethical use of information technologies in small- and mid-size enterprises along with the perspectives of managers and vice-managers regarding computer ethics. Findings revealed that more than half of the enterprises (53.3%) used unlicensed software. Forty percent of the managers thought that their employers had little working knowledge on computer ethics. The majority reported to be exposed to computer crimes (86.7%). Most managers (76%) thought that controlling and checking the contents of employers' e-mails was inconvenient. In addition, they considered employers' chatting (72 %) and surfing adult websites (93%) quite inconvenient even if employers did not hamper the work. Most enterprises did not have any formal precautions regarding computer ethics. Finally, a relationship between education level and the degree of tolerating unethical behaviors could not be found.

Some well-established studies in the field primarily focused on computer-related fraudulence. For instance, Friedmann (1997) conducted a study with 212 undergraduate students to investigate intellectual property and privacy issues. Software fraud was examined under three headings: Fraud for personal use, for friends' use and for profit. In addition, privacy construct was examined under three headings namely accessing computer files without reading, accessing files with the aim of reading the contents, and accessing files with the aim of altering the contents. Findings revealed that undergraduate students' perceptions regarding computer related fraudulences was different from their perceptions regarding the same fraudulences in other areas. More specifically, they were more careful about privacy issues when the files were not on computer. However, in terms of accessing computer files, the level of consciousness was lower. It was suggested that since accessing computer files was easier than other types of fraudulences, since the guilty was not aware of the harmful results of their actions, and since the mistreated was not aware of the fraudulences, such behaviors were more common.

Computer users' perceptions regarding ethics have been well investigated through focusing on ethical dilemmas. Bergem (1993) conducted interviews with 65 pre-service teachers regarding their opinions on professional ethics through using ethical dilemmas. Findings revealed that participants' social sensitivity and moral judgment skills had an effect on their analyses of ethical dilemmas. After training was given to participants, it was revealed that participants' judgments regarding ethical dilemmas were more constructive. It was suggested that formal education regarding ethical dilemmas had an influence on increasing participants' theoretical and practical knowledge and helping them to solve ethical dilemmas in a more constructive way.

Perceptions of users have also been investigated with regard to differences among professionals from different backgrounds. Parker, Swope and Baker (1990) conducted a study in Cape Town University to investigate differences between ethical perceptions of information system students and practitioners. It was revealed that students had different points of view regarding computer ethics in comparison to practitioners actively working in the field. More specifically, students were more tolerant of unethical behaviors in comparison to practitioners.

It was also revealed that as the level of experience increased, practitioners responded in a more ethical way. Such a finding suggested that experience might have an effect on ethical judgments of individuals.

Similar to the Uysal (2006) and the Akbulut, Uysal, Odabasi and Kuzu (2008a) studies, several studies investigated the influence of gender on ethical decision making in addition to several other background variables. For instance, Conger and Loch (1996) conducted a comprehensive study to examine whether unethical computer behaviors varied according to gender, attitudes, social norms, computer literacy level, age, occupation, and socioeconomic status. The results of an exploratory survey were presented identifying user's attitudes and behavior when ethical issues were encountered. Findings revealed that both attitudes and social norms played a significant role in determining individual's acts relating to privacy and ownership. Men and women used different decision cues in forming their intentions toward such computing acts. For instance, in terms of taking technical application files, women acted according to norms whereas men acted according to attitudes. In terms of running a program for a friend, women acted according to norms and attitudes, whereas men acted according to attitudes, computer literacy levels and norms. In terms of reading others' e-mails, women acted according to norms, level of computer literacy, age, occupation and socioeconomic status whereas men acted according to attitudes, age, occupation and socioeconomic status.

Khazanchi (1995) investigated whether gender had an influence on defining unethical computer behaviors during ICT use and development stages. While interpreting seven different scenarios involving different issues as professional responsibilities, social responsibilities, accuracy, preserving privacy and personal responsibilities, women tended to be more successful in defining unethical instances. On the other hand, Adam (2000) suggested that women seemed to be more ethical in some instances whereas no difference was found between men and women in some other instances. It was suggested that there was not any study indicating that men were more ethical than women. Such arguments were partially supported by the study of Bissett and Simpson (1999) maintaining that women paid more attention to others' feelings which led them to be more ethical. Similarly, several studies revealed that females' ethical judgments were more appropriate than those of males in many areas (Bear, 1990; Dawson, 1995; Gattiker & Nillegan, 1988; Ghazali, 2003; Gutek & Larwood, 1987; Kreie & Cronan, 1998; Mert, 2003).

In addition to gender, several studies were conducted to investigate the relationship between ethical decision making and age (Dawson, 1995; Haidt, Koller & Dias, 1993; Turiel, 1983; Turiel, Killen & Helwig, 1987). Findings generally revealed that age was a significant predictor of ethical decision making process as children tended to be more ethical than adults. To our knowledge, there is not a specific study merely focusing on the influence of age on computer related ethical decision making processes. However, there seemed to be a relationship between computer attitudes and age indicating that younger people were more inclined in using computers whereas elders had negative attitudes (Igberia & Parasuraman, 1989). On the other hand, Kelley et al., (1994) found a positive relationship between attitudes and age. Both studies suggested some kind of relationship between the two variables. Since attitudes had a role on ethical decision making as mentioned above, such a relationship between age and ethical decision making might be found as well.

There are also studies focusing on the influence of computer experience or socioeconomic status on ethical decision-making. For instance, Loch and Conyer (1996) found a positive relationship between computer literacy and ethical decision making regarding technical application files. In terms of using a computer program for a friend, or in terms of reading others' e-mails, a negative relationship between ethical decision making and computer literacy was found. As for socio-economic status, Haidt, Koller and Dias (1993) revealed that individuals from high socio-economic classes had more tolerance towards the violation of ethical rules. In contrast to above studies, Gattiker and Kelley (1999) suggested that computer experience or socio-economic status did not have an effect on decision-making processes regarding ethical dilemmas.

A recent study conducted by Mert (2003) investigated the influence of both gender and socio-economic status on decision making processes regarding ethical dilemmas. Mert asked which thinking styles predicted undergraduate students' responses to specific ethical scenarios. Findings revealed that females' perceptions were better than those of males. In addition, perceptions of education faculty students were better than those of other faculties. A significant relationship between socioeconomic status and ethical perception levels was found. More specifically, ethical perception scores were higher in low-income participants whereas scores decreased as the income level increased. It was suggested that, as the income increased, students felt more comfortable and flexible in violating rules.

PURPOSE

The current study aimed to determine problems related to computer ethics with a reference to privacy, accuracy,

property and accessibility; investigate the origins of such problems; and propose suggestions regarding these problems through the help of practitioners who had an ICT background. Following research questions were addressed to realize this purpose:

1. What are the opinions of ICT professionals regarding computer ethics?
2. What are the opinions of ICT professionals regarding four ethical issues of the information society: intellectual property, accuracy, privacy and accessibility?
3. What kinds of solutions were suggested by ICT professionals regarding intellectual property, accuracy, privacy, and accessibility problems?

METHODS AND PROCEDURES

Participants

Participants of the study consisted of 20 computer professionals. Ten of them were graduates of computer education and instructional technologies departments, who worked as computer science teachers in Eskişehir, and the other ten were graduates of computer science departments who worked as software experts in Anadolu University Division of Computer Based Instruction, and in the Anadolu University Computer Center. All participants pursued a professional career in information technologies and computer science. Fifteen of the participants were male and five were female. Purposeful sampling procedure was applied to determine participants. In addition, computer professionals volunteered to participate in the study were selected. Participant names were replaced with pseudonyms in accordance with the principle of privacy, and these pseudonyms were reported while interpreting the results.

Data Collection

Semi-structured interviews were conducted with participants to determine their opinions regarding research questions. Interviews were arranged separately with each participant in time slots and places they determined. Data collection tool consisted of an interview form including seven open-ended questions developed by the researcher. In order to make sure that the interview form was appropriate and sufficient to address the research questions of the study, the researcher resorted to expert opinions provided by four professionals working in the field of computer education and instructional technologies. The form was revised based on expert opinions and made ready for implementation as suggested by leading methodology sources in the field of qualitative research (Miles & Huberman, 1994).

Data Analysis and Interpretation

While analyzing data, content analysis was implemented by using recent reference books on qualitative research design and data analysis (Glesne, 2006; Grbich, 2007; Lindlof & Taylor, 2002; Marshall & Rossman, 1999). In the analysis, data were coded, themes were found, data were arranged in accordance with codes and themes, and findings were interpreted (Strauss & Corbin, 1990). That is, inductive coding procedure was implemented. The purpose was to describe data and expose hidden facts enjoyed by the data (Yıldırım & Şimşek, 2005). The data which were described, interpreted, scrutinized with regard to cause-and-effect relationships and drawn to some conclusions were also supported with direct quotations to reflect participants' ideas properly.

Initial data coming from semi-structured interviews were audio-taped, transcribed, reviewed sentence by sentence, and transferred to interview forms. Statement patterns that occurred in the data were listed by the researcher and an independent scholar in the field to generate themes related to research questions. The themes were transformed into a coding key, which was used by the researcher and an independent rater to mark these themes on the data sheets. Then, the reliability of the coding key was examined through the formula proposed by Miles and Huberman (1994, p.64) (i.e. reliability = number of agreements / total number of agreements + disagreements). The reliability coefficients were .94 (Question 1), .96 (Question 2), .94 (Question 3), .98 (Question 4), .100 (Question 5), .98 (Question 6), and .96 (Question 7). All inter-coder reliability coefficients were above .70 suggesting that the coding procedure was reliable.

Findings

Opinions Regarding Computer Ethics

Participants' opinions regarding the question addressing their understanding of the computer ethics concept are classified under the following themes:

Table 1: Themes regarding opinions on computer ethics

Themes
Inappropriate behaviors regarding computer ethics
The necessity to generate ethical principles
The need for education on ethics
The need for legal sanctions
Security problems
Economic results

It was observed that none of the participants had working knowledge regarding what constituted computer ethics. Five of the participants asked for additional explanation when they were asked about the concept. However, additional explanations did not lead to a plausible opinion regarding computer ethics either.

Participants mostly explained computer ethics in terms of using unlicensed software and security problems. Sample definitions emerging from the data are given below:

“ehh. I don’t have quite much information regarding computer ethics. What comes to my mind is mostly Internet ethics. I think of things like stealing information or sending viruses, things done by hackers.” [Elif]

“Computer ethics is a concept, which can influence relationships among people.” [Gonca]

“I think of computer ethics, I mean ethics, as moral conducts, a general definition covering all things done with computers, software, security issues. I think computer ethics is a general concept which covers all these things.” [Murat]

Participants stated that computers were used in all areas of their lives leading to several societal problems. İsmail stated that computer ethics was not different from ethics in general:

“I think computer ethics ...ehh... is not so different from the ethics concept we use in our daily lives. ...ehh... the only difference...before that I want to talk about the thing...Ethics, in terms of the thing, in terms of accessing information I think a doctor should be accessed by all means, this is ethics. On the other hand this information should not be available to all on the Internet or through computers, this is ethics as well. Like I said the only difference of computers, the only difference of Internet is that information spreads quite easily through these.” [İsmail]

Elif and Mehmet on the other hand, relates computer ethics to Internet ethics directly:

“Computer ehh while you are working I mean (...) while storing something I did, something I created , while storing it on the Internet, I thought somebody else might have taken and used it.” [Elif]

“Internet is commonly used by all. So, I think, it is important to generate ethics regarding what should be done, what should not be done in this area. So, I think it is necessary to organize a field of study, or some legal sanctions.” [Mehmet]

Participants preferred to explain computer ethics by stating unethical behaviors. According to participants, unethical behaviors were copying file or programs, showing disrespect to people’s work, accessing secret or personal information of individuals and publishing this on the Internet, showing disrespect while communicating on the Internet, reading or downloading others’ files and e-mails, visiting adult web sites, video-recording individuals’ sexual lives and publishing on the Internet, hacking and sending viruses.

“... well I don’t know ehh using software with cracks, copying mp3 files ...” [Burhan]

“...here they might be problems related to interpersonal communication or accessing people’s personal information, or specific work used in the work life or secret information of a company might be exposed to other external people by some people.” [Gonca]

“...ehh this might be the use of e-mail services for different purposes ehh or Internet pages might be used for different purposes. I mean bad purposes for example accessing porn sites or (...) ehh I see some

events in our environment, on television, on radio, here and there. Some people's obscene views are recorded and distributed without permission eh I think such behaviors are against personal rights and these are not ethical." [Funda]

"Ehh in terms of computer ethics, of course it is necessary to respect people's work. Plus people should respect each other, for instance, I want to give a sample. I get into Mynet, I play games, there is a place with a lot of cursing, I do not open that I mean people have communication problems I think. Besides, people should respect each other, because we cannot get anywhere with curse words." [Aykut]

Participants suggested that it was necessary to generate ethical principles to prevent unethical behaviors, to provide education to computer and Internet users regarding ethical behaviors, and to support academic studies regarding ethics:

"Computer ethics is a concept which can influence human relationships. Besides, it can influence the system or relationships among people who are working in a company. Here there can be problems related to interpersonal communication, or related to access to personal information. Some people might provide access to secret information of a company, or current work of the company. I think such things should be prevented. Maybe some standards regarding this might be generated; however, I don't have a clear idea whether these will be applicable." [Gonca]

"Internet is a commonly used field. Su, it is important to generate ethics regarding the behaviors to follow and behaviors not to follow." [Mehmet]

"Today, when we say technology the first thing comes to our mind is computer and Internet. It is a must to deliver right or wrong things to people, things related to computer use, Internet use or technology use. People should be informed about this subject. Computer ethics should be a must course. Like a normal computer course, people should be educated on the purposes of computer use, what is right and what is wrong." [Yavuz]

"... some studies conducted in academic fields are positive I think." [Selim]

However, they suggested that some problems might not be prevented with such principles. Thus, participants asked for legal sanctions and proposed that every individual should take their own precautions as well:

"If necessary, a field of study might be created for this, if necessary some legal sanctions etc. etc. might be generated." [Mehmet]

As individual precautions, frequent backing up, using assistive programs and antivirus software were suggested. As organizational precautions, participants thought that preserving personal information was the responsibility of the system manager:

"I think, for this, computer users particularly while keeping their information in their personal computers, if they need to share this information on the Internet, they should take the first steps as precautions like using assistive programs, virus software, personal back-ups. Ehh for their own security." [Mustafa]

"Besides that in terms of ethics, the responsibility somewhat belongs to the network managers because every manager in a company can access to information of users and their workers. It is not difficult to track their e-mails, web surfs. This is up to the managers, ethics is in their control. Besides that, these are individuals' own responsibilities." [Mustafa]

Burhan stated that if individuals followed unethical conducts, several fields might be harmed from that:

"Economically you harm producers of these because buyers pay a specific amount for this. If they do not pay, the company cannot develop new things. Since this does not happen, the company go to bankrupt and then there is nothing more to share. Ehh economically it is a harmful thing, clearly not pleasant." [Burhan]

Opinions Regarding Intellectual Property Problems

Participants' opinions regarding the question addressing intellectual property problems are classified under the following themes:

Table 2. Themes regarding intellectual property problems

Themes
<i>Problems</i>
Using unlicensed software
Unauthorized access to personal information
Unauthorized sharing of personal information
Unlicensed information
Not acknowledging the resource while quoting
<i>Origins of the problems</i>
Internet
Financial problems
Desire to get the ready-made material
Insufficient awareness regarding computer ethics

Participant responses to this question are classified under two themes as intellectual property problems and origins of these problems. Most participants thought that using unlicensed software was the basic problem regarding intellectual property. For instance, Selim stated that Turkish users resorted to unlicensed software more than users in other countries:

"Ehh. As far as I know, in terms of producing and distributing unlicensed software, Turkey ranks among the firsts in statistics." [Selim]

Participants considered unauthorized access to personal information as a serious problem of intellectual property. They stated that accessing and getting information without effort was not ethical. They complained that it was easy to distribute information accessed without authorization, and no precautions were taken for this problem:

"In our country people do not like to pay for computer products, information technology products. Ehh regarding this we also confront with several problems I mean ehh we should have the ownership of our information. Getting this information without an effort, without a contribution is really sad. Particularly this is common in Turkey. Street vendors provide us with any software with fewer prices. Sometimes you do not need to pay either. You can download the program from the Internet and then use." [Selim]

"... the use of a creative idea I own is being used by somebody else for other purposes without informing me..." [Yavuz]

"In this regard, as I said before people's ideas and work might be used by somebody else and might be used as if these are their own property. Personally I did not experience such a thing but we see such things on the Internet. There are websites for assignments or theses. People use these sites as resources or use the complete work as if it is their own work. I heard such things." [Gonca]

In this regard, Elif stated that online shopping was not secure as people could access their personal information:

"I mean, till now I did not experience a stealing instance, like file theft. I did not experience such a thing. I do online shopping as well, I use my credit card but I do not use it everywhere. So something bad did not occur to me so far." [Elif]

As the origin of intellectual property problems, participants considered financial problems, Internet and the desire to get the ready-made material easily:

"Particularly this is common in Turkey. Street vendors provide us with any software with fewer prices. Sometimes you do not need to pay either. You can download the program from the Internet and then use." [Selim]

Hakan believes that insufficient awareness regarding computer ethics was the source of intellectual property problems:

"...When it comes to intellectual property, people are alone. They are alone with their conscience in a sense. So, the only solution to intellectual property problems is increasing awareness regarding computer ethics." [Hakan]

Proposed Solutions for Intellectual Property Problems

Participants' suggestions regarding the solutions to intellectual property problems are classified under the following themes:

Table 3: Proposed solutions for intellectual property problems

Themes
<i>Legal sanctions</i>
Preserving intellectual property with laws
Buying copyrights
<i>Individual precautions</i>
Generating a mutual moral structure
Using digital signatures
Critical and skeptical approaches
Hardware and software security precautions
Acknowledging the source of the information

Participants believed that individual and legal precautions might be taken to prevent intellectual property problems. Two suggestions emerged in terms of legal sanctions. Murat and Faruk proposed legal action whereas Vedat believed that such problems might not be prevented through legal actions:

"... umm my solutions are... things that are created should be preserved with legal actions, such as individual patent rights. This is the definite solution, but this should be implemented very well. Today several pirate software programs are on sale easily. Through Internet precautions or through personal computers these things should be prevented, this is a recommendation for the software world." [Murat]

"...Uhh on this subject legal precautions should be taken ehh people who earn through these illegal things, or people who duplicate others' work should be punished I believe." [Faruk]

"ehh in terms of intellectual property ehh you cannot prevent others' distributing information through Internet. Internet influences the computer ethics in a most negative way. You cannot prevent its distribution. I mean you cannot differentiate what is ethical what is unethical, or what can be used what cannot be used through law." [Vedat]

Mehmet and Vedat believed that using digital signatures might help solving intellectual property problems:

"Now recently several users began to use digital signatures. This, I believe, might solve many problems. When you give a digital identity to what you have created, you prevent duplication or unauthorized use of that material at least partially. Now, I believe more people should tend to use digital signatures, should get their unique digital signatures as a solution that first comes to my mind." [Mehmet]

"... plus a second event that will come on stage soon is the use of digital signatures, I mean rather than encouraging digital signature use gradually, it should be a rule out of a sudden. Everybody should know about the source of that information, the owner of it, how much of it can be used. I believe this can be solved after this system improves." [Vedat]

Mustafa and Yavuz believed that buying copyrights might be a solution to intellectual property problems:

"ehh when we think about intellectual property, we try to produce something, say a research software, information we publish on the Net, it is necessary to register these through an organization and to buy copyrights ..." [Mustafa]

"... like other inventions and discoveries, having a patent or getting a license might be a solution ..." [Yavuz]

Duygu proposed that acknowledging the source of information might be a solution:

"ehh I mean any information on the Internet should be acknowledged in terms of who searched it, who prepared it. If everybody mentions who created the information, who uploaded that information to the Web and on which date, or which resources were used, this might be better." [Duygu]

Generating a mutual moral structure was proposed as a solution to intellectual property problems by Mehmet and Vedat:

“... As I said before the only solution to prevent this is to create a unique moral structure over individuals. How can we create this? I can give you an example from my field. If you see that a person duplicates without authorization, you should exclude that person from your field. I mean employing that person again, I mean, some other firm should not employ such a bad person. Or if you have such a colleague, you should personally give that person a cold shoulder.” [Mehmet]

“There needs to be an auto-control mechanism. I mean people need to be sensitive. They should first think about using somebody else’s productions. Auto-control solves many problems.” [Vedat]

Mustafa and Burhan referred to security precautions related to hardware and software:

“Well, as I said before, individuals should maintain their own security first. Ehh they should re-check information they are about to publish on the Internet before they publish it.” [Mustafa]

“...Updates, virus software, using firewall programs.” [Burhan]

In the previous question, Internet was considered as a source of intellectual property problems. Mustafa maintained that being critical and skeptical might be helpful while dealing with such problems:

“Besides that while working in a company other than their place, both the functionality of the working place and the positions of the managers should be evaluated in a critical manner maybe by means of their own observations. I mean what if our data is transmitted to somewhere else; such a skeptical approach might prevent such unauthorized information transmission.” [Mustafa]

Opinions Regarding Accuracy Problems

Participants’ opinions regarding the question addressing accuracy problems are classified under the following themes:

Table 4. Themes regarding accuracy problems

Themes
<i>Problems</i>
Incorrect information on the Internet
<i>Origins of the problems</i>
Ease of information publishing
Trusting in Internet information
Insufficient control of information on the Internet

Most participants maintained that since the source of information on the Internet was not clear, and since people resorted to this information without questioning the source, they were skeptical about Internet-based information. For instance, Selim, Elif and Ferda stated their opinions as follows:

“ehh we can access a lot of information in a short span of time. I think the amount of correct information is quite small. I mean I think it is a huge garbage dump. I have real trust issues with the Internet” [Selim]

“... I do not trust in most websites on the Net. I mean ehh even something is put there by mistake; many people cite that information as if it is correct.” [Elif]

“Particularly, I do not trust in resources I found on the Internet. I feel the need to confirm from a book what I found on the Net. I believe what you find should be confirmed through some other resources.” [Ferda]

However, İsmail trusted in information related to technical subjects and Burhan trusted in information provided in the official websites of specific brands:

“In terms of accuracy, yes, actually since I conduct searches on technical subjects, I rarely confront with incorrect information” [İsmail]

"I believe that official websites of brands involve credible information whereas I am skeptical about others." [Burhan]

In addition, participants believed that Internet did not have a control mechanism. Since everybody could publish information as if it was correct, the amount of correct information was quite small:

"ehh now as the areas of use are quite large everybody has the chance to get in and publish any information they want on the Internet as if that information is correct." [Mehmet]

"ehh Internet ehh our ehh we can easily access it ehh so we feel more comfortable there. I mean eh introducing ourselves ehh we do not have to reveal ourselves and this comfort is motivating for dangerous purposes sometimes. I mean we think nobody can catch us there. We do not have to prove that a piece of information is credible or correct, or we do not have to account for to anybody." [Selim]

One of the origins of accuracy related problems was a lack of control mechanisms or insufficient supervision of information on the Internet as stated by Faruk:

"...Unfortunately, there is not an organizational body or mechanism controlling the credibility of information given to, transmitted to people. I believe this issue should be examined seriously. I mean when people get into Internet for information, to access correct information, there they are misinformed. Or they access the wrong information. I want this to be controlled strictly." [Faruk]

Proposed Solutions for Accuracy Problems

Participants' suggestions regarding the solutions to accuracy problems are classified under the following themes:

Table 5. Proposed solutions for accuracy problems

Themes
<i>Critical and interrogating point of view</i>
Control or research of information accuracy
<i>Legal precautions</i>
Generating legal sanctions
<i>Security precautions</i>
Trusting in known websites
Using digital signatures and certificates

Most participants believed that it was necessary to have a critical and interrogating point of view to deal with accuracy problems. In this regard, they suggested that information should be compared with print materials and other resources, or should be approved by expert organizations and individuals:

"... I mean it is necessary to know the real source. To understand the credibility of information, it is necessary to be skeptical a little. Is it really true? I read this, but is there really an accuracy problem? I should check other resources, do they say the same? Definitely such an approach is necessary." [Mustafa]

"ehh personally if you want a personal solution I can suggest you check from a couple of different sources. I mean rather than using information from the first place we see it, I suggest checking its accuracy at some other places and then use it." [Selim]

"There is so much information isn't it? So much information is around; there are hundreds of libraries on different subjects. Hundreds of pieces of information ehh some places to get information on specific subjects. All resources do not say the same thing sometimes. In this regard, universities and some firms in the computer sector have significant responsibilities." [Vedat]

Another solution was that correct and credible information should be limited to official websites or known sources:

"...a carefully built and well-organized website seems to provide us with more credible information I think." [Elif]

"I mean the solution might only be realized through trusting in big corporations. They should inform people that they have a control mechanism; they provide information in a secure way, so that a solution might be arrived." [Murat]

"... If I am supposed to offer information, and if that information will be searched from the Internet it should be an official organization, it can be a university, an official company, or something like that, I do care about that... I mean I am careful whether it is an official body, like university, government, etc. ..." [Alper]

However, Murat and İsmail believed that information on the Internet could not be supervised. Mehmet on the other hand, was against such a control mechanism on the Internet. Rather, the information should be controlled by internal mechanisms of organizations and individuals rather than an overseeing body:

"The solution is actually hard to be realized on the Internet. It is all around the world, controlling is almost impossible." [Murat]

"ehh actually I cannot provide much solutions for this because it is against the logic of Internet, I mean technically because technically it is impossible to control it. Technically it is a umm scattered structure; it cannot be controlled from a single source." [İsmail]

"Now this confirmation is actually I do not think that it is correct for third or fourth parties to control this. As a result, you publish content, if this content is not correct, users will notice it somehow and will not resort to that source again. This problem solves itself I think. So, I do not think it is necessary for third or fourth parties to interfere with this process." [Mehmet]

Selim and Duygu proposed generating legal sanctions to prevent problems regarding accuracy:

"... regarding the control of the content I think there should be some legal arrangements I mean some countries generate laws to regulate the use of content on the Internet, we know this. I believe such a thing does not exist in Turkey. I do not have definite information but such precautions should be taken here as well." [Selim]

"...if the source of an Internet article is not given, if the source of a piece of information is not provided, publishing such things on the Internet is forbidden, but there is not a legal sanction regarding this. But within the legal framework, such things might be arranged I mean anonymous resources or information whose researcher is not known might be prevented." [Duygu]

Hakan believed that digital certificates and signatures could be a solution to accuracy-related problems:

"...In order to be sure of the source of the information there are some technical solutions, digital certificates, digital signatures, etc. if these applications spread ehh and become standardized, applied correctly, at least we could know the source of information. This contributes to credibility." [Hakan]

Opinions Regarding Privacy Problems

Participants' opinions regarding the question addressing privacy problems are classified under the following themes:

Table 6. Themes regarding privacy problems

Themes
<i>Problems</i>
Unauthorized access to personal information
Fear / anxiety
Surveillance of IP addresses
<i>Origins of the problems</i>
Shared PCs
Curiosity

The most stated privacy problem was unauthorized access to personal information. Participants stated that Internet was not a secure place to store personal information. Malicious people might easily access personal information through Internet, for instance, through online banking applications, which might publicize secret

personal information. They also stated that personal work should not be stored in shared computers in offices or other places. Some websites required users to provide some personal information. In spite of being limited, such information might lead to other information about individuals. For instance, Ferda explained a problem she experienced as follows:

“For instance, when somebody enters my national identity number, they can find the place I work or for how many years I have been working there. Finding the national identity number is not a big problem. Anybody who knows your name, your mother’s and father’s name and your birthplace can access to several pieces of information about you. There is no limitation to this on the Internet. Actually, I am quite inconvenient about this issue.” [Ferda]

Alper thought that surveillance of IP addresses while surfing is a violation of privacy rights:

“Well, for example ehh the fact that people know your IP address ehh means that they can know which server surfs which websites.” [Alper]

The most evident result of privacy problems was that participants did not trust in Internet and lived with a fear and anxiety of revealing their personal information to malicious people, who can share this information without authorization. In addition, they experienced a fear of revealing personal information so that other people can steal their information or access their e-mails:

“Internet is not a secure place. Ehh so it is not hard for somebody else to access personal and important information hidden in our computers. I mean all computers are connected to each other in a network, so ehh anybody who works on this for a while, any hacker can easily access to your personal computer. Besides that ehh I mean this person can even be your colleague. I mean while you are out for lunch during the lunch break he can sit on your chair, access your financial information or get some information related to your bank accounts. This is I think ehh I mean this is not an issue like you can close your eyes, turn your back and leave.” [Selim]

Burhan believed that people had a weakness of curiosity regarding personal information of others which led to privacy problems:

“People think that cracking somebody else’s password and accessing personal files is a big confidentiality. If you take the precautions I just mentioned, risks are fewer. If you do not, it is quite likely that you see your personal information everywhere.” [Burhan]

Hakan stated that he was quite uncomfortable with the practice of signing in specific databases, which asked them to give some personal information. Such personal information might be used as a key to other information about an individual:

“There are databases which might cause my personal information to be accessed by some others. I do not want to talk about these pieces of information, but through using Internet and some pieces of simple information, you can find more detailed information about a specific person. These detailed pieces of information might help you to go beyond.” [Hakan]

Proposed Solutions for Privacy Problems

Participants’ suggestions regarding the solutions to privacy problems are classified under the following themes:

Table 7. Proposed solutions for privacy problems

Themes
<i>Security Precautions</i>
Using advanced ciphering methods
Using security software
Not providing personal information on the Internet
Not storing personal information on shared computers
<i>Legal Precautions</i>
Generating legal sanctions

The most evident solution regarding privacy problems was using advanced ciphering methods. Participants believed that databases containing special information should be accessed through advanced passwords. In

addition, even the storage of these data should be realized through advanced ciphering. They also maintained that only a few authorized people or managers should access to storage of these databases.

“Besides that, databases I mentioned should not be accessed easily, there should at least be a password to confirm user identity, and everybody should not access all others’ information.” [Hakan]

“I mean technically ciphering methods might be used I mean maybe I do not know how easy, how difficult or how expensive is this, but while these are stored somewhere, they should be stored with passwords as well, or only one person or very few people can access that storage, so a more secure thing might be applied.” [Gonca]

“My solutions regarding this ehh actually there is such a thing ehh there are small password tools particularly for Internet banking. These tools ehh produce passwords in every 30 seconds or once a minute. If we are allowed to use such tools on the Internet while shopping, etc. or if people are urged to use such things ehh people stealing passwords might not access personal information because he doesn’t have the password tool. This might be a solution.” [İsmail]

“You are going to ask for a solution. There might be a ciphering system, which we use right know. But there are hackers who can crack these passwords. This is somewhat related to individuals’ personal moral values I think.” [Funda]

Hakan also indicated that Internet services for communication purposes such as e-mail, forum and chat should be more powerful in terms of technical issues to prevent such privacy problems:

“We said these issues might stem from technical problems as well. Particularly services with communication purposes like e-mail services or anything with communication purpose should be technically powerful and be robust to abuse.” [Hakan]

Using cookies as a security precaution, using security software, providing incorrect information for website memberships, giving secondary e-mails rather than frequently used ones, obtaining fake e-mail addresses to use when necessary, and not reading e-mails when the sender is not known were other precautions as exemplified below:

“I think with antivirus programs with Trojans etc. here as an upper level of our personal computers firewalls installed to server computers, software, computer software to prevent such things, these might be solutions I think.” [Mustafa]

“... I did not give very important information it says birthday and so on I do not provide them correctly. I mean I do not know what occurs from these but for example, I always have a fake e-mail address, I always give that. (...) It says they are going to give me a card and ask for our mother’s maiden name. I do not know who is at the other side, maybe they are going to use it when I give it. I am trying to be careful in this regard.” [Elif]

“ehh in this virus attacks etc. ehh the simplest attacks occur through e-mails. You should take the same pain with your e-mails as you take in your snail-mails and letters. You should not open e-mails coming from unknown senders or unnecessary content.” [Mehmet]

Legal actions constituted an important part of the dataset. Majority of the participants asked for legal precautions to prevent privacy problems:

“In this regard legal actions should be taken I mean there should be a legal solution, there is not any other solution, I suppose, it should be prevented by law.” [Alper]

“In this regard again laws should severely punish. I do not know whether these are applied now but there are many fraudulence cases on the Internet and I have never heard of people who have been punished if we think of Turkey. I mean these laws should be strict, I mean they should be punished even if it is too severe.” [Murat]

“Like I said, the solution for all is legal sanctions for those who publishes or uses content without authorization. I mean these things are in their own nature like I said before. If you do not get into these

websites, it is over. Solutions are not logical. As it is literally an abuse of personal rights and freedoms, severe punishments are necessary.” [Mehmet]

Participants also suggested that documents containing personal information should not be kept in personal computers. In addition, mutual information should be stored in a shared place on the network, personal information should not be given on the Internet and personal precautions should be taken.

Opinions Regarding Accessibility Problems

Participants’ opinions regarding the question addressing accessibility problems are classified under the following themes:

Table 8. Themes regarding accessibility problems

Themes
<i>Problems</i>
Economic problems
Internet infrastructure
Inequality of opportunities in accessing information
<i>Origins of the problems</i>
Economic problems
Foreign language proficiency
Infrastructure differences among countries

The first problem mentioned by participants regarding accessibility was relatively higher cost and slower speed of Internet access in Turkey. In addition, since having a computer is a must to access Internet, they tended to use Internet cafes. Most databases asked for a price which prevented them from accessing information:

“...you see resources like computers and Internet access are resources with a certain cost. Financially these resources cannot be obtained every time and everywhere. In this regard, a problem of equality comes into stage.” [Hakan]

“Individuals want to access a certain piece of information through Internet, but they might not have computers and they might need to go to Internet cafes. This is a problem. Not having a computer can be a problem.” [Elif]

Participants also thought that the current infrastructure and the quality of service were quite weak being quite behind what customers needed. People in other countries could access information faster which created a problem of inequality:

“ehh but of course this is not provided to us with appropriate conditions. If you say why, we use a low speed with a high cost. I think Turk Telekom provides this service with excessive price and this is a low quality service. In addition, ehh after we buy the service, additional service we need is quite bad ehh technical support and service supports are bad. They do not provide it in a quality way I think.” [Selim]

“ehh now Turkey’s... in Turkey... our Telekom infrastructure actually does not work for the good of the information technology sector I mean does not meet the needs.” [Mehmet]

“I do not believe in the equality of individuals in terms of the equality of information, because it is not so. For instance, access of an American to information is different from my access, because, to say it simply, I can use ADSL at home. Normal users can only afford to pay for it. Ehh it can provide I think utmost 2048 Megabits. For instance a user in America can use Internet faster with a lower price and access information.” [Ismail]

Participants stated that Internet was an easy way of accessing information, there was somewhat equality of access as the information was open to all; however, knowing how to access information was a must. That is, ready-made information was not possible, which required research:

“Ehh. If that information is on stage and clear, then Internet is the easiest way. You do not pay anything for this; it is already open to all. You just take a permission to enter. So you enter and use it. I mean you should make use of every site on the Internet which is not asking for a password.” [Vedat]

“Here, illiteracy and insufficient education, not knowing the subject and nothing else. Actually, virtual environment is something provided to all. Those who know how to use it use it, others just look.”
[Burhan]

Mustafa, Duygu and Mehmet stated that most websites providing important information asked for registration. These sites provided information, services and opportunities to real users in return for a price. Thus, some information could only be accessed by the richer, which led to inequality:

“When you connect an educational site they offer you the basics regarding their education, they just give you a demo or tutorial. In order to access subsequent steps, you need to register or pay some... They give you limited service, but offer the complete service to real subscribers.” [Mustafa]

“You see, they ask you to register to get a piece of information. You see you need to register, you need to pay some to get more.” [Duygu]

“You know the equality of individuals, you see, now to connect Internet and use good computers to do your jobs require some financial resources. Of course, as the financial situations of individuals are not equal, in our country people who are financially wealthy can make use of comfortable communication services and Internet services more.” [Mehmet]

“No equality, I mean, actually there should be equality. Now I mean in our Turkey some regions have Internet and some do not have an idea about it. These should become widespread around Turkey. I mean everybody should be equal I think. Everybody should access information directly.” [Murat]

Participants stated that the origins of accessibility problems were financial problems, insufficient resources in Turkey and infrastructure differences among countries. Opinions regarding financial problems and infrastructure differences can be seen in above quotations. The opinion regarding the language of resources is exemplified below:

“... regarding accessibility, but the only problem is the Turkish content. I mean when you check, good writings and articles are all English, there are few Turkish contents, and this is problematic. ...” [Alper]

Proposed Solutions for Accessibility Problems

Participants' suggestions regarding the solutions to accessibility problems are classified under the following themes:

Table 9. Proposed solutions for accessibility problems

Themes
<i>Economic Precautions</i>
Developing freeware
Free access to Internet
Free access to databases
<i>Institutional Solutions</i>
Institutional support for access
Increasing bandwidth
Infrastructure improvement
Governmental support to education
<i>Individual Solutions</i>
Self-development

The most evident solution was taking economic precautions. Among these were free Internet access and freeware:

“You see, maybe it is somewhat utopia but maybe with the government support, computer environments might be created where everybody can access Internet every time and these places might become widespread. This can sustain digital equality.” [Hakan]

“If the Internet access in Turkey become widespread, if people ehh can access it with less cost, this inequality will be removed. I mean again ehh the problem stems from the service provider company and the service itself.” [Selim]

Duygu and Ferda stated that accessing databases should be free of charge:

"I mean, you see, as I said commercial worries should be lessened ehh in order to access something, you need to register, you need to become a member, you need to know the password, such things should not be asked. Ehh because if it is published on the Internet, it is there for people to access it, I believe. This should be like that. I mean less price should be asked, additional costs should be eliminated. Or at least less cost should be asked to access information ..." [Duygu]

"In this regard, I opt for more equality. Me I mean there should be flexibility in accessing databases, accessing information on the Internet." [Ferda]

As institutional precautions, participants referred to governmental support to schools for access, increasing bandwidth, improving infrastructure and governmental support for educational ICT use:

"I mean, the solution is simple. More bandwidth, like the ones abroad. They need to invest a bit on infrastructure. I mean I had to install and cancel ADSL connection several times. Every time I do this, they have a cliché "no port", I confront with that cliché. I mean, I already pay for this service. Why don't they use that money to invest for a new port for a new user? I wonder this. I think Telekom should work a bit more." [Selim]

"Our solution is governmental policies should support education more. I mean they should support this more, all schools should use Internet ehh I mean all individuals in Turkey should have equal rights." [Murat]

As individual precautions, participants maintained that even though opportunities and services varied among individuals, individuals should strive for self-development:

"ehh when we look at the situation from people's perspectives, I mean they completely are limited by the services provided to them. Sharing might be important I mean rather than accessing things on the Internet in an unethical way, for instance, an individual in another university can communicate with an individual in this university, can ask for ideas or for resources they have, by communicating and improving relationships these problems might be solved in a more ethical way" [Gonca]

CONCLUSION

The current study identified problems related to computer ethics with a reference to privacy, accuracy, property and accessibility; investigated the origins of these problems; and proposed several suggestions regarding these problems through the help of ICT practitioners. Findings revealed that even ICT professionals were not aware of a working definition of computer ethics. However, they all agreed on a consensus regarding the importance of obeying ethical conducts with computers and the Internet. It is clear from the data that participants interpreted computer ethics as Internet ethics. In addition, they explained the concept of computer ethics through resorting to unethical computer using behaviors such as using unlicensed software, copying files or programs without authorization, showing disrespect to people's work, accessing secret or personal information of individuals and publishing this on the Internet without authorization, showing disrespect while communicating on the Internet, unauthorized reading or download of others' files and e-mails, visiting adult web sites, video-recording individuals' sexual lives, publishing these records on the Internet, hacking and sending viruses. Even though all participants were graduates of departments focusing on computer sciences, who were working as either teachers or software experts in privileged information technology positions, they had problems in describing the concept of computer ethics adequately, and resorted to unethical behavior samples rather than defining the concept. This might stem from the fact that they did not take undergraduate course(s) on computer ethics. As suggested by Bergem (1993), formal education on ethical practices and implications might help them to develop their theoretical and practical background on computer ethics, and generate better solutions for ethical dilemmas. In this regard, offering a must course like Computer Ethics in undergraduate computer science programs might be an effective solution.

Participants suggested that several ethical principles should be developed to prevent unethical computer and Internet using behaviors. In addition, they asked for better training and education regarding computer ethics along with higher support for academic endeavors focusing on computer ethics. Legal precautions were proposed quite frequently along with several personal precautions such as frequent backing up of files, using assistive programs and antivirus software programs. It was suggested that organization administrators had the responsibility to sustain security of secret information. The fact that they asked for ethical principles which

should be taught to computer users, they asked for additional training and education regarding computer ethics, and they asked for support to academic endeavors on computer ethics demonstrated the high value they attributed to the importance of education. In addition, participants accompanied computer ethics with Internet ethics, which revealed that they did not consider computer ethics in a vacuum. Rather, they thought of computer as a technology helping them to access Internet suggesting that participants thought of computer ethics and Internet ethics as sub-dimensions of the same concept.

Almost all participants were consistent with the problem of intellectual property reporting that they had no problem with this issue. They supported the idea of intellectual property whose most serious dimension was using unlicensed software. This problem was followed by unauthorized access to personal information. This finding was partially in line with the findings of the Friedmann (1997) study indicating that undergraduate students did not give enough importance to unauthorized copying of software. In addition, findings blaming legal looseness for unethical misconduct were parallel to the findings of Friedman as well. Intellectual property problems and proposed solutions revealed that participants accounted individuals for computer misdemeanors rather than third or fourth parties to control such behaviors. It was unfortunate to find out that even ICT practitioners were able to get unlicensed software whenever and wherever they wanted. This is somewhat caused by the socioeconomic status of computer users as the current income levels were far behind the position to get all necessary software programs with a license. In this regard, as mentioned by participants, socioeconomic status might be an important indicator of unethical computer using behaviors, particularly in terms of the intellectual property issues.

In most ethical problems, participants resorted to legal sanctions in addition to personal, organizational and technical precautions. Some personal precautions might be quite technical for average computer users. In addition, proposed legal sanctions might lead to endless constraints which should rank them last as a precaution. For instance, the well-known website, YouTube, has been shut down for several months in Turkey. Hundreds of websites similar to YouTube have been prohibited as administrators did not trust in individuals' own control mechanisms. Participants asked for an overseeing body or organization to control for the accuracy of information. Both precautions, overseeing control mechanism and legal restrictions, might create the consequence of over-limiting individuals' rights. It is unfortunate that participants, who were all university graduates, thought of restrictions and constraints as solutions rather than individual and societal precautions.

Accessibility problems mentioned by participants might be supported with several studies and theoretical work pieces in the literature. The digital divide among countries has been cited in several studies like the well-known Campbell (2001) study and the Alampay (2006) study. A thorough integration of ICTs into current everyday practices requires a well-established infrastructure. Infrastructure problems have been cited as a primary problem interfering with ideal ICT integration to everyday practices and educational settings (Akbaba-Altun, 2006; Clarke, 2007; Göktaş, Yıldırım & Yıldırım, 2008; Gülbahar, 2008; Odabaşı, 2000; Ololube, 2006). In this regard, complaints of the participants were found to be acceptable whereas suggested solutions seemed to be depending on governmental bodies and service providers, which were somewhat beyond practitioners' control. In brief, participants were right that since they did not have equal opportunities with their equals developed countries, they were in a disadvantaged position in creating knowledge and transforming this knowledge into wisdom.

In terms of accuracy, findings revealed that most participants considered Internet-based resources as unreliable. In addition, as Internet is a platform where information is disseminated without an effective quality control mechanism, participants did not trust most of the resources found on the Internet. This finding supported the Toprakçı (2007) argument maintaining that the accuracy of Internet-based information causes problems, particularly in instructional settings, since students begin to come to classroom with incorrect or invalid approaches. Participants in the current study suggested that such a problem could only be solved through an effective control mechanism which is somewhat impossible for the time being. Participants suggested that Internet-based resources should be supported and validated with print resources. In addition, they trusted in some official websites where digital signatures and security certificates were strictly adopted, which was considered plausible in the current study.

The current study contributes to the research literature, which were mostly conducted in a quantitative methodology revealing 'whats' but somewhat leaving a gap in terms of 'whys'. However, the current study was conducted with limited number of participants. In addition, its scope might have excluded several ethical problems and dilemmas experienced in the information society. In this respect, more detailed studies through both qualitative and quantitative methodologies and mixed-method researches are seriously sought for to diagnose other ethical problems of the information society and to propose a variety of feasible solutions.

Moreover, the study is primarily based on ICT practitioners' self-reports, which should be triangulated with other data collection methods and procedures during further research endeavors.

REFERENCES

- Adam, A. (2000). Gender and computer ethics. *Computers and Society, December 2000*, 17-24.
- Akbaba-Altun, S. (2006). Complexity of Integrating Computer Technologies into Education in Turkey. *Educational Technology & Society*, 9, 176-187.
- Akbulut, Y., Uysal, O., Odabasi, H. F., & Kuzu, A. (2008a). Influence of gender, program of study and PC experience on unethical computer using behaviors of Turkish undergraduate students. *Computers and Education*, 51(2), 485-492.
- Akbulut, Y., Sendag, S., Birinci, G., Kilicer, K., Sahin, M.C., & Odabasi, H. F. (2008b). Exploring the types and reasons of Internet-triggered academic dishonesty among Turkish undergraduate students: Development of Internet-triggered Academic Dishonesty Scale (ITADS). *Computers and Education*, 51(1), 463-473.
- Alampay, E. A. (2006). Beyond access to ICTs: measuring capabilities in the information society. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 2(3), 4-22.
- Bear, G. G. (1990). Knowledge and computer ethics: Its relationship to computer attitude and socio moral reasoning. *Journal of Educational Computer Research*, 6(1), 77-87.
- BEK (2003). *Bilim Etiği Kılavuzu (Science Ethics Guide)*. Anadolu University: Eskişehir. Retrieved July 7, 2006, from <http://www.anadolu.edu.tr/tr/bilimsel/bek.pdf>
- Bergem, T. (1993). Examining aspects of professional morality. *Journal of Moral Education*, 22(3), 297-313.
- Birinci, G., & Odabaşı, H. F. (2006). Akademik çalışmalarda İnternet kullanımı: Etik bunun neresinde?, Proceedings of the 6th International Educational Technology Conference (pp. 289-295). Gazimağusa, KKTC, 19-21 Nisan.
- Bissett, A., & Shipton, G. (1999). An investigation into gender differences in the ethical attitudes of IT professionals, *ETHICOMP99*, Rome.
- Bowyer, K. W. (1996). *Ethics and computing living responsibly in a computerized world*. California, USA: IEEE Computer Society Press.
- Campbell, D. (2001). Can the digital divide be contained? The digital divide: employment and development implications. *International Labour Review*, 140(2), 119-141.
- Charlesworth, M. (2000). How can a course in ethics and professionalism be included in an Information Systems Curriculum? *A Research Project in the Department of Information Systems in the Faculty of Commerce of Rhodes University*.
- Clarke, P. J. (2007). Exploring the use of computer technology in a Caribbean context: Views of pre-service teachers. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 3(1), 23-38.
- Conger, S., & Loch K.D. (1996). Evaluating ethical decision making and computer use. *Communications of the ACM*, 39(7), 74-83.
- Çevik, A., & Kuzu, A. (2006). Bilgisayar laboratuvarlarında karşılaşılan güvenlik sorunları ve çözüm önerileri konusunda öğretmen görüşleri. Proceedings of the 6th International Educational Technology Conference (pp. 425-433). Gazimağusa, KKTC, 19-21 Nisan.
- Dawson, L. M. (1995). *Women and men, morality and ethics*. Business Horizons, 4(38), 61-68.
- Friedman, B. (1997). Social judgment and technological innovation: Adolescents' understanding of property, privacy, and electronic information. *Computers in Human Behavior*, 13(3), 327-351.
- Gattiker, U. E., & Kelley, H. (1999). Morality and computers: Attitudes and differences in moral judgments. *Information Systems Research*, 10, 233-254.
- Gattiker, U. E., & Nillegan, T. (1988). Computerized offices in Canada and the United States: Investigating dispositional similarities and differences. *Journal of Organizational Behavior*, 9, 77-96.
- Ghazali, H. (2003). *Examining high-school students' views on computer and information ethics*. Unpublished doctoral dissertation. Kansas State University, Manhattan, KS.
- Glesne, C. (2006). *Becoming qualitative researchers: An introduction* (3rd edition). New York: Pearson.
- Göktaş, Y., Yıldırım, Z., & Yıldırım, S. (2008). The keys for ICT integration in K-12 education: Teachers' perceptions and usage. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 34, 127-139.
- Grbich, C. (2007). *Qualitative data analysis: An introduction*. London: Sage Publications.
- Gutek, B. A., & Larwood, L. (1987). Information technology and working women in the USA. M. J. Davidsons, C. L. Cooper eds. *Women and Technology*. Chichester, UK: Wiley & Sons.
- Gülbahar, Y. (2008). ICT usage in higher education: A case study on preservice teachers and instructors. *The Turkish Online Journal of Educational Technology (TOJET)*, 7(1), 32-37.
- Haidt, J., Koller, S. H., & Dias, M. G. (1993). Affect culture, and morality, or is it wrong to eat your dog. *Personality and Social Psychology*, 65, 613-628.

- Igarria, M., & Parasuraman, S. (1989). A path analytic study of individual characteristics, computer anxiety and attitudes toward microcomputers. *Management*, 15, 373-388.
- İşman, A., Çağlar, M., F Dabaj, Z. Altınay, & Altınay, F. (2004). Attitudes of students towards computer. *The Turkish Online Journal of Educational Technology (TOJET)*, 3(1), 11-21.
- Kelley, H., Gattiker, U. E., Paulson, D., & Bathnagar, D. (1994). End-user attitudes and information systems: A cross-national study. *Paper presented at the Annual Meeting of the Administrative Sciences Association of Canada*, Halifax, Nova Scotia, Canada.
- Khazanchi, D. (1995). Unethical behavior in information systems: the gender factor, *Journal of Business Ethics*, 14, 741-9.
- Kılıçer, K., & Odabaşı, H. F. (2006). Bilgisayar öğretmenliği: Etik bunun neresinde? Proceedings of the 6th International Educational Technology Conference (pp. 1124-1129). Gazimağusa, KKTC, 19-21 Nisan.
- Kizza, J. M. (2002). *Ethical and social issues in the information age*. New York: Springer Verlag.
- Kreie, J., & Cronan, T. P. (1998). How men and women view ethics? *Communication of the ACM*, 41(9), 70-76.
- Lindlof, T. R., & Taylor, B. C. (2002). *Qualitative communication research methods* (2nd edition). London: Sage Publications.
- Loch, K.D., & Conger, S. (1996). Decision making and computer use. *Communication of the ACM*, 39(7), 74-83.
- Maner, W. (1996). Unique ethical problems in information technology. *Science and Engineering Ethics*, 2(2), 137-154.
- Marshall, C., & Rossman, G. B. (1999). *Designing qualitative research* (3rd edition). London: Sage Publications.
- Mason, R. O. (1986). Four ethical issues of information age, *MIS Quarterly*, 10(1), 5-11.
- Mert, İ. S. (2003). *Düşünme stilleri ve etik algı arasındaki ilişki: Üniversite öğrencileri üzerine bir uygulama*, *Yayınlanmamış Doktora Tezi*. Ankara: Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Second Edition. California: Sage Publications.
- Mollavelioğlu, M. Ş. (2003). Küçük ve orta ölçekli işletmelerde bilgi teknolojilerinin etik kullanımı ve bir uygulama, *Yayınlanmamış Yüksek Lisans Tezi*. Erzurum: Atatürk Üniversitesi Sosyal Bilimler Enstitüsü.
- Moor, J. H. (2004). Reason, relativity and responsibility in computer ethics. T. W. Bynum, S. Rogerson eds. *Computer Ethics and Professional Responsibility*. Malden, MA: Blackwell Publishing.
- Moor, J. H. (1985). What is computer ethics?, *Journal of metaphilosophy*, 16(4), 266-275.
- Namlu, A. G., & Odabasi, F. (2007). Unethical computer using behavior scale: A study of reliability and validity on Turkish university students. *Computers and Education*, 48, 205-215.
- Odabaşı, F. (2000). Faculty use of technological resources in Turkey. *Innovations in Education and Training International*, 37(2), 103-107.
- Ololube, N. P. (2006). Appraising the relationship between ICT usage and integration and the standard of teacher education programs in a developing economy. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 2(3), 70-85.
- Parker, D., Swope, S., & Baker, B. (1990). *Ethical conflicts in information and computer science, technology, and business*. Wellesley, MA: QED Information Sciences.
- Strauss, A. and Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Sage Publications.
- Toprakçı, E. (2007). The profiles of the use of the Internet for study purposes among university students. *The Turkish Online Journal of Educational Technology (TOJET)*, 6(3), 129-144.
- TUBITAK, (2006). Bilimsel dergilere gönderilen makalelerde dikkat edilmesi gereken noktalar (Matters to consider in articles being sent to scientific journals). *Council of Research and Publication Ethics*. Retrieved July 8, 2006, from <http://journals.tubitak.gov.tr/genel/brosur.pdf>
- Turiel, E. (1983). *The development of social knowledge: Morality and convention*. New York: Cambridge University Press.
- Turiel, E., Killen, M., & Helwig, C. C. (1987). Morality: Its structure, functions, and vagaries. J. Kaan, S. Lamb eds. *The Emergence of Morality in Young Children*. University of Chicago Press, Chicago, IL, 155-243.
- Uysal, O. (2006). Öğretmen adaylarının bilgisayar etiğine ilişkin görüşleri. *Yayınlanmamış Yüksek Lisans Tezi*. Anadolu Üniversitesi Eğitim Bilimleri Enstitüsü, Eskişehir.
- Yaman, M. (2007). The competence of physical education teachers in computer use, 6(4), *The Turkish Online Journal of Educational Technology (TOJET)*, 6(4), 79-87.
- Yıldırım, A., & Şimşek, H. (2004). *Sosyal bilimlerde nitel araştırma yöntemleri*. 3. Baskı. Ankara: Seçkin Yayıncılık.

STUDENTS' ATTITUDES AND PERCEPTIONS TOWARDS THE EFFECTIVENESS OF MOBILE LEARNING IN KING SAUD UNIVERSITY, SAUDI ARABIA

Dr. Fahad N. Al-FAHAD

Dean, College of Applied Studies and Community Service
King Saud University, P. O. Box 22459, Riyadh - 11495
alfahadfn@hotmail.com

ABSTRACT

The main aim of this research study is to better understand and measure students' attitudes and perceptions towards the effectiveness of mobile learning. This paper reports on the results of a survey of one hundred eighty six undergraduate female students at King Saud University about their attitude and perception to the use of mobile technology in education. An analysis of the quantitative survey findings is presented focusing on the ramification for mobile-learning (m-learning) practices in university learning and teaching environments. The author has attempted to determine how this technology can be optimally used to improve student retention at Bachelor of Art and Medicine programmed at King Saud University in Saudi Arabia. Result of this survey clearly indicate that offering mobile learning could be our method for improving retention of B.A ,and M.D. students, by enhancing their teaching/learning. The biggest advantage of this technology is that it can be used anywhere, anytime and adopt their mobile learning systems with the aim of improving communication and enriching students' learning experiences in their open and distance learning.

KEYWORDS: M-learning; student attitudes; student perception; mobile technology.

INTRODUCTION

DISTANCE EDUCATION

In the last decade, distance education has developed in two major directions: "the individual flexible teaching model and the extended classroom model" (Rekkedal and Dye, 2007). The former allows students to start the class at any time, study in isolation and communicate with instructors and classmates through asynchronous tools. The latter organizes students into groups, requires them to meet at local study centre, and allow them to use interactive technologies such as video conferencing to interact (Rekkedal & Dye, 2007).

Due to the rapid development of technology, courses using a variety of media are being delivered to students in various locations in an effort to serve the educational needs of growing populations. In many cases, developments in technology allow distance education programs to provide specialized courses to students in geographically remote areas with increasing interactivity between students and teacher. Although the ways in which distance education is implemented differ markedly from country to country, most distance learning programs rely on technologies which are either already in place or are being considered for their cost-effectiveness. Such programs are particularly beneficial for the many people who are not financially, physically or geographically able to obtain traditional education.

Distance education has experienced dramatic growth both nationally and internationally since the early 1980's. It has evolved from early correspondence education using primarily print based materials into a worldwide movement using various technologies. The goals of distance education, as an alternative to traditional education, have been to offer degree granting programs, to battle illiteracy in developing countries, to provide training opportunities for economic growth, and to offer curriculum enrichment in non traditional educational settings. A variety of technologies have been used as delivery systems to facilitate this learning at a distance. Distance education relies heavily on technologies of delivery. Print materials, broadcast radio, broadcast television, computer conferencing, electronic mail, interactive video, satellite telecommunication and multimedia computer technology are all used to promote student-teacher interaction and provide necessary feedback to the learner at a distance.

However, recent development in interactive multimedia technologies which promise to facilitate "individualized" and "collaborative" learning, are blurring the distinctions between distance and traditional education. These technologies also have the capability of creating new environment for learning such as "virtual communities". Students in traditional settings are being given entire courses on CD-rom multimedia disks through which they progress at their own pace, interacting with the instructor and other students on electronic mail or face to face according to their needs (Technology Based Learning, 1994). Through international collaboration, students around the world participate in cooperative learning activities sharing information using computer networks (Riel, 1993). In such cases, global classrooms may have participants from various countries interacting with each other at a distance. Mediated educational activities allow students to participate in

collaborative, authentic, situated learning activities (Brown & Palincsar, 1989; Brown, Collins, & Duguid, 1989). In fact, the explosion of information technologies has brought learners together by erasing the boundaries of time and place for both site based and distance learners. Research in distance education reflects the rapid technological changes in this field. Ozgur (2007), evaluated audio books as supported course materials in distance education. It takes and initiatives role to meet the needs of higher education in Turkey by providing equal opportunity with the help of information and communication technology. Although early research was centered around media comparison studies, educators have recently become more interested in examining how the attributes of different media promote the construction of knowledge (Salomon, Perkins, & Globerson, 1991). It is within the theoretical framework of knowledge construction and expert systems (Glaser, 1992) that some of the most promising research on mediated learning appears (Barrett, 1992; Harasim, 1993; Salomon, 1993). Also Ajadi, Salawn and Adeoye (2007), discussed the relevance of e-learning in the position of education in Nigeria.

MOBILE LEARNING

People often think mobile or wireless technologies are the same as mobile wireless technologies (Cook, Pachler and Bradley (2008). Strictly speaking, mobile wireless technologies are different from mobile or wireless technologies simply because not all mobile technologies are wireless nor are all wireless technologies mobile. According to Malladi and Agrawal (2002), mobile wireless technologies consist of two aspects: mobility and computing. They claimed that mobile computing represents users' continuous access to network resources without limitation of time and location. Wireless means transmission of any form of data-text, voice, video or image which is conducted through radio waves, infrared waves or microwaves, rather than using wires (Dubendorf, 2003). Therefore, mobile wireless technology is defined as any wireless technology that uses radio frequency spectrum in any band to facilitate transmission of text data, voice, video, or multimedia services to mobile devices with freedom of time and location limitation.

The freedom of time and location is related to the concept of anytime and anywhere access that represents the two main characteristics of mobile wireless technologies-mobility and reachability (BenMoussa, 2003; Camponovo & Pigneur, 2003; Ng-Kruelle, Swatman, Rebne, & Hampe, 2002; Turban, Lee, King, Warkentin, & Chung, 2002). Rismark, Solvberg, Stromme and Hokstad (2007), found that affordance of constant access to LMS by mobile phones may represent new learning opportunities in higher education. Mobile wireless technologies use public stations- antennas-or Wireless Access Points (WAPs) that are connected to wired-network in a building or public area to give a way of access for web resources and communication for mobile wireless technology users. With mobile wireless network or service in mobile wireless devices, users can access network information anytime, anywhere. (Hahn, 2008). For example, people can carry wireless laptops anytime, anywhere and can access a network in public places, such as an airport and a library. In addition, handheld devices can be carried and connected to a network anywhere, anytime using public stations (e.g., antenna).

In the Kingdom of Saudi Arabia, recently, all major mobile network providers have announced commercial packages offering broad band internet connection for mobile devices in economical prices, making the necessary technology available and affordable. Precisely, nowadays mobile devices, present in Saudi Arabia market, are enhanced with technology, like GPRS and UMTs, presenting the user with the opportunity to exploit all the advantages of actual internet connection. Additionally, the new technology announced by network providers: High Speed Packet Access (HSPA), offer a download speed of 7.2 Mbps.

Here, we refer to the experience of the Kingdom of Saudi Arabia (KSA) in the application of e-learning and distance education, which is one of the leading and promising experiments in the Arab world. Saudi Arabia has announced officially the utilization of distance learning, and to achieve this objective leading towards the future, has launched initiatives to establish six infrastructures for higher education and distance education initiative to 1) bridge (Tajseer), the e-learning educational portal system; 2) bridges management, (Jusur LMS System) in e-learning; 3) launch an award in university for e-learning excellence, 4) the national repository for learning objects Taiseer service for e-learning and 5) the establishment of Saudi National Center for e-learning, and distance education for university education, and functions circulated e-learning management system in harmony with needs of university education in the Kingdom of Saudi Arabia; and 6) developing the academic and administrative skills and management system, e-learning and distance education, building electronic curriculum contents and forms of digital and print for a number of university courses, and to build the educational portal for e-learning and distance learning and awareness programme for electronic education and distance education. For further details of the system proposed by the Ministry of Higher Education and National Center in KSA, you can visit the Web site of the Ministry of Higher Education (www.ElC.Edu.sa).

LITERATURE REVIEW

Distance education is on the brink of another shift. M-learning education is on the go, thanks to mobile phones and personal digital assistants (PDAs) which expands the boundaries of anytime, anywhere learning. It was approximately ten years ago that distance education experienced a shift in course delivery methods. North American libraries in particular embraced the World Wide Web. As internet access methods, they began moving from mailing course content such as books, audio or video tapes, or photocopies of journal articles, to creating or linking to digital content which could be read on line. Students could access course materials from wherever they were, 24 hours a day without the help of a librarian.

Traditional research on digital libraries focused on developments in technology (Hong et al., 2002). Levy and Marshal (1995), Hahn (2008), challenge those who would maintain the traditional view of the library in a digital environment. Various projects, such as WiTEC, tested the usefulness of wireless devices in classroom environments (Wang et al., 2003); White, (2004) Benson, Samarawickema, & O'Connell, (2005), or in class field trips. Yet, as a distance education institution, Australia has no classrooms. Australia has had to adapt courses to fit the goals of students who are never in the same room with their instructors and tutors, or with other students. Australia has conquered these challenges by employing innovation and flexibility, earning a reputation as "Canada's Open University" through a commitment to research into the state of the art of distance education.

It has only been recently that studies of digital libraries (Tennant, 2008), have moved outside the classroom. Dong and Agogino (2004), concluded that Mlearning is most useful when it links real-world situation to relevant information resources. They explored how downloading key information to a PDA would help to enrich the learning experience of students of a field trip. They also suggested the scenario of students at a learning experience of students on a field trip. They also suggested the scenario of students at a museum being able to use their PDAs to provide relevant information. They explored two approaches: transforming and transcoding for delivering digital content intended for full-sized personal computers to mobile computing devices. Transformation require that all content be marked up in XML and presents content with style sheets appropriate to the capabilities of the remote device that will be displaying it. Transcoding also takes into account the capabilities of the mobile device as well as its network conditions but it displays content without changing it. The approach they didn't use in their study, web clipping, such as AvantGo, delivers only text content by stripping out any multimedia contents, an approach that doesn't exploit a digital library's versatility.

Waycott and Kukulska-Hulme (2003) also studied the use of PDAs outside the classroom. They focused exclusively on student' experiences with reading course materials and taking notes on PDAs. Using PDAs for reading and note taking was discovered to be less than ideal. Students were getting lost in the documents, and were unable to make notes as comprehensively and easily as they could with a paper copy of the materials. However, their study was conducted using a Palm m105 PDA; a PDA which at the time was relatively affordable and which offered most features common to PDAs, but which doesn't come close to offering the technology available today (Ogata, et al. 2008).

The technological capacity of PDAs has increased tremendously in the past three years. Screens are bigger with more clarity; systems have more memory and more multimedia capabilities with more refined methods for imputing data. There are constant advancements in this field as well as the plethora of possibilities, such as PDA models with unique capabilities, and a wide variety of systems and applications. These wide ranging advancements provide researchers with more questions than answers on possible methods for delivering digital library content to PDAs. According to Clyde (2004), the challenge "is to identify the forms of education and training for which M-learning is particularly appropriate, the potential students who most need it and the best strategies for delivering mobile education" (p. 46).

Analysis of student perceptions on m-learning

The survey was conducted to explore and analyze the factor crucial in overcoming the possible hindrance of m-learning implementation in higher education, student perception of m-Learning may be influenced by specific individual variables. The variable taken into consideration in the study were gender, course of study and attitudes to new technology. The research has indicated that female students are attracted to the ease of use. The three specific objective of the survey were :

- 1- To explore the student attitudes and the perceptions on the effectiveness of mobile learning.
- 2- To draw the student's preferences for mobile learning in distance education.
- 3- To examine the extent of use mobile learning by distance learners.

METHODOLOGY

In order to study the attitudes of students on the effectiveness of mobile learning, a questionnaire was developed with 8 items designed to measure students' attitudes and perception on the effectiveness of mobile learning. A five point Likert Scale with strongly agree; agree; undecided; disagree; and strongly disagree, was used from main items. This approach is commonly employed in distance education research (Biner, 1993; Roberts, Irani, Telg & Lundy, 2005).

The Study was conducted in the King Saud University, Riyadh, Saudi Arabia. A random sample of undergraduate female students (N= 186), age range 18 - 26 years filled in a questionnaire (the questionnaire was in Arabic language). All participants were asked to complete a questionnaire which included all types of measuring students' attitudes and perceptions on the effectiveness of mobile learning. Eight, key questionnaire were adopted from this stage as shown in Table 1.

The questionnaire, including a cover letter, was distributed to participants during the class. All subjects were asked to respond to the questionnaire and their responses were guaranteed confidentiality. The data of this study was gathered by means of a paper and pencil survey. Respondents of the survey were undergraduate students from different colleges. Students from Applied studies and Community Service (Group 1) were undertaking 5 selected courses, in different areas, in specific 1) Introduction to Islamic culture (IS 101); 2) Islam and building society (IS 102);, 3) Arabic language skills (Al 101); 4) Arabic writing (Al 103); 5) English (Eng. 101). Group (2) consisted of students from Educational Kindergartens faculty and group (3) students were from and Medicine.

Every course contained approximately (50-70) students. The total number of respondents was 186. The questionnaires were distributed and collected at the end of semester in June, 2008. The data collected was processed and statistically analyzed through SPSS Ver.10. In our first study on the students' attitude and perception towards the effectiveness of mobile learning in King Saud University, Kingdom of Saudi Arabia, the questionnaires were distributed to 186 students (female) in different colleges, college of Applied Studies and Community Service (represented group 1, 37.6%); department of educational Kindergartens (representing group 2, 34.9%), and College of Medicine (representing group 3, 27.4%). Respondents of the survey were college students undertaking different selected courses. All the students who participated in this survey owned cellular phone. Other type of mobile devices such as PDAs, iPods, and MP3 players were owned by fewer than half of the respondents. This lead to an important issue to be considered in any future mobile learning implementation.

RESULTS AND DISCUSSION

Mobile phones seem the best device to use in the learning of high student ownership, yet a requirement to use them in a course would deprive a small percentage of students who do not own or use a mobile phone. The first objective namely the student's attitudes and perceptions to m-learning was measured using eight closed questions (Table 1). Table (1) shows the percentage of the descriptive statistics for the effectiveness of mobile learning.

Responses to each of the indicators on effectiveness of mobile learning were measured on a Linkert Scale of 1 to 5, ranging from "Strong agree" to strong disagree" Scores greater than 3.0 indicate relative importance, below 2.0 indicate relative unimportance; a score of 2 to 3 shows it to be neither important nor unimportant. Data in Table 2, provides an overview of the relative importance of these indicators. Mean scores of the sample indicate that more than 50%, of respondents strongly support mobile learning as an effective method for learning. This data indicates that some how, mobile technologies are more flexible and enable students greater freedom of learning any place, any time. Responses to a question on availability of mobile phones show that respondents did not agree with the suggestion that mobile phones are unavailable to large number of students. Respondents also strongly agree with the suggestion that there would be high cost involved in owning and using mobile devices for mobile learning. Respondents did, however, report apprehension regarding the quality of networking presently available to them. Mobile technologies such as mobile phones can be used to enrich students' learning environment by providing timely information.

Mobile learning can also provide good support to micro-learning, a new and effective way of learning (Habitzel, Mark, Stehno & Prock, 2006). It has been observed by Habitzel and his colleagues (2006), for example, people can learn more effectively if "information" is broken down into smaller, more easy-to-comprehend units. Therefore it is suggested here, that mobile learning is an ideal medium simply because it supports this "new way" of learning via the use of SMS, pre-recorded MP3 fits, and so forth.

Also, the study found that only 25.3% (N=47), of the respondents were aware of mobile learning. In survey on the use of different communication tools like PDAs, iPods, and MP3 players, results show that, less than 50% of the respondents owned these mobile devices. The finding of 100% of respondents reported owning a mobile

phone, suggests that mobile technologies are rapidly becoming more ubiquitous and, arguably, more accessible to a large number of learners in Saudi Arabia.

The majority of these cell phones present advanced characteristics like relaying and displaying photos (96.8%); use of alarm (79.6%); and use as an organizer (78.50%); downloading e-mail (19.4%); reading news (22.0%); and watching movies (15.1%). The students do not use mobile devices too much in the movies application.

In specifically, 25.3% of (N=47) students strongly agree that mobile learning can be an effective method of learning as it can give immediate support, with 39.2% (N=73) feeling that the mobile learning will be more flexible method of learning as it can be done anytime anywhere. 31.7% (N=59), of respondents strongly agree that the mobile learning will improve communication between student and teacher, and 30.69% (N=57) strongly feel that expenses are involved in mobile learning. 24.7% (N=46%), of the respondents, feeling that the mobile learning will bring new opportunities of learning. Further more, there are several indicators in the survey (Table 1) related to the effectiveness of mobile learning. The majority of the respondents preferred the effective use of mobile technology in promotion of distance learning where as Traxler (2003) ,also support the findings of the study. Also, the majority of respondents in this study confirmed the importance of mobile devices for its flexible availability, improving the communication between students and teacher.

However, The results of this study can be explained in Table (3). Table (3) gives the results of extracted communalities of all the variables. It shows the proportion of the variance of a variable explained by the common factors. From Table (3), it is very clear that the "mobile learning will improve communication between student and teacher" has the least percentage (48.1%), of variance that can be predicted or explained by other 7 variables. On the other hand, "mobile learning will bring new opportunities of learning" has the highest variation (74.4%), that can be accounted for by other 7 variables. These results reveal the importance attached to the fact that "mobile learning will improve communication between student and teacher". The communality of (74.4%), in the "mobile learning will bring new opportunities of learning" can be predicted by the usage of other variable studies. Thus an improvement in the usage of other variables will have corresponding effect on the new opportunities of learning.

Another statistical analysis instrument is reliability coefficient, Cronbach's alpha (Cronbach, 1951), to estimate the scale of consistency among items in the group (Hair, Anderson, Tatham & Black, 1998).

The Cronbach's alpha is generally acceded upon the level of 0.70, albeit it is acceptable at 0.60 in exploratory research (Hair et al., 1998). Table 4, illustrates the factors extracted from factor analysis and the Cronbach's alpha from reliability analysis of the data. Factor analysis loaded eight questionnaire statements into two components. Statements 1-5, and 6-8 respectively.

The internal consistency, represented by coefficient alpha, of all items is as much as 0.6641. It reports an existence of cohesive internal relationships of all measurements statements in representing the mobile learning, and this result provides confidence, that statistical results produced are coming from stable measurement source.

The first component represents the most contributory element to mobile learning. Alpha value of this factor is 0.8419 representing a high internal consistency of this component. The alpha value of the second factor is 0.6079, which is quite low owing to the very limited number of items (3 items).

Table 1: Descriptive Statistics for the Effectiveness of Mobile Learning

Item No.	Questionnaire Indicator	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Not responded	Total
1	Mobile learning can be an effective method of learning as it can give immediate support.	47 (25.3)	53 (28.5)	36 (19.4)	27 (14.5)	21 (11.3)	2 (1.1)	186
2	Mobile learning will bring new opportunities of learning.	46 (24.7)	66 (35.5)	27 (14.5)	28 (15.1)	15 (8.1)	4 (2.2)	186
3	Mobile learning will be more flexible method of learning as it can be done anytime, anywhere.	73 (39.2)	73 (39.2)	16 (8.6)	18 (9.7)	5 (2.7)	1 (0.5)	186
4	Mobile learning will improve communication between student and teacher.	59 (31.7)	60 (32.3)	27 (14.5)	22 (11.8)	14 (7.5)	4 (2.2)	186
5	Mobile learning is a quicker method of getting feed back in learning.	30 (16.1)	48 (25.8)	44 (23.7)	44 (23.7)	13 (7.0)	7 (3.8)	186
	Mobile learning cannot be used for learning due to:							
6	unavailability of mobile phones with a larger number of students.	24 (12.9)	27 (14.5)	14 (7.5)	66 (33.5)	43 (23.1)	12 (6.5)	186
7	expenses involved in Mobile learning.	57 (30.6)	47 (25.3)	31 (16.7)	36 (19.4)	6 (3.2)	9 (4.8)	186
8	poor networking in the city.	48 (25.8)	49 (26.3)	29 (15.6)	29 (15.6)	22 (11.8)	9 (4.8)	186

Note: figures in brackets indicate percentage.

Table 2: Indicators for Effectiveness of Mobile Learning Mean Score

Item No.	Questionnaire Indicator	G1 (N=70)		G2 (N=65)		G3 (N=51)		Overall	
		M	SD	M	SD	M	SD	M	SD
1	Mobile learning can be an effective method of learning as it can give immediate support.	2.20	1.40	2.86	1.40	2.63	1.06	2.55	1.34
2	Mobile learning will bring new opportunities of learning.	2.09	1.30	2.62	1.35	2.55	2.10	2.44	1.29
3	Mobile learning will be more flexible method of learning as it can be done anytime, anywhere.	1.80	1.08	2.02	1.10	2.39	1.08	1.96	1.06
4	Mobile learning will improve communication between student and teacher.	1.97	1.35	2.43	1.32	2.65	1.09	2.25	1.28
5	Mobile learning is a quicker method of getting feed back in learning.	2.50	1.40	2.91	1.30	3.55	1.33	2.68	1.29
	Mobile learning cannot be used for learning due to:								
6	unavailability of mobile phones with a larger number of students.	2.84	1.68	3.37	1.58	2.47	1.24	3.22	1.58
7	expenses involved in Mobile learning.	2.27	1.40	2.27	1.40	2.25	1.30	2.25	1.30
8	poor networking in the city.	2.59	1.56	2.59	1.56	2.47	1.45	2.47	1.45
Overall, G1, G2, & G3		1.9	.80						

Table 3: Communalities (Extraction Method: Principal Component Analysis)

	Initial	Extraction
1	1.000	.687
2	1.000	.744
3	1.000	.619
4	1.000	.481
5	1.000	.593
6	1.000	.703
7	1.000	.621
8	1.000	.675

Table 4: Rotated Component Matrix and Cronback's Alpha of Mobile Learning

Statement	Component	
	1	2
1	.828	
2	.847	
3	.778	
4	.691	
5	.764	
6		.811
7		.783
8		.624
<i>Cronbach's Alpha</i>	.8419	.6079

CONCLUSIONS

This paper investigates the students' attitudes and perceptions of 186 University Student's from different colleges towards effectiveness of mobile learning in their studies.

The authors have analyzed the answers to the qualitative questions in the surveys in an attempt to gain an understanding of how current students view the use of mobile devices in learning environments. The analysis of student perception on m-learning points to the fact that mobile learning is widely embraced by the student community. The majority of student supported the notion that the wireless networks increase the flexibility of access to resources in learning and that they could work independently of variable resources like lab or library PCs. The Students also were keen to use all sources of m-learning approaches through lab tops, mobile phones and PDAs so that access to information would be anytime and anywhere. As the date reveals m-learning activities can much better engage students in the learning process. Students in this survey changed from passive learners to truly engaged learners who are behaviorally, intellectually and emotionally involved in their learning tasks.

The Mobile technologies are perceived as an effective tool in improving communication and learning. In developing countries like Saudi Arabia, where WAP and PDA – based mobile technologies are not yet popular due to the cost involved in owning and using such higher-end mobile technologies, less expensive SMS-based mobile technologies such as mobile phones, do hold tremendous potential which can be strategically used to support and improve student relation.

REFERENCES

- Ajadi, T.O., Salawn, I.O. and Adeoye F.A., (2008), E-learning and Distance Education in Nigeria. The Turkish online Journal of Educational Technology (JOJET), volum (7), Issue (4) article (7).
- Barrett, E. (Ed.) (1992). *Sociomedia: Multimedia, hypermedia and the social construction of knowledge*. Cambridge, MA: The MIT Press.
- BenMonssa, C. (2003, April). Workers on the move: New opportunities through mobile commerce. Paper presented at the UKAIS Conference, University of Warwick, Retrieved November 16, 2005, from <http://www.Warwick.Ac.Uk/Nbsral/UKais/abstracts.php#73>.
- Benson, R., Samarawickrema, & O'Connel, M., (2002). Showcasing examples of good practice in e-learning: an opportunity for research in distance education? Research in Distance Education 6, Geelong, Australia, pp. 71-82. <http://www.Deakin.edu.au/education/rads/conferences/publications/ride/2004/index.php>.
- Binar, P. M. (1993). The development of an instrument to measure student attitudes towards television course. The American Journal of Distance Education, 7 (1), 62-73.
- Brown, A. L., & Palincsar, A. S. (1989). Guided, cooperative learning and individual knowledge acquisition. In L. B. Resnick (Ed.), *Knowing, Learning and Instruction: Essays in Honor of Robert Glaser* (pp. 393-452). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. Educational researcher, 18 (1), 32-42.
- Clyde, L. A. (2004). M-Learning. Teacher Librarian (Internet) October, 31 (1). Available from <http://www.teacherlibrarian.com/tltoolkit/info tech 32 1.html>. (Accessed: March 31, 2005).
- Cook, J., Pachler, N. and Bradley, C. (2008), Bridging the Gap? Mobile phones at the interface between informal and formal learning:. Accepted by RCET's Special Issue: Learning while Mobile, the Journal of the Research Centre for Education Technology, Kent State University. Available. http://www.rcetj.Org/files/RCETJ_4_LearningWhilemobilecook_.pdf.
- Cronbach, L.J., (1951). Coefficient alpha and the internal structure of test. Psychometrical, 16, 297-334.
- Componva, G., & Pigneur, Y. (2003, April). Business model analysis applied to mobile business. Proceedings of the 5th International Conference on Enterprise Information systems (ICEIS), Angers, France.
- Dong, A. and Agogino, A. M. (2004). In International conference on digital libraries., Vol. 2 the Energy and Resources Institute, New Delhi, PP. 892-898.
- Dubendorf, V. A. (2003), *Wireless data technologies*. New York: John Wiley & sons.
- Glaser, R. (1992). Expert knowledge and processes of thinking. In D. f. Halpem (Ed.), *Enhancing thinking Skills in the Sciences and Mathematics* (pp. 63-76). Hillsdale, New Jersey: Lawrence Erlbaum Associates.
- Habitzel, K., Mark, T.D, Stehno, B., & Prock, S. (2006). Microlearning; Emerging concepts, practices and technologies after e-learning. Proceeding of Micro learning 2005 Learning & Working in New Media, In conference Series: Innsbruck University press: Retrieved June 6, 2007 from <http://www.microlearning.org/micropapers/microlearning2005-proceedings-digitaversion.Pdf>.
- Harasim, L. M. (1990). Online education: An environment for collaboration and intellectual amplification. In L. M. Harasim (Ed.), *Online Education: Perspectives on a New Environment* (pp. 39-64). NY: Praeae.

- Hair, J. F., Anderson, R.E., Tatham, R.L., & Black, W.C., (1998). *Multivariate Data Analysis*. 5th ed. Upper Saddle River, New Jersey: Prentice – Hall.
- Hahn J. (2008), Mobile Learning for the Twenty – First Century Librarian. *Reference Services Review*, 36(3), (pp. 272-288).
- Hong, W., Thong, J. Y. L., Wong, W. M. and Tam, K. Y. (2002). Determinants of user acceptance of digital libraries: an empirical examination of individual differences and system characteristics. *Journal of Management Information Systems*, 18, pp. 97-124.
- Levey, D. M. and Marshal, C. C. (1995). Going digital: A look at assumptions regarding digital libraries. *Communications of the ACM*, 38, pp. 77-84.
- Maladi, R., & Agrawal, D.P. (2002). Current and future applications of mobile and wireless networks. *Communications of the ACM* (10) 45.
- Ng- Kruelle G., Swatman, P. A. Rebne, D. S., & Hamp, F. (2002). The price of convenience: Privacy and mobile commerce. *Quarterly Journal of Electronic Commerce*, 3 (3), 273-285.
- Ogata, H., Saito A., N., Paredes, R. G., San Martin, G. A., and Yano, Y. (2008). Supporting Classroom Activities with BSUL System.
- Ozgur, A. Z. (2007), Evaluating Audio Books as supported Course Materials in Distance Education: the experiences of the blind learners. *The Turkish online Journal of Education Technology (TOJET)*, Volume (6), Issue (4), Article(2).
- Rekkedal, T. & Dye, A. (2007). Mobile distance learning with PDAs: Development and testing of pedagogical and system solutions supporting mobile distance learners. *International review of Research in Open and Distance Learning*, 8, (2), pp. 1-21.
- Rieger, r. and Gay, G. n.d. Using mobile computing to enhance field study. (Internet) Available from <http://www.oise.utoronto.ca/cscl/papers/rieger.pdf> (Accessed: November 23, 2004).
- Riel, M. (1993). Global education through learning circles. In L. M. Harasim (Eds.), *Global networks* (pp. 221-236). Cambridge, MA: The MIT Press.
- Rismark, M., Solvbery, A. M., Stromme, A. and Hokstad, L. M. (2007). Using Mobile Phones to Prepare for University Lectures: Student's Experiences. *The Turkish online Journal of Educational and Technology (JOJET)*, Volume (6), Issue(4) Article(9).
- Roberts, T. G., Iran; T. A., Telg, W. & Lundy, L. K., (2005). The development of an instrument to evaluate distance education courses using student attitudes. *The American Journal of Distance Education*, 19 (1), 51-64.
- Salomon, G. (Ed.). (1993). *Distributed cognitions: Psychological and educational considerations*. Cambridge: Cambridge University Press.
- Salomon, G., Perkins, D. N., & Globerson, t. (1991). Partners in cognition: Extending human intelligence with intelligent technologies. *Educational Researcher*, 20 (3), 2-9.
- Tennant, R. (2008). On the move with Mobile Web: Library and Mobile Technology. *Library Technology Reports*, July, 44 (5).
- Traxler, J. (2003), M-Learning – evaluating the effectiveness and the cost. *Proceeding of Mlearn 2003 : Learning with mobile devices*, (pp 183-188). London: Learning and Skills Development Agency.
- Wang, H. Y., Liu, T. C., Chou, C. Y., Liang, J. K., Chan, T. W. and Yang, S. 2003. The framework of three learning activity levels for enhancing usability and feasibility of wireless learning environment (sic). *Journal fo Educational Computing Research*, 30, pp. 331-351.
- Waycott, J., & Kukulska-Hulme, A. (2003). Students' Experiences with PDAs for reading course materials. *Personal and Ubiquitous Computing*, 7 (1), 30-43.
- White, N. (2004). M-Learning with Disadvantaged Kids. Full Circle Associates Community Blog (Internet) November 2, Available from <<http://www.fullcirc.com/weblog/2004/11/m-learning-withdisadvantaged-kids.htm>> (Accessed: November 30, 2004).

THE ROLE OF GENDER AND AGE ON STUDENTS' PERCEPTIONS TOWARDS ONLINE EDUCATION CASE STUDY: SAKARYA UNIVERSITY, VOCATIONAL HIGH SCHOOL

Fahme DABAJ

Faculty of Education, Eastern Mediterranean University, Famagusta, TRNC, Mersin 10, Turkey.

(This work was presented in World Academy of Science, Engineering and Technology Conference, Italy, 2008)

ABSTRACT

The aim of this study is to find out and analyze the role of gender and age on the perceptions of students to the distant online program offered by Vocational High School in Sakarya University. The research is based on a questionnaire as a mean of data collection method to find out the role of age and gender on the student's perceptions toward online education, and the study progressed through finding relationships between the variables used in the data collection instrument. The findings of the analysis revealed that although the students registered to the online program by will, they preferred the traditional face-to-face education due to the difficulty of the nonverbal communication, their incompetence of using the technology required, and their belief in traditional face-to-face learning more than online education.

Regarding gender, the results showed that the female students have a better perception of the online education as opposed to the male students. Regarding age, the results showed that the older the students are the more is their preference towards attending face-to-face classes.

Keywords: Distance education, online education, internet education, student perceptions.

INTRODUCTION

Distance education, as defined by the all educators in this field, is a process in which a distance exists between the person(s) who deliver the instruction and the person(s) of reception. It consists of distance teaching and distance learning. Due to time and other restrictions of life, distance education has become the most popular way for those who are getting their instructions and increasing their knowledge in their area of interest.

The new diverse technological devices have enabled people to share information and make teaching and learning processes possible with no time and distance limitations especially for those adults who cannot continue their traditional education in classrooms face-to-face with their instructors. Distance education, therefore, is now offered either totally or partially at a distance, nearly in all areas of education or skill development programs by almost all universities all over the world. Thanks to distance education which made it possible for people to access to specific instruction that they would never otherwise receive. Different Universities use different methods to deliver instructions to distant students, and the most popular way of delivering the instruction nowadays is by the global interconnected network which is known as the Internet.

BACKGROUND OF THE STUDY

With the evolution of the Internet, especially email and the World Wide Web (WWW), it became possible to electronically deliver education to distances while achieving a good degree of interaction within the limits of the technology to create a cost-effective teaching and learning process (Robert & Jason, 2004). So the World Wide Web facilitated the online education which is defined as the communication and collaboration within an education context using technologies (Piezon, Donaldson, 2005).

This study focuses on distance education via email and the World Wide Web as the method of delivering instruction through on-line diploma programs offered by Sakarya University in Turkey (www.sakarya.edu.tr).

CONTEXT OF THE STUDY

As mentioned in Sakarya University's distance education website, Adapazarı Vocational High School, operating under the auspices of the Sakarya University, rightfully boasts for a reputation of being the first institution offering courses on the internet. The programs offered are Computer Programming and Information Technology, Information Management, Business, Industrial Electronics and Mechatronics.

THE PURPOSE OF THE STUDY

The purpose of the present study is to analyze the existing relationships between students' perceptions of online distant education and gender and age.

The web-based instruction in distance education can be made efficient enough if the site is developed and designed in such a way as to maximize the course requirements, satisfy student needs, and make the communication process more interactive, especially the communication between students has been the most important factor in many studies (Prammanee, 2003; Bryun, 2004; Hodgkinson, Mostert, 2005). These factors are very important if we want to overcome the communication barriers which are the result of an asynchronous text-based method of instruction, such as students' frustrations, isolation and feelings of belonging, and the fear of using the technology (Hara, 1998).

Interactivity in an online program is directly related with the amount of contact the student has with the instructor, with his peers, and with the course material (Sherry, 1996). This interactivity and the roles of the students and instructors, changing from the traditional instructor-centered to learner-centered process, encourage the students to seek for answers and build their own knowledge from their own experiences. Finally, the increase of communication and interaction between the students and their instructors in an online learning has a great importance (Swan, 2002).

RESEARCH QUESTIONS

The online programs offered by the Sakarya University will form the basis of this case study in this research, in which the perceptions and attitudes of the students to online distance education will be analyzed with respect to their age and gender. Students enrolled in these programs have varying skill levels related with the technology and the distance education environment. The analysis will progress through the perceptions of students towards distance education in a web-based system and seek answers to whether there are relationships between students' age and sex and their perceptions regarding distance education?

The above problem will be analyzed in detail based on the analysis of the relationships between students' perceptions to online education and the independent variable questions asked in the questionnaire.

RESEARCH METHODOLOGY

The research methodology of this study will use the quantitative statistical methods and techniques such as significance differences, correlation and the cross-tabulation distribution to find out if there is a significant relationship between the independent and the dependent variable questions, measuring the role of age and gender of students towards their perceptions regarding distant education

RESEARCH DESIGN

This case study will provide an analysis of the data collected regarding the role of gender and age of the students' perceptions in the web-based online courses and the online programs offered by Sakarya University. "The case study is the basic building block of the research design. In a case study, a variable or a set of variables is measured in one group (or individual) at one point in time." (Bouma and Atkinson 1995:110). The quantitative data will be collected via survey questionnaire and be analyzed via quantitative statistical methods.

POPULATION

The population consists of all elements or figures which are under study. The population of this research study is all the students enrolled in the distance education programs and the online courses in the fall term of the 2005/2006 Academic Year.

DATA COLLECTION INSTRUMENT

A questionnaire was prepared and posted on the internet to be filled by the population in concern, which comprises 2556 students enrolled in the online courses and distant programs offered by the Sakarya University. The numbers of respondents was 118 students all of who have successfully filled and submitted the questionnaire.

DATA ANALYSIS

The online questionnaire was divided into two main parts. Part I: Personal information regarding age and gender (Independent variable). Part II: questions related with students' perceptions towards online education (Dependent variables). The questionnaire aims at finding whether there are significant differences and relationships between the two independent variables and the 20 dependent variable questions listed in the table below, and to find and analyze the student perceptions towards the online courses and the distant education programs offered.

The existence of relationships between the variables was analyzed using the correlation statistical method taking into consideration the two-tailed significance with error-level ($\alpha=0.05$) and the data analysis's results are given

in the following table; (r) represents the correlation coefficient and (s) represents the significance. (Bolded figures show the existence of significant correlation).

TABLE I
Significance of the Independent Variables

Q	Dependent Variables	Independent Variables Significance at the 0.05 level (2-tailed)	
		Gender	Age
1	I find online education mechanical due to its dependency on technology.	r -.242 s .008	-.314 .001
2	I prefer attending face-to-face classes.	r -.185 s .045	-.293 .001
3	I have concerns regarding the adequacy of the teachers in online education.	r -.020 s .828	-.249 .006
4	I have concerns regarding the adequacy of the online education given.	r .013 s .888	-.157 .090
5	I am not happy about the punctuality of the information received in online courses.	r .110 s .235	-.219 .017
6	There is no adequate communication between students in online education.	r -.011 s .903	-.086 .353
7	I fear that I may be isolated from other students in online education.	r .004 s .966	-.118 .203
8	I have difficulty regarding nonverbal communication and collaboration in online education.	r .094 s .309	-.225 .014
9	I do not posses the academic confrontation needed.	r .004 s .970	-.123 .184
10	I do not posses the communication competence needed in online education.	r -.065 s .483	-.178 .054
11	I face no difficulty in dealing with the easy tasks but encounter difficulties in the challenging ones.	r -.035 s .705	-.288 .002
12	I have concerns regarding the responsibilities I should take in online courses.	r -.143 s .123	-.328 .000
13	I am incompetent in using the computer	r -.097 s .294	-.187 .042
14	Online education does not motivate me so I do not learn well.	r -.170 s .065	-.305 .001
15	I think in online education more time is needed.	r -.099 s .287	-.202 .028
16	I do not have confidence on the reliability of the materials and the knowledge attained in online courses.	r -.137 s .138	-.242 .008
17	I may be interrupted at home or at work while taking online education.	r -.016 s .862	-.093 .315
18	I don't get support from my family, friends and bosses regarding online education.	r .131 s .158	-.069 .458
19	I am worried that the online education may interfere with my personal life.	r .067 s .473	-.158 .088
20	I believe that the individual differences are not taken into consideration in online education.	r -.033 s .722	-.149 .107

RESULTS OF THE ANALYSIS

Considering the significance and the correlation data analysis, a cross-tabulation analysis between the independent and dependent variables for those who have significance value indicating the existence of a meaningful relationship between them, were considered to analyze and interpret the results regarding the aim of this study research.

Regarding gender, the analysis showed that there is an inverse correlation between gender and the first two questions with a significance of (0.008 and 0.045) and a correlation coefficients of (-0.242 and -0.185). According to the cross tabulation of the data between the gender and the first question, where 35% of the students were female and 65% were male, 65% of the students (54% of female, 71% of male) regarded online

education as mechanical due its dependence on technology and almost 44% of the students (31% female, 51% male) preferred taking face-to-face education rather than online education.

Age and questions (1, 2, 3, 5, 8, 11, 12, 13, 14, 15, 16) of the analysis showed that there is an inverse correlation between age and these questions with a significance of (0.001, 0.001, 0.006, 0.017, 0.014, 0.002, 0.000, 0.042, 0.001, 0.028, 0.008) and a correlation coefficients of (-0.314, -0.293, -0.249, -0.219, -0.225, -0.288, -0.328, -0.187, -0.305, -0.202, -0.242) respectively. According to the cross tabulation of the data between age and these questions, where 4% of them were at the age younger than 18, 64% within the age range of 18 to 25 and 32% were above 25 years old, almost 71% of the students perceived online education as mechanical due its dependence on technology, and nearly 48% of the students preferred face-to-face education rather than online one, and almost 83% of the students have concerns about the sufficiency and competence of the online instructors, 76% of the students were not happy about the punctuality of the information received, 60% of the them said that they face difficulty regarding nonverbal communication and collaboration, 71% have difficulties dealing with challenging or hard tasks, 69% have concerns in taking responsibilities in online courses, 75% answered that they are incompetent in using computers, 55% said that online education does not motivate them so they do not learn well, 50% think that more time is needed in online education, 84% does not have confidence in the reliability of the materials and the knowledge attained in online courses.

Gender and age variables played an important role in this analysis, and the cross tabulation data showed that 4% of the students (2% female, 5% male) were at the age younger than 18, 64% (86% female, 52% male) within the age range of 18 to 25 and 32% (12% female, 43% male) was above 25 years old.

CONCLUSIONS

For the majority of the students, the online education was found to be mechanical and most preferred taking traditional face-to-face education. They also had concerns regarding the reliability of the materials used on the net and the adequacy or competence of the teachers who deliver the instruction, and they also faced shortness of time and experienced difficulty in nonverbal communication. The analysis, none the less, showed that, the percentage of male students perceiving online education as these is higher than the female students, and this percentage increases among the male and female students who are above thirty years old.

REFERENCES

- Bouma, G. D. and Atkinson, G. B. J. 1995 A Handbook of Social Science Research, Oxford: OUP
- Bruyn, L. L. (2004). Monitoring online communication: Can the development of convergence and social presence indicate an interactive learning environment? *Distance Education*, 25(1), 67-81.
- Hara, Noriko (1998). Students' Perspectives in a Web-Based Distance Education Course. Indiana University. Retrieved on 4/3/2005 from <http://php.ucs.indiana.edu/~nhara/paper/mwera98.htm>
- Hodgkinson, C., M., Mostert, M. (2005). Online debating to encourage student participation in online learning environments: A qualitative case study at a South African University. *International Journal of Education and Development using Information and Communication Technology*, 1(2), 94-104.
- Robert H. Woods, Jr. & Jason D. Baker, Interaction and Immediacy in Online Learning, The International Review of Research in Open and Distance Learning, Vol 5, No 2 (2004). Retrieved on 4/1/2007 from <http://www.irrodl.org/index.php/irrodl/article/view/186/268>
- Piezon, S. L., Donaldson, R. L. (2005). Online groups and social loafing: Understanding student-group interactions. *Online Journal of Distance Learning Administration*, 8 (4).
- Prammanee, N. (2003). Delivering learning on the Net: The why, what & how of online education. *Educational Technology & Society*, 6(1), 125-126.
- Sherry, L. (1996). Issues in Distance Learning. *International Journal of Educational Telecommunications*, 1 (4), 337-365. Retrieved on 4/3/2005 from <http://carbon.cudenver.edu/~lsherry/pubs/issues.html>
- Swan, K. (2002). Building learning communities in online courses: The importance of interaction. *Education, Communication and Information*, 2(1), 23-49.
- www.sakarya.edu.tr

TRENDS AND ISSUES IN EDUCATIONAL TECHNOLOGIES: A REVIEW OF RECENT RESEARCH IN TOJET

Dr. Ayfer ALPER

Ankara University, Faculty of Educational Sciences
Department of Computer Education and Instructional Technologies
ayferalper@yahoo.com

Dr. Yasemin GÜLBAHAR

Başkent University, Faculty of Education
Department of Computer Education and Instructional Technologies
gulbahar@baskent.edu.tr

ABSTRACT

The aim of this research study is to investigate the articles published between 2003-2007 in Turkish Online Journal of Educational Technology (TOJET) in order to reveal the trends and issues addressed in this electronic journal for the field of educational technology. The specific purposes of this article are to reveal: (1) the methodologies and theories that underlie research, (2) the topics that have been most and least heavily researched, (3) the design types that shapes research, (4) the issues on selection, size and level of the sample, and (5) some other issues like number of authors, data collection methods, references and variables. After a detailed document analysis, the articles are carefully investigated and categorized according to the selected criteria. Then these qualitative data were analyzed inductively, categorized according to already existing or emerging themes. Moreover, some parts of the analyzed data are transformed into numerical values and presented as graphics. The results showed that in order to improve the quality of research in the field of educational technology; research studies should have a theoretical basis, the mixed method of research (qualitative and quantitative) should be used to complement each other, the research studies should address K-12 as much as Higher Education, new and emerging research topics should be sought, interdisciplinary topics should be investigated, and diversity in terms of sample selection, data collection, and research design should be sought.

Keywords: Educational Technology, Content Analysis

INTRODUCTION

A recent review of the literature discloses an abundance of educational technology research studies employing a variety of research methodologies in a variety of educational settings. The research in this area has evolved especially since the Internet and communication technologies became widespread. Thus, the early studies are mainly focused on the impact of technology on the students in terms of cognitive and affective outcomes academic achievement. Several meta-analyses have investigated the impact of computer-assisted instruction on student outcomes (Waxman & Michko, 2003). Some other meta-analyses have examined aspects such as the effects of microcomputer applications in elementary schools (Ryan, 1991) and the effects of computer programming on student outcomes (Liao & Bright, 1991). Niemiec and Walberg (1992) summarized the findings on 13 quantitative research syntheses that were conducted between 1975 and 1987 and found that the average effect size was .42, which indicated that the average student who received computer-based instruction scored at the 66th percentile of the control group distribution (i.e. the 50th percentile). Overall, these meta-analyses have documented the positive effects of educational technology on student achievement in general (Schacter, 2001; Sivin-Kachala, 1998; Wenglinsky, 1998).

On the other hand, Blok, Oostdam, Otter and Overmaat (2002), investigated the effectiveness of computer-assisted instruction (CAI) programs in supporting beginning readers. Their findings were similar to earlier meta-analyses by Kulik and Kulik (1991) and Ouyang (1993), which also examined the effects of CAI and found it to have positive but small effects (Waxman & Michko, 2003). Lou, Abrami and d'Apollonia (2001) examined the effects of students working in a small group versus working individually when students were using computer technology. They found that small-group learning had more positive effects than individual learning. Other recent meta-analyses in technology have examined topics such as the effectiveness of interactive distance education (Cavanaugh, 2001), computer-assisted instruction in science education (Bayraktar, 2001-2002), and computer-based instructional simulation (Lee, 1999).

Schacter (1999) mentioned that there are analysis of 5 largest scale studies about impacts of Education Technology which were selected for their scope, comprehensive samples, and generalizability to local, state, and national audiences. The first study (Kulik, 1994) is employed a statistical technique called meta analysis to

aggregate the results over 500 individual studies to draw a single conclusion. This study summarized more than 97 of the computer-based instruction studies conducted in the 1980s, noting that students typically learn more and faster in courses involving computer-based instruction and have more positive attitudes. The results of his meta-analysis support the use of computers as a means to improve student achievement. The second (Sivin-Kachala, 1998) reviewed hundreds of individual studies whereby the authors shed light on consistent patterns that emerged across studies. The third (Baker, Gearhart & Herman, 1994) reviewed a partnership between Apple and five schools across the nation. The fourth study (Mann, 1999) reported the results of West Virginia's 10 year statewide education technology initiative. The fifth (Wenglinsky, 1998) assessed a national sample of fourth and eight grade students using simulation and higher order thinking technologies. The sixth (Scardamalia & Bereiter, 1996) and seventh (Harel & Papert, 1991) and (Harel, 1990) reviewed two smaller scale studies that show the promise of never emerging technologies on student learning.

On the other hand, educational leaders invited the meeting of Preparing Tomorrow's Teachers to Use Technology and they agreed on the need for identification through research of the best practices in the use of technology in teacher education. Studies to determine the generalizable effects of technology in teacher preparation programs are essential because of the key role of the teacher in education and because of the existing evidence on the need for in-depth preparation of teachers to use technology effectively (Thompson, 2005). In addition leading researchers in education widely agree that more theory and evidence based research in education is needed (Feuer, Towne, & Shavelson, 2002; Roblyer & Knezek, 2002).

Hence, this article summarizes the past five years' studies in educational technology to help us become better prepared for future research challenges. This goal is accomplished by examining all articles about educational technologies of TOJET between 2003 and 2007. The specific purposes of this article are to reveal: (1) the methodologies and theories that underlie research, (2) the topics that have been most and least heavily researched, (3) the design types that shapes research, (4) the issues on selection, size and level of the sample, and (5) some other issues like number of authors, data collection methods, references and variables. It is expected that this article will provide directions and suggestions for future research by revealing the gaps and needs.

METHOD

Research Procedure

For this research study, one of the leading journals in the field of educational technology, The Turkish Online Journal of Educational Technology (TOJET) was selected. TOJET is a quarterly, peer-reviewed international electronic journal which can be accessed online from the address <http://www.tojet.net>.

TOJET is devoted to the issues and applications of educational technology to enhance learning and teaching. TOJET is included in many databases like Education Research Index, ERIC and EBSCO Online. It has editors and editorial board members from Turkey, TRNC, USA, Germany, Holland, Italy, Finland, Ukraine, Malaysia, Canada, India and Jordan. The main purpose of knowledge sharing through TOJET as stated in its web page, is the contribution toward the improvement of education and learning through educational technology through various ideas and practical solutions.

Since the scope of the journal was educational technology, all the published manuscripts for the last five years (2003-2007) formed the content for this research. Several criteria were preset by the researchers in order to draw a general picture of what has been done through five years. The main goal of this content analysis was to find answers to some questions. What characterizes research on educational technology? How has research on educational technology developed recently? What is the general trend of researchers about educational technology?

Hence, for the content analysis of manuscripts published in TOJET in last five years, researchers set the criteria as follows:

- ♦ Research Topics
- ♦ Authors
- ♦ School Level
- ♦ Research Theories
- ♦ Research Design
- ♦ Sample Selection Method
- ♦ Sample Size
- ♦ Data Collection Methods
- ♦ Resources

- ♦ Number of Variables (dependent-independent)
- ♦ Research Type (qualitative-quantitative)

The purpose of the present study is to categorize and synthesize recent research studies published in TOJET for the last five years, in order to shed light on future studies that will be conducted in the field of educational technology. Thus, this study reports on the results of the content analysis of TOJET, to provide guidance for the development of an educational technology research agenda.

Data Analysis

After a detailed document analysis, the articles are carefully investigated and categorized according to the criteria specified below. Then these qualitative data were analyzed inductively, categorized according to already existing or emerging themes. Moreover, some parts of the analyzed data are transformed into numerical values and presented as graphics.

FINDINGS

The findings of this study are reported according to the selected criteria. Some results are presented as numbers, whereas some are provided as graphics.

Research Topics

Although it was difficult to distinguish between the research topics authors published, an inductive coding facilitated the categorization of emerging themes (Table 1). The following research topics were emerged from the analyzed data. Since some articles pointed out more than one topic, they were listed more than one times under different headings.

Table 1 Research Topics Emerged from the Document Analysis

Research Topics	Number of Articles
Effects of Computer Based Instruction/Multimedia	36
Web-Based/Online Education	35
Integration of Technology into Education	32
Assessment/Evaluation of Instructional Software	15
Perceptions about computers/technology	12
Design/Development of Instructional Software	12
Teachers' Competencies of Technology	10
Attitudes toward computers/technology	8
Presentation of Real Applications	8
Alternative Assessment	6
Constructivist Learning Environments	6
Cognitive Styles/Tools	5
Benefits/Challenges	5
Effects on Student Achievement	5
Mobile Learning	4
Comparison of traditional vs. online learning	3
Virtual Reality	3
Management Issues	3
Creativity	2

The research topics which appeared one times during the analysis was; intelligent tutoring, visual learning strategies, creativity, interactions, e-readiness, motivation, and self-efficacy. Top three topics which also lead the research in the field are composed of research on computer based and online technologies, and their integration into education.

Number of Authors

Most of the articles have one or two authors which can be explained as the lack of collaboration between academicians (Table 2). Another main reason maybe the academic carrier requirements that most of the authors should meet in terms of points from these research studies.

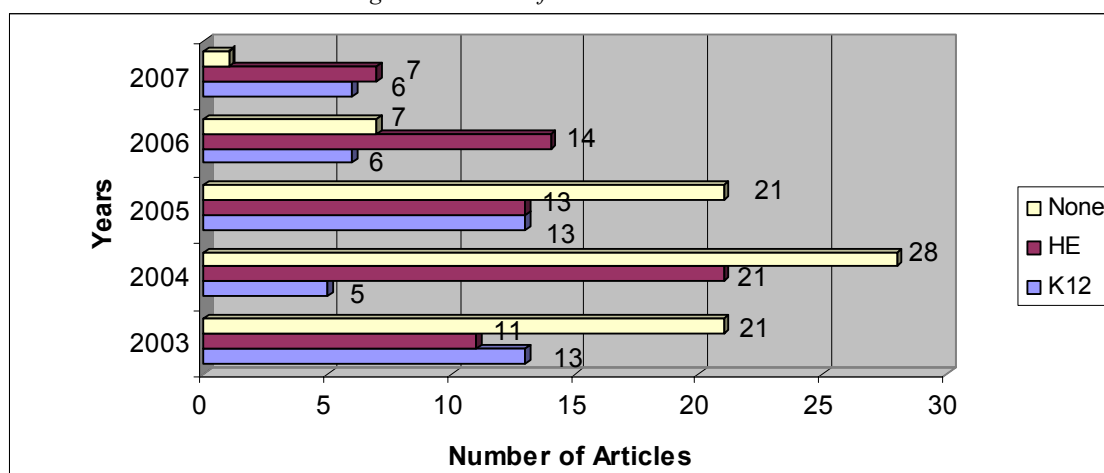
Table 2 Author numbers per articles

Number of Authors	Number of Articles
1	87
2	59
3	26
4	10
5	3
6	2
10	1

School Level

It is understood from the graph that except 2003 and 2005, in the other three years higher education is more preferable for authors (Figure 1). In 2003 more K12 schools and in 2005 equal amount of K12 and HE has been studied. The reason why HE is much preferred than K12 by researchers may be the difficulty of getting permission, in other words the bureaucracy.

Figure 1 Number of School Levels Per Year



Research Theories/Framework

Among 187 articles only 76 based their discussion or findings on theoretical basis. In 2003, “computer aided instruction” is the most favored one (Yeditepe & Karadağ, 2003; Alakoç, 2003; Altun, 2003; Akçay et al., 2003; Güven & Karataş, 2003; İpek, 2003; Kocasaraç, 2003; Morgil et al., 2003; Arslan, 2003; Çekbaş et al., 2003; Yenice, 2003; Boynak, 2003). The underlying theories in these articles are summarized in Table 2.

Table 2 Research Theories/Framework

Research Theories/Framework	Number of Articles
Computer Aided/Based Instruction	21
Web-Based Education	16
Constructivist Learning Environments	8
Diffusion of Innovation Theory (Rogers)	6
Social Learning Theory (Bandura)	3
Multiple Intelligences Theory (Gardner)	3
Interactive/Active Learning	3
Cognitive Learning Theories	4
Other Theories	12
Total	76

The field of other theories/framework includes problem-based learning, visual learning, creative thinking, inquiry based learning, Gibson’s model of affordances, generative theory, individual learning, mobile education, experiential learning, cooperative learning, virtual reality, and item response theory. It is obvious that theoretical preferences heavily based on learning theories.

Research Design

The analysis indicated that most of the studies are in the type of literature review (74) and descriptive (63) (Table 3). The number of experimental studies is very low that explains the difficulties of experimental studies. The results also illustrates that the last two years, namely 2006 and 2007, have a few literature review and more descriptive and experimental studies. In 2006 and 2004, the number of experimental studies are higher than the others (Çetin & et al., 2004; Özsoy & Yıldız, 2004; Morgil & et al., 2004; Baki & Birgin, 2004; Morgil & et al., 2004; Dündar & Kıyıcı, 2004; Baki & Şahin, 2004; Özdenler & Sayın, 2004; Aksoy & Özad, 2004; Akçay & et al, 2006; Şen & Neufeld, 2006; Çataloğlu, 2006; Aydın, 2006; Tezci & Dikici, 2006; Yıldırım, 2006; Tosun & et al., 2006; Gönen & et al., 2006).

Table 3 Research Design Types Per Year

Research Design	2003	2004	2005	2006	2007	Total
Descriptive	17	14	16	6	10	63
Experimental	7	9	6	9	3	34
Literature Review	19	31	22	1	1	74
Discussion	2	0	3	11	0	16
Total	45	54	47	27	14	187

Sample Selection

Because of not mentioned directly, most of sample selection types has been predicted by the authors. The number of articles that has been clearly mentioned its sample selection type is very low (Table 4). Most common selection type was “accessible sampling” as assumed by authors. Furthermore, 89 articles those are mostly in the type of discussion or literature review, and presented as “none” in the results.

Table 4 Sample Selection Method Per Year

Sample Selection	2003	2004	2005	2006	2007	Total
Accessible	10	15	18	14	7	64
Clustered Sampling	9	5	5	0	3	22
Randomly	4	3	1	1	3	12
None	22	31	23	12	1	89
Total	45	54	47	27	14	187

Sample Size

The highest percentages of preferable range of sample size are over 200 (Akpınar, 2003; Can, 2003; Olkun & Altun, 2003; Tor & Erden, 2004; Ayman & Serim, 2004; Akpınar, 2004; Toprakçı, 2005, Varank, 2005; Arnas, 2005; Süer & et al., 2005; Deniz, 2005; Özdemir, 2006; Kabadayı, 2006; Kumtepe, 2006; Koç & Ferneding, 2007; Baloglu, 2007; Bozkaya & Aydın, 2007; Toprakçı, 2007). The results show that most of the authors can reach high numbers of sample size (Table 5).

Table 5 Sample Sizes Per Year

Sample size	2003	2004	2005	2006	2007
1.-29	2	5	3	1	2
30-59	6	2	7	5	1
60-89	7	5	1	2	1
90-119	0	1	4	2	2
120-159	5	4	2	2	1
160-200	0	2	2	2	2
200->	3	3	4	3	4

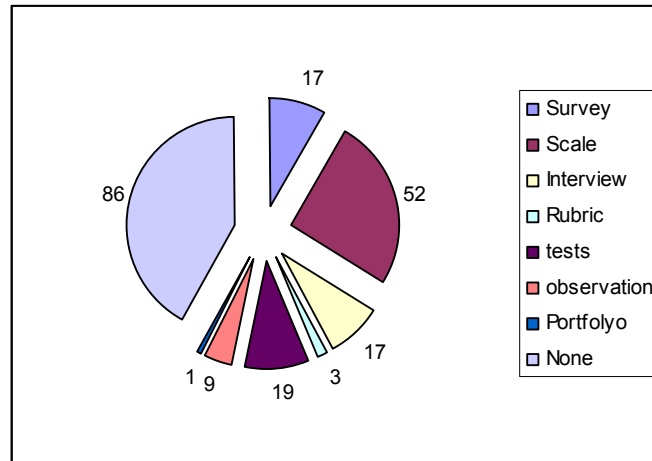
Data Collection Methods

The articles are analyzed in terms of data collection methods also. The methods for collection of data show diversity especially in terms of the selected research methods. Although in some research studies more than one data collection instrument is used, they are presented separately in Table 6. Figure 2 illustrates the general distribution of preferred data collection methods for the last five years.

Table 6 Data Collection Methods Per Year

Data Collection	2003	2004	2005	2006	2007
Survey	8	2	7	0	0
Scale	10	12	10	9	11
Interview	5	4	6	1	1
Rubric	1	0	1	1	0
Achievement Tests	4	5	4	6	0
Observation	2	3	3	0	1
Portfolio	0	1	0	0	0
None	20	30	23	12	1
Number of Articles	47	54	47	27	14

Figure 2 Data Collection Types for the last five years

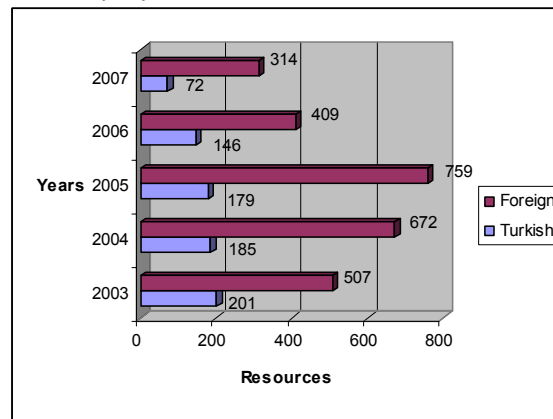


Since most of them are discussion or literature review, totally 86 researches have no any explanation about the type of data collection. Most of the studies collect data by asking scales (52 articles) and the other three main parts of the data collections are achievement tests, survey and interview. Although rubric is commonly preferred as an alternative assessment tool in last years, it has not been applied in these last five year studies of TOJET.

Resources

The articles analyzed in terms of references as being national or international (Figure 3). The results showed that although international resources are preferred mostly, the number of national resources used as references are increasing year by year which is a satisfactory result.

Figure 3 Number of References as National or International in the Articles



Dependent vs. Independent Variables

The findings showed that totally 62 articles have one dependent variable, whereas 95 articles have no dependent variable (Table 7 and Table 8). Most of these 95 articles are in the type of discussion or literature review. The highest number of dependent variables presented in the articles is 5. Since the authors did not mention about the variables in their study in detail, most of the variables has been estimated by the authors. The number of articles that has been clearly mentioned detailed information about the variables researched was very low. In addition 51 articles over 186 has one independent variable and the highest number of dependent variables was 8.

Table 7 Data Collection Methods Per Year

Years	Number of Dependent Variables					
	1	2	3	4	5	None
2003	15	3	4			23
2004	18	4	1			31
2005	11	5	3	1	1	26
2006	9	6				12
2007	9	1			1	3
Total	62	19	8	1	2	95

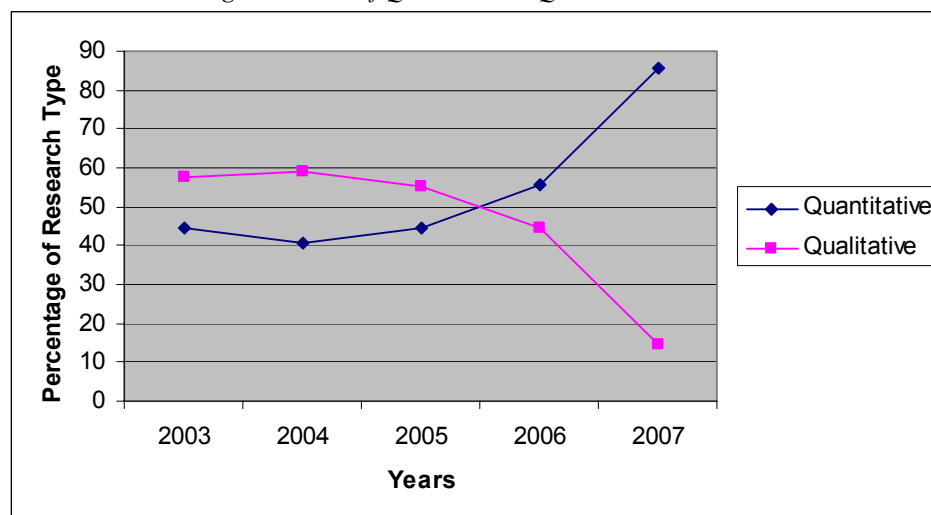
Table 8 Data Collection Methods Per Year

Years	Number of Independent Variables								
	1	2	3	4	5	6	7	8	None
2003	8	6	2	2	2	1			23
2004	15	2	2	2			1	1	31
2005	10	8	2						26
2006	12	2		1					12
2007	6	2			1	1	1		3
Total	51	20	6	5	3	2	2	1	95

Trend of Quantitative vs. Qualitative Studies

Most of the mentioned qualitative studies are either literature review or discussion. Until 2005 more literature review or discussion types of articles has been studied. In 2006 and 2007 more quantitative studies has been conducted.

Figure 4 Trend of Qualitative vs. Quantitative Methods



As it is obvious from the graph that the research community has relied heavily on qualitative methods (Figure 3) for the first three years, then there is a reverse action. Apart from 2007, it can be concluded that both types of research methods are preferred by researchers in a consistent manner.

DISCUSSION AND CONCLUSION

Education systems come across with technologies like computers, web and Internet approximately in last 15 years, and gained acceleration especially in last ten years in Turkey. The analysis of articles published in TOJET in last five years indicated some recent changes of research interests but also showed trends that have remained steady in the research community. However, it should be noted that these results are based on 187 articles of only one electronic journal. The main findings of this study are summarized according to the previously specified criteria as follows.

1. Research Topics

The results indicated that the most favored topics which also lead the research in the field are composed of research on computer based and online technologies, and their integration into education. Unfortunately, there are so few research studies conducted about the recently new emerging technologies like virtual reality and mobile learning. When compared with the international studies conducted in other countries, this situation is an important shortcoming. However, without necessary investments to technology and people, it is difficult to expect to produce research studies parallel with the international literature.

2. Authors

The reason why most of the articles have one or two authors is dedicated to the lack of collaboration between academicians or the difficulty of meeting academic carrier requirements. Of course this is a cultural phenomenon since the academicians in Medical schools are publishing articles with many authors all the times. This difference between research fields is interesting and needs further investigation.

3. School Level

Although these studies are conducted by researches in universities, more studies are conducted in Higher Education than K12 except 2003. In terms of number of students and teachers, when K-12 and Higher Education is compared, it is obvious that more research studies should be conducted in K-12. When limitation to access to technology, inadequate skills of teachers and inadequate opportunities of technology training in K-12 and difficulties for official authorization are considered, this emerging result is inevitable.

4. Research Theories

When theoretical basis of research studies are analyzed, again a shortcoming appears in terms of underlying theories which guides research. Among many teaching and learning theories and models which can be adapted to technology-rich learning environments, only few of them are addressed by the researchers. Why the researchers miss the theoretical bases for their research studies, although the most important part of any research is the theory that the study underlines, is a hard question to answer. One of the reasons why there are so few articles considered theoretical basis may be related to the youth, in other words experience of the field (Webster & Watson, 2002).

5. Research Design

The findings revealed literature review and descriptive type of articles are much more than other design types. Especially the number of experimental studies is very low. This result may be explained as the difficulties of conducting research studies like longitudinal, quasi-experimental and experimental.

6. Sample Selection Method

Popularity of “accessible sampling” in sample selection method is another interesting result of this research. Among many sample selection methods only two “random” and “clustered” are used as different methods other than “accessible” sampling in the whole 187 articles. Bureaucratic procedures seems to result with loose of time, money and effort, which discourages researchers to administer their researches in different environments by using different methods.

7. Sample Size

The findings revealed that there are no problems in terms of sample sizes, since researchers can reach huge numbers whenever necessary.

8. Data Collection Methods

Compared to the other criteria, there was diversity in data collection methods used in research studies. But in fact, many other emerging and different methods should be used for different purposes like triangulation.

9. Resources

Since Turkey is a developing country, most of the other countries are one step further than our country in terms of educational technology applications and research. This clarifies why researchers use international references more than national ones. On the other hand, increasing number of national references may be dedicated to the increase of quality of research in our country.

10. Number of Variables (dependent-independent)

Not seeing enough details about the variables was another disappointing result of this study. It was really difficult from the content to eliminate the variables and types.

11. Research Type (qualitative-quantitative)

In terms of research type, results in general indicated that both types of research methods are preferred by researchers in a consistent manner.

As a summary, it was difficult to analyze the data needed for this article, since the flow and content of the articles are showing a huge diversity. Some articles do not meet the criteria which are taught at a compulsory course for all graduate students in all departments of the faculty of education. Any way, the results are valuable and show us the needs and gaps to fulfill in the future studies.

Hence, keeping these results in mind, researchers should consider the following points in their research in the field of educational technology while guiding their future research studies.

- The research studies should have a theoretical basis
- The mixed method of research (qualitative and quantitative) should be used to complement each other
- The research studies should address K-12 as much as Higher Education
- New and emerging research topics should be sought
- Interdisciplinary topics should be investigated
- Diversity in terms of sample selection, data collection, and research design should be sought

Since these findings are valid only for the articles of TOJET published in the last five years, the results of this research study cannot be generalized. However, the findings may be used to increase the quality of future research studies, by taking attention of researchers to important points and gaps realized throughout this research study.

REFERENCES

- Akçay, H., Durmaz, A., Tüysüz, C., Feyzioğlu, B. (2006). Effects of Computer Based Learning on Students' Attitudes and Achievements Towards Analytical Chemistry. 5(1), TOJET.
- Akçay, H., Tüysüz, C. & Feyzioğlu, B. (2003). Bilgisayar Destekli Fen Bilgisi Öğretiminin Öğrenci Başarısına ve Tutumuna Etkisine bir Örnek: Mol Kavramı ve Avogadro Sayısı. 2(2), TOJET.
- Akpınar, Y. (2003). Öğretmenlerin Yeni Bilgi Teknolojileri Kullanımında Yükseköğretimin Etkisi: İstanbul Okulları Örneği. 2(2), TOJET.
- Akpınar, Y. (2004). Eğitim Teknolojisiyle ilgili Öğrenmeyi Etkileyebilecek bazı Etmenlere Karşı Öğretmen Yaklaşımları. 3(3), TOJET.
- Alakoç, Z. (2003). Matematik Öğretiminde Teknolojik Modern Öğretim Yaklaşımları. 2(1). TOJET.
- Altun, A. (2003). Öğretmen Adaylarının Bilişsel Stilleri ile Bilgisayara Yönelik Tutumları Arasındaki İlişkinin İncelenmesi. 2(1). TOJET.
- Arnas, Y. A. (2005). 3-18 Yaş Grubu Çocuk Ve Gençlerin İnteraktif İletişim Araçlarını Kullanma Alışkanlıklarının Değerlendirilmesi. 4(4), TOJET.
- Arslan, B. (2003). Bilgisayar Destekli Eğitime Tabi Tutulan Ortaöğretim Öğrencileriyle bu Süreçte Eğitici Olarak Rol Alan Öğretmenlerin BDE'ye İlişkin Görüşleri. 2(4), TOJET.
- Arsoy, A. & Özad, B.E.(2004). The Experiential Learning Cycle in Visual Design. 3(2), TOJET.
- Aydın, S.(2006). The Effect of Computers on the Test and Inter-Rater Reliability of Writing Tests of ESL Learners. 5(1), TOJET.
- Ayman, U. & Serim, M.C.(2004). Implications of the Integration of Computing Methodologies into Conventional Marketing Research upon the Quality of Students' Understanding of the Concept. (3(4), TOJET.
- Baker, E. L., Gearhart, M. & Herman, J.L. (1994). Evaluating the apple calssrooms of tomorrow. In E.L. Baker, and H.F. O'Neil, Jr. (Eds.). Technology assessment in education and training. Hillsdale, NJ:Lawrence Erlbaum.

- Baki A. & Birgin, O.(2004). Alternatif Değerlendirme Aracı Olarak Bilgisayar Destekli Bireysel Gelişim Dosyası Uygulamasından Yansımalar: Bir Özel Durum Çalışması. 3(3), TOJET.
- Baki, A., & Şahin, S. M.(2004). Bilgisayar Destekli Kavram Haritası Yöntemiyle Öğretmen Adaylarının Matematiksel Öğrenmelerinin Değerlendirilmesi. 3(2), TOJET.
- Baloğlu, A. (2007). A Flexible Mobile Education System Approach. 6(4), TOJET.
- Bayrak, B., Kanlı, U. & İnce, Ş. K.(2007). To Compare the Effects of Computer Based Learning and the Laboratory Based Learning on Students' Achievement Regarding Electric Circuits. 6(1).
- Bayraktar, S. (2001-2002). A meta-analysis of the effectiveness of computer-assisted instruction in science education. *Journal of Research on Technology in Education*, 34, 173-188.
- Blok, H., Oostdam, R., Otter, M. E., & Overmaat, M. (2002). Computer-assisted instruction in support of beginning reading instruction: A review. *Review of Educational Research*, 72, 101-130.
- Boynak, F. (2003). Bilgisayar Destekli Devre Tasarımı Dersi Uygulaması. 3(1), TOJET.
- Bozkaya, M. & Aydın, İ. E. (2007). The Relationship between Teacher Immediacy Behaviors and Learners' Perceptions of Social Presence and Satisfaction in Open and Distance Education: The Case of Anadolu University Open Education Faculty. 6(4), TOJET.
- Cavanaugh, C. S. (2001). The effectiveness of interactive distance education technologies in K– 12 learning: A meta-analysis. *International Journal of Educational Telecommunications*, 7, 73-88.
- Can, T. (2003). Bolu Ortaöğretim Okulları Yöneticilerinin Teknolojik Liderlik Yeterlilikleri. 2(3), TOJET.
- Cataloğlu, E. (2006). Open Source Software in Teaching Physics: A Case Study on Vector Algebra and Visual Representations. 5(1), TOJET.
- Çekbaş, Y., Yakar, H., Yıldırım, B. & Savran, A. (2003). Bilgisayar Destekli Eğitimin Öğrenciler Üzerine Etkisi. 2(4), TOJET.
- Çetin, G., Ertepinar, H. & Geban, Ö.(2004). Developing and Implementing an Instructional Technology Aided Conceptual Change Approach in Teaching Ecology Concepts at Ninth Grade. 3(1), TOJET.
- Deniz, L. (2005). İlköğretim Okullarında Görev Yapan Sınıf ve Alan Öğretmenlerinin Bilgisayar Tutumları. 4(4), TOJET.
- Dündar, Ş. & Kıyıcı, K. (2004). Enstrümental Analiz Dersinde İnternet Destekli Öğretim Uygulanmalı Mıdır? 3(3), TOJET.
- Feuer, M. J., Towne, L., & Shavelson, R. J. (2002). Scientific culture and education research. *Educational Researcher*, 31 {8}, 4—14.
- Gönen, S., Kocakaya, S. & İnan, C.(2006). The Effect of the Computer Assisted Teaching and 7e Model of the Constructivist Learning Methods on the Achievements and Attitudes of High School Students.5(4), TOJET.
- Güven, B. & Karataş, İ.(2003). Dinamik Geometri Yazılımı Cabri ile Geometri Öğrenme: Öğrenci Görüşleri. 2(2). TOJET.
- Harel, I. (Ed.). (1990). *Constructionist learning: A 5th anniversary collection of papers reflecting research reports, projects in progress, and essays by the Epistemology and learning Group*. Cambridge, MA:MIT Media Laboratory.
- Harel, I. & Papert, S. (1991). Software design as a learning environment. In I. Harel and S. Papert (Eds.). *Constructionism*, 41-84. Norwood, NJ: Ablex.
- İpek, İ. (2003). Bilgisayarlar, Görsel Tasarım ve Görsel Öğrenme Stratejileri . 2(3), TOJET.
- Kabadayı, A. (2006). Analyzing Pre-School Student Teachers' and Their Cooperating Teachers' Attitudes towards the Use of Educational Technology. 5(4), TOJET.
- Kiyici, G. & Yumuşak, A. Fen Bilgisi Laboratuvarı Dersinde Bilgisayar Destekli Etkinliklerin Öğrenci Kazanımları Üzerine Etkisi -Asit-Baz Kavramları ve Titrasyon Konusu Örneği. 4(4), TOJET.
- Kocasaraç, H. (2003). Bilgisayarların Öğretim Alanında Kullanımına İlişkin Öğretmen Yeterlilikleri, 2(3), TOJET.
- Koç, M. & Ferneding, K.A.(2007). The Consequences of Internet Café Use on Turkish College Students' Social Capital. 6(3), TOJET.
- Kulik, C. & Kulik, J. A. (1991). Effectiveness of computer-based instruction: An updated analysis. *Computers in Human Behavior*, 71, 75-94.
- Kulik, J. A. (1994). Meta-analytic studies of findings on computer-based instruction. In E.L.Baker, and H.F. O'Neil, Jr. (Eds.) *Technology assessment in education and training*. Hillsdale, NJ:Lawrence Erlbaum.
- Kumtepe, A.. T. (2006). The Effects of Computers on Kindergarten Children's Social Skills. 5(4), TOJET.
- Lee, J. (1999). Effectiveness of computer-based instructional simulation: A meta-analysis. *International Journal of Instructional Media*, 26, 71-85.
- Liao, Y. K. & Bright, G. W. (1991). Effects of computer programming on cognitive outcomes: A meta-analysis. *Journal of Research on Computing in Education*, 24, 367-380.
- Lou, Y., Abrami, P. C. & d'Apollonia, S. (2001). Small group and individual learning with technology: A meta-analysis. *Review of Educational Research*, 71, 449-521.

- Mann, D., Shakeshalf, C., Becker, J. & Kottkamp, R. (1999). West Virginia's Basic Skills/Computer Education Program: An Analysis of Student Achievement. Santa Monica, CA:Milken Family Foundation.
- Morgil, İ., Cingör, N., Erökten, S., Yavuz, S. & Oskay, Ö. Ö. (2004). Bilgisayar Destekli Kimya Eğitiminde Portfolyo Çalışmaları. 3(2), TOJET.
- Morgil, İ., Erökten, S., Yavuz, S. & Oskay, Ö. Ö. (2004). Computerized Applications on Complexation in Chemical Education. 3(4), TOJET.
- Morgil, İ., Oskay, Ö.Ö., Yavuz, S. & Arda, S. (2003). The Factors that Affect Computer Assisted Education Implementations in the Chemistry Education and Comparison of Traditional and Computer Assisted Education Methods in Redox Subject. 2(4), TOJET.
- Niemiec, R. P. & Walberg, H. J. (1992). The effects of computers on learning. International Journal of Educational Research, 17, 99-108.
- Olkun, S. & Altun, A. (2003). İlköğretim Öğrencilerinin Bilgisayar Deneyimleri ile Uzamsal Düşünme ve Geometri Başarıları Arasındaki İlişki. 2(4), TOJET.
- Öğüt, H., Altun, A.A., Sulak, S.A. & Koçer, H.E.(2004). Bilgisayar Destekli, İnternet Erişimli İnteraktif Eğitim CD'si ile E-Eğitim. 3(1), TOJET.
- Ouyang, J. (1993). Meta-analysis: CAI at the level of elementary education. Paper presented at the World Conference on Education Multimedia and Hypermedia, Orlando, FL.
- Özdemir, S. (2006). Affects of Television as a Natural Educator: Can Television be a Tool as an Informal Educator?: A TRNC Sample. 5(1), TOJET.
- Özdener, N. & Sayin, H.(2004). Macromedia Flash Eğitimi Amacı ile Geliştirilen bir Eğitsel Yazılımın Bütünsel ve Kullanılan Yöntemler Açısından Değerlendirilmesi. 3(2), TOJET.
- Özsoy, N. & Yıldız, N.(2004). The Effect of Learning Together Technique of Cooperative Learning Method on Student Achievement in Mathematics Teaching 7th Class of Primary School. 3(3), TOJET.
- Ryan, A. W. (1991). Meta-analysis of achievement effects of microcomputer applications in elementary schools. Educational Administration Quarterly, 27, 161-184.
- Saka, A. Z. & Yilmaz, M. (2005). Bilgisayar Destekli Fizik Öğretiminde Çalışma Yapraklarına Dayalı Materyal Geliştirme ve Uygulama. 4(3), TOJET.
- Scardamalia, M. & Bereiter, C. (1996). Computer support for knowledge-building communities. In T. Koschmann, (Ed.). CSCL: Theory and practice of an emerging paradigm. Mahwah, NJ:Erlbaum.
- Schacter, J. (1999). The Impact of Education Technology on Student Achievement. Milken Exchange on Education Technology, Santa Monica, California. Available online at <http://www.mff.org/pubs/ME161.pdf>
- Schacter, J. (2001). The impact of education technology on student achievement: What the most current research has to say. Santa Monica, CA: Milken Exchange on Education Technology.
- Sivin-Kachala, J. (1998). Report on the effectiveness of technology in schools, 1990-1997. Washington, DC: Software Publishers Association.
- Süer,İ., Kaya, Z., Bülbül, H. İ., Karaçanta, H., Koç, Z., Çetin, Ş.(2005). Gazi Üniversitesi'nin Uzaktan Eğitim Potansiyeli. 4(1), TOJET.
- Şen, A.. & Neufeld, S. (2006). In Pursuit of Alternatives in ELT Methodology: Webquests. 5(1), TOJET.
- Şengün, M. T. & Turan, M. (2004). Coğrafya Eğitiminde Bilgisayar Destekli Ders Sunumunun Öğrenmedeki Rolünün Öğrenci Görüşlerine Göre Değerlendirilmesi. 3(1), TOJET.
- Tezci, E. & Dikici,A. (2006). The Effects of Digital Portfolio Assessment Process on Students' Writing and Drawing Performances. 5(2), TOJET.
- Thompson, A. D. (2005). Scientifically Based Research: Establishing a Research Agenda For The Technology in Teacher Education Community. Journal of Research on Technology in Education. 37(4), 331-337.
- Toprakçı, E. (2005). Türkiye'deki Okul Yöneticisi ve Öğretmenlerin Evlerindeki Bilgisayarı Mesleki Amaçlı Kullanım Profilleri (Sivas İli Örneği). 4(2), TOJET.
- Toprakçı, E. (2007). The Profiles of the Use of the Internet for Study Purposes among University Students. 6(3), TOJET.
- Tor, H. & Erden, O. (2004). İlköğretim Öğrencilerinin Bilgi Teknolojilerinden Yararlanma Düzeyleri Üzerine bir Araştırma. 3(1), TOJET.
- Tosun, N., Suçsuz, N., Yiğit, B.(2006). The Effect of Computer Assisted and Computer Based Teaching Methods on Computer Course Success and Computer Using Attitudes of Students. 5(3), TOJET.
- Ulusoy, M. (2005). Computer Based Social Studies Instruction: A Qualitative Case Study. 4(4), TOJET.
- Varank, İ. (2005). A Research Proposal to Compare a Computer-Based and a Lecture-Based Computer Literacy Course. 4(4), TOJET.
- Waxman, H. C. & Michko, G. M. (2003) A Meta-Analysis of the Effectiveness of Teaching and Learning With Technology on Student Outcomes. Learning Point Associates, Naperville, Illinois.
- Webster, J. & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. MIS Quarterly, 26(2), 8-13.

- Wenglinsky, H. (1998). Does it compute? The relationship between educational technology and student achievement in mathematics. Princeton, NJ: Educational Testing Service Policy Information Center.
- Yeditepe, M. E. & Karadağ, Z. (2003). Application of Computer Aided Mathematics Teaching in a Secondary School. 2(1), TOJET
- Yenice, N. (2003). Bilgisayar Destekli Fen Bilgisi Öğretiminin Öğrencilerin Fen ve Bilgisayar Tutumlarına Etkisi. 2(4), TOJET.
- Yıldırım, Z.(2006). Preservice Computer Teachers as Hypermedia Designers: The Impact of Hypermedia Authoring on Knowledge Acquisition and Retention. 5(3), TOJET.