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*Journal of*

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# **Interactive Instruction**

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**D E V E L O P M E N T**

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VOLUME 17, NUMBER 1

SUMMER 2004

The Design and Development of an Online Learning Support System for Preservice Teachers: A Discussion of Attitudes and Utilization

Planning for Accessibility and Usability in E-Learning

Real World Strategies for Integrating CDL into Your Training Process

# The Design and Development of an Online Learning Support System for Preservice Teachers: A Discussion of Attitudes and Utilization

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**ABSTRACT** - This study explored how preservice teachers perceived and utilized an Online Learning Support System and examined the changes in preservice teachers' attitudes due to participation in an online supplementary course. In this research, a combination of qualitative and quantitative methods was used. The data were obtained through focus group interviews and surveys, gathered throughout the spring semester of the 2001-2002 academic years. Forty preservice teachers participated in this study. Owing to the positive attitudes of the preservice teachers toward computers at the beginning of the semester, no significant changes were observed upon completion of the online supported course. Participants reported that an orientation session to the web site, accessibility of the web site, reading from a computer screen, and providing up-to-date information on the web site affected their usage of the course materials.

## Introduction

As a result of a technology explosion occurring in this century, society imposes a great demand on teachers to prepare children for the information era. This includes preparing individuals who can produce both new technology and new applications, as well as the ability to utilize these technologies in real-world situations. Preservice teacher education programs have gradually taken on the task of preparing future educators to teach in technology classrooms. According to The Office of Technology Assessment (OTA, 1995) report; "The most direct and cost-effective way to educate teachers about technology is through the preservice education they receive in colleges of education or other institutions" (pp. 166-167).

According to The Office of Technology Assessment (OTA, 1995), today most schools and teachers in the United States have at least some access to different kinds of technologies, such as video equipment and computers. However, not many of these technologies are being used to their potential and most classroom environments are still not significantly influenced by technologies.

Grabe and Grabe (1998) stated: "...colleges of education have not been responsive to the expectation that new teachers will come into K-12 classrooms prepared to use the resources the schools have purchased" (p. 19). Similarly, according to the OTA (1995) report, the majority of teachers have not had appropriate training to prepare them to use technology in their teaching. There is a large body of research which supports the position that the biggest obstacle to using technology in education is the lack of adequate teacher training (Grabe & Grabe, 1998; Yildirim & Kiraz, 1999; Yildirim, 2000b).

Countries all around the world have been revising their preservice education programs by integrating technologies into their curricula. For example, The Higher Education Council (HEC), which is responsible for the planning, coordination, and supervision of higher education and teacher education in Turkey, has also made changes, as recently as 1998, in the curricula of the departments in the schools of education. The Higher Education Council has developed a new teacher training curricula for the schools of education in Turkey. According to the new curricula, a computer literacy

course became a necessary course for all preservice teachers to fulfill the requirements for a teaching credential (Yildirim, 2000a; Gurbuz, Yildirim, & Ozden, 2001). This computer literacy course was designed to improve and enhance teachers' information technology skills (HEC, 1998). The major aim of this course is to teach basic computer skills and introduce teachers to several commonly used computer applications, such as word processing, spreadsheets, databases, telecommunications, and presentation programs. Yildirim (2000a) claimed that even though this computer specific course is the first attempt at preparing Turkish preservice teachers to use computer technologies in the classroom, this effort should go beyond only training the teachers on basic computer skills. He also stated that the Council should recognize the need for providing other courses concentrating on instructional strategies to promote teaching with computers in the classroom.

Technology is often taught as a distinct subject for preservice teachers to learn basic use of computers (OTA, 1995; Tyler-Wood, Christensen, Arrowood, Allen, & Maldonado, 2000). However, taking only one computer literacy course is less likely to lead to a successful result (Yildirim, 2000a; Thompson, Bull, & Willis, 2001; Moursund & Bielefeldt, 1999; Gurbuz, Yildirim, & Ozden, 2001; Cagiltay, Cakiroglu, Cagiltay, & Cakiroglu, 2001). Researchers strongly suggest that technology should be integrated across the entire teacher education curriculum (Davis, 1999, Yildirim, 2000a; Thompson, Bull, & Willis, 2001). For preservice teachers to become effective integrators of technology, it is essential that they should see the models (Gibson, 2002) and they must be provided with opportunities to practice what they have learned (Thompson, Bull, & Willis, 2001; Tyler-wood et. al., 2000; Thomas & Cooper, 2000).

The Internet became a popular educational tool because it is comprised of multimedia features in addition to the power of the World Wide Web (web). The Web provides a user-friendly interface and easy access to text, graphics, audio, and video materials that may be used in a common and consistent format. Most educational web sites provide basic course information such as syllabus, schedule, announcements,

and reading lists. Others go beyond static materials to include synchronous or asynchronous communication, online testing, discussion groups, conferences, whiteboards, and streaming audio and video (Hazari & Schnorr, 1999). Many faculty members have recognized the potential of using the Internet for instruction because the web holds promises for both distance education and conventional learning environments (Alessi & Trollip, 2001). Recently, there has been an increase in the number of instructors using online materials to support traditional instruction (Lightfoot, 2000). This also holds true for teacher education programs where it is commonly believed that the use of the Internet as a supplementary tool in preservice teacher training will provide new opportunities for students and instructors (Ferdig, Roehler, & Pearson, 2002).

Based on the fact that preservice teachers' attitudes toward computers and learning with computers may influence their technology usage in their professional life, this study looked at their attitudes before and after they completed a web-supported teaching credential course. Owing to the fact that attitude plays an important role in the future uses of technologies, many researchers have investigated this topic (Yildirim, 1999, 2000b; Askar & Umay, 2001; Willis & Montes, 2002; Sherry, 2000; Sanders & Morrison-Shetlar, 2001). In other words, monitoring changes in students' attitudes during their education is still a critical issue in the field of teacher education. Moreover, due to the fact that very little research has been conducted on how preservice teachers utilize online tools in their teacher training, there is a continuous need for further research on the effectiveness of using the Web in teaching and learning processes for preservice teachers. The purpose of this research was to develop an online supplementary tool and examine the changes in the attitudes of preservice students due to participation in teacher credential course. This study also explored how preservice teachers perceive and utilized the Online Learning Support System.

## Method

This study explored how preservice teach

ers perceived and utilized an Online Learning Support System (OLSS) that was designed and developed to provide a platform for presenting utilities like course content, news, course assignments, and the facilitation of communication among students and the instructor. The proposed study looked at the following questions:

1. What are the participants' attitudes toward computers and computer competency levels before using the OLSS?
2. Is there a relationship between preservice students' computer competency and their attitudes toward computers?
3. Is there a difference in attitudes of students toward computers before and after completing the course?
4. What are the students' perceptions about the web site of the course?
  - 4.1 What are the students' perceptions on factors affecting the usage of the web site?
  - 4.2 What are the students' perceptions on usage of the utilities of the web site?
  - 4.3 What are the students' suggestions about the effective use of the utilities of the web site?

### Participants

The subjects of this study were the students of a web-supported traditional course offered by the Department of Educational Sciences at the Middle East Technical University. Of 43 prospective teacher students from the department of Foreign Language Education enrolled in the "Instructional Planning and Evaluation" course, 40 students participated in this study. Students' Cumulative Grade Points (GPA) ranged from 1.88 to 3.50. The participants in this study were predominantly female (82.5%, 33 of 40). Nearly all of the students (92.5%, 37 of 40) had taken two or more computer related courses; three of them (7.5%, 3 of 40) had taken one computer related course. The results of the data showed that there were a limited number of students who own a home computer (20%, 8 of 40).

### Research Model

In this research, a combination of qualitative and quantitative methods was used in order to explore the research questions in detail. Using a combination of the quantitative and qualitative methods could lead to a robust understanding of the problem from different perspectives of the participants. Due to the fact that very little research has been conducted on how preservice teachers utilize online tools in their teacher training, the initial data gathering needed to be more qualitative in order to gain a breadth of view about the subject. Merriam (1997) asserted that the qualitative researcher is "interested in understanding the meaning people have constructed, that is, how they make sense of their world and the experiences they have in the world" (p. 6). Quantitative evaluation instruments such as questionnaires force participants to express their feelings and experiences into the researcher's evaluation categories. However, interviews provide a framework for participants to express their own understanding in their own terms (Patton, 1990).

### Procedure

The data were gathered throughout the spring semester of the 2001-2002 academic year in the "Instructional Planning and Evaluation" course offered by the Department of Educational Sciences. The data were collected in the following manner. At the beginning of the semester, the researcher was introduced to the students. The researcher underlined that participation in the study was voluntary and all responses would be kept completely confidential. Finally, the students were asked to participate in the study and were given time to complete the pre-test. All students who had taken the course were provided with a login and password to log on to the course web site.

The instruments used in this first meeting aimed to collect data to identify the entry characteristics of students. Thus, a number of demographic categorical variables, including gender, age, possession of a computer, and locations of students' access to computers, were requested from participants besides grade point average (Cum. GPA) score. In order to recover their computer competency

level, the Computer Competency Survey (CSS) was used. To identify students' attitudes towards the computer, "Teachers' Attitudes toward Computers Questionnaire" (TAC) was administered.

Besides administering TAC and CCS at the end of the semester, students were asked to participate in an interview. Out of 15 students who had indicated that they were willing to share their experiences with the online supplementary web site, three focus groups were constructed. Three sessions of semi-structured interviews were conducted. The number of students in each group ranged from 4 to 6 students. Each interview lasted 50 to 70 minutes, and all interviews were audio recorded. In the interviews the researcher aimed to investigate students' perceptions about overall web-supported courses in more detail. In this study, focus group interviews were preferred since, "People need to listen to others' opinions and understandings in order to form their own" (Marshall and Rossman, 1999, p. 114). One-to-one interviews might not be powerful because a participant might be unprepared or undecided on exactly what to say. Focus group interviews create a social environment, which promotes participants' expression of their feelings (Marshall & Rossman, 1999; Yildirim & Simsek, 1999; Krueger & Casey, 2000).

### The Course

The study was administered during an Instructional Planning and Evaluation (EDS 222) course throughout the spring semester of the 2001-2002 academic years. The course was offered to prospective teachers to fulfil their teaching credential by the Department of Educational Sciences in Middle East Technical University. EDS 222 is a 4-credit course consisting of three hours for theory and two hours for lab practice. Before the semester started, course content was developed. During the content development process, the content was also transformed into electronic format, so as to be published on the web. Throughout the semester, the course was supported with online materials and activities without revision to the course schedule or its routines.

### Tools Provided by the Online Learning Support System (OLSS)

OLSS provides tools for both instructors and students. Students are provided with "Announcements," "Assignments," "Lecture notes," "Grades," "Uploads," "Syllabus," "Forum," "Password," and "Help." Instructors design activities and facilitate the use of such tools. In order to utilize OLSS, both students and the instructor are required to login to the system. OLSS' fundamental parts and functions are given below:

**Announcement:** Instructor can communicate with students and send feedback and up-to-date news to the students. Announcement was divided into two frames: one specific only to the enrolled student, and the other accessible to the whole class. When students login to the system they meet directly with the announcement, which can be seen in Figure 1.

**Assignment:** Students can view their assignments list. Clicking an assignment enables students to access the details of a specific assignment. Students can also upload their assignments in an electronic format by means of the web site. There is also an "upload" section, which allows students to monitor their previously uploaded files.

**Lecture notes:** Students are provided concise lecture content, presentation, and other supportive materials. Students can take print-outs of the lecture notes.

**Grades:** Students can access all of their grades, including previously received ones.

**Forum:** The Forum allows students to write new messages both individually to the instructor and publicly to classmates, in response to their classmates and instructor comments. Figure 2 depicts a screen shot from the forum section.

**Help:** Help contains a list of tasks and instructions on how to use different parts of the web site. When students click on any task, they can reach graphically supported, step-by-step instructions. A sample screen shot for help topics is presented in Figure 3.

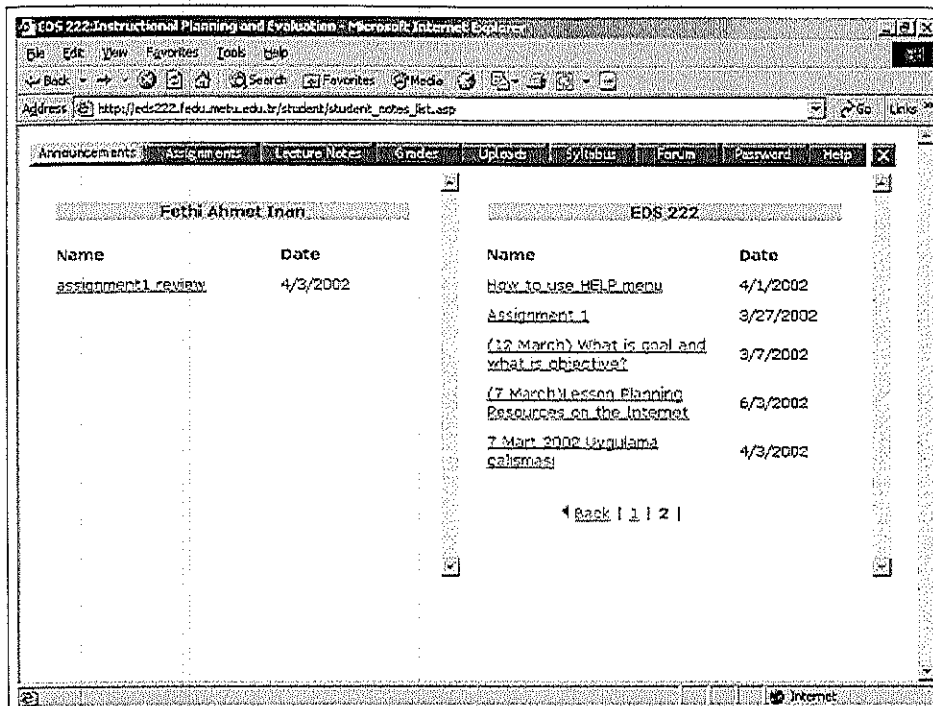


Figure 1

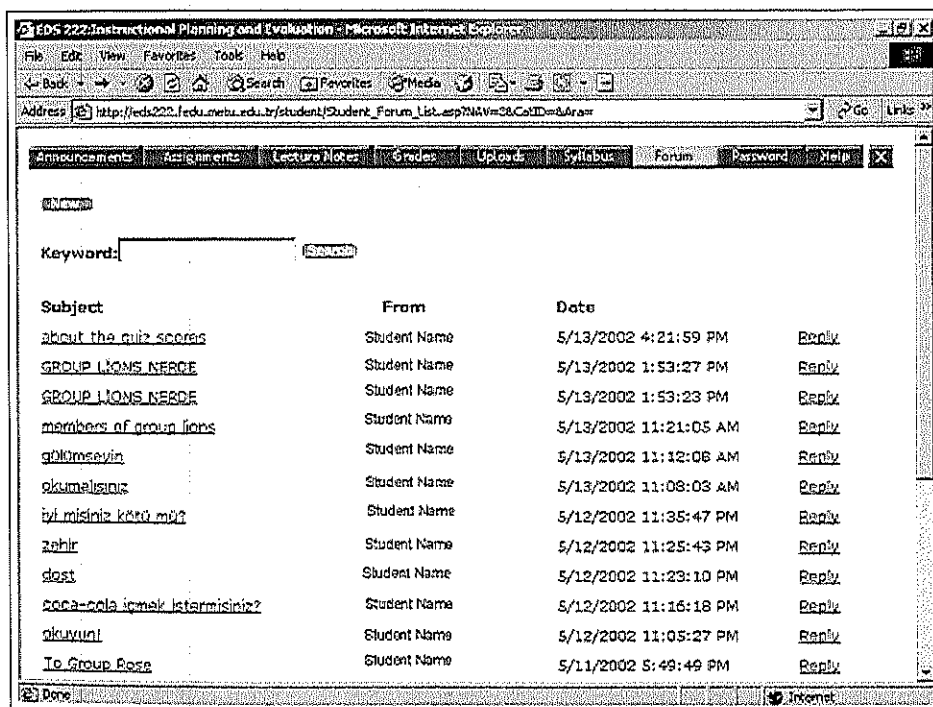


Figure 2

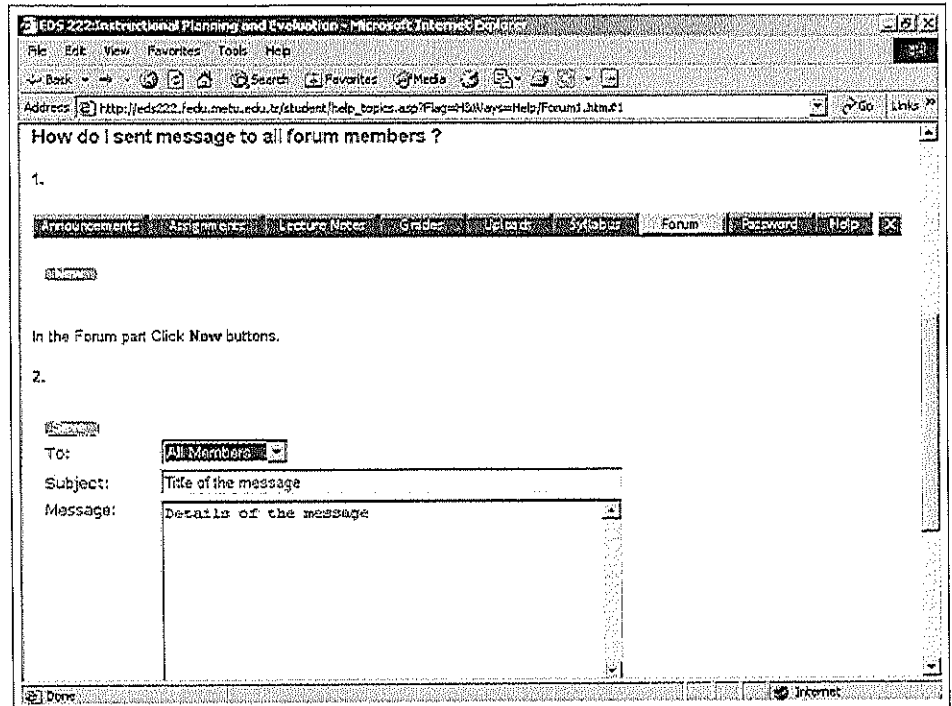


Figure 3

### Data Collection Instruments

*Teachers' Attitudes Scale.* The Teachers' Attitudes toward Computers Questionnaire (TAC) was administered to measure teachers' attitudes toward computers. The pre-post differences were compared to explore changes in attitudes that occurred during the semester. TAC was developed by Knezek and Christensen (1996) and was adapted by the researcher. The scale contained eight subscales: Enthusiasm/Enjoyment, Anxiety, Avoidance, Productivity (teacher), Negative Impact on Society, Productivity (student), Liking, and Email. The items on the survey are rated on a Likert-type scale with 1 equaling strongly disagree to 5 equaling strongly agree. As stated by Christensen & Knezek (1998), the reliability coefficient was calculated separately for the TAC subscales and reported as a high reliability for each sub-scale of the instrument ranging from .85 to .97. For the reliability of the TAC, the reliability coefficient was found to be  $\alpha = .95$  ( $N=31$ ) and  $\alpha = .97$  ( $N=23$ ) for pre- and post-administrations of this scale respectively for this study.

*Teachers Computer Competency Scale.* The Teacher Computer Competency Scale (CCS) was developed by the researcher to assess students' competency on computer skills in the following domains: Word processor, Pre-

sentation program, Electronic spreadsheet, Web Editor, Web Browsers, Online Communication Tools, Online Collaboration Tools, CAI applications, Audio-Video materials, Learning Management Systems, and Distance Learning Materials. This scale included eleven items on a 5-point Likert-type scale. The items on the survey are rated on a Likert-type scale ranging from 1 to 5. For the reliability of CCS, the reliability coefficient was found to be  $\alpha = .67$  ( $N=36$ ) for this study.

*Interview guide.* The interview guide used in the focus group interviews included five fundamental parts. In the first part, students were asked to assess the course content. In the second part, students' perceptions on the teaching and learning process were investigated. The third part contained questions about measurement and evaluation tools used in the course during the semester. In the fourth part, the researcher inquired about students' perceptions of the web site used as a supplementary tool in the course. In this part, questions were mainly about students' use of the web site tools, factors affecting students' usage rate and their suggestion on the web site. At the end of the interviews, students were also asked their future concerns on the usage of technology in their professional life.

### Data Analysis

The data obtained through the surveys were analyzed by the following statistical techniques: frequencies, percentages, means and standard deviations, correlation, and within-subject ANOVA. The demographics, attitude scores, and competency scores were analyzed by using descriptive methods. Pearson Correlation coefficients were computed among the students' perceived competency scores and their prior attitudes toward computers. A two-way within-subjects ANOVA test was used to evaluate whether there was a difference in the attitudes of students toward computers before and after completing the course.

The procedure conducted to analyze the qualitative data includes the following steps: Data were organized, categories were generated, data were coded, and emergent understandings were tested. The procedure followed for analyzing the qualitative data was mainly centered on the procedures stated by Marshall and Rossman (2000) and Patton (1990). First, the researcher reads through all the interview data to identify meaningful units based on the research questions and assigns descriptive codes to these units. For instance, codes like "colored text," "summary," "example," "accessibility," "testing" were used to describe data. Second, the descriptive codes that fit

together meaningfully were grouped in categories such as "content presentation," "self-assessment," "usability," and "support." The categories enabled the researcher to identify the themes to present data. A third level, testing emerging understanding, was carried out to evaluate the whole data for their usefulness and patterns of themes. Later, thematic coding was employed to generate the general themes that are presented in their headings. Namely, this includes, "factors affecting the usage of the web site," "usage of the utilities of the web site," and "suggestions about the effective use of the utilities of the web site."

### Findings

#### *Students' prior computer competencies and attitudes*

All of the participants in this study had previously taken at least one computer related course. Students' self-perceived competency of using certain technology types showed that they were most competent in "Online communication tools," "Word processors," and "Web browsers." The participants were found to be less competent in "CAI applications," and "Learning management systems." The means and standard deviations of the students' self-perceived competency of certain technology types are presented in Table 1.

Table 1. Means and Standard Deviations for Students' Computer Competency (N=40) \*

Technologies	M	SD
Word processors	3.95	.71
Presentation programs	3.50	.99
Electronic spreadsheets	2.90	1.03
Web Editors	2.18	1.43
Web Browsers	3.55	1.36
Online Communication Tools	4.56	.71
Online Collaboration Tools	2.85	1.03
CAI applications	1.48	.79
Audio & Video materials	2.23	1.05
Learning Management Systems	1.64	.84
Distance Learning Materials	2.43	1.36

\* Ratings were made on a 5-point scale (1 = not competent, 5 = very competent)



**Attitudes and Competency**

To find out whether any correlation existed between the students perceived competency score and their prior attitudes toward computers, correlation coefficients were computed. The relationship between students' competency scores and attitudes score was found to be positive and statistically significant ( $r(38) = .55, p < .001$ ). The analysis of data revealed in general that students having high computer competency also had positive attitudes toward computers.

**Pre- and Post-Attitudes**

A two way within-subjects ANOVA was conducted to evaluate whether there was a difference in attitudes of students toward

learning with computers before and after completing the course. The dependent variable was the attitudes subscale scores. The within-subjects factors were eight attitude subscales and time interval. The means and standard deviations associated with these data are presented in Table 2. The time and attitude effect together with the interaction effect were tested using the multivariate criterion of Wilks' lambda ( $\tilde{\Lambda}$ ). An alpha level of .01 was used for the analyses. The main effect associated with time and the interaction effect were not significant,  $F(1, 34) = .009, p = .92$  and  $F(7, 28) = 3.11, p = .02$ , respectively. However, the main effect associated with the attitude subscale factor was significant,  $F(7, 28) = 32.75, p = .001$ .

Table 2. Means and standard deviations for students' pre- and post-attitudes subscales (N=35)\*

Attitude Scale	Pre-Test		Post-Test	
	M	SD	M	SD
Enthusiasm/Enjoyment	4.02	.50	4.14	.58
Anxiety**	3.50	.69	3.54	.76
Avoidance**	4.16	.43	3.94	.54
Productivity (teacher)	4.16	.37	4.11	.43
Negative Impact on Society**	3.12	.45	2.99	.65
Productivity (student)	4.08	.41	4.18	.48
Liking	3.28	.63	3.33	.66
Email	3.85	.51	3.98	.52

\* Ratings were made on a 5-point scale (1 = strongly disagree, 5 = strongly agree)

\*\* High score represents a low level of perception on these items.

## Students' Perception about the Website

### *Theme I: usage of the utilities of the web site.*

In this study, students and the instructor utilized the online learning support system throughout the semester. Some parts of the web site were used frequently and some parts were used rarely. "Announcement" was emphasized as being one of the most frequently used tools of the web site. The "Forum" was seen as the least utilized part of the web site. Since lecture notes were composed of a heavily loaded content, which was not designed in an organized way, students did not prefer to read from the computer screen. Some students used the "Help" part of the web site in order to learn how to use the various parts of the web site, but most of the students expressed that the tools provided within the web site were easy to use. So, they did not feel a need for help.

The web site was not frequently used for communication purposes because students had the opportunity to interact directly with each other. They preferred face-to-face communication instead of communicating via web. Thus, the tool was not frequently used. Although some of the students preferred to use the "forum" part for communication purposes, most of the students alternatively preferred to use a telephone and GSM for communicating with each other due to immediacy. Possibility of face-to-face interaction and lack of privacy of the forum messages together resulted in some students being passive participants. The "Forum" was not also utilized effectively to create and carry on discussions. Only some parts of the communications occurring between students and instructor were carried out by the "Forum" portion of the web site.

*Theme II: factors affecting the usage of the web site.* Keeping contact with the instructor online, and the possibilities of easy uploads and revisions were stated by the students as the advantages of the web site. Furthermore, students found the download time of the web site fair enough for their work. Navigation of the web site was stated as being helpful enough to access all the parts of the web site. Visual elements provided within the web site were found to be effective in making the web site easy to use.

On the other hand, there are several factors that negatively effected the students' usage of the web site. Introducing the web site, accessibility, reading off the computer screen, facilitation, privacy, and up-to-date information on the web site were underlined by the students as effecting factors for their usage of the web site.

Lack of orientation toward utilization of the tools was one of the major factors which effected the utilization of the web site. One of the students summarized this as, "We could have been informed about the usage of the tools provided within the web site at the beginning of the semester. If there was a detailed explanation, we could use the web site more effectively." The results revealed that students were not given enough information about the features and usage of the web site parts, which in turn underlies the importance of demonstration provided at the beginning of the course.

Accessing computers to use the web site was another constraint for students to utilize the web site. Difficulty in finding available laboratory hours to work, crowdedness and increased noise levels for the computer laboratories have negatively effected students' utilization of the web site. Besides, students had not utilized some parts of the web site due to their dislike of reading from the computer screen. One of the students compared reading from hardcopy and computer screen, and concluded that: "...At first, I tried to read lecture notes from the computer screen. I increased the font size in order to read easily. But later on, my eyes got tired." Reading from the computer screen made students feel uncomfortable, and moreover their eyes got tired after awhile.

The point which got the students' attention most, was the facilitation of the web site. Underlying the importance of continuously updating the web site, the students stated that if the web site was kept up-to-date by the activities, it would force them to check the web site more regularly. The students also put emphasis on facilitation provided by the instructor. One student said that the instructor should start discussions by posing an interesting topic and encouraging them to make comments on that topic. Another student explained this point by saying: "The

more actively the instructor uses the web site, the more frequently we utilize it."

*Theme III: suggestions about the effective use of the utilities of the web site.* The suggestions made by the students in order to increase the utilization of the web site and to improve the effectiveness of using the web site as a supplement for the traditional course mainly focused on the presentation of the content, usage of the communication tools, evaluation tools, and facilitation of the web site.

It was emphasized that the overall content on the web site should be comprised of different types of resources, presented in a summarized way. Students enjoyed studying from PowerPoint presentations supplied within the web site. Moreover, most emphasized the importance of visual layout in the presentation of information. One student said: "The lecture notes should be presented in a more attractive way. It was so dull. Pages could be colorized and effects could be used to gain attention. By using pictures, the pages may become more enthusiastic and attractive. It was too ordinary." Another stated: "There should be animated pictures within the lecture notes."

Most of the students proposed that the web site could be composed of assessment tools. They emphasized two points. First, the web site could be used as a direct assessment tool, and second, the website could be used for gathering feedback. Obviously, most of the students expressed their need for additional activities and questions regarding applications, as well as self-assessment. Most of the students emphasized that the instructor should give immediate feedback when a question is posed to the web site.

Regarding the communication tools provided within the web site, students agreed on the same topics. They expressed their wish for communicating individually by using a private area supplied in the web site.

Throughout the course, the instructor supplied students with additional website addresses in order to help students while working on their lesson plan assignments. However, students stated that the supplied web addresses were not enough. One of the students explained the reason as: "When we are doing a search on the web, we get lost within the pages. If we were given a list of addresses on a specific topic, instead of general addresses, this would be good for us. We

do not want to lose time by searching addresses."

As a final point, some students stated that they were looking for a more enthusiastic and social environment within the web site. For creating such an environment, they suggested communication should not only be based on educational concerns but also social concerns related with contemporary issues and their role in the society. They also said that the climate provided in the web site should not be formal, but warm.

### Implications for Practice

For further practice, the following suggestions may be helpful for instructors and instructional designers while designing, delivering, and implementing a web-supported traditional environment.

- Provide a demonstration at the beginning of the semester as well as continuous support and help throughout the semester.
- Provide course handouts in different file formats (word document, pdf document, html file, etc.) with a print-friendly option in the web site.
- Enhance course content by providing all possible types of media and material sources (text, audio, video, animation, simulation, etc.)
- Provide a wide range of pre- and post-instructional activities (additional resources, additional materials, self-assessment utilities, etc.) apart from the content.
- Provide self-assessment tools to help students monitor their learning.
- Provide enough guidance and support to make students participate in the web site more regularly.
- Post questions to think about and discuss, send examples, and provide additional materials and Internet addresses.
- Keep the design of web pages simple and consistent. Provide simple navigation by informing the students which page he/she is on during that moment, and make all the utilities accessible in every page.
- Online supplementary tools should provide a social environment to create an online community.

- Support students' privacy on all parts of the website and provide individualized feedback.
- Provide private communication channels between students-students and students-Instructor.

## Conclusion

At the beginning of the semester, students had a higher attitude toward computers and a higher level of competency in using the Internet, office applications and online communication tools. However, it was observed that their competency for using computer technology in educational purposes was lower. Nearly all students had previously taken more than one computer literacy course, which could have positively influenced their perceived level of computer competence. This study revealed that students who had high computer competency scores also had positive attitudes toward computers in general. Those students' attitudes toward computers did not change significantly after taking an online supplementary course. This result was not surprising for two reasons: the duration of the treatment was short, and students already had positive attitudes toward computers at the beginning of the semester. This result might also be due to the limited sample size and limited resources.

In order to create an effective use of a web-based environment, the features of the web site should be used in a manner that parallel the goal of the related utility. The key to effective web based/supported instruction is focusing on the needs of the students, the requirements of the content, and the constraints faced by the instructor. The overall content should be presented in various formats that meet different expectations of the students. Besides navigational support, the content should be kept in summary or outline form to minimize reading from the computer screen. It is a widely known fact that in terms of visual design, each web page should be designed in a way that minimizes the information on each presented page. Hence, together with these opportunities it is seen that adding self-assessment tools for students could play an important role in students' motivation and interaction. As stated by different authors, interactivity in a web-based environment is a key to success (Moore & Kearsley, 1996; Palloff & Pratt, 2001).

Due to the fact that very little research has been conducted on how preservice teachers utilize online tools in their teacher training, there is a continuous need for further research on the effective use of the Web in the teaching and learning process of preservice teachers. Although these results are only suggestive of the influence of utilizing online support tools in preservice education courses, the increased use of Internet-based resources warrants future research in this area. For example, one could investigate the long-term impacts, gains in learning outcomes, retention of knowledge, and individual differences. Furthermore, it may also be interesting to observe how students' attitudes change over time after being exposed to the web-supported learning environment. Hence, longitudinal studies that observed the same students over time would prove most beneficial.

## References

- Alessi, S. M., & Trollip, S. R. (2001). *Multi-media for learning: Methods and development*. Massachusetts: Allyn & Bacon.
- Askar, P & Umay, A. (2001). Preservice elementary mathematics teachers' computer self-efficacy, attitudes towards computers, and their perceptions of computer-enriched learning environments. *Proceedings of SITE 2001 Conference, USA*, 2262-2263.
- Cagiltay, K., Cakiroglu, J., Cagiltay N., & Cakiroglu, E. (2001). Öğretimde bilgisayar kullanimina iliskin öğretmen görüşleri - Teachers' perspectives about the use of computers in education *Hacettepe University Journal of Education -Hacettepe Egitim Dergisi*, 21(1), 19-28.
- Christensen, R. & Knezek, G. (1998). Parallel forms for measuring teachers' attitudes toward computers. *Proceedings of SITE 1998 Conference, USA*, 826- 830
- Davis, N. (1999). The Globalization of education through teacher education with new technologies: A view informed by research. *Educational Technology Review*, 12, 8-12.
- Ferdig, R.E., Roehler, L. R., & Pearson, P. D. (2002). Scaffolding preservice teacher learning through web-based discussion forums: An examination of online conversations in the reading classroom explorer. *Journal of Computing in Teacher Education*, 18(3), 87-94.

- Gibson, S. (2002). Incorporating computer-based learning into preservice education courses. *Contemporary Issues in Technology and Teacher Education* [Online serial], 2(1), 95-116.
- Grabe, M., & Grabe, C. (1998). *Integrating technology for meaningful learning*. USA: Houghton Mifflin Company.
- Gurbuz, T., Yildirim, S., & Ozden, M. Y. (2001). Comparison of on-Line and traditional computer literacy courses for preservice teachers: A case study. *Journal of Educational Technology Systems*, 29(3), 259-269.
- Knezek, G., & Christensen, R. (1996). *Changes in teacher attitudes during technology training sessions* (Tech. Rep. No. 96.1). Denton: Texas Center for Educational Technology.
- Krueger, R. A., & Casey, M. A. (2000). *Focus groups: A practical guide for applied research*. Thousand Oaks: Sage Publications.
- Lightfoot, J. M. (2000). Designing and implementing a "Full-Service" ClassPage on the Internet. *Journal of Educational Multimedia and Hypermedia*, 9(1), 19-33.
- Marshall, C., & Rossman, G. B. (1999). *Designing qualitative research*. Thousand Oaks: Sage Publications.
- Merriam, S. (1997). *Qualitative research and case study applications in education*. San Francisco: Jossey-Bass.
- Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view*. USA: Wadsworth Publishing Company.
- Moursand, D., & Bielefeldt, T. (1999). Will new teachers be prepared to teach in a digital age: A national survey on informational technology in teacher education. Santa Monica, CA: Milken Family Foundation.
- Palloff, R. M., & Pratt, K. (2001). *Lessons from the cyberspace classroom: The realities of online teaching*. San Francisco: Jossey-Bass.
- Patton, M. Q. (1990). *Qualitative evaluation and research methods*. Newbury: Sage Publications.
- Sanders, D. W., & Morrison-Shetlar, A. I. (2001). Student attitudes toward web-enhanced instruction in an introductory biology course. *Journal of Research on Computing in Education*, 33(3), 251-262.
- Sherry, A. C. (2000). Expanding the view of preservice teachers' computer literacy: implications from written and verbal data and metaphors as freehand drawings. *Journal of Technology and Teacher Education*, 8(3), 187-218.
- Thomas, J. A., & Cooper, S. B. (2000). Teaching technology: A new opportunity for pioneers in teacher education. *Journal of Computing in Teacher Education*, 17(1), 13-19.
- Tyler-wood, T., Christensen, R., Arrowood, D., Allen, J., & Maldonado, M. (2001). Implementing Technology into Preservice Teacher Courses: PT3 First Year Accomplishments. *Proceedings of SITE 2001 Conference, USA*, 1784-1787.
- Thompson, A., Bull, G., & Willis, J. (2001). *SITE position paper: Statement of basic principles and suggested actions ('Ames White Paper')*. Retrieved December 25, 2002, from <http://www.aace.org/site/SITEstatement.htm>.
- The Higher Education Council (1998). *Reorganization of preservice teacher training program in the school of education*. Retrieved January 2, 2003, from [http://www.yok.gov.tr/egitim/ogretmen/ogretmen\\_yetistirme\\_lisans/rapor.pdf](http://www.yok.gov.tr/egitim/ogretmen/ogretmen_yetistirme_lisans/rapor.pdf).
- U.S. Congress, Office of Technology Assessment. (1995). *Teacher and technology: Making the connection*. Washington, DC: U.S. Government Printing Office.
- Willis, E.M., & Montes, L.S. (2002). Does requiring a technology course in preservice teacher education affect student teacher's technology use in the classroom? *Journal of Computing in Teacher Education*, 18(3), 76-80.
- Yildirim, A., & Simsek, H. (1999). *Sosyal bilimlerde nitel araştırma yöntemleri*. Ankara: Seckin Yayınevi.
- Yildirim, S. (1999). Are Educational Computer Courses Effective? Teachers are talking. *Proceedings of SITE 1999 Conference, USA*, 425-431.
- Yildirim, S., & Kiraz, E. (1999). Obstacles to integrating on-line communication tools into preservice teacher education: A case study. *Journal of Computing in Teacher Education*, 15(3), 23-28.
- Yildirim, S. (2000a). Furnishing Turkish Preservice Teachers with IT Skills. Hope or Hype? *Proceedings of SITE 2000 Conference, USA*, 928-933.

Yildirim, S. (2000b). Effect 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.

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