

YÖK, (1998). Eğitim Fakültesi Öğretmen Yetiştirme Programlarının Yeniden Düzenlenmesi. YÖK Raporu.

Teacher Educators' ICT Competencies, Usage, and Perceptions

Eğitim Fakültesi Öğretim Elemanlarının BT Yeterlilikleri, Kullanımları ve Algıları

Yüksel Gökteş

Assistant Professor at the Department of Computer Education & Instructional Technology, Ataturk University, Erzurum, Turkey
Phone: 90-442-231-4047 Fax: 90-442-236-0955
yukselgoktas@atuni.edu.tr, yukselgoktas@hotmail.com

Soner Yıldırım, Zahide Yıldırım

Associate Professors at the Department of Computer Education & Instructional Technology, Middle East Technical University, Ankara, Turkey
soner@metu.edu.tr & zahidey@metu.edu.tr

ABSTRACT

This study presents survey findings about teacher educators' perceptions about ICT integration into teacher education programs, their perceived ICT competencies and their ICT usage in their courses. The data were collected through a questionnaire from 111 teacher educators in 18 schools of teacher education (STE) and through interview with 6 teacher educators in 3 STE. The results indicated that most of the participants expressed positive perceptions about the integration of ICT into teacher education programs. Generally, their ICT competency was completely sufficient. They use the Internet as a supportive tool to their courses, and particularly search engines used by them.

Key Words: teacher education, ICT perceptions, ICT competencies, ICT usage

ÖZET

Bu çalışma; eğitim fakültesi öğrencin elemanlarının Bilişim Teknolojilerinin (BT) eğitim fakültesine bütünleştirilmesi konusundaki algılarını, BT konusundaki yeterliliklerini ve BT'yi derslerinde ne şekilde kullandıklarını incelemektedir. Veriler; 18 eğitim fakültesindeki 111 öğretimin elemanından anketler yoluyla, 3 eğitim fakültesindeki 6 öğretimin elemanından da görüşmeler yoluyla toplanmıştır. Sonuçlar göstermektedir ki, çalışmaya katılanların büyük bir kısmının BT'nin eğitim fakültesine bütünleştirilmesi konusundaki algıları olumludur. Sonuçlar, çalışmaya katılanların BT konusunda gerekli yeterliliklere sahip olduklarını göstermektedir.

İnternet'i derslerine destek amaçlı olarak kullanarak öğretimin elemanlarının, en fazla da arama motorlarından yararlanarakla görülmektedir.

Anahtar Sözcükler: Öğretmen eğitimi, BT algısı, BT yeterlilikleri, BT kullanımı

SUMMARY

To better facilitate professional development for teacher educators and better prepare tomorrow's teachers to integrate Information and Communication Technologies (ICT) effectively in classrooms, it is necessary to examine teacher educators' ICT perceptions, ICT competencies, and their uses of ICT in their courses. This study presents survey findings about teacher educators' perceptions about ICT integration into teacher education programs, their perceived ICT competencies and their ICT usage in their courses. Consequently, this study addressed the following research questions: (1) What are the teacher educators' perceptions about ICT integration into teacher education programs? (2) What are the teacher educators' perceived ICT competencies? (3) To what extent do teacher educators use ICT in their courses?

A multi-method approach was used by utilizing interviews and questionnaires. The data were collected through a questionnaire from 111 teacher educators in 18 schools of teacher education (STB) and through interview with 6 teacher educators in 3 STB. The questionnaire was developed by the researchers based on a review of related literature and consisted of 24 items. It included 13 multiple choices items, 7 five-point Likert-type items, and 4 open-ended questions. Semi structured interviews were also used to collect data from teacher educators. For these reasons, the interview guide was developed by the researchers. While the quantitative responses were analyzed using descriptive statistics, the qualitative responses were analyzed using the content analysis.

The results indicated that most of the participants expressed positive perceptions about the integration of ICT into teacher education programs. The main reasons for positive perceptions revealed that ICT can: (1) increase the quality of instruction, (2) be very supportive and effective for instructors and students, (3) help people succeed in an

information society, and (4) increase the quality and ease the process of instructing. Consequently, teacher educators perceived the integration of ICT as a necessary mission in their programs. Generally, the majority of the teacher educators perceived themselves as competent in both basic ICT competencies and advanced ICT competencies. Although, the majority of them perceive themselves as more competent with "basic ICT competencies", which include general basic software usage, versus "advanced ICT competencies", which consist of generally mastered skills of ICT integration. The findings also indicated that majority of teacher educators do not offer online courses. They use the Internet as a supportive tool to their courses, and particularly search engines used by them. Computer and LCD projector, and word processing and presentation software were ranked as the most frequently used hardware and software by the teacher educators.

Even though the results of this study cannot be generalized, these results are promising; indicating to some extent teacher educators are integrating ICT into their courses. The study may help the researchers and practitioners to learn about the current status of teacher educators in regard to integration of ICT into their courses.

1. Introduction

After the 1980s, information and communication technologies (ICT) have become essential for teaching and learning environments day by day. These drastic changes certainly affect today's teacher education context. Initially, ICT issues quickly moved from instituting special programs for preparing individuals to become ICT specialists in schools and then to infusing ICT into all aspects of an educator's preparation. With the above-mentioned consequences, many action plans were adopted at national and international levels, as well as investments for ICT in teacher education. Most of the teacher education programs have been redesigning their curricula in order for prospective teachers to become competent users of new technologies when they become teachers (Glenn, 2002; Goktas, 2006).

In 1998, parallel to the international practices, Higher Education Council (HEC) developed new teacher education curricula for schools of teacher education (STE), and ICT has been included in the new teacher education curricula. According to the new curricula, the 'Computer' and 'Instructional Technology and Material Development (ITMD)' courses became compulsory in both primary and secondary pre-service teacher education programs. The main purpose of 'Computer' course is to help prospective teachers' process basic computer skills on commonly used computer applications. In 'ITMD' course, prospective teachers gain knowledge and skills in a variety of instructional technologies, and develop and evaluate technology-based instructional materials (Goktas, Yildirim, & Yildirim, 2008; HEC, 1998).

The integration of ICT into these courses, by the teacher educators who offer the new courses in teacher education programs have important roles. By integrating ICT into these courses, the teacher educators can enhance the effectiveness of the courses and become role models for the prospective teachers. In the literature, good role models were recommended for prospective teachers to observe appropriate modeling throughout their undergraduate process (Kainki, Franklin, & Duran, 2001; Yildirim, 2000). In this context, to better prepare prospective teachers to integrate ICT in their future classrooms, teacher educators should take the responsibility to prepare prospective teachers by infusing ICT in their courses (Bai & Ertaner, 2006; Vannatta & O'Bannon, 2002; Willis & Tucker, 2001).

To better facilitate professional development for teacher educators and better prepare tomorrow's teachers to integrate ICT effectively in classrooms, it is necessary to examine teacher educators' ICT perceptions, ICT competencies, and their uses of ICT in their courses. Therefore, there is a need to examine current status of the teacher educators in regard to aforementioned issues. Consequently, this study addressed the following research questions:

- (1) What are the teacher educators' perceptions about ICT integration into teacher education programs?
- (2) What are the teacher educators' perceived ICT competencies?
- (3) To what extent do teacher educators use ICT in their courses?

2. Method

2.1 Selection of participants

The teacher educators, who teach ICT related courses in STE, were clustered into twelve statistical regions using NUTS level 1 to be representative of the population. After that, 18 STE, at least one school from each region were selected by convenience sampling method. Then, 223 questionnaires were distributed to teacher educators from these schools in May 2005, requesting their participation by completing the questionnaire. Follow-up questionnaires were sent in June and July 2005 to teacher educators that did not respond during the first query. Of these, 111 teacher educators responded the questionnaire with a return rate of 49.8 percent.

The researchers also collected data via interviews in July-August 2005. For this, the interviews with teacher educators were done by selecting 6 teacher educators from 3 STE in the capital city (Ankara). First, the province and 3 STE from the province were selected by convenience sampling method. After that, 6 teacher educators were chosen through a purposeful sampling approach using the criterion technique from these STE. For this purpose, the criteria used for the selection of this group were as follows: (1) participants who instruct ICT related courses, and (2) participants who have three years of teaching experience in STE. All participants have been assigned pseudonyms to protect their identity.

2.2 Data collection instruments

The questionnaire was developed to gather information from the teacher educators and consisted of 24 items. It included 13 multiple choices items, 7 five-point Likert-type items, and 4 open-ended questions. It was developed by the researchers based on a review of related literature (Baron & Goldiman, 1994; Inner, 2000) in 2004. After a peer review by four graduate students, four experts examined the questionnaire, and the instrument was revised according to their feedbacks. It was then checked by a Turkish

language expert for clarity of the language. After the revision, a pilot test was conducted with 64 teacher educators in 3 different STB in April 2005 at Ankara. The Cronbach alpha coefficient was calculated as 0.87 denoting a satisfactory reliability. Subsequently, a factor analysis was applied to the scale to determine whether the items measured two factors: basic ICT competencies (Factor 1) and advanced ICT competencies (Factor 2).

After gathering data from 111 teacher educators, the Cronbach alpha coefficient of the questionnaire was re-calculated and found to be 0.97 denoting a satisfactory reliability. Subsequently, a factor analysis was applied to the scale to determine whether the items measured two factors. The Cronbach alpha of Factor 1 was 0.96 and the Cronbach alpha of Factor 2 was 0.92.

In this study, semi structured interviews were also used to collect data from teacher educators. For these reasons, the interview guide was developed by the researchers. The guide was examined first by three graduate students and then four experts. After experts' reviews, pilot sessions were undertaken with one teacher educators in order to determine if interview procedures were acceptable and to determine if any additional interview questions needed to be asked in order to answer the research questions.

2.3 Data analysis

In this study, while the quantitative responses were analyzed using descriptive statistics; the qualitative responses were analyzed using the content analysis. For the descriptive analysis, frequencies, means, percentages, and standard deviations of questionnaire items were calculated. For the content analysis, the model by Miles and Huberman (1994) was used to guide the process, which involves data reduction, data display, and conclusion drawing / verification phases. These processes began after the recorded interview sessions were transcribed into text for analysis using Windows Media Player. During the process of reading and re-reading the transcripts, researchers of the study discussed the resulting interpretations.

3. Findings

3.1 Teacher educators' perceptions

The teacher educators were asked about their perceptions of ICT integration in education programs through open-ended responses, and they were also interviewed to deeply investigate the issues they mentioned in these responses. Open-ended in the survey revealed that teacher educators perceived the integration of necessary mission in their programs. One teacher educator (Zeynep) noted as follows for this necessity as:

"To succeed, in Information Society, we need citizens equipped with necessary knowledge and skills in ICT. Every citizen in society should be able to at least use basic ICT skills for sure. In this process, I believe that the best way would be to begin with preservice teacher education programs."

Another important theme emerging through the open-ended questions was advantages of integration of ICT into teacher education programs. It was stated using a variety of materials, methods and equipments in courses, teachers can improve their performance in their instruction, and they could also benefit from ICT to improve the quality of instruction more efficiently. All interviewees mentioned these advantages noted that ICT integration into their teaching would be very supportive and effective for teachers. One teacher educator (Hasan) summarized these opinions by stating:

"Integration of ICT can increase the quality and ease the process of teachers' instruction in their classes. They can be better professionals by benefiting from the easiness of technology."

All respondents of both open-ended questions (n=111) and interviews (n=6) stated that all preservice education programs should support their students with ICT literacy. One teacher educator (Elif) stated these basic skills as:

"Teachers should be knowledgeable about how to use MS Office tools very well. In addition, they should know how to use the Internet and they should be taught how to search information in the Internet environment, how to use e-mails, and design web pages."

The last concern that one teacher educator (Mıralı) emphasized was the importance of integrating ICT not only at a subject-matter level, but rather as an institutional approach. He also noted the importance of practice as a support for theoretical knowledge for an ICT integration process. He stated:

"ICT integration process should be taken into consideration in a more context and institutional based approach including STE, rather than only a content-based approach. I believe that theoretical information of this process should be supported by school experiences."

3.2 Teacher educators' perceived ICT competencies

The perceived ICT competencies were examined using the ICT competency subscale in the questionnaire. The subscale includes competencies on (1) basic ICT knowledge and skills, and (2) advanced ICT knowledge and skills. The participants rated their levels of agreement with the questionnaire statements by using a five-point Likert-type scale.

As presented in Table 2, the findings indicate that the majority of the participants perceived themselves as competent in both basic ICT competencies ($M=4.45$) and advanced ICT competencies ($M=4.11$). The majority were 'sufficient' or 'completely sufficient' regarding most of these competencies. The majority of the teacher educators perceived their competency levels as 'sufficient' or 'completely sufficient' in the "use of word processors for personal and institutional purposes" (96.2%, $M=4.78$), "use of presentation software for personal and institutional purposes" (95.2%, $M=4.72$), and "identify legal, ethical, and societal issues related to use of ICT" (88.5%, $M=4.56$). On the other hand, "use of ICT in analysis process of a course" (69.5%, $M=3.86$) was perceived as the lowest competency.

Table 2. Perceived ICT competencies of the teacher educators

Competencies	%					M	SD
	Completely Insufficient	Insufficient	Neutral	Sufficient	Completely Sufficient		
Use of word processors for personal and institutional purposes	0.0	0.0	3.8	14.3	81.9	4.78	0.50
Use of presentation software for personal and institutional purposes	0.0	1.0	3.8	17.3	77.9	4.72	0.58
Identify legal, ethical, and societal issues related to use of ICT	1.0	3.8	6.7	15.2	73.3	4.56	0.85
Use of spreadsheets for personal and institutional purposes	1.0	5.7	4.8	19.0	69.5	4.50	0.90
Use of ICT for communication	1.0	1.9	6.7	29.5	61.0	4.48	0.79
Use of operating systems	0.0	7.6	2.9	27.6	61.9	4.44	0.88
Use of ICT for collecting data	1.9	3.8	5.7	29.5	59	4.40	0.91
Use of ICT to enhance personal development	1.0	7.6	7.6	26.7	57.1	4.31	0.97
Use of computer-aided instruction materials	1.9	5.7	7.6	30.5	54.3	4.30	0.97
Use of ICT to support instruction process	1.9	5.7	4.8	38.1	49.5	4.28	0.94
Use of communication tools to support instruction	1.9	3.8	8.6	36.2	49.5	4.28	0.91
Use of hypermedia and multimedia tools to support instruction	1.9	6.7	8.6	36.2	46.7	4.19	0.98
Use of ICT for problem solving	2.9	6.7	11.5	29.8	49.0	4.15	1.06
Use of ICT in implementation process of a course	1.9	5.7	10.5	40.0	41.9	4.14	0.96
Identify, select, and evaluate ICT resources	2.9	5.7	15.2	30.5	45.7	4.10	1.05
Use of ICT to support instruction out of classroom	2.9	9.5	7.6	36.2	43.8	4.09	1.08
Use of ICT for knowledge management	2.9	9.6	11.5	30.8	45.2	4.06	1.10
Integrate ICT into courses (curriculum)	3.8	6.7	9.5	43.8	36.2	4.02	1.04
Evaluation of computer-aided instruction materials	2.9	13.3	10.5	25.7	47.6	4.02	1.18
Use of ICT for decision-making	1.0	9.0	18.0	33.0	39.0	4.00	1.02
Use of ICT in design process of a course	2.9	12.4	8.6	36.2	40.0	3.98	1.12
Use of ICT in development process of a course	2.9	10.5	9.5	41.9	35.2	3.96	1.06
Use of ICT in analysis process of a course	1.9	11.4	17.1	30.5	39.0	3.93	1.09
Factor 1 (basic ICT competencies) overall	3.8	13.3	13.3	32.4	37.1	3.86	1.17
Factor 2 (advanced ICT competencies) overall						4.45	0.62
Overall						4.11	0.82
						4.23	0.75

3.3 Teacher educators' ICT usage

In the third, the data were presented about the current situation of teacher educators' ICT usage in regard to online courses given, use of the Internet as a supportive tool in

their courses, properties of the physical settings where the courses were carried out, evaluation methods, and hardware and software that the teacher educators use in their courses.

The findings of the study indicate that while 76% of the teacher educators stated that they use the Internet as a supportive tool in their courses, and 20.7% of them mentioned that they use the Internet partially in their courses (see Table 3).

Table 3. Teacher educators' use of the Internet as a supportive tool in their courses

Internet Usage	N	%
Use	84	75.7
Partial use	23	20.7
None	3	2.7
No Response	1	0.9
TOTAL	111	100

Teacher educators who were using the Internet in their courses as a support tool were asked how they were using the Internet by selecting more than item. The findings showed that 95 teacher educators used search engines, 83 teacher educators use e-mail, and 63 teacher educators use web pages for supporting their lesson. The use of forum and chat (25 and 15 teacher educators, respectively) were rated as the least used ways of using the Internet as a support tool (see Table 4). Almost 16% of the teacher educators offer at least one online course, 83% of them do not offer any online courses (see Table 5).

Table 4. Teacher educators' Internet tools usage

Tools	f
Search engines	95
E-mail	83
Webpage for supporting lessons	63
Forum	25
Chat	15

Table 5. Online courses offering by teacher educators

Online Courses	N	%
Not offered	92	82.9
Offered	18	16.2
No Response	1	0.9
TOTAL	111	100

According to teacher educators, a majority of the 'Computer' course were offered in a computer laboratory (see Table 6). While 29 teacher educators offer 'ITMD' course in traditional classroom settings, more than half of the teacher educators offer these courses in either a computer laboratory (29) or electronic classroom (33). As it is presented in Table 7, generally, they preferred to assess the learning outcomes of the courses through 'project-based evaluation' (69) and 'performance tests' (62). It can be noted here that, teacher educators could select more than one item for these questions.

Table 6. The places where ICT related courses were offered

Places	'ITMD' Course	'Computer' Course
	f	f
Computer laboratory	29	66
Electronic classroom	33	16
Traditional classroom	29	4

Table 7. Assessment methods used in ICT related courses

Methods	'ITMD' Course	'Computer' Course
	f	f
Project-based evaluation	71	69
Performance tests	55	62
Written Exam	31	30
Multiple choice exam	14	14

Teacher educators who were using ICT in their courses ranked the frequency of use (5 indicating 'All the time', 4 indicating 'Often', 3 indicating 'Rarely', 2 indicating 'Never', and 1 indicating 'don't know what it is') of their hardware and software usage

in their courses. The results of the study show the most frequently used hardware by the teacher educators in both courses were the computer ($M=3.93$ and $M=3.34$) and second, the LCD projector ($M=3.73$ and $M=2.88$) as indicated in the Table 8. The least used hardware by the teacher educators in their courses were cameras ($M=1.43$ and $M=1.73$), videos ($M=1.70$), and television ($M=1.67$).

Table 8. Hardware used by teacher educators in their courses

Hardware	‘TMD’ Course		‘Computer’ Course	
	M	SD	M	SD
Computer	3.34	0.80	3.93	0.24
LCD Projector	2.88	1.08	3.73	0.57
Printer	2.21	1.03	2.01	0.86
Scanner	1.98	0.94	1.84	0.72
OHP	2.53	1.10	1.67	0.94
Camera	1.73	1.01	1.43	0.57
Video	1.70	0.83	-	-
Television	1.67	1.02	-	-
Overall mean	2.45	1.01	2.68	0.68

The most frequently used software by teacher educators were “word processing” and then “presentation programs”. The results indicate that the use of “video conferencing programs” by the teacher educators in their courses was rated as the least used application (see Table 9).

Table 9. Software used by teacher educators in their courses

Software	‘TMD’ Course		‘Computer’ Course	
	M	SD	M	SD
Word Processor (e.g., MS Word)	3.16	0.86	3.71	0.52
Presentation Programs (e.g., PowerPoint)	3.01	0.90	3.53	0.71
Spreadsheets (e.g., Excel)	2.54	0.94	3.46	0.73
Web Browsers (e.g., Internet Explorer)	2.95	0.93	3.42	0.69
Operating Systems (e.g., Windows)	2.71	1.27	3.25	1.09
Receiving/Sending e-mail	2.80	1.06	3.21	0.89
Web Programming (e.g., HTML)	1.85	1.12	2.32	1.09
Web Page Development (e.g., FrontPage)	2.22	1.22	2.23	1.11
Image Editing (e.g., Photoshop)	2.13	1.02	2.19	1.02
Databases (e.g., Access)	1.98	1.23	2.17	1.11
Reference Programs (e.g., Dictionary)	2.04	1.20	1.87	0.95
Animation Programs (e.g., Flash)	2.06	1.20	1.85	0.88
Forum	1.75	1.15	1.69	1.00
Learning Management System (e.g., WEB CT)	1.86	1.48	1.63	1.12
Desktop Publishing (e.g., Corel Draw)	1.93	1.46	1.62	0.90
Chat	1.56	1.12	1.62	0.89
Video Conference Programs	1.31	0.90	1.43	0.83
Instructional Game	2.18	1.44	-	-
Simulation	2.02	0.93	-	-
Tutorials	2.02	1.18	-	-
Authoring Languages (e.g., Authorware)	1.93	1.45	-	-
Overall mean	2.38	0.95	2.58	1.15

4. Discussion

The results indicated that most of the participants expressed positive perceptions about the integration of ICT into teacher education programs. According to Ropp (1999) and Gülbahar (2008), this is crucially important for the process of integration. Thus, through analysis of interview results and open-ended responses, it is not incorrect to conclude that the participants were enthusiastic and aware of the opportunities about ICT integration into teacher education programs. The main reasons for positive perceptions revealed that ICT can: (1) increase the quality of instruction, (2) be very supportive and effective for instructors and students, (3) help people succeed in an information society, and (4) increase the quality and ease the process of instructing.

The results of the questionnaire show that the general ICT competency of the teacher educators was ‘completely sufficient’. It was revealed that the teacher educators have

gained their mastery of ICT skills in a variety of ways. According to Rosenfeld and Martinez-Pons (2005) adequate ICT competencies is critical important to successful ICT usage in the classrooms. The results for teacher educators are different from Turkmen (2006) and Odabasi (2000). The first showed "*the Turkish faculty members have low mean scores in current knowledge, indicating they may not be prepared with skills necessary to succeed in the 21st century*" (p. 9). The latter stated that the teacher educators are not familiar with current ICT resources. However, this study's results indicated that teacher educators felt themselves as competent overall and that they are prepared. This most likely occurred due to differences among characteristics of participant groups. Turkmen and Odabasi had collected data from all teacher educators, whereas this study used teacher educators who were currently teaching 'Computer' or 'ITMD' courses. There is also considerable evidence for teacher educators' concerns about the use of general application software and concerns about lack of specialized ICT skills. Although, the majority of them perceive themselves as more competent with "basic ICT competencies", which include general basic software usage, versus "advanced ICT competencies", which consist of generally mastered skills of ICT integration.

It can be concluded from results that although a limited number of teacher educators offer online courses, the majority of them use the Internet as a support tool and as a communication tool (e-mail) for their courses. While the teacher educators use a computer and LCD projector most of the time as hardware, they use word processing and presentation software more than other software. The results of SEIRTEC (1998) support the list of software; their report indicated that the highest use made of software by faculty is word processing. On the other hand, use of forum and chat was ranked as the least used Internet tools by the teacher educators. In the STE, most of the courses are offered in face-to-face instructional environments, and both students and the instructor have opportunities for face-to-face discourse. They might not be in need of online communication tools.

Even though the results of this study cannot be generalized, these results are promising, indicating to some extent teacher educators are integrating ICT into their

courses. In this study, ICT resources of STE and workload of teacher educators are not mentioned. In further research studies, teacher educators' ICT integration into these courses should be examined together with their access to ICT and work load. This may help the researchers and practitioners to learn more about the current status of teacher educators in regard to integration of ICT into their courses.

5. References

- Bai, H., & Ertmer, P. (2006). Teacher educators' beliefs and technology uses in relation to preservice teachers' beliefs and technology attitudes. In M. Simonson & M. Crawford (Eds.), *29th Annual Proceedings Volume #2 on the Practice of Educational Communications and Technology* (pp. 73-80). Dallas, TX: ABECT.
- Baron, L. C., & Goldman, B. S. (1994). Integrating technology with teacher preparation. In B. Means (Ed.), *Technology and education reform* (pp. 81-110). SF: Jossey-Bass Publ.
- Göktaş, Y. (2006). *The current status of information and communication technologies integration into schools of teacher education and K-12 in Turkey*. Unpublished PhD. Thesis, METU, Ankara, Turkey.
- Göktaş, Y., Yildirim, Z., & Yildirim, S. (2008). A Review of ICT related courses in preservice teacher education programs. *Asia Pacific Education Review*, 9(2), 81-92.
- Glen, A.D. (2002). *Emergence of technology standards for preservice teacher education*. North Central Regional Educational Laboratory, NCREL's Educational Technology. <http://www.ncrel.org/tech/standard> (2005, December 20)
- Gülbahar, Y. (2008). ICT usage in higher education: A case study on preservice teachers and instructors. *The Turkish Online Journal of Educational Technology* 7 (1).
- HEC. (1998). *Eğitim fakülteleri öğretmen yetiştirme programlarının yeniden*

düzenlemesi. Ankara: T.C. Yükseköğretim Kurulu Başkanlığı.

İmer, G. (2000). *Eğitim fakültelerinde öğrenen adaylarının bilgisayar ve bilgisayar eğitimi kullanıma yönelik nitelikleri*. Baskısız. Anadolu University Publications.

Karicki, M., Franklin, T., & Duran, M. (2001). A technology partnership: lessons learned by mentors. *Journal of Technology and Teacher Education*, 9 (3), 407-417.

Miles, M.B., & Huberman, A.M. (1994). *An expanded sourcebook: Qualitative data analysis (2nd ed.)*. Thousand Oaks, California: Sage Publications.

NVIGM. (2006). *Niyus İstatistikleri: İsim İstatistikleri*.

<http://www.nvi.gov.tr/1_Ana_Sayfa_Isim_Istatistikleri_Sun.html> (2006, March 17)

Odabasi, H. F. (2000). Faculty use of technological resources in Turkey. *Innovations in Education and Training International*, 37(2), 103-107.

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), 402-417.

Rosenfeld, B., & Martinez-Pons, M. (2005). Promoting classroom technology use. *The Quarterly Review of Distance Education*, 6(2), 145-153.

SEIRTEC. (1998). *Technology and preservice teacher education program survey*. <<http://education.lamu.edu/lhe/>> (2005, February 5)

Turkmen, H. (2006). Exploring Turkish science education faculties' understanding of educational technology and use. *International Journal of Education and Development using ICT [Online]*, 2(2). <<http://ijedict.dec.uwi.edu>> (2006, August 10)

Vannatta, R. A., & O'Bannon, B. (2002). Beginning to put the pieces together: A technology infusion model for teacher education. *Journal of Computing in Teacher Education*, 18(4), 112-123.

Willis, E. M., & Tucker, G. R. (2001). Using constructionism to teach constructivism: Modeling hands-on technology integration in a preservice teacher technology course. *Journal of Computing in Teacher Education*, 17(2),

4-37.

Yildirim, S. (2000). Effects of an educational computing course on preservice and inservice teachers: A discussion and analysis of attitudes and use. *Journal of Research on Computing in Education*, 32(4), 479-495.