Preservice Teachers' Perceptions of an Introductory Instructional Technology Course

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Abstract

Today's schools continue to be challenged by the increased visibility, roles and cost of educational technology. Recent studies on the integration of technology into education suggest that preservice teachers have to experience effective applications of computer technology for teaching and learning, if they are going to use them in their own classrooms. This paper discusses the importance of the technology standards for the teacher preparation programs and the students' perceptions of the adequate use of technology for their teaching practices. The survey was conducted with 80 students who enrolled in the Introductory Instructional Technology Course at a research university in the Southeast in fall 2002. Findings suggest that the standard-based curriculum and the use of project-based assessment enable students to achieve all the necessary skills and knowledge through cross-curricular hands-on practice during the course.

Introduction

Over the years, educational technology has played an important role in the innovation of education, providing both teachers and students with more options and flexibility in their teaching practices. With the Internet and computer technology available to most teachers, educational technology becomes increasingly indispensable in the field of education. In today's schools, multimedia software, content- based CD-ROMs, online resources and many other technologies provide students and teachers with many new research tools, limitless wealth of information, shared professional practices (Keane, 2002), communication tools, and new modes of learning. Availability of the Internet in schools enables teachers and students to have a variety of opportunities to

expand the curriculum. For example, participating in NASA projects enriches the science classroom, and participating in local or global collaborative projects provides students with valuable cross- cultural learning experiences.

Today's schools continue to be challenged by the increased visibility, roles and cost of educational technology. Considering current trends in education, a modern classroom would not be complete without computers, software, Internet connections, projectors, and a variety of other high-tech devices (Keane, 2002). According to Hasselbring et al. (2000), schools will be equipped with the best hardware and software in the near future, but it is unlikely that teachers and students will use them effectively, if teachers are not trained. The success of technology infusion in schools depends on training both inservice and preservice teachers. In the near future, public schools will require teachers to have competent technology skills and be able to effectively implement educational technology in classrooms. Therefore, it is logical to require preservice teachers to incorporate technology into the lessons they prepare to teach (Johnson et al. 2000) as teacher education programs help them to prepare for their future classrooms.

The NETS and Teacher Education

Recent studies on the integration of technology into education suggest that preservice teachers have to experience effective applications of computer technology for teaching and learning, if they are going to use them in their own classrooms. Teacher education programs are responsible for preparing preservice teachers for tomorrow's classrooms (NCATE, 1997). The National Council for Accreditation of Teacher Education (NCATE), which is the major United States agency responsible for the accreditation of teacher training programs, has begun to emphasize the importance of

technology in education in its standards. In response to the movement of the NCATE, the International Society for Technology in Education (ISTE) formed the writing team composed of teachers, technology coordinators, school administers, and teacher educators developed the National Education Technology Standards (NETS) for all teachers and performance indicators. Those standards were approved and have been revised by the NCATE to facilitate nation-wide school improvement. The purpose of the NETS for teachers is to enable teacher education programs to promote the use of educational technology to facilitate personal and professional development (NCATE,1997), providing a framework of performance indicators. Performance indicators for each standard measure the necessary skills and knowledge accomplished by students. Since the NETS have been adopted by NCATE, those standards have been widely used throughout the nation to guide universities in application of technology in the educational process (ISTE, 2002). Teacher education programs have begun implementing the competency-based licensure standards. According to the ISTE report (2002), at the state level, 43 of the 50 states have adopted, adapted, aligned with, or referenced the NETS at official state documents by October 31, 2002. In 1997, the Tennessee State Board of Education adopted the licensure standards for all prospective teachers and the technology standards were imbedded into them. In 2000, the board approved the transitional performance-based standards model proposed by the NCATE, which contains the performance indicators for measuring technology competency (Tennessee Board of Education).

Swanson and Pearson (2003) advocate the implementation of the NETS to facilitate the goal of educational process, which is to empower students to live in the 21st century. Since the standard-based curriculum and assessment will require student

performance at certain levels, the implementation of the NETS will accelerate school improvement overall in the United States. To assure that prospective teachers attain these standards, teacher education institutions will need substantial professional development in technology, and prospective teachers will need to have a fundamental understanding and necessary skills in using computers in the curriculum.

In order for teachers to feel comfortable using technology in their classrooms, training has to take place in a way that enables them to gain self-confidence in their abilities (Becker, 2000). In a national survey (Duhaney, 2000), a majority of teacher respondents indicated that they have had some training in technology, but only 20% of them felt comfortable using computers or in understanding how to use technology to assist in providing an engaging and meaningful learning environment. These survey results indicate a problem that teacher education programs can and should address.

Preservice Teachers' Perceptions of an Instructional Technology Course

Many teacher educators and teacher education programs have been experimenting with the use of technology over the years. Despite their efforts, there are still challenges and concerns regarding teacher's ability to integrate technology into teaching and learning activities and their comfort in doing so. Many suggestions and recommendation have been made to improve teacher education programs. Effective teaching strategies, sound pedagogy, appropriate curriculum, faculty development, and updating equipment are typically the most important considerations in teacher education. Although teacher education institutions have tried their best to provide quality education to their students for many years, many concerns are voiced by many educators. Those concerns include

current trends and issues about the best means of integrating technology into teacher preparation and preparing teachers to do the same in their classrooms.

Therefore, it is important to examine students' perceptions of technology courses that they take as a part of their coursework in order to enhance learning outcomes and effectiveness of the courses. This research reports preservice teachers' perceptions of an introductory instructional technology course based on the NETS: whether they feel they will be comfortable using technology in their prospective classrooms, and whether they value technology in teaching practice.

Methodology

Subjects

Participants in this study were 80 students who enrolled in the introductory instructional technology course in a research university in the Southeast's College of Education during Fall 2002. The participants were undergraduate students and graduate students majoring in education. They were diverse in gender, age, ethnicity and subject concentration areas. There were 12 males and 68 females. Thirty-seven (46%) of the respondents reported having less than 1 year of teaching experience, while forty three (54%) students reported having at least 1 year teaching experience.

Teacher Education Program

The professional teacher education programs at a research university in the Southeast are offered to a student who holds a bachelor's degree and has been admitted to graduate school. The programs require students to complete a yearlong school-based internship along with graduate coursework before qualifying for teacher licensure. The amount of coursework depends on the program and the subject areas. An alternative

program is designed to provide an opportunity for people with appropriate work experience in a non-school setting to prepare for a second or third career in teaching. This program requires students to complete an eight-week full-time summer school term and a yearlong school-based internship. The Tennessee State Board of Education mandates that all applicants applying for a teaching license must have a certain pattern of course work in their chosen teaching field while completing the general education requirements at a research university in the Southeast. The teacher education programs at a research university in the Southeast require all students who apply for teacher licensure to take the ITCE486 course as a part of their undergraduate or graduate coursework. The Lyndhurst program requires students to take an instructional technology course, which is equivalent to the ITCE486 course.

Course content

ITCE 486 course is an introductory instructional technology class required for preservice teachers at a research university in the Southeast. The course is designed to prepare teacher education students to use a variety of computer based technologies including hypermedia, multimedia, digitized video and audio, desktop publishing, spreadsheet, database applications, graphic organizers, and Web page design. The computer applications that the course handles include AppleWorks (Word processing, Spreadsheet, Database), PrintShop Deluxe, PowerPoint, Netscape Composer, Inspiration, Kidspiration, HyperStudio, and many other applications on a need basis. In addition to addressing various computer applications and instructional design models, the course is designed so that students investigate new state and national technology initiatives and standards and learn to develop lesson plans integrating technology with clear

instructional objectives using the Tennessee teacher competency framework. During the course, students are assigned projects such as designing lessons integrating technology applications, creating messages inviting parents to the classroom, developing Web pages for WebQuest or ThinkQuest using Netscape Composer and other applications. At the end of the semester, the students put all their products together and produce a technology portfolio along with the lesson plans, incorporating technology to prove their competency. The course is lecture-based class with an online supplement. The syllabus and assignment sheet for the course are available upon request. The course has been designed in accordance with the NETS.

Research questions

The research questions were:

(1) Does the Introductory Instructional Technology Course for preservice teachers equally emphasize each National Educational Technology Standard?

(2) Is there any difference in the students' perceptions regarding use of technology according to their licensure areas?

(3) Do students equally value the use of technology for their teaching and learning practices regardless of their teaching experience and age?

Materials

A survey instrument was composed of 29 questions with three-point Likert scale (yes, no, not sure). Respondents indicated their content specialization, internship and/or teaching experience, and levels of education. The questions were adopted and modified from the Technology Standards for Teachers developed by the International Society of Technology Education (ISTE) in 2000. They were designed to gather information about

course content, the relative emphasis given to each standard within the course, the students' competency level in technology use, and their perceptions of the adequate use of technology in learning and teaching practice. Questions placed at the end of each section were designed to gather information about the students' perceptions of the value of technology for their professional development. The survey questions were organized into five categories:

(1) Section I: Technology operation and concept (7 questions)
(2) Section II: Planning and designing learning environments and experiences (5 questions)
(3) Section III: Teaching, learning and the curriculum (5 questions)
(4) Section IV: Assessment and evaluation (5 questions)
(5) Section V: Productivity and professional practice (5 questions)

Three experts in instructional technology reviewed the survey as a measure of construct validity.

Procedures

A survey packet (consisting of a cover letter to the instructor and the survey instrument) was sent to the instructors of the course. The course, consisting of six sections, was taught by three instructors. The cover letter to the instructors explained the purpose and intention of the survey and assured the anonymity of individual respondents. The cover letter asked for permission to conduct the survey with the students in the classroom setting. All three instructors agreed to participate in the survey. Upon receiving permission, the investigator visited the classrooms at the designated time (two weeks before semester's end) and explained to the students their rights, the purpose of the research, and procedures of the survey. The investigator distributed the survey instrument

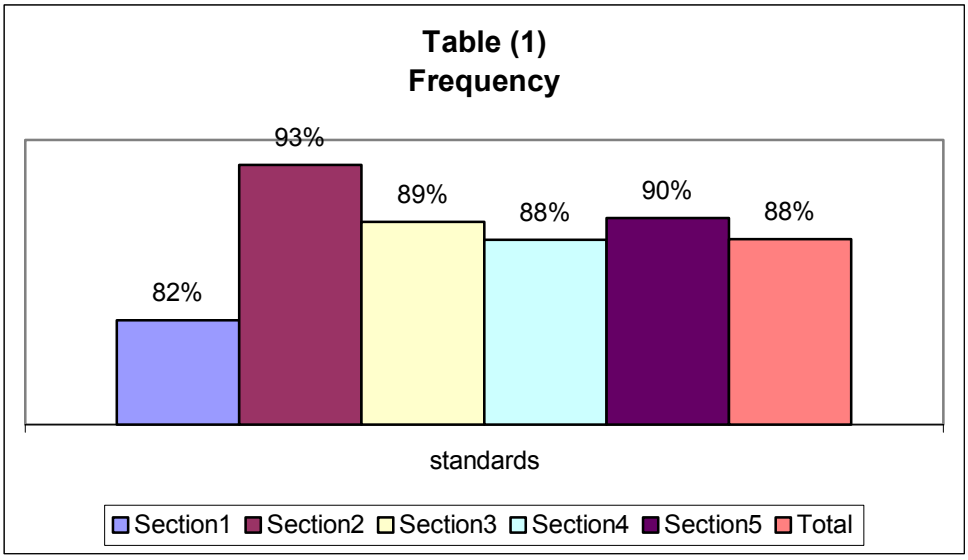
to each student and waited until they completed the questionnaire to increase the return rate (80 of 81 returned).

Data Analysis

Data were analyzed using the appropriate statistical methods to answer each research question (see below). The answer "yes" was coded 1, while the answer "no" or "not sure" was coded 0. The mean and frequency of responses were computed to answer research question #1 based on the coding system. An ANOVA, a T-Test for equality of means, and the Levene's Test for Equality of Variance were applied to answer research questions #2 and #3.

Question #1: Did the Introductory Instructional Technology Course for preservice teachers equally emphasize each National Educational Technology Standard?

Table 1. Frequency table of each section



Note: * Section I: Technology operation and concept , * Section II: Planning and designing learning environments and experiences, * Section III: Teaching, learning and the curriculum, * Section IV: Assessment and evaluation , * Section V: Productivity and professional practice (5 questions)

Table 1 indicates that 82% of students reported having competency in technology

operation and concept; 93% felt competent in using technology to plan and design learning environments and experiences; 89% felt competent in using technology for teaching, learning and curriculum; 88% felt competent in employing technology as an assessment and evaluation tool; 89% reported competency in using technology for productivity and professional practice (administrative responsibilities). Overall 88% of the students reported that they had confidence in utilizing technology in their future classrooms and the same percentage valued the use of technology in learning and teaching practice.

Table 2. Frequency table of section I

	No		Yes		Not Sure	
	Count	%	Count	%	Count	%
Question1	3	3.8%	71	88.8%	6	7.5%
Question2	0	.0%	80	100.0%	0	.0%
Question3	1	1.3%	57	71.3%	22	27.5%
Question4	13	16.3%	50	62.5%	17	21.3%
Question5	3	3.8%	73	91.3%	4	5.0%
Question6	13	16.3%	51	63.8%	16	20.0%
Question7	1	1.3%	79	98.8%	0	.0%

Note: The questions are available in the Appendix A.

Interestingly, responses to section I (see Frequency table 2), technology operations and concepts, showed the lowest confidence level. Section I recorded the lowest mean score among five sections and there was variability in the students' responses. Eighty students (100%) reported that they could operate both of the PC and MAC computers. Seventy-nine students (98.8%) reported that they believe that it is important for teachers to have basic knowledge of concepts and operations of computer technology for their classrooms. On the other hand, only fifty-seven students (71.3%) reported that they could explain terminology related to computer technology, and fifty students (62.5%) reported that they could demonstrate installing content-based software.

Fifty-one students (63.8%) reported that they were confident with basic troubleshooting techniques.

In sum, the students perceived that the Introductory Instructional Technology course equally emphasizes each National Educational Technology Standard. The data also indicated that the students enrolled in the course feel comfortable using computers in planning and designing teaching activities such as developing lesson plans, teaching strategies, utilizing online resources, and technology–based materials. However, many students were uncertain about their skills, in installing content-based software or basic troubleshooting techniques. In addition, the students believed that the use of technology in classrooms enhances students' learning and helps to create meaningful learning environments. They also believed that the use of technology tools affects the quality of teaching practice and that computer literacy will increase their chances of finding employment.

Question #2: Was there any difference in the students' perceptions regarding use of technology according to their licensure endorsement areas?

Table 3. Demographic Information (Licensure Endorsement Area)

	Frequency	**Percent**
PreK-8	39	48.8%
Secondary	31	38.8%
Special Education	10	12.5%
Total	80	100.0%

The demographic information of the survey indicates that the student respondents have nine different licensure areas. For convenient analysis, the categorical variables were merged into three categories: special education, elementary/middle (PreK-8), and

secondary education as indicated in table 3. Since the number of students who were in the PreK-3 group was small, the PreK-3 group was merged into K-8 education group.

Table 4. ANOVA for overall responses

	df	F	p
Between Groups	2	1.54	.22

α=.05

To investigate the differences of the responses according to the licensure endorsement areas, an ANOVA was employed to determine the differences of the means among the three groups. The independent variables were the licensure areas such as special, preK-8, and secondary education, and the dependent variables were the means of the questions. According to the test results shown in table 4, there were no significant differences in mean scores for skills and beliefs among the three groups $F(1.54)$, $p = .22 > 0.05$. When an ANOVA test was conducted for each question according to the licensure endorsement areas, the data indicated that responses to statement # 3, # 4 and # 9 exhibited differences in their means by the groups. Interestingly, for statement # 9, only 77% of the secondary group agreed, while 100% of other groups did. Detailed information is as follows:

Table 5. ANOVA for statement # 3, # 4, and # 9 by license areas

Sources	**F**	**p**
Between groups		
# 3: I can explain terminology related to computer technology.	4.88	.01
# 4: I can demonstrate installing content-based software.	4.90	.01
# 9: I can apply knowledge from current instructional research on the use of technology to my future classroom.	6.88	.00

α=.05

Overall data showed no difference in the students' perceptions in the use of technology according to their licensure endorsement areas. However, the detailed information reveals that the secondary education group perceived the use of technology more positively than did those in PreK-8 and special education.

Question #3: Did students equally value the use of technology in their teaching and learning practice, regardless of their teaching experience and ages?

Five statements (# 7, #12, #17, # 22, and # 27) that were designed to explore the students' beliefs about the use of technology were analyzed to answer research question 3. The demographic information from the survey indicated that the teaching experience of the students ranged from zero to fifteen years. For convenient analysis, the categories of teaching experience were merged into two groups, "those without experience" (n=37) and "those with experience" (n=43). The "group without experience" included the students who had no or less than one year of teaching experience. The "group with experience" included the students who had more than one full year of teaching experience. Descriptive statistics and a T-test for equality of means were employed in order to determine whether there were any differences in perceptions of the value of technology according to teaching experience. The independent variables were teaching experience, while dependent variables were the mean scores of the five statements. The test results revealed that within the group without experience, 88% agreed with the statements, and 86% of "the group with experience" agreed with the statements. Detailed information is as follows:

Table 6. Frequency table: Students' beliefs about the use of technology by teaching experience

Statements	Frequency	
	Without experience	With experience
7. I believe that it is important for teachers to have basic knowledge of concepts and operations of computer technology for their classroom.	100%	97.7%
12. I believe that it is important for teachers to know how to utilize technology-based materials to plan for their lessons.	86.5%	96.5%
17. I believe that a technology-implemented curriculum is important for students in their learning.	86%	86%
22. I believe that it is important for teacher to apply technology resources to facilitate a variety of effective assessment and evaluation strategies.	83%	86%
27. I believe that my competent use of technology will increase my chances to get hired.	86%	79%
The mean of the above data	88%	86%

As shown in table 6, the students highly valued the use of technology in learning and teaching practice regardless of their teaching experience. Interestingly, when comparing the response frequencies, the students without teaching experience valued the use of technology slightly more than the students with teaching experience. It is presumed that the students who had teaching experience might have had doubt about technology access and use in a real classroom setting.

To investigate the difference in responses by ages, students were divided into three groups: under 22 (n=30), 22-29 (n=43), and above 30 (n=7), and responses to five statements (statement # 7, #12, #17, #22, and #27) were analyzed by age groups. Descriptive statistics and an ANOVA were employed in order to examine whether there was any difference in perceptions of the value of technology according to age. The result yielded F (.54), P=.65 > 0.05, indicating that there were no significant differences in

responses among age groups. Therefore, it was concluded that all students valued the use of technology for teaching and learning practice, regardless of their teaching experience and age.

Conclusion and Implications

Based on the study results, the introductory instructional technology course at a research university in the Southeast is well designed to cover various educational technology applications, following the guidelines of NETS (2000) for teachers. The students in the course responded with confidence regarding their abilities to demonstrate the necessary skills. It appears that designing the courses based on the NETS standards/ guidelines has been effective. Another important notion from the results of this study is the use of project-based assessment. Since the course emphasized performance by creating projects f\or assessment, the students gained necessary skills through cross-curricular hands-on practice. By the end of semester, students had produced a number of projects using various computer applications.

The findings support Swanson & Pearson's (2003) study that the implementation of technology standards may facilitate or act as a catalyst in the process of empowering learning. Fulford and Ho (2002) also point out the importance of establishing standards for curriculum reform. According to their study, many universities, as well as school systems, have increased the number of technology resources; yet professional development has primarily focused on learning various software programs rather than using them across the curriculum. Even though these approaches contribute to the integration of technology in the classroom, it is not an appropriate approach for long-term effect. The focus should be on applying skills across curriculum by establishing and

implementing standards such as the NETS. Implementing the NETS for Teachers (ISTE, 2002) requires substantial effort from schools and colleges of education, school districts, and the teachers themselves (Swanson & Pearson, 2003). However, in the long run, the NETS will contribute to improve learning and teaching environments by assisting preservice teachers with building the vision of technology infusion in their future classrooms.

Research Limitations

The survey used in this study was conducted during a class period when evaluation of student projects was underway. Therefore, the reliability of the data is somewhat questionable. Furthermore, it is uncertain whether or not the students will retain the knowledge and skills they believe they obtained in the class, unless they keep using them. The limited response choices (yes, no, not sure) used in this survey limited the students' options to express their perceptions. In addition, combining two response choices (no=0, not sure=0) and the categorical variables in research question 2 and 3, may have skewed the results because the analysis may not have reflected the students' perceptions accurately. Even with these limitations, the study has provided insight into students' perceptions of and reactions to this standards-based course, and it appears that using the NETS as a design framework has had positive impact on the course and participants in it.

Contributors

Eunjoo Oh is a doctoral student in Instructional Technology at the University of Tennessee in Knoxville. She is currently working as a coordinator at the Technology Enhanced Curriculum Lab in the College of Education, Health, and Human Sciences. Her research interests include technology integration in reading and foreign language education and computer-based education.

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