

**Envisioning the Foundations of Technology Integration  
in Pre-service Education**

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## Envisioning the Foundations of Technology Integration

The need to provide preservice candidates with authentic opportunities to use technology in K-12 classrooms is well-documented (Dawson, 2006). In light of this, the International Society for Technology in Education (ISTE) developed the National Educational Technology Standards for Students (1998). The technology standards described what technology K-12 students should be able to use to create student-centered products that develop critical thinking skills. Additionally Enhancing Education Through Technology (EETT), part of the No Child Left Behind Act (2001), provided financial assistance and guidance for improving technology proficiency among teachers, as well as for increased technology use in classrooms (Delisio, 2005). Since students in entry level teacher education program often experienced a range of technology integration during their high school education (Bannister & Ross, 2005), it is not surprising that many lacked the skills to be proficient in technology. The authors cautioned, "The K-12 students who are not seeing technology integration being modeled in their schools are less likely to value this emphasis once they reach their teacher education programs" (p. 79).

This gap in candidate technology integration experience becomes a problem that teacher educators encounter when working with candidates to create the dynamic environments enriched by technology that the International Society for Technology (2000) in Education envisions. Whipp, Eckman, and van den Kieboom (2005) noted that teacher educators needed to partner with K-12 schools that afforded opportunities for students to experience effective technology integration in their school placements. Such schools, the authors observed, should have sufficient hardware. In addition, the authors suggested planning for and assessing preservice teacher and inservice teacher knowledge and skills in using technology (p. 41).

Preparing candidates to integrate technology in support of teaching for meaningful learning can be complex. The process, from initial contact with to fluent use of technology for teaching, is often long and painful. Therefore, enabling teachers and preservice candidates to use technology meaningfully requires more than merely affording them isolated technology skills (Burns, 2002). Zhao, Frank, and Ellefson (2006) noted that teaching for meaningful learning with technology is not simply inserting technology into the

teaching sequence, but, rather, inventing new ways of teaching. Basically, teachers need a series of interconnected, situated, and sustained experiences to construct new practices through experimentation and reflection.

There is a growing interest in preparing candidates to integrate technology into their curricula. Therefore, it is not surprising that educational institutions are being carefully scrutinized (Banister & Ross, 2005). Research suggests that the ability to teach with technology encompasses a much broader set of cognitive and psychological qualities, including: teachers' knowledge of technology as a solution to their problems; teachers' beliefs about and attitude toward technology, especially with regard to its compatibility with existing practices and potential for improving student learning; teachers' knowledge about and perception of enabling conditions; and teachers' social capital – their access to assistance from others. In order for teachers to be effective in the integration of technology, they must have knowledge of: (1) technology as a solution to their problems, (2) enabling conditions of a technology, and (3) location of support and ways to obtain it (Zhao, et. al., 2006).

Field experiences are a hallmark of teacher education programs (Dawson, 2006), as they provide opportunities within actual teaching settings and facilitate authentic learning. In addition, field placements for preservice candidates afford these students the opportunities for viewing examples of technology integration for higher order thinking in practice. It is imperative that teachers provide a series of interconnected, situated, and sustained experiences to construct new practices through experimentation and reflection. Driven by current educational technology standards and past research, it is evident that educational technologies can enhance the learning of all students in a variety of academic environments.

This purpose of this exploratory study is to examine the use of technology integration as seen by 90 candidates in their first year field experience.

### *Theoretical framework*

With an increased emphasis on teaching critical thinking skills and the integration of technology, the consequent need for teachers who can adeptly integrate technology into their lessons becomes critical. Technology integration is "the use of technology by students and teachers to enhance teaching and learning and to support existing curricular goals and objectives" (Sun, Heath, Byrom, Phlegar, & Dimock, 2000, p. 55). Apple Classrooms of

Tomorrow research (Sandholtz, Ringstaff, & Dwyer, 1997) delineated different levels of technology integration by classroom teachers. This project was a collaborative research and development effort among public schools, universities, research agencies, and Apple Computer. This longitudinal study “set out to investigate how routine use of technology by teachers and students would affect teaching and learning” (Sandholtz, Ringstaff & Dwyer, 1997, p. 3). The Apple Classroom of Tomorrow (ACOT) instrument includes five choices from which an educator can select the level he or she understands and uses technology. These levels include (a) entry, (b) adoption, (c) adaptation, (d) appropriation, and (e) invention. The information is relevant as one determines how teachers utilize technology integration in their classrooms.

*Methods and/or techniques (data sources, instruments, procedures)*

The purpose of this exploratory study was to examine the technology integration by entry level students in a teacher education program in their field experience. The researchers studied the observation surveys collected from four sections of an introduction to teaching class comprised of 90 teacher education candidates in a college of teacher education at a private Midwestern university. The semester-long course was taught in Winter 2006. Two instructors taught the classes, with each responsible for instructing two sections of the class. During the class, candidates utilized technology-enhanced learning strategies to learn about the profession of teaching. Total enrollment in the four sections was 90 candidates, who were predominantly first year students. Of all the candidates, three were sophomores, and one was a junior. The college offered seven other sections of this class with an additional enrollment of 150 first year candidates.

During the course of the fifteen week semester, the candidates were transported by bus to their field experience once a week for three hours during seven weeks of the course in February and March, 2006. Candidates were placed in seventeen different schools in urban, rural, suburban, and private settings. During this placement, candidates observed or assisted the teacher in classroom teaching, while the teacher acted as a mentor for the candidate.

During the final week of the observation (two sections) or the week after the observation experience (two sections), the candidates completed a modified version of BETA 04-05 Teacher Survey (Biennial Educational Technology Assessment) during the Introduction to Teaching class time. The BETA Teacher Survey is a self-report online

instrument developed by eTech Ohio (2004) to assess how technology supports classroom curricular needs from the teacher perspective. The students' demographic information gathered from the teacher that they observed during the field observation included years of teaching, grades taught, computer access for personal use, and access to the Internet during personal time. The second part of the survey included 18 possible uses of technology and technology integration that might be employed by the teacher in the classroom or for class preparation. (Candidates also met with teachers during their prep periods.) Candidates ranked the frequency of the use by K-12 teachers and students in the classroom that they observed.

Participant responses were converted into scores on an Excel spreadsheet. A university statistician unfamiliar with the candidates or the course analyzed the data statistically using the SPSS software program.

Several concerns presented threats to validity. Candidates were not evaluated for knowledge of technology integration, although all candidates were in sections of the Introduction to Teaching course that used technology integration to teach content. The BETA 04-05 Survey was designed for inservice teachers self-report in the schools, not for preservice teacher observation, so that reliability and validity statistics developed during its implementation were not directed to this specific use of the survey.

### *Results and conclusions*

The 90 preservice candidates observed 33 teachers in different learning contexts: urban (44.1%), suburban (38.2%), rural (5.8%), and private (11.7%). Inservice teacher placements paired students with teachers with a range of teaching experience: 2-5 years (36%), 6-12 years (30%), 13-20 years (27%), and more than 21 years (6%). Preliminary results indicate that teaching experience had a significant effect on use of technology for data manipulation/organization because teachers with less experience were more apt to use technology for data management. This study illustrates that if teachers possess the requisite technology skills they are more likely to integrate educational technologies in their instructional repertoires which can enhance the learning of all students. It also sheds light on the impact of technological advancements in a variety of academic environments and areas as well as how changes in practice are occurring (or not occurring) in these settings.

It is important to note that teachers at all school locations had access to a personal computer (94%), and the majority had access to the Internet (88%). However, during the

seven weekly observations, some trends emerged on teacher integration of technology in their classrooms. It is not surprising that a large number of teachers did not use the Internet (44%), nor did they utilize software for presentations (59%), simulation programs (59%), or student alternative assessment software (59%). This was disconcerting, as candidates failed to consistently observe the integration of educational technologies in the teaching and learning process and its impact on our practice. It is important that teacher education faculty begin to address these concerns as we struggle to answer the difficult questions relevant to the integration of educational technologies to enrich the learning and educational experiences for all learners.

Frequency data revealed that many teachers do not appear to be using technology when the candidates are observing them. Preliminary analysis of the data suggests that teaching experience had significant effect on the use of several applications. Years of teaching had a significant relationship with student alternative assessment and with content specific software use.

*Educational and/or scientific importance of the work*

This study is an exploratory investigation of inservice candidate observations of teacher integration of technology in learning contexts. Because one method of learning is observation of technology integration, this study sought to determine if candidates in an introductory teacher education class could access the integration of technology and the level of that integration in their observation experience. This exploratory study also provides baseline data for analysis to determine pre-service candidates' understanding of technology integration and to obtain evidence to support the effects of educational technologies in student learning and on achievement measures, a key element of NCLB. This study also suggests information about the relationship between years of teaching and software used by the teacher in an observation setting. This study is the first step in triangulating the data between what candidates observed and what teachers in school districts report about technology use and integration.

It is imperative that teacher education ensure that preservice candidates are indeed provided the opportunity to explore and develop effective uses of technology in K-12 classrooms. Additionally, teacher education must promote technology use in authentic contexts through curriculum-based, technology-enhanced field experiences. Regardless of the strategies employed, consideration must be given to the fact that candidates "do not

actually learn from experiences as much as they learn from reflecting on experience" (Posner, 2005, p. 21). Therefore, it is essential that candidate reflection is promoted as an element of the learning experience.

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