
Preparing Urban Teachers to Integrate Technology for Instruction: Challenges and Strategies

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This paper focuses on the challenges faced by faculty in the urban teacher preparation programs, particularly in the area of technology integration by pre-service and in-service teachers in their classroom instruction. The paper discusses the issues of first-order barriers (access to technology, infrastructure support) and second-order barriers (perceptions and attitudes toward technology, motivation to integrate technology), that impede successful technology integration in an urban classroom. Strategies to overcome these barriers are further discussed in detail, which provide teachers with finding a balance between learning technology skills and applying these skills to fit their pedagogical beliefs of meaningful technology integration.

Introduction

This paper focuses on two faculty member's experiences related to teaching urban teachers to integrate technology within their instruction. To provide contextually grounded perspectives from the two faculty members, this paper first reviews literature on technology integration in the teacher preparation programs and describes the context of the urban setting, i.e., the Charter College of Education (CCOE) at California State University, Los Angeles (CSULA). The description is followed by pertinent information on an instructional technology course and characteristics of urban student teachers, focusing on their technology competencies and attitudes toward using technology for instruction. This paper then moves on to discuss instructional strategies employed by the two faculty members to overcome two types of challenges, and to offer perspectives within the context of relevant theoretical conversations and findings from other studies. This paper then concludes with recommendations and considerations for preparing urban teachers to use technology for instruction.

Technology Integration in the Teacher Preparation Programs

In order to understand the technology integration perspectives of the two faculty and their challenges, it is necessary to first examine the literature related to technology integration in K-12 schools as well as teacher preparation programs across the United States of America (U.S.A). One of the definitions given by the National Center for Educational Statistics (NCES, 2002b) described technology integration

as “the incorporation of technology resources and technology-based practices into daily routines, work, and management of schools. Technology resources are computers and specialized software, network-based communication systems, and other equipment and infrastructure. Practices include collaborative work and communication, Internet-based research, remote access to instrumentation, network-based transmission and retrieval of data, and other methods” (p.75). In the last decade, computers and Internet technologies have become a common feature in the school landscape. According to the National Center for Education Statistics (NCES, 2005), nearly 100 percent of public schools in the United States had access to the Internet in fall 2003. Public schools have made consistent progress in expanding Internet access in instructional rooms (classrooms, computer and other labs, library/media centers, and any other rooms used for instructional purposes) from 3 percent in 1994 to 93 percent in 2003. In 2003, 95 percent of the public schools used broadband connections to access the Internet. Studies have shown that K-12 schools have reached critical mass with regard to access to computers and the Internet (Morrison, Lowther, & DeMeulle, 1999; Tharp, 1997) and hence teachers and teacher educators are turning their attention away from the adoption decision (to use or not to use computers) to the implementation process (when and how to use computers in meaningful ways) (Ertmer, 1999).

The Preparing Tomorrow’s Teachers to Use Technology (PT3) grants funded by the U.S. Department of Education is a large scale initiative intended to address the technology integration issue at a systemic level. This effort is also clearly evident by various national organizations, such as International Society for Technology in Education (ISTE) and National Council for Accreditation of Teacher Education (NCATE) that have developed specific performance indicators to evaluate implementation of technology integration standards. All NCATE accredited teacher education programs must be able to demonstrate the ways in which they prepare teacher candidates to use educational technology to help all students learn (NCATE, 2000). Colleges of Education must provide a “conceptual understanding of how knowledge, skills, and dispositions related to educational and information technology are integrated throughout the curriculum, instruction, field experiences, clinical practice, assessments, and evaluations” (NCATE, 2002, p. 7). Similarly, the National Educational Technology Standards for Teachers (NETS•T) developed by ISTE define six standards areas for all classroom teachers as follows (http://cnets.iste.org/teachers/t_stands.html):

1. Teachers demonstrate a sound understanding of technology operations and concepts.
2. Teachers plan and design effective learning environments and experiences supported by technology.

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3. Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning.
 4. Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.
 5. Teachers use technology to enhance their productivity and professional practice.
 6. Teachers understand the social, ethical, legal, and human issues surrounding the use of technology and apply that understanding in practice.

The ISTE NETS•T have served as the corner stone of educational technology curricula across teacher preparation programs in the nation, and attempts have been made to infuse these standards to fulfill the NCATE requirements. Despite these efforts, research has indicated a general lack of confidence among pre-service and in-service teachers with regard to their ability to effectively integrate technology into their classrooms or to be able to use technology in innovative ways (Office of Technology Assessment, OTA, 1995; Willis, Thompson & Sadara., 1999). According to the U.S. Department of Education (1998), only five percent of the K-12 teaching force is estimated to have effectively integrated technology within their everyday practice. A survey by the NCES (1999) indicated that approximately one-third of teachers reported feeling prepared to integrate educational technology into classroom instruction. Since most pre-service and in-service teachers today have had little experience with integrated technology classrooms, they typically have few images or models on which to build their own visions of an integrated classroom (Beichner, 1993; Ertmer, 1999; Hannafin, 1999; Kerr, 1996). These issues of inadequate technology integration models and lacking confidence among pre-service teachers further get magnified with urban inner city teachers that often have fewer technological resources, support, and training opportunities. The inequity in technology access and teacher preparation has a significant effect on urban students' future lives. It is therefore a pressing issue to prepare urban teachers to effectively integrate technology into their instruction.

Context of the Urban Setting

Since 1993, the Charter College of Education (CCOE) at California State University, Los Angeles (CSULA) has operated as the first Charter College of Education in the nation. Because the campus is located in the heart of metropolitan Los Angeles, the CCOE programs reflect concern with the problems and challenges of urban education with particular emphasis on linguistic and cultural diversity. The CCOE is accredited by the National Council for Accreditation of Teacher Education (NCATE). This accreditation covers both initial teacher preparation programs and advanced educator preparation programs. One

aspect of the accreditation involves meeting the National (ISTE NETS) and State technology standards. The teacher preparation programs in the CCOE at CSULA provide single and multiple subject teaching credentials to a large number of teachers every year and is rated number one college in the state preparing bilingual teachers. A recent study (2002) published by the California Commission on Teacher Credentialing indicated that CSULA ranks as California's top public university in terms of the number of candidates being awarded a teaching credential—more than the combined total of the eight University of California Campuses and more than any of the other CSU campuses (a one-year total of 1080 teaching credentials and approximately 500 credentials for other education professionals).

Most of these teachers are either already employed or work for the schools within the Los Angeles Unified School District (LAUSD). CCOE has approximately 2500-2550 (each quarter, according to the 2004 NCATE report) student teachers comprised of various ethnic, cultural, and linguistic groups. The school enrollment of students comprises of 70% women and 30% men and is culturally diverse, having a student population that is approximately 50% Latino, 21% Caucasian, 13% Asian/Pacific Islander, 6% African-American, and 2% international students. Almost 15% of the student population comes from out-of-state or foreign institutions.

Due to its urban setting, the CCOE's mission is to "enable educators to meet high standards and ensure maximum learning and achievement potentials of culturally and linguistically diverse urban learners". In its effort to fulfill the mission, the college provides resources and support to all the students in the College of Education that will enable them to be in the forefront of the technological era. There are seven computers labs within the CCOE, including five PC labs and two Macintosh labs. In addition, the college has recently wired all classrooms and wireless laptop computers are available to check out for instructors and students to use. One of the college's priorities in recent technology developments has been providing technology support personnel to its faculty. As a result, CCOE has its own technology support team and an instructional technology specialist to assist faculty in integrating technology for instruction.

Instructional Setting

All student teachers in the credential program in the Charter College of Education are required to meet technology standards and competencies as mandated by NETS and NCATE. The course, *EDIT 430 Information Technologies in the Classrooms*, offered by the Instructional Technology Master's Program within the CCOE, is designed to meet these technology standards required for California Level II teaching

credentials. The purpose of the course is to prepare pre-serve and in-service teachers to integrate technology into their (future) classrooms. The following are the some of the important performance standards that are required of the students enrolled in this class:

1. Promote effective use of technology that is aligned with national, state and school district technology and curriculum standards.
2. Use computer applications to manage records (use and manage gradebook programs, school record keeping software) and use technology as tool for assessing student learning and providing feedback to students and their parents.
3. Use computer based collaborative tools such as e-mail, online chats, and threaded discussion groups to collaborate with peers, resource specialists, and others to plan and implement instruction, engage in site-based planning, etc.
4. Use established selection criteria to evaluate electronic materials and resources and help their students to assess the authenticity, reliability, and bias of electronic information resources and data.
5. Design, adapt, and implement lessons that develop information literacy and problem-solving skills as tools for lifelong learning.
6. Use technology to increase students' ability to plan, locate, evaluate, select, and use information to solve problems and draw conclusions.
7. Use and evaluate electronic portfolios for professional growth and for evaluating their students' work.
8. Discuss technology issues for students with disabilities including IEPs, assistive technology, accessibility, and diverse student learning needs, legislation, and classroom applications.

Delivery Mode of the Class:

EDIT 430 Information Technologies in the Classrooms has been offered by the two faculty members in three delivery formats: face-to-face, online (80-90% online), and hybrid (40-60% online). The class is designed in a way to make it easier for the students to access information and understand the weekly classroom activities, readings, and assignments via WebCT, which is used as a course management tool with all three delivery formats.

Course Content:

EDIT 430 is taught over 11 weeks and hence the class is organized to include 11 weekly learning modules. All the weekly modules are carefully structured with step-by-step description of the tasks involved and a detailed process describing how each of those tasks would be completed (see Appendix A). Other resources such as project examples,

online resources, and detailed performance based rubrics are also provided. Communications such as e-mail, discussions, chat, and hosting of students papers and projects are all conducted via WebCT.

The Student Teachers

The student teachers in the EDIT 430 class are required to complete their level II technology competencies in order to get their teaching credential and hence many of the students take this class as a program requirement. Initially, many of these students come with mixed feelings toward the class and are very skeptical about what they will be learning in the class, how they will apply it to their classroom setting and whether the class will be difficult. They vary to a great extent with their prior computer experience, level of computer expertise, and attitudes toward computers. On the one extreme, there are a number of fluent computer users. They are usually independent explorers, actively experimenting on the various computer programs available in the labs throughout the course. On the other extreme, some students display little understanding in operating the computer. Some of these students even have little experience with keyboarding. They do not feel confident about their ability to learn about computers, and their endeavors and struggles to work with computer applications are especially apparent during the first few weeks of the class. Another characteristic that describes the student teachers in this class is their different levels of access to computers at work or home. Some students have access to a computer at home and at schools where they teach or are involved with their field experiences, whereas there are few students who still do not have access to computers at home or at work. Also those that have access to computers do not have the most current software installed.

Challenges and Strategies

Challenges:

The challenges faced by the two faculty teaching EDIT 430 have several commonalities, and hence both faculty collaborated to enlist the issues and find appropriate solutions, to help the student teachers integrate technology in a meaningful way during their student teaching and in their future classroom instructions. As described by Ertmer (1999), there are two types of barriers to technology integration: *first-order barriers* to technology integration are described as being extrinsic to teachers and include lack of access to computers and software, insufficient time to plan instruction, and inadequate technical and administrative support. In contrast, *second-order barriers* are intrinsic to teachers and include beliefs about teaching, beliefs about computers, established classroom practices, and unwillingness to change.

First-order barriers. On the surface, the challenges faced by the faculty with their EDIT 430 students were extrinsic, rooted in the first-order barriers. Such barriers often become more complicated by many technical problems encountered by urban teacher learners, such as improper computer operations and maintenance problems associated with sharing of computers, inadequate home/work computer memory capacity, insufficient computer access, outdated software technology at home or work, and inadequate technical support at work. Since many student teachers come from a low-income group and teach in inner-city schools of Los Angeles with inadequate access to current computers and software, they do not have adequate experience in troubleshooting computer related problems. The only time they have access to latest software tools and a computer is during their class time on campus or if they work in the open access labs at CSULA. Once they are home or at work the students have difficulty completing their projects due to lack of current software tools or computers per se.

Many students in the EDIT 430 still use 3 1/2 inch floppy disks to save their projects as many cannot afford to buy the high-capacity USB storage devices that approximately cost \$ 30-40 along with the cost of the textbook (around \$ 60-70) for the class. However, the class requires them to learn web design, create multi-media based PowerPoint presentations, download digital pictures and graphics, etc., which require large storage capacity. Since multi-media integration requires enormous storage space, it lends to several difficulties, particularly when students lack a clear understanding of optimizing graphics and other media with regard to their file size. Overall, inadequate computer memory capacity seems to be one of the major sources of problem, as most student teachers get very creative and excited about incorporating graphic images and other multimedia into their projects.

Another persistent challenge for both instructors in teaching EDIT 430 is for the students to acquire both a conceptual and working understanding of file folder management. Students do not understand the concept of organizing files into folders so as to make them easily accessible. This makes it difficult for them to work on different computers in various settings, since the files are not saved properly on their storage device or is lost within their storage device among many other files that are randomly saved with improper file names and extensions.

Second-order barriers. Technical problems compounded with the lack of resources at home or at work undoubtedly contribute to student teachers' perceptions of using computers for learning and instruction. Consequently, both the faculty agree that the first order barriers with the urban teachers manifest into second-order barriers as teachers get really frustrated with using technology and do not see the pedagogical fit of

integrating technology in their classrooms. They may be aware of the potential benefits of using computers for teaching and learning, but remain skeptical about the technological resources available to them to create meaningful technology integrated learning environments. The student teachers become even more frustrated and feel inadequate in class if they find their peers who can demonstrate excellent technical skills and have access to all resources within their school districts or at home. This schism between the haves and have-nots that exists in urban schools clearly brings out the issue of digital divide. This gap was recently identified under social economic descriptors, across ethnic backgrounds, education levels, languages, and demographic locations (rural, suburban, or urban) (Bowman, 2005).

Since second-order barriers are intrinsic to teachers and include beliefs about teaching and established classroom practices, the major challenge faced by the faculty is moving students to a higher level of learning with the technology which entails the paradigm of constructivist learning. Technology is merely a tool and effective integration is to move away from mimicking traditional pedagogy of using technologies as teaching machines (Cuban, 1968). The ways that we use technologies in schools must change from their traditional role of technology-as-teacher to technology-as-partner in the learning process (Jonassen, Peck & Wilson., 1999) and create learning environments that are meaningful and authentic for the learners. The following strategies were used by the two faculty to help the student teachers understand how to use technology tools to make their life as a teacher more productive and aligned with the skills required for the fast-paced technological era.

Strategies:

Several of the students' barriers to integrating technology stem from the first-order barriers to which the faculty has limited control. However, the two faculty teaching EDIT 430 have adopted several strategies to alleviate, if not all, at least some of the first-order barriers and consequently address the second-order barriers related to attitudes toward technology. It should be noted that the two types of barriers are interrelated and a more effective and practical strategy would be aiming toward second-order barriers, by inspiring teachers to be creative with new opportunities afforded by technology and use the technological resources at their disposal to encourage active learning in their classrooms. The following highlights some of these strategies:

Providing Teachers with a Conceptual Framework and a Vision. Not only there is an inequity in school computer access and teacher training for technology integration, studies have shown that schools with higher proportion of low socioeconomic status students tend to use technology for low level tasks (e.g., drill and practice) as opposed to student centered

applications used by more affluent schools (George, Malcolm, & Jeffers, 1993; Meyer, 2001). To encourage new ways of using technology in urban schools, it is important to provide teachers with a conceptual framework and a vision for integrating technology into their classrooms. The two faculty adopted Grabe and Grabe (2004) text “*Integrating Technology for Meaningful Learning*,” which provides an activity-based (project-based) model of technology integration. The key themes emphasized throughout the text include: (1) technology integrated into content-area instruction, (2) a tools approach, (3) an active role for students, (4) a facilitative role for teachers, (5) a multidisciplinary approach, and (6) cooperative learning. For both the faculty teaching EDIT 430, the emphasis is centered on shifting from the old paradigm of learning *from* technology to the constructivist paradigm of learning *with* technology, and making technology a partner in creating meaningful learning environments.

Using Peer Modeling and Coaching in a Community of Practice.

Based on the concepts of distributed cognition (Perkins, 1992; Pea, 1993), community of practice (Brown & Duguid, 2000), and cognitive apprenticeship (Collins, Brown & Newman, 1989; Collins, Brown, & Holum, 1991), the authors (two faculty) believe that learning is embedded in rich cultural and social contexts. In addition to showing examples of best practices of technology integration, we encourage active sharing and modeling effective technology integration strategies among student teachers with their peers. It is not only effective to allow students teachers to make connection to real-life examples of what can be done in teaching contexts that are similar to their own, but it also helps them to transfer their learning from one situation to another and encourages them to brainstorm creative solutions to maximize the technological resources at their disposal. We also capitalized on peer coaching by inviting skilled computer users to be co-facilitators within the learning community of the classroom. This strategy was used to model to the student teachers how they can benefit from technology expertise of their own students (the new digital generation of learners) in trying out student centered technology projects in their classrooms. Peer modeling and coaching can be done face-to-face or online via email, chat, or threaded discussion. Support from human infrastructure (related to one-on-one help from peers or experts), in the absence of adequate technological infrastructure support (related to accessibility of computers and technical help), is one of the effective strategies used to overcome the second order barriers related to the attitude and beliefs toward technology integration (Javeri, 2003).

Extending Learning with Sustainable Technology Infrastructure

Support. According to Ertmer (1999) and empirical evidences (Javeri, 2003), one of the biggest obstacle related to the first order barriers is the

lack of resources and time to explore technology integration practices. Both faculty have made strong endeavors to provide scaffolding to students teachers with detailed instruction of weekly activities, assignments, rubrics, projects, tutorials, and online resources (e.g., videos of best practices) via the use of WebCT as a course management tool. The extensive use of WebCT has extended students' learning while providing them with a strong sense of a learning community. The course is thorough with details and rich resources that could be taught in face-to-face, online (80-90% online) or hybrid (40-60% online) formats. By teaching the class in three formats students are able to choose their mode of learning, and thus addresses some of the first order barriers and enables the faculty to provide one-on-one support (face-to-face and online) to the student teachers.

The 11 week teaching modules includes several open lab times for students to work on their projects if they do not have access to computers or software at home. The faculty have directed them to websites where students can download thirty day trial versions of the software which gives them enough time to complete their class projects. Both faculty have directed students to writing technology grants and get funding for buying computers, and software for their classrooms. The use of WebCT as a course management tool further alleviates the problem of storage capacity. Students can upload their projects on WebCT in the presentation section or e-mail themselves huge files to continue working outside of school as WebCT is accessible 24/7. The students are provided with self-paced step-by-step instructions and tutorials on how to use particular software tool with screen shots (see Appendix A) so that they can learn the software at their own pace and time. As learners feel more in control of their learning, their beliefs and competencies in working with computers gradually increase. For some students, this increased confidence often contributes to a different perception about using computers and their potentials for learning and instruction.

Conclusion

Integrating technology into instruction with limited resources in urban schools is a challenge for most of our teachers in the teacher credential program. The student teachers find themselves in two different worlds when they take classes at CSULA and when they have to go back to their classrooms to implement what they have learned in their technology classes. This paper addresses the key issues associated with the first order and second order barriers and strategies that have been used and successfully implemented in the instructional technology class with pre-service and in-service teachers. Providing a vision, effective modeling, collaboration, human infrastructure support (from peers and faculty), sustainable technology infrastructure support via WebCT and

time to play with the computer tools, opportunities to reflect on their integration practices are some of the strategies that are effective in overcoming the first and second order barriers (Ertmer, 1999, Javeri, 2003). The strategies used by the two faculty in order to help the student teachers overcome their barriers in integrating technology have immensely helped the student teachers in understanding the pedagogical relevance to seamless integration of technology in their classroom instruction. The integration effort of these student teachers in turn will benefit a larger community of students (K-12) who are growing up in the new digital landscape. Preparing students to face the challenges of the dynamic and technologically astute workforce in the 21st century is one ultimate goal of teacher education program (Javeri, 2003).

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Appendix
An Example of a Weekly Module

Week 3: WebPages Assignment



Task:

1. Today you should have completed your brochure and paint assignments and posted them on WebCT on the Discussion/Post your assignment section.
2. Post your views on the discussion board. Reply to your instructor's post by replying to the message. Make sure you address all the questions asked by your instructor on the message.
3. You will learn to create webpages using Microsoft Word.

Process:

Instructions for creating Webpages:

1. There are many web authoring software that allows you to create webpages. For example, the two popular ones are: Microsoft FrontPage and Macromedia Dreamweaver MX 2004. However in this class I will give you instructions on creating webpages using Microsoft Word since it is available on most of the computers. However, feel free to use any type of software you have used before to create webpages (You should know how to use the software). Below is an overview of your assignment.

- *Overview of the Webpages Assignment:* You will be required to create two webpages. The first one will be your homepage and the second page will be a resource page. On the homepage you could include description about yourself, any graphics (your own picture from webct), any other pictures, a link to the resource page and any other information you want to include. On the resource page include a list of your favorite resources, graphics, any other information, and a link back to your homepage. Details and instructions are provided on the PowerPoint as well as on the handout in the next section.

2. Before you start creating your own webpages, take a look at the examples below.
3. Click here to download the [PowerPoint tutorial](#) for creating your webpages (for novices). Click here to download the [handout](#) for students who are experts and do not need step-by-step instructions. I would encourage

you to look at both the tutorial and handout. (Note: When you click on the PowerPoint tutorial link or the handout link, you will see a pop-up window asking you whether you want to open it or save it. You can either click on open or save. If you click on open, the file will open in the browser and you can view it. However if you click on save, you could save it on your disk/harddrive and then open the file from your disk/harddrive. Please note that these instructions are for PC users and Microsoft office xp). Both the PowerPoint tutorial and handout are just the guidelines. Remember designing webpages is a highly individual and creative process.

4. Here are few examples of personal webpages designed by other students. Some students have gone beyond the minimum requirements. Feel free to try and be creative as long as you meet the grading rubric.

1. [Example 1](#)
2. [Example 2](#)
3. [Example 3](#)
4. [Example 4](#)
5. [Example 5](#)
6. [Example 6](#)
7. [Example 7](#)
8. [Example 8](#)

Evaluation:

Graded as follows:

Click here for the [grading rubric](#). Copy and paste the rubric into Microsoft Word. Complete it and e-mail it to your instructor as an attachment via WebCT.

Total points possible: 24

Next Week Assignment:

1. Post your WebPages on WebCT before the next class (Week 4).
2. E-mail your instructor completed rubric for your webpages.
3. Next week your instructor will review software evaluation guidelines on WebCT.