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ABSTRACT

A growing concern in teacher education programs is technology training. Research confirms that training positively affects perservice teachers' attitudes and technology proficiency. However, little is known about the kinds of factors that may predict preservice teachers' integration of technology into their own instruction. The goal of this study is to explore which factors affect elementary education candidates' integration of technology into their instruction during field placement. A multiple regression analysis was conducted on seniors' responses to a survey administered immediately after completion of the field placement experience. Results revealed that four predictors accounted for 24.8 percent of the variance in candidates' reported integration of technology into their field placement instruction. Significant findings showed that candidates tended to integrate a higher degree of technology into their instruction if they reported high general technology proficiency, if more technology was available in their classroom, and if their mentor teachers used technology more frequency. However, a belief about technology being motivating was not a strong predictor. (Author/SM)

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Predicting Elementary Education Candidates' Technology Integration During their Field Placement Instruction

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Abstract

A growing concern in teacher education programs is technology training. Research confirms that training positively affects pre-service teachers' attitudes and technology proficiency (Abbott & Faris, 2000; Blake, Holcombe, & Foster, 1998; Negishi & Elder, 2002; Snider, 2003). However, little is known about the kinds of factors that may predict pre-service teachers' integration of technology into their own instruction. The goal of this study is to explore which factors affect elementary education candidates' integration of technology into their instruction during field placement. A multiple regression analysis was conducted on seniors' responses to a survey administered immediately after completion of the field placement experience. Results revealed that four predictors accounted for 24.8% of the variance in candidates' reported integration of technology into their field placement instruction. Significant findings (at $p < .01$) showed that candidates tended to integrate a higher degree of technology into their instruction if they reported high general technology proficiency ($\beta = .17$), if more technology was available in their classroom ($\beta = .32$), and if their mentor teachers used technology more frequently ($\beta = .16$). However, a belief about technology being motivating was not a strong predictor.

Predicting Elementary Education Candidates' Technology Integration During their Field Placement Instruction

A growing concern in teacher education programs is technology training. A number of studies have explored pre-service teachers' attitudes toward email, computers, internet resources, and various types of software as well as their technology proficiency. Although research indicates that training positively affects pre-service teachers' attitudes and technology proficiency, less attention has been directed toward the kind of factors that affect pre-service teachers' implementation of technology in their own instruction. It is worthwhile to understand factors that encourage actual technology use in instruction.

Pre-service teachers' attitudes toward technology

Blake, Holcombe, and Foster (1998) examined effectiveness of technology training as they investigated attitudes and beliefs of introductory use by pre-service teachers. The research sample was upper level undergraduate teacher education majors enrolled in a field-based Block program that required use of email in coursework and at professional development sites. The data was collected through interviews and surveys. The results indicated that majority of the pre-service teachers felt that email was an important technological tool after the training and indicated that they would implement email in their classrooms.

Another study by Abbott and Faris (2000) also examined the attitudes toward the use of email and computers by pre-service teachers before and after a semester-long literacy course that required the use of technology to complete assignments and

activities. Sixty-three undergraduate students majoring in elementary education held more positive attitudes toward using computers and email on a post survey compared to a pre-survey. Most pre-service teachers found using computers enjoyable and believed that using computers contributed to learning as well as to producing products related to teaching and schooling.

Snider (2003) examined the effectiveness of the technology project, Learning and Integrating New Knowledge and Skills (LINKS), supported by a U.S. Department of Education PT3 implementation grant. The LINKS project provided a variety of technology trainings through laboratory sessions and one-on-one interventions for pre-service teacher candidates. The training included completing course requirements through email and using a Web-based, technology-integrated lesson plans. The data analysis involved pretest and posttest data based on valid matched pairs from two cohorts. The results indicated that all pre-service teachers, on average, considered themselves more proficient technology users on the posttest than on the pretest. In addition, the findings showed significant attitude changes for pre-service teachers. Open-ended comments revealed generally positive responses in relationship to acceptance and comfort with technology and confidence in ability to integrate its use in future curriculum delivery.

A recent study by Negishi and Elder (2002) examined the effectiveness of a technology-training project, funded by the Preparing Tomorrow's Teachers Use of Technology (PT3) initiative of the U. S. Department of Education. They explored pre-service teachers' attitudes and proficiency toward using technology in the classroom. It provided a variety of training sessions for elementary education candidates: Assistive

technology was offered for pre-service teachers to better prepare them for diverse classrooms in which students with disabilities may benefit from specialized equipment. They also learned to use search engines on the Internet to develop their lesson plans, and how to create web pages. The results showed statistically significant attitude changes and proficiency in computer use for pre-service teachers from pre-training to post-training. For example, they became more willing to believe that using technology was motivating for students in the classroom.

Overall, research confirms that technology training in teacher education positively affects pre-service teachers' attitudes and proficiency. However, it is important to realize that the ultimate goal of technology training in teacher education should focus on actual use of technology in instruction. Additional studies have investigated factors that affect teachers' implementation of technology in their instruction.

Integrating technology in instruction

One study examined the process of technology integration by in-service teachers (Zhao, Pugh, Sheldon, & Byers, 2002). The researchers discussed factors that impact the degree of success of classroom technology integration, including (1) technology proficiency, (2) teachers' beliefs, (3) technological infrastructure, and (4) social influence. A successful integration of classroom technology was more likely to occur: (1) when teachers had not only skills but also knowledge about what was necessary in using a specific technology in teaching, (2) when teachers believed technology to be "the means to an end, rather than an end itself," (3) when teachers had access to useful and functional technologies, and (4) when teachers worked with peers

who were excited and used technology in teaching. Although the participants were all in-service, it is likely that these factors similarly impact technology use by pre-service teachers, too.

Research on technology integration in the classroom has also considered obstacles to technology use. Snider (2003) stated that pre-service teachers believed low level of access to technology would be a significant barrier to technology use. Also, pre-service teachers were concerned because they seldom saw technology use modeled in public school classrooms although many of them gained comfort with technology and confidence in their ability to integrate it within instruction due to technology training. Wang (2002) also discussed that pre-service teachers, in general, did not have many models that gave them ideas on how to use computers and other technologies in their own classroom.

In summary, previous research analyzed the process of integrating technology in instruction. Although pre-service teachers' beliefs and technology proficiency are considered to be important outcomes of technology training, factors impacting pre-service teachers' integration of technology in their own instruction are important to study. Issues, such as, availability of technology and modeling of technology use were found to be critical for in-service teachers and suggested by other researchers to be important for pre-service teachers. Therefore, this study examined whether these factors predict pre-service teachers' use of technology in their instruction during their field placement.

Method

Participants

The participants were 222 undergraduate students (212 female, 10 male) majoring in elementary education at a mid-south university. They were all seniors and completed the field placement prior to our data collection. The participants consisted of three graduating classes including 44 from the first, 76 from the second, and 102 from the third.

Procedure

This study was a part of larger evaluation project that examined the effectiveness of infusing technology in education system, funded by the Preparing Tomorrow's Teachers Use of Technology (PT3) initiative of the U. S. Department of Education. One aim of this grant was to train elementary education candidates in a technology rich environment. Each semester, a number of workshops were offered to pre-service teachers. Assistive technology was one major training session; it aimed to familiarize pre-service teachers with assistive technologies that would serve students with special needs. They also learned a variety of topics related to the use of the Internet including utilizing search engines to develop lesson plans and how to create web pages. In addition, they were introduced to project-based lessons such as Project Learning Tree, Project Wild, and Project Wet.

Data was collected through surveys near the end of each semester, when elementary education candidates had completed their field placement.

Instruments

The survey featured a variety of topics related to technology. This study investigated the following:

Pre-service teachers' beliefs about technology being motivating (BELIEFS) was assessed by a two-item scale. The items were "When working with technology, students display more interest in the activity" and "Students are excited about using computers in the classroom." The preservice teachers rated the items on a 5-point (5 = strongly agree to 1 = strongly disagree) Likert scale. The mean of the item was calculated and used for the analysis. The Cronbach alpha was .66.

Pre-service teachers' general technology proficiency (GENERALTECH) was assessed by one item: "When it comes to using technology for personal and school use, I consider myself" The item was rated with 6-point (6 = extensive user to 1 = infrequent user) Likert scale.

The technology availability (AVAILABILITY) at pre-service teachers' field placement classroom was assessed by three-item scale. The items included "In my field placement classroom, there was useful and functional technology available 'for my mentor teacher's use, 'for my use,' and 'for my student use.'" The scale was rated with 5-point (5 = strongly agree to 1 = strongly disagree) Likert scale. The Cronbach alpha was .85.

Their mentor teacher's use of technology in instruction (MENTOR) was assessed by a four-item scale. The items included "My mentor teacher used technology during my field placement 'to plan and design his/her lessons,' 'to carry out his/her lessons,' 'for assessment and evaluation,' and 'for other professional activities.'" The

response categories of the scale were: 5 = frequently, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never. The mean score was calculated and used for the analysis. The Cronbach alpha was .82.

Pre-service teachers' use of technology in instruction (INTEGRATION) was assessed by a four-item scale. The items were such as "I used technology during my field placement 'to plan and design my lessons,' 'to carry out my lessons,' 'for assessment and evaluation,' and 'for other professional activities.'" The response categories of the scale were: 5 = frequently, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never. The mean was calculated and used for the analysis. The Cronbach alpha was .65.

Data Analysis

Multiple regression analysis with forced entry was chosen to assess the degree and character of the relationship between dependent variable and independent variables. The criterion variable was pre-service teachers' use of technology in instruction (INTEGRATION). The predictor variables were pre-service teachers' beliefs about technology being motivating (BELIEFS), general technology proficiency (GENERALTECH), availability of technology (AVAILABILITY), and mentor teachers' use of technology in instruction (MENTOR).

Results

Results indicated that the four predictors accounted for 24.8% of the variance in candidates' reported integration of technology into their field placement instruction.

Significant findings (at $p < .01$) showed that candidates tended to integrate a higher degree of technology into their instruction if they reported high general technology proficiency ($\beta = .17$), if more technology was available in their classroom ($\beta = .32$), and if their mentor teachers used technology more frequently ($\beta = .16$). However, candidates' beliefs about technology being motivating were not a strong predictor.

Table 1: Model Summary

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	22.344	4	5.586	17.236	.000
Residual	67.735	209	.324		
Total	90.079	213			
R Square	.248				

Table 2: Coefficients

Model	Standardized Coefficients Beta	t	Sig.
Constant		4.815	.000
BELIEFS	.104	1.605	.110
AVAILABILITY	.317	4.864	.000
MENTOR	.164	2.643	.009
GENERALTECH	.167	2.682	.008

Discussion

The purpose of this study was to explore which factors affect pre-service teachers' integration of technology into their instruction during field placement. The multiple regression model indicated that access to technology, general technology proficiency, and mentor teachers' use of technology were significant predictors of implementation of technology during student teacher experience. Although technology availability had the strongest impact on the integration, each factor was important and contributed to the implementation of technology. The elementary education candidates

who were prepared to use their technology skills and knowledge could integrate technologies more frequently than ones who did not have enough proficiency. Moreover, modeling gave pre-service teachers some kind of direction for how to incorporate available technology into their own teaching and to promote students' learning. The findings indicated that a belief about technology being motivating for students was not a significant factor. The attempt to integrate technology in one's teaching appears to be affected by practical, immediate factors such as computer availability and proficiency more so than by beliefs that technology is beneficial.

Conclusion

There have been many efforts to enhance technological environment and technology proficiency in K-12. Over the decades, the number of computers in schools has dramatically increased and technology training for educators has been offered through the U.S. Department of Education (Bennett, 2002). Research focusing on the effectiveness of technology training showed positive outcomes of participants in terms of attitude and technology proficiency. However, it is important to realize that teacher education programs should not only teach pre-service teachers how to use technology but also teach them how to incorporate technology into their teaching and students' learning (Abbott & Faris, 2000). One way to teach pre-service teachers how to incorporate technology into classroom is through modeling its use. Drazdowski, Holodick, and Scappaticci (1998) stated "as an education department faculty member and supervisor of student teachers, I must model in my own classroom what I expect of intern teachers during their student teaching semester."

The process of classroom technology integration is complex. Predictors, such as technology availability, technology proficiency, and modeling by mentors though vital, could not fully explain the complex process. Further research should continue to examine additional factors that predict pre-service teachers' actual use of technology. At the same time, we should carefully examine the problem of transfer as it pertains to technology training and use in actual instruction. How can we more successfully encourage pre-service teachers to integrate technology in their field placement and then in their future teaching?

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