

The Effect of an Educational Internet-Based Computer Literacy Course on Pre-service Teacher Education Students' Computer Self-Efficacy

Dr. Amjad M. Abuloum
Faculty of Educational Sciences
Hashemite University
Zarqa, Jordan

أثر تدريس مادة ثقافة الحاسوب التربوية عبر الإنترنت
على الفاعلية الذاتية نحو الحاسوب لدى معلمي ما قبل
الخدمة

د. أمجد محمد أبو لوم
قسم العلوم التربوية
الجامعة الهاشمية
الزرقاء - الأردن

أثر تدريس مادة ثقافة الحاسوب التربوية عبر الإنترنت على الفاعلية الذاتية نحو الحاسوب لدى معلمي ما قبل الخدمة

د. أمجد محمد أبو لوم

قسم العلوم التربوية

الجامعة الهاشمية

الزرقاء - الأردن

الملخص

هدفت هذه الدراسة إلى مقارنة الفاعلية الذاتية نحو الحاسوب لدى معلمي ما قبل الخدمة في بداية ونهاية الفصل الدراسي الذي طرحت فيه مادة ثقافة الحاسوب التربوية عبر الإنترنت وذلك في ضوء خبرة الطلبة السابقة في استخدام الحاسوب. وقد استندت هذه الدراسة إلى الإطار النظري لنظرية الفاعلية الذاتية لباندورا Bandura (1977,1986).

شملت هذه الدراسة على ٩٧ طالباً ممن سجلوا مادة ثقافة الحاسوب التربوية عبر الإنترنت والتي تطرح ضمن البرنامج الدراسي لكلية العلوم التربوية بالتعاون مع مكتب التعليم الإلكتروني في الجامعة الهاشمية. وللحصول على المعلومات اللازمة تم إعداد استبانة باستخدام مقياس ليكرت وذلك في ضوء المراجعة الأدبية للدراسة وفي ضوء تحليل المهارات التي يتم التركيز عليها عادة في تدريس مواد ثقافة الحاسوب. وتم جمع البيانات اللازمة وتحليلها باستخدام التحليل الوصفي، وتحليل التباين المتعدد، وتحليل التباين المتعدد المشترك.

لقد جاءت نتائج الدراسة لتظهر بأن تدريس مادة ثقافة الحاسوب التربوية عبر الإنترنت قد حسنت وطورت بشكل ملحوظ الفاعلية الذاتية نحو الحاسوب فيما يخص متغيرات أساسيات الحاسوب، ومعالجة النصوص، وإعداد الجداول الإلكترونية، واستخدام الإنترنت. لقد انطبقت هذه النتائج على معلمي ما قبل الخدمة المسجلين في مادة ثقافة الحاسوب والذين ليس لديهم خبرة سابقة في استخدام الحاسوب. أما الذين لديهم خبره سابقة بالحاسوب، فقد تحسنت فاعليتهم الذاتية وتطورت بشكل قليل وعلى مستوى جميع المتغيرات. وهذا يؤكد أهمية هذه المادة المطروحة إلكترونياً لمن ليس لديهم خبرة سابقة في استخدام الحاسوب. وفي ضوء النتائج فقد أوصت الدراسة بعدد من التوصيات التي تفيد التربويين الذين يعملون على تطوير البرامج التعليمية في مجال الحاسوب لمعلمي ما قبل الخدمة.

The Effect of an Educational Internet-Based Computer Literacy Course on Pre-service Teacher Education Students' Computer Self-Efficacy

Dr. Amjad M. Abuloum
Faculty of Educational Sciences
Hashemite University
Zarqa, Jordan

Abstract

The purpose of this study was to compare pre-service teacher education students' computer self-efficacy at the beginning and end of an Internet-based computer literacy course by prior computer experience. Self-efficacy (Bandura, 1977; Bandura, 1986) constituted the theoretical framework for this study.

The study surveyed 97 students who were enrolled in an educational Internet-based computer literacy course offered by the Faculty of Educational Sciences in association with the Hashemite University e-Learning Office. A Likert-type Computer Self-Efficacy instrument was developed based on careful review of literature and analysis of skills usually emphasized in computer literacy courses. In addition to descriptive analyses, multivariate analysis of variance (MANOVA) and multivariate analysis of covariance (MANCOVA) were used for data analysis.

Results of the study suggest that the computer literacy course significantly improved computer self-efficacy for all factors (basics, word-processing, spreadsheets, and Internet) for pre-service teacher education students who entered the course with no prior computer experience. However, students entering the course with prior computer experience gained less computer self-efficacy for all factors. In general, in terms of computer self-efficacy, the computer literacy course was more effective for students who entered the course with no prior computer experience than those who entered with prior computer experience.

Based on these results, several recommendations were offered for teacher educators, particularly those who develop programs in the area of pre-service teacher computer education.

The Effect of an Educational Internet-Based Computer Literacy Course on Pre-service Teacher Education Students' Computer Self-Efficacy

Dr. Amjad Abuloum

Faculty of Educational Sciences
Hashemite University
Zarqa, Jordan

Introduction

The literature supports the growing field of technology and the need for knowledge and use of technology in education. Learners will continue to demand flexible ways of learning, and collaborative tasks between technology and education, which combine teaching and learning skills. According to Powell & Lord (1998), students continually need positive exposure of technology for positive growth.

According to McDonald (2002), computer-mediated communication encourages collaborative learning by not providing cues regarding appearance, race, gender, education, or social status bestowing a sort of anonymity to participants. Students and instructors can converse through a variety of forums, including e-mail, online discussion forums, bulletin boards, and web pages (Richter, 2001). This kind of communication is helpful in promoting diverse viewpoint; alternative ways of looking at problems; and teaching higher-level skills such as analysis, synthesis, and evaluation (Driscoll, 1998). In addition to communication, computers support the use and delivery of multimedia elements, such as sound video, and interactive hypermedia (McNeil et al., 2000). A study completed by Devlin and James (2003) concluded that the impact of multimedia and educational technology could provide some indication of improved student learning.

Several studies (Compeau & Higgins, 1995; Hill Smith, & Mann, 1987; Taylor & Todd, 1995; Torkzadeh & Koufteros, 1994; Torkzadeh & Koufteros, 1993; Yi & Venkatesh, 1996) have tested

a variety of social and cognitive constructs to improve the effective and efficient use of computer information technology. According to Doll and Torkzadeh (1989), one of the most important constructs used to examine the ability of the learner to successfully perform computer-related tasks is self-efficacy.

Established to explain behavioral changes, the self-efficacy theory and its theoretical framework were initially espoused by Bandura (1986). Self-efficacy, as defined by Bandura, is “people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses.” (p. 391)

The self-efficacy construct described by Bandura was composed of two cognitive dimensions, personal self-efficacy and outcome expectancy. Bandura (1977) defined personal self-efficacy as “the conviction that one can successfully execute the behavior required to produce the outcomes” and outcome expectancy as “a person’s estimate that a given behavior will lead to certain outcomes” (p. 193). Therefore, unlike attitudes, the interpretation of self-efficacy is identified with a set of clearly defined skills or behaviors (Bandura, 1986; Murphy, Cover, & Owen, 1989).

According to Bandura (1986), there are four potential sources that may impact self-efficacy: Actual experiences, emotional arousal, vicarious experiences, and verbal persuasions. Although all sources may contribute significantly to perceptions of self-efficacy, actual experiences are considered the most powerful source of self-efficacy information (Tschannen-Moran et al., 1998). As seen by Bandura (1986), the perception that performance (as an actual experience) has been successful raises efficacy beliefs while the perception that performance has been unsuccessful lowers efficacy beliefs.

Self-efficacy toward computers (or computer self-efficacy) is necessary to make effective use of computer technologies to gain momentum in the different aspects of education. According to Zhang & Espinoza (1997), self-efficacy and attitudes towards computers are significant predictors of a student perceived need to

learn computer skills. In fact, studies show that self-efficacy toward computers is a critical predictor for the use of computer technology (Delcourt & Kinzie, 1993; Ertmer, Evenbeck, Cennamo, & Lehman, 1994; Jorde-Bloom, 1988; Kinzie, Delcourt, & Powers, 1994; Olivier & Shapior, 1993; Zhang & Espinoza, 1997). Therefore, Compeau and Higgins (1995, p.192) define computer self-efficacy as “a judgment of one’s ability to use a computer”.

Liu, Reed, & Phillips, (1992), Sheffield (1996), and Summers (1988) indicated that pre-service teacher education students had little prior experience and knowledge of computer technologies when entering education programs. Therefore, introductory computer literacy courses are needed to provide students with actual experience about basic computer concepts and skills (Kim & Peterson, 1992).

In comparison to the more traditional courses, pre-service teachers’ computer self-efficacy and achievement rise when these teachers are involved in technology rich content lessons (Hacker & Sova, 1998). In fact, the longer a pre-service teacher participates in a course integrating technology, the more confident he/she feels toward technology (Bohlin & Hunt, 1995; Milbrath & Kinzie, 2000). Moore (1994) indicated that computer based learning highly motivates learners. Therefore, the use of computer technologies and time using these technologies in computer literacy courses are believed to be determining factors of increasing computer self-efficacy. In other words, the more exposure to technology integration through teaching methods courses and as course requirements the more confident a pre-service teacher may feel toward using computers as a teaching tool. Therefore, increasing computer technology experiences for the pre-service teacher could impact the eventual use of such technology in the classroom by contributing to the formation of positive attitudes and self-efficacy (Delcourt & Kinzie, 1993; Drost & Abbott, 2000).

Although computer literacy courses are usually based on the assumption that students have little or no prior computer experience (Brock, Thomsen, & Kohl, 1992), prior experience of using computers usually influences expectations of students participating

in these courses (Milbrath & Kinzie, 2000). In fact, it has been shown that prior experience, encouragement, and self-efficacy are related to attitudes towards computer technologies (Busch, 1995). However, it is not clear what and how prior computer technology experiences are effective in producing pre-service teachers who intend to use computer technology in a positive way. Therefore, this study comes to examine prior computer experience as a source of influence on computer self-efficacy. More precisely, the study was conducted with the intent to compare pre-service teacher education students' computer self-efficacy at the beginning and end of an educational Internet-based computer literacy course by prior computer experience. This study extends previous exploratory work on the relationship between computer self-efficacy and computer literacy.

Statement of the Problem

Previous research has provided complicated findings regarding the relationship between prior computer experience and computer self-efficacy. For example, many studies showed that actual experience with computers has been found to enhance an individual's personal sense of computer self-efficacy (Durndell & Haag, 2002; Ertmer, Evenback, Cennamo, & Lehman, 1994; Hill, Reed, & Behr, 1987; Laguna & Babcock, 2000; Laurillard, 1996; Medvin, Reed & Behr, 2002; Miura, 1987). In addition to quality, quantity of past computer experience also seems to influence self-efficacy (Bradley & Russell, 1997; Medvin et al., 2002; Moroz & Nash, 1997). According to Kellenberger (1996), any prior experience using technology can affect students' current self-efficacy toward computer use.

Other studies (Hasan, 2003; Karsten & Roth, 1998), however, showed that only those experiences that develop or enhance the specific computer skills defined to compromise computer literacy in a particular context are likely to have an impact on computer self-efficacy. In other words, these studies indicated that the relevance of prior computer experience seems to matter more than its quan-

tity. Hasan's study (2003) examined the influence of eight types of computer experiences on computer self-efficacy. The results of his study indicated that experience with computer programming and graphics applications have strong and significant effects on computer self-efficacy beliefs, whereas experience with spreadsheet and database applications demonstrated weak effects.

In addition, the quick development of computer technologies and applications in education seems to further complicate the situation (Milbarth & Kinzie, 2000). Therefore, studies on the relationship between computer self-efficacy and computer literacy in light of prior computer experience are eventually needed. Specifically, the problem of the study is to determine the effect of an Internet-based computer literacy course on pre-service teacher education students' computer self-efficacy in light of their prior computer experience.

Aim of the Study

The aim of the study was to provide an answer for the following question:

Are there statistically significant differences in computer self-efficacy for pre-service teacher education students that are attributed to their prior computer experience?

By answering the above question, the study attempted to examine the effect of an Internet-based computer literacy course on pre-service teacher education students' computer self-efficacy in light of their prior computer experience.

Research Question

The main research question that drove this study was:
Are there statistically significant differences in computer self-efficacy for pre-service teacher education students that are attributed to their prior computer experience?

Significance of the Study

This study was conducted to investigate the effect of an Internet-based computer literacy course on pre-service teacher education students' computer self-efficacy in light of their prior computer experience. In general, the findings of the study are believed to be of a great value for teacher education institutions in planning and designing teacher education programs that encourage teachers to use computers in the classroom. More specifically, the study placed a primary emphasis on investigating the contribution of prior computer experience to pre-service teacher education students' computer self-efficacy. This, of course, will help educators, administrators, and policy-makers to gain insights into how teacher education computer literacy courses can be customized to satisfy the specific needs of schools at which pre-service teacher education students will be working.

Methodology

Subjects

This study compared pre-service teacher education students' computer self-efficacy at the beginning and at the end of a one-semester Internet-based computer literacy course. The participating target population of the study was all students enrolled in the course "Computers in Education" in the second semester of the academic year 2003-2004 at the Hashemite University-Jordan. The sample of the study was the whole population, which included 100 students. The actual sample utilized in the study was those who completed the Computer Self-Efficacy Survey before and after completion of the course. One hundred students completed the survey before completion of the course. After completion of the course, 97 students were able to complete the survey. Thereby, matching students by scores after completing the course to scores before completing the course yields a sample of 97 students for this study.

Description of the Computer Literacy Course

This study examined the effectiveness of an Internet-based computer literacy course offered for pre-service teacher education students. The course was designed for those with no prior experience with computers. It prepares future teachers to use computer technology in the classroom. As outlined in the course syllabus, the course covers the following areas:

- Basics: contains information about basic computer operations such as saving files to different storage media, maintaining a computer system, and using peripherals.
- Word-processing: contains information on how to use many of the basic features of a word-processing application such as creating/editing documents, adding graphics, creating tables and charts, and desktop publishing in general.
- Spreadsheets: contains information on how to use many of the basic features of a spreadsheet application such as creating/editing spreadsheets, using functions and formulas, and manipulating layout and presentation of data.
- Internet: contains information on the use of the Internet in education such as conducting Web searches, downloading programs from the Internet, using e-mail, and basic information about programming language.

To emphasize the role of the Internet and the Web in education and to give students the chance to practice using Internet technologies, the design of the course was based on the Web. In summer of the year 2003, an intensive, well prepared workshop on developing Internet-based courses was held at the Hashemite University. Around 25 highly-motivated instructors from different departments were selected to be trained on various techniques and methods used in designing Internet-based courses. The objective of the workshop was to prepare courses that can be taught in a flexible (mixed) mode, which consists of both classroom face-to-face instructions and completely online instructions. Courses designed in this mode move a significant portion of the learning activities from the classroom to the Web. The instructor and the

students have the advantages of real-time exchange in scheduled classes but have the benefit of continuing the discussion and assignments in the spaces between meetings. Blackboard Learning and Community Portal System™, an authoring environment that utilizes asynchronous (Bulletin, e-mail) and synchronous (Chat) communication tools, was used to deliver the Internet-based courses. The workshop resulted in a number of Internet-based courses. Among these courses was the computer literacy course used in this study.

In teaching this course, face-to-face lectures of three class hours per week were supplemented by a variety of Internet-based materials including an extensive collection of interactive, collaborative practice materials as a supplement to the textbook, and extensive files of repeatable practice quizzes. As part of the assessment, students were required to log into Blackboard and complete weekly assignments that were designed to foster students' relationship with the course. Daily participation in electronic discussion forums and chat rooms was also required from students as part of the ongoing assessment.

Variables of the Study

The study consists of the following variables:

1. Independent variable: The independent variable was prior computer experience with two levels: With and Without.
2. Dependent variable: The dependent variable was computer self-efficacy with four levels: Basics, Word-processing, Spreadsheets, and Internet.

The Instrument

This study used a 20-item instrument that was divided into four subscales: Basics, Word-processing, Spreadsheets, and Internet. Each subscale rated 5 items on a 3-point Likert-type scale, with 3 equaling "Yes, I can," 2 equaling "Maybe I can," and 1 equaling "No, I can not." The items were developed after (1) careful review

of computer self-efficacy scales available in related literature (Coover & Owen, 1989; and Torkzadeh & Koufteros, 1994) and (2) analysis of skills emphasized in several computer literacy courses designed to teach computer-related skills. All items were worded positively, so high scores indicate a high degree of confidence in one's ability to use computers.

The instrument underwent two phases of validity verifications. In the first phase, all items of the instrument were sent to a panel of four instructional technologists from four Jordanian universities to rate each item for clarity and usefulness in measuring students' computer self-efficacy. Based on the panel's suggestions, necessary changes were made to the survey. In the second phase of the validity verification, the survey was administered to a randomly selected sample of 30 students who were enrolled in the Internet-based computer literacy course in the first semester of the academic year 2003-2004. Students were asked to rate the survey items for clarity of expression. Feedback obtained from these students was utilized in preparing the final version of the computer self-efficacy survey, as shown in Appendix A.

The internal consistency of the instrument was determined using the same sample utilized in this study, which included 97 students who were studying in the Internet-based computer literacy course during the second semester of the academic year 2003-2004. The coefficient alpha reliabilities of the computer self-efficacy scale and its sub-scales before and after completion of the course are presented in table 1.

Table 1
Reliability of the Computer Self-Efficacy Scale

Dependent Variable Subscale	Before Course Completion	After Course Completion	All
Basics	0.887	0.887	0.840
Word-processing	0.872	0.872	0.845
Spreadsheets	0.851	0.852	0.828
Internet	0.781	0.781	0.792
Overall Scales	0.945	0.945	0.881

Procedure

Data from the pre-service teacher education students enrolled in the Internet-based computer literacy course were collected in the following manner. At the first class meeting, the instructor gave a brief overview of the course. Then, students were asked to participate in the study and informed that their participation would not affect their final grade in the course. They were given enough time to complete the survey. The same survey was given at the last class, and students were informed that all responses would be kept completely confidential.

Statistical Analysis of Data

Scores collected using the research instrument were coded and provided as a data file for running statistical analysis by applying the Statistical Package for Social Sciences (SPSS). Descriptive statistics was used to describe the sample of the study. It included frequency counts, standard deviations, and mean scores on selected variables.

To answer the research question, multivariate analysis of variance (MANOVA) and multivariate analysis of covariance (MANCOVA) procedures were used to assess the effect of students' prior computer experience on their computer self-efficacy. More specifi-

cally, multivariate analysis of variance was used to evaluate the initial differences in the four factors of students' computer self-efficacy (basics, word-processing, spreadsheets, and Internet) that are attributed to their prior computer experience, before completion of the Internet-based computer literacy course. Therefore, the four factors of students' computer self-efficacy measured before completion of the course were the dependent variables, and students' prior computer experience was the independent variable.

Multivariate analysis of covariance was used to determine whether there were statistically significant differences in the four factors of students' computer self-efficacy with regard to their prior computer experience, after completion of the computer literacy course, controlling for their computer self-efficacy before completion of the course. While the four factors of students' computer self-efficacy measured after completion of the course were the dependent variables, students' computer self-efficacy measured before completion of the course was the covariate. As in the case of MANOVA, the independent variable used in this analysis, MANCOVA, was students' prior computer experience.

Results of the Study

Descriptive Statistics

Means and standard deviations of students' computer self-efficacy for the four factors (basics, word-processing, spreadsheets, and Internet) before and after completion of the computer literacy course are presented in table 2.

Table 2
Mean Scores and Standard Deviations of Students' Computer Self-Efficacy before and after Completion of the Course

Variable	Before M	Completion SD	After M	Completion SD
Computer Self-efficacy Scale				
Basics	13.55	4.00	16.98	3.62
Word-processing	8.16	3.62	12.59	3.55
Spreadsheets	6.09	2.61	11.21	3.95
Internet	6.99	3.30	11.93	4.13

Among the four levels of computer self-efficacy before completion of the computer literacy course, the “basics” level was the highest. On the other hand, the mean score for “Spreadsheets” was the lowest. Compared to mean scores before completion of the course, the mean scores for the four factors of students’ computer self-efficacy after completion of the course were higher.

MANOVA for Self-efficacy before Completion of the Course

Means and standard deviations of students’ computer self-efficacy at different levels of prior experience before completion of the computer literacy course are presented in table 3. The group of students with prior computer experience had more self-efficacy than the group with no prior computer experience for the four factors (basics, word-processing, spreadsheets, and Internet). An interesting finding revealed by data in table 3 is that almost half of the students entered the course with no prior experience. This emphasizes the findings of the study conducted by Liu et al. (1992).

Table 3
Mean Scale Scores of Groups before Completion of the
Computer Literacy Course

Dependent Variable	Prior Experience	M	SD	N
Computer Self-efficacy Scale Basics	Without	10.45	3.08	47
	With	16.46	2.15	50
	Total	13.55	4.00	97
Word-processing	Without	5.55	1.32	47
	With	10.62	3.38	50
	Total	8.16	3.62	97
Spreadsheets	Without	5.04	0.20	47
	With	7.08	3.36	50
	Total	6.09	2.61	97
Internet	Without	5.23	0.81	47
	With	8.64	3.87	50
	Total	6.99	3.30	97

Computer self-efficacy scores for the four factors (basics, word-processing, spreadsheets, and Internet) measured at the two levels of prior computer experience were analyzed using one-way multivariate analysis of variance (MANOVA) to examine if mean differences were significant. The results showed that the prior computer experience main effect was significant, Wilks' lambda=.371, $F(4,92)=39$, $p<.001$, indicating there were differences between the two levels of prior computer experience (with and without) on the four factors of computer self-efficacy (basics, word-processing, spreadsheets, and Internet).

Subsequent to the MANOVA, the Bonferroni method was used to make comparisons between group means for prior computer experience. The results (presented in table 4) showed that students with prior computer experience had significantly more computer self-efficacy for all factors (basics, word-processing, spreadsheets, and Internet) than students with no prior computer experience.

Table 4
Mean Differences of Levels of Computer Prior Experience on Self-efficacy before Completion of the Literacy Course

Dependent Variable	Prior Experience	Mean Difference (I-J)	Sig.
Basics	With (I) Without (J)	6.01*	.000
Word-processing	With (I) Without (J)	5.07*	.000
Spreadsheets	With (I) Without (J)	2.04*	.000
Internet	With (I) Without (J)	3.41*	.000
* The mean difference is significant at the 0.05 level.			

MANCOVA for Self-efficacy after Completion of the Course

Means and standard deviations of students' computer self-efficacy at different levels of prior experience after completion of the computer literacy course are presented in table 5. After completion of the computer literacy course, both groups of students (with and without prior computer experience) had higher computer self-efficacy mean scores for all factors (basics, word-processing, spreadsheets, and Internet) than what they had before completion of the course. In fact, the mean score of the group that entered the course with no prior computer experience had increased tremendously, on all four factors, compared to the group that entered the course with prior computer experience. The mean scores of both groups after completion of the course were close.

Table 5
Mean Scale Scores of Groups after Completion of the
Computer Literacy Course

Dependent Variable	Prior Experience	M	SD	N
Computer Self-efficacy Scale Basics	Without	16.68	4.44	47
	With	17.26	2.66	50
	Total	16.98	3.62	97
Word-processing	Without	12.45	3.91	47
	With	12.72	3.21	50
	Total	12.59	3.55	97
Spreadsheets	Without	11.32	4.25	47
	With	11.10	3.68	50
	Total	11.21	3.95	97
Internet	Without	12.26	4.42	47
	With	11.62	3.87	50
	Total	11.93	4.13	97

Controlling for computer self-efficacy before completion of the literacy course, computer self-efficacy scores on the four factors (basics, word-processing, spreadsheets, and Internet) measured at the two levels of prior computer experience after completion of the literacy course were analyzed using one-way multivariate analysis of covariance (MANCOVA) to examine if mean differences were significant. The results showed that the prior computer experience main effect was not significant, Wilks' lambda=.980, $F(4,88)=.440$, $p=.779$, indicating there were no differences between the two levels of computer prior experience (with and without) on the four factors of computer self-efficacy (basics, word-processing, spreadsheets, and Internet) after completion of the computer literacy course. This concludes that group differences detected on computer self-efficacy measured at the two levels of prior computer experience disappeared after completing the computer literacy course.

Discussion and Conclusions

This study examined the effect of an Internet-based computer literacy course on pre-service teachers' computer self-efficacy. The purpose behind conducting the study was to examine the changes in computer self-efficacy of pre-service teacher education students stemming from participating in an educational computer literacy course and to test whether students' prior computer experience could have an effect on their computer self-efficacy.

The descriptive statistics of the study indicated that the mean scores of the four factors of students' computer self-efficacy (basics, word-processing, spreadsheets, and Internet) after completion of the course were higher than those before completion of the course. This concludes that the computer literacy course did enhance students' computer self-efficacy. The same conclusion has been made by several studies (Durndell & Haag, 2002; Hill et al., 1987; Laguna & Babcock, 2000; Laurillard, 1996; Medvin et al., 2002; and Moroz & Nash, 1997). In fact, this conclusion can be explained by the following points:

- Computer literacy courses are offered as an initial step in preparing a student teacher's future in computer technology.
- Computer literacy courses are usually designed to teach basic computer skills and introduce pre-service teacher students to several common computer applications (e.g., word processing, spreadsheets, and Internet).
- In computer literacy courses, pre-service teacher students are provided with hands-on experiences that can be integrated into their teaching.
- Several students in the computer literacy course utilized in this study indicated that they were introduced to basic computer skills and software that they could use for themselves and for the classroom. They also indicated that they learned more computer terminology so they may understand items using computer terms.

The findings of the study showed that before completion of the computer literacy course there were significant differences between the two levels of prior computer experience (with and without) on computer self-efficacy for all factors (basics, word-processing, spreadsheets, and Internet). The group of students with prior computer experience had more computer self-efficacy than the group with no prior computer experience for all factors. This finding, which has been supported by several studies (Chu, 2003; and Kagima & Hausafus, 2000), concludes that students entering computer literacy courses generally have different computer experience backgrounds and, therefore, have different computer self-efficacy. In designing computer literacy courses, this conclusion has to be an essential part of the planning process. In addition to addressing the needs of students who have no prior computer experience, these computer literacy courses have to address the needs of students who have some prior computer experience. In this regard, a computer literacy placement test prior to taking computer literacy courses can be a useful aid in the selection process of students.

The findings also showed that after completion of the computer literacy course the prior computer experience main effect was not significant. In other words, there were no significant differences between the two levels of prior computer experience (with and without) on all factors of computer self-efficacy (basics, word-processing, spreadsheets, and Internet). This concludes that group differences detected on computer self-efficacy measured at the two levels of prior computer experience disappeared after completing the computer literacy course. Based on this conclusion, one can say that:

- Although it raised computer self-efficacy for both types of students (with and without prior computer experience), the computer literacy course was more effective and more useful for those who had no prior computer experience.
- Computer literacy courses should be given at an introductory level of teacher education programs to eliminate differences in

computer self-efficacy that may exist among students before they get in depth in their programs.

Recommendations

Based on the findings of this study, the following recommendations were set forth:

- Prior computer experience contributes to pre-service teacher education students' computer self-efficacy. Therefore, students' computer self-efficacy should be assessed before they enroll in a computer literacy course.
- One way to encourage teachers to use computers in the classroom is to increase their prior computer experience. This can be achieved by providing several computer literacy courses tailored to specific levels of computer self-efficacy.
- Similar to pre-service teacher education students, inservice teachers should be provided with technology training that can satisfy specific needs in the schools at which they work.
- Other studies are needed to examine the effect of factors other than prior computer experience on students' computer self-efficacy. Owning a personal computer and age are two possible factors that are worth researchers' attention.

References

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. **Psychological Review**, *84*(2), 191-215.

Bandura, A. (1986). **Social foundations of thought and action**. Englewood Cliffs, NJ: Prentice-Hall.

Bohlin, R. M., & Hunt, N. P. (1995). Course structure effects on students' computer anxiety, confidence and attitudes. **Computing Research**, *13*(3), 263-270.

Bradley, G., & Russell, G. (1997). Computer experience, school support and computer anxieties. **Educational Psychology**, *17*(3), 267-285.

Brock, E. J., Thomsen, W. E., & Kohl, J. P. (1992). The effects of demographics on computer literacy of university freshmen. **Journal of Research on Computing in Education**, *24*(4), 563-570.

Busch, T. (1995). Gender differences in self-efficacy and attitudes towards computers. **Journal of Educational Computing Research**, *12*(2) 147-158.

Chu, L. (2003). The effects of web page design instruction on computer self-efficacy of preservice teachers and correlates. **Journal of Educational Computing Research**, *28*(2), 127-142.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. **MIS Quarterly**, *9*(2), 189-211.

Coover, M. D., & Owen, S. V. (1989). Development and validation of the computer self-efficacy scale. **Educational and Psychological Measurement**, *49*, 893-899.

Delcourt, M. A. B., & Kinzie, M. B. (1993). Computer technologies in teacher education: The measurement of attitudes and self-efficacy. **Journal of Research and Development in Education**, **27**(1), 35-41.

Devlin, M., & James, R. (2003). The potential of a methodology for university-wide multimedia and educational technology evaluation. **Assessment & Evaluation in Higher Education**, **28**(1) 47-58.

Doll, W. J., & Torkzadeh, G. (1989). A discrepancy model of end-user computing involvement. **Management Science**, **35**, 1151-1171.

Driscoll, M. (1998). **Web-Based Training: Using Technology to Design Adult Learning Systems**. San Francisco: Josey-Bass/Pfeiffer.

Drost, C., & Abbott, J. (2000). **Programs that prepare teachers to integrate technology into instruction in meaningful ways: How successful are they?** Paper presented at the Society for Information Technology & Teacher Education International Conference, San Diego, CA.

Durndell, A., & Haag, Z. (2002). Computer self-efficacy, computer anxiety, attitudes towards the Internet and reported experience with the Internet, by gender, in an East European sample. **Computers in Human Behavior**, **18**(5), 521-536.

Ertmer, P. A., Evenbeck, E., Cennamo, K. S., & Lehman, J. D. (1994). Enhancing self-efficacy for computer technologies through the use of positive classroom experiences. **ERT&D**, **42**(3), 45-62.

Hacker, R., & Sova, B. (1998). Initial teacher education: A study of the efficacy of computer mediated courseware delivery in a partnership context. **British Journal of Educational Technology**, *29*(4), 333-341.

Hasan, B. (2003). The influence of specific computer experiences on computer self-efficacy beliefs. **Computers in Human Behavior**, *19*(4), 443-451.

Hill, T., Smith, N. D., & Mann, M. E. (1987). Role of self-efficacy expectations in predicting the decision to use advanced technologies: The case of computers. **Journal of Applied Psychology**, *72*(2), 307-313.

Jorde-Bloom, P. (1988). Self-efficacy expectations as a predictor of computer use: A look at early childhood administrators. **Computers in Schools**, *5*(1/2), 45-63.

Kagima, L. K., & Hausafus, Ch. O. (2000). Integration of electronic communication in higher education: Contributions of faculty computer self-efficacy. **Internet and Higher Education**, *2*(4), 221-235.

Karsten, R., & Roth, R. M. (1998). The relationship of computer experience and computer self-efficacy to performance in introductory computer literacy courses. **Journal of Research on Computing in Education**, *31*(1), 14-25.

Kellenberger, D. W. (1996). Preservice teachers' perceived computer self-efficacy based on achievement and value beliefs within a motivational framework. **Journal of Research on Computing in Education**, *29*(2), 124-140.

Kim, C. S., & Peterson, D. (1992). The introductory computer course: Business majors perceived importance of topics. **Journal of Education for Business**, *6*(6), 361-365.

Kinzie, M. B., Delcourt, M. A. B., & Powers, S. M. (1994). Computer technologies: Attitudes and self-efficacy across undergraduate disciplines. **Research in Higher Education**, **35**(6), 745-768.

Laguna, K. D., & Babcock, R. L. (2000). Computer testing of memory across the adult life span. **Experimental Aging Research**, **26**(3), 229-234.

Laurillard, D. (1996). **Rethinking university teaching: A framework for the effective use of education technology**. New York, NY: Routledge.

Liu, M., Reed, W. M., & Phillips, P. D. (1992). Teacher education students and computers: Gender, major, prior computer experience, occurrence, and anxiety. **Journal of Research on Computing in Education**, **24**(4), 457-467.

McDonald, J. (2002). Is "as good as face-to-face" as good as it gets? **Journal of Asynchronous Learning Networks**. **6** (2), 10-15. Retrieved February 14, 2004 from http://www.aln.org/publications/jaln/v6n2/v6n2_macdonald.asp

McNeil, S. G., Robin, B. R., & Miller, R. M. (2000). Facilitating interaction, communication and collaboration in online courses. **Computers and Geosciences**, **26**, 699-708.

Medvin, M. B., Reed, D. M., & Behr, D. S. (2002). **Computer Training for Preschool Teachers: Impact on Computer Self-Efficacy, Values, and Anxiety**. Paper presented at the Head Start National Research Conference, Washington, DC.

Milbarth, Y. L., & Kinzie, M. B. (2000). Computer technology training for prospective teachers: Computer attitudes and perceived self-efficacy. **Journal of Technology and Teacher Education**, **8**(4), 373-396.

Miura, I. T. (1987). The relationship of computer self-efficacy expectations to computer interest and computer enrollment in college. **Sex Roles**, **16**(5/6), 303-311.

Moore, K. (1994). NCATE standards: Restructuring teacher education. **Teacher Education Quarterly**, **21**(2), 27-36.

Moroz, P. A., & Nash, J. B. (1997). **Assessing and Improving the Factorial Structures of the Computer Self-Efficacy Scale**. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.

Murphy, C. A., Coover, D., & Owen, S. V. (1989). Development and validation of the computer self-efficacy scale. **Educational and Psychological Measurement**, **49**, 893-899.

Olivier, T. A., & Shapior, F. (1993). Self-efficacy and computers. **Journal of Computer-Based Instruction**, **20**(3), 81-85.

Powell, J. V., & Lord, L. M. (1998). Toward qualitative assessment of a computer-based simulation in preservice field experience: A survey pilot study. **Journal of Technology and Teacher Education**, **6**(2-3), 115-124.

Richter, M. (2001). **An Exploration of Using Web Enhanced Teaching and Online Communication in a Conventional Context**. Division of Languages and Intercultural Studies Anglia Polytechnic University, Cambridge, U.K.

Sheffield, C. J. (1996). An examination of self-reported computer literacy skills of preservice teachers. **Action in Teacher Education**, **17**(4), 45-52.

Summers, M. (1988). New primary teacher trainees and computers: Where are they starting from? **Journal of Education for Teaching**, **14**(2), 183-190.

Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. **Information System Research**, **6**, 144-176.

Torkzadeh, G., & Koufteros, X. (1993). Computer user training and attitudes: A study of business undergraduates. **Behaviour & Information Technology**, **12**, 284-292.

Torkzadeh, G., & Koufteros, X. (1994). Factorial validity of a computer self-efficacy scale and the impact of computer training. **Educational and Psychological Measurement**, **54**, 813-821.

Tschannen-Moran, M., Hoy, A. W., & Hoy, W. K. (1998). Teacher efficacy: Its meaning and measure. **Review of Educational Research**, **68**(2), 202-248.

Yi, M. Y., & Venkatesh, V. (1996). Role of computer self-efficacy in predicting user acceptance and use of information technology. In **Proceedings of the Second Annual Americans Conference on Information Systems** (p. 244-246). Phoenix, AZ.

Zhang, Y., & Espinoza, S. (1997). Affiliations of computer self-efficacy and attitudes with need for learning computer skills. **Journal of Educational Computing Research**, **17**(4), 371-383.

Appendix A

Item of the Computer Self-Efficacy Scale

Using the following scale, please indicate your current level of confidence with the activity described in each statement. If you are currently unfamiliar with a particular activity, then you might select the response "No, I can not."

Scale: 3=Yes, I can; 2=Maybe I can; 1=No, I can not

Basics	Yes I can	Maybe I can	No I can not
1. I feel confident saving files to a storage medium (like a floppy disk).	3	2	1
2. I feel confident formatting a disk.	3	2	1
3. I feel confident making back-up disks.	3	2	1
4. I feel confident printing a file to a printer.	3	2	1
5. I feel confident scanning files/folders/disks for viruses.	3	2	1
Word-processing:			
1. I feel confident using a word processing program to create a document.	3	2	1
2. I feel confident formatting text (e.g. bold, italic) while word processing	3	2	1
3. I feel confident moving blocks of text while word processing.	3	2	1
4. I feel confident making corrections while word processing.	3	2	1
5. I feel confident creating tables and charts while word processing.	3	2	1
Spreadsheets:			
1. I feel confident creating a spreadsheet.	3	2	1
2. I feel confident entering data into a spreadsheet.	3	2	1
3. I feel confident using built-in functions with data in a spreadsheet.	3	2	1
4. I feel confident using formulas with data in a spreadsheet.	3	2	1
5. I feel confident creating charts from data in a spreadsheet.	3	2	1
Internet:			
1. I feel confident using a browser to search the Web.	3	2	1
2. I feel confident using a search engine to locate a specific internet site.	3	2	1
3. I feel confident sending and receiving email messages.	3	2	1
4. I feel confident sending an attachment with an email message.	3	2	1
5. I feel confident downloading files and programs from the Internet.	3	2	1

