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Broadening Our View About Technology Integration: Three Literacy Educators' Perspectives

Shelley B. Wepner
Manhattanville College

Liqing Tao
CUNY Staten Island

Nancy M. Ziomek
Widener University

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Shelley B. Wepner
Manhattanville College

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What can we realistically expect teacher educators to do with technology, given the contexts in which they find themselves, the skills that they bring to their contexts, and the changes that they would need to make? We attempt to answer this question through three self-studies as we integrated technology into methods courses and student teaching supervision. Data sources included reflective journals, lesson plans, observations, and interviews. Pre-established categories and constant comparative method were used to analyze the data. Three common themes emerged (the issue of technology integration; the interdependence of skills, responsibilities, and context; and the mediation of context) that lead us to conclude that the notion of technology integration varies in different contexts.

LITERACY EDUCATORS HAVE long realized the importance and potential of technology in literacy teacher education programs (Labbo & Reinking, 1999; Leu & Kinzer, 2000; Reinking, 1999). Efforts have been made both to theoretically contextualize technology's role in literacy education (Leu, 2000; Reinking, 1995) and explore practical applications of technology in literacy teacher education (Morrow, Barnhart, & Rooyakkers, 2002; Watts-Taffe, Gwinn, Johnson, & Horn, 2003). Theoretical justifications of technology's role in literacy education have strong implications for literacy teacher education, providing unique perspectives for re-examination of literacy teacher education programs in the context of new literacies (Reinking, 1995). One implication would be the reconsideration of the knowledge and skills literacy teachers need to be equipped to teach new literacies in the electronic age (Leu, 2000).

To foster such necessary knowledge and skills of literacy teachers, teacher education programs have to envision technology as an integral component and need to develop technology integration systematically throughout programs (International Society for Technology in Education (ISTE), 2000). However, most of the practical endeavors for integrating technology into literacy teacher education have occurred at individual levels rather than at the program level. Literacy educators have used various technologies including email, the Internet, literacy software, and video cases in literacy methods classes to enhance teacher candidates' experiences with technology (Merkley, Schmidt, & Allen, 2001; Morrow, et al., 2002). Positive results have included increased confidence in using technology (Morrow, et al., 2002), increased technology skills (Watts-Taffe, et al., 2003), better understanding of technology's role in teaching (Watts-Taffe, et al., 2003), and an expanded perspective of literacy in the electronic age (Reinking, 1999).

We are aware of only two studies that actually have focused on the contexts in which faculty members integrated technology (Boling, 2003; Wepner, Tao, & Ziomek, 2003), though there are studies that mention the conditions that affect faculty use. Studies indicate that faculty use of technology has been affected by the technical skills of the faculty (Myers, Miels, Ford, & Rurke, 1997), level of access to technology (Boling, 2003; Wepner, et al., 2003), technical support (Boling, 2003; Morrow, et al., 2002), and university teaching experiences (Boling,

2003), and curricular appropriateness of technology integration (Wepner, et al., 2003).

One limitation of the majority of studies about faculty technology integration is the restricted contexts for technology use. These studies were usually situated in one program or department (Merkley, et al., 2001; Morrow, et al., 2002; Watts-Taffe, et al., 2003), and used similar software or a similar technique (Boling, 2003; Teale, Leu, Labbo, & Kinzer, 2002). While they provide us with insights about technology integration in teacher education, these insights are usually only appropriate in their own contexts and might not offer direction for technology use with different challenges and opportunities.

The present study is intended to look into the contextual conditions that affect faculty technology integration of three literacy educators at two different institutions and with different instructional capacities. We studied ourselves to examine the following question: What can we realistically expect to do with technology, given the contexts in which we found ourselves, the skills that we bring to our contexts, and the changes that we would need to make? An ultimate purpose of the study was to provide insights about the relationship between technological skills, context (or contextual complexities), and shifting responsibilities as literacy educators attempt to integrate technology into their programs.

Technological skills refer to one's knowledge of hardware, applications, graphics, telecommunications, integrated technologies, and multimedia construction. Contextual complexities (or context) refer to the tension between existing material and human resources and the positive and negative responses to these resources. This contains five categories we identified in our previous study (Wepner, et al., 2003). They are equipment/software, technical support, administrative and peer support, availability of funds, and student expertise. Shifting responsibilities refer to ways in which tasks and duties change to use technology effectively in the classroom. The four categories are role as catalyst, planning for instruction, instructing students, and monitoring students (Wepner, et al., 2003).

Background

When one of us co-edited a book on ways to help K-8 teachers integrate technology into classrooms (Wepner, Valmont, & Thurlow, 2000), it became obvious that there is little research available on the shifting responsibilities of teachers as they subscribe to standards for using technology in their classrooms. Two of us decided that we needed to examine ways in which classroom teachers' responsibilities change as a result of teaching with technology. We found through interviews and classroom observations that teachers' responsibilities shift considerably (Wepner & Tao, 2002). They need to devote more time to their professional development to acquire the necessary technology and technical knowledge. They must spend more time planning and organizing for instruction and arranging for the availability and usefulness of the equipment. They also need to come to accept that, even as veteran teachers, they are humbled by their lack of technology proficiency.

An outgrowth of this study was a recommendation that literacy educators, as part of the K-16 education continuum, need to study their own shifting responsibilities as they work toward helping teacher candidates learn to use technology for teaching. Three of us, at different points in what we refer to as the technology comfort continuum, and with different institutional contexts and conditions, studied the way in which we changed our practices to get our teacher candidates to use technology in their methodology courses and student teaching assignments. We found that the same issues confronting teachers in the K-12 classroom affected our performance as literacy educators (Wepner, et al., 2003).

Furthermore, we found that our own contexts actually affected our interest in and ability to use technology for teaching and supervision. We recognized the need to study our own contexts in relation to our own skills and responsibilities to determine realistic expectations for ourselves.

Methodology for the Current Study

Subjects and Data Sources

We are three literacy educators coming from two different comprehensive universities in the northeast region of the United States. Two of us, Liqing and Nancy, taught introductory literacy methods classes and one (Shelley) supervised student teachers. The 45 teacher candidates enrolled in the coursework had to evaluate software and Internet sites, learn how to use multimedia software, develop webquests, and include technology in their lesson planning. The two student teachers had to plan and teach four lessons using technology during a semester. The five data sources were our own reflective journals, teacher candidates' reflective journals, samples of lesson plans, observations of student teachers' lessons conducted by Shelley, and teacher candidates' interviews by Liqing and Shelley.

We used reflective journals to record our own observations and reflections. Nancy and Liqing wrote in their reflective journals every two weeks. Shelley wrote in her reflective journal after every technology-based lesson taught by the student teachers. Teacher candidates had to use a modified form of a teaching strategy called KWL for their reflective journals. They had to record what they "Knew" about using technology and what they "Wanted" to learn before teaching. Afterwards, they had to record what they still "wanted to Learn" and provide suggestions for doing the lesson next time. All three of us reviewed and analyzed teacher candidates' lesson plans for appropriate uses of technology during our instruction. Student teaching observations were conducted weekly, and Shelley's observations were recorded on a standardized form used by all university supervisors. Liqing and Shelley interviewed students at the end of the semester to find out their perceptions of their experiences with technology. Students' interview data were transcribed.

Data Analysis

While we followed Bogdan & Biklen's (2003) recommendation for this qualitative research study to develop a fairly open-ended question to

look into the process of technology integration in our individual contexts, we did our data analysis by using the categories we found in the previous study (Wepner, et al., 2003): shifting responsibilities and contextual complexities and their components. Data analysis was conducted as follows. During the academic year when the data were collected, we individually examined our data sources. Our reading of the data was continuous and repeated several times, both for data coding and for verifying the preset categories. We also met face-to-face with each other five times over the year to discuss the appropriateness of our data analysis. When we met, we re-examined the categories from our previous study in light of the present data to make sure that they still fit. We discussed the data analysis of our individual data that had been shared with each other through email attachments before we met.

We compared our data sources with pre-established categories for shifting responsibilities and contextual complexities to look for themes to describe our transactions in our unique roles (Wepner, et al., 2003). In particular, teacher candidates' interviews and reflective journals were analyzed for insights into the dynamic relationship between proficiency, responsibility, and context on affecting knowledge of and use of technology. Lesson plans and observations of student teachers' teaching lessons were examined for contextual factors that contributed to a technology-based lesson's success or lack of success and the shifts in responsibility and technological proficiencies required of the university supervisor. As a result, we further clarified and consolidated our categories of contextual complexities to more accurately capture what we actually experienced. The resulting components of contextual complexities were reduced from five to four: equipment/software, technical support, administrative and peer support, and student expertise.

Findings

The three case studies describe our background with technology, our responsibilities, findings, and issues. To provide a clear picture of individual situations of technology integration, we use first person narrative for each case description. Results are reported for the three cases by looking at the relationship between skills, context, and responsibilities.

Nancy's Story

Background. I came from an institution in which technology was almost nonexistent. Integrating technology into our courses was not yet even a subject of discussion. This current position presented me with a very different set of expectations, including my participation with other faculty on a large technology grant. The grant, coupled with the decision to research this topic, provided strong internal and external motivation to increase my skills.

The start of this study marked my first attempt to seriously integrate technology into my undergraduate reading/language arts methods courses. It was a very time consuming process for me to sift through my traditional course content to decide what to give up to make space for new material, what assignments to eliminate to create new ones, and how to plan for assessment and grading of these new assignments. I began to see how this would be a circular process: I now knew enough to require my students to use technology which forced me to learn more about it.

Responsibilities. When I began to teach my two methods courses with a changed format, I had added a number of technology requirements, both as a means for my students to learn course content (i.e., extensive use of CD-ROMs that accompanied my new textbook) and as assignments for my students to complete independently (i.e., a series of web site evaluations). My pre- and post- evaluations of these activities uncovered two surprises: some of my students knew less about technology than I had expected and the large majority of them felt there should have been more, not less, technology included in the course. I was then able to take these findings into account in planning my second go-around.

For this study, I added technology-related requirements to my courses and increased the percentage of the courses grade that would be based upon these requirements. My students were required to evaluate two pieces of reading/language arts software, develop a reading/language arts lesson that included the use of the Internet, create an integrated thematic unit that included the use of technology, and attend two

computer workshops on topics such as web quests, and developing web pages.

I had them complete a KWL-Suggestion form (KWL-S) for these workshops. Again, I was surprised by what I found. Many of the students felt there should be more computer workshops and more technology-related topics. They indicated they had gained knowledge that would serve them well as teachers, for example, "I learned that in a web quest there should be a specific question to be answered so my students would have some direction. I also learned that the directions need to be very clear so students don't get confused. Finally, web quests need to be visually appealing and easy on the eyes."

Findings. First, I did not have to have or use any sophisticated technology skills. I needed a general knowledge of software and websites and an understanding of what should be included in a good technology-based lesson plan.

My second finding has to do with my context. My institution as a whole, and the large majority of the individuals who teach here, are committed to being technologically proficient. Add to this the previously mentioned technology grant we had recently been rewarded. The encouragement, the equipment, and the necessary technological support are there for us. This has made it easy to develop to include technology in our teaching. It is as if most of the potential challenges have been removed. I do not have to teach these computer workshops. I just send my students to a brand new, staffed computer lab. There are not many excuses for not taking advantage of what this context offers.

My third finding has to do with my responsibilities. I served mainly as a catalyst for the integration of technology. I changed my course format, created and explained the new assignments, and arranged for the computer lab through our Technology Learning Specialist.

I did not have to do a lot of teaching about or modeling the use of technology. I served as a monitor as well as catalyst. I monitored the completion of students' requirements, assessed and graded their work, and monitored their attendance at the required workshops.

Issues. I have become increasingly aware that technology must be integrated into undergraduate methods courses to adequately prepare teacher candidates. The methods teachers, not the student teaching supervisor, should be held responsible for this important part of our undergraduates' education.

I have come to realize that while teacher candidates may be able to use technology for their own needs, they might not be adequately prepared to actually use technology to teach content to their own students. I am trying to arrange for my methods students to each teach a small-group technology-based lesson as a required part of their weekly field experience. There are issues with this requirement such as my students' confidence and competence in conducting such a lesson, availability of computers, and technological support to help with the problems that inevitably occur during these lessons. If teacher candidates gain even limited hands-on experience in using technology to actually teach content during field placements, they will be better equipped to effectively use it as student teachers.

Liqing's Story

Background. I have always been interested in technology applications in education, including email applications in facilitating elementary school students' literacy development, and computer applications in teacher education. In my reading and language arts methods classes, I have used some reading and language arts software. In addition, I have taught a graduate level instructional technology class. I can generally handle simple hardware problems and installation issues, yet I have to refer to lab technicians for more complex computer problems.

As a user of technology and believer in the facilitative potential of technology in educational learning, I joined my two colleagues in the present project at my own institution. At the time of the initiation of the project, my institution was facing a technological dilemma. It was under pressure to increase its applications of technology in teacher education programs since it was beginning to prepare for NCATE accreditation. However, the only instructional technology faculty resigned the previous

June, leaving a support vacuum for instructional technology applications within the Education Department. There were a few individual faculty members in the department who were using the Blackboard system and other content related software, though coordinated sharing of successful applications was not happening.

Responsibilities. The class involved in the present study was an undergraduate introductory reading methods class with 25 students. The course required students to use two types of technology. First, they had to use the Blackboard system to carry on weekly chapter discussions, download handouts, and check for weekly assignments. Second, they had to create a language arts or social studies web quest. This project required students to use simple web authoring tools such as Microsoft Word to create their web quests.

I depended mainly on myself for teaching technology use in the lab during several demonstration and hands-on classes. The lab was not always accessible to students due to the limited hours during weekdays and the close-downs over the weekends. The lab technician could help my students only when he did not have any other classes in the lab, which was usually not during late afternoon class times when they were on campus. To anticipate my students' needs for technology support, I used office hours to help troubleshoot both the discussion board and web quest projects.

Findings. I had to give almost equal weight to technical procedural instruction and reading/language arts instruction. The equipment, support structures, and colleague interactions presented a challenge for integrating technology into my methods class. I found myself constantly struggling to get accustomed to the contextual constraints.

My plans were first adjusted to deal with the lack of technological and technical support, and then my plans were changed to address students' lack of technology expertise. I stayed away from CD-ROM software use because the lab could not make any CD-ROM available to our students. I chose the Blackboard system over Yahoo or other discussion forums because it was supported at the institutional level. I

chose the web quest project because of its accessibility and wide educational applications.

Although a pre-survey did not reveal a big gap in computer knowledge among my students, many juniors and seniors indicated that this was the first college class that required them to use technology in their assignments aside from word processors. To accommodate students' lack of technology knowledge, I added two lab times to the original three. I also planned a class session to talk about using Blackboard.

Integrating technology challenged my teaching expertise and my students' tolerance of it in a methods course. I recorded in my reflection journal: "Then a breaking point came when a student exclaimed that she did know how to do it. I immediately asked her to tell the class whether it was difficult. She was by no means a very technical student or even a smart student in class. Her answer that it was just that easy made others want to try it themselves...."

I constantly questioned my adequacy with technology and continuously sought opportunities to update my knowledge. For instance, I had to learn unexpectedly, at the behest of a student, to convert texts into PDF files. Luckily, and because the department did not have the software, I found that the faculty technology support office in the library had the Acrobat Writer.

I served as both a catalyst in facilitating students' use of technology for teaching and an instructor in teaching the basics of computers and web page construction. Students' comments at the end of the course indicated some positive and encouraging signs of success. Students learned the mechanical aspects of using technology and the importance of shaping web resources into useful lessons for their students. "The most difficult aspect was coming up with an actual lesson" was a comment made by a student who "knew nothing about web quests before this class." Another student voiced a similar insight: "[I] actually learned the technical part of creating a web quest was tedious not difficult. I found the hardest part was focusing on a topic."

While writing about my situation in my reflective journal, I constantly mentioned the need for support from same-minded faculty who used technology in their classes. Although I took some steps to set up some support structures that had limited capacity, I know that integrating technology into teacher education will remain a constant challenge within my context.

Issues. The tension between using technology and teaching the content remains a constant issue. The enthusiasm of the students whom I interviewed afterwards confirmed the value of using web quests with my class. However, they did not seem to think the use of Blackboard was valuable for their future teaching career, or even for the present course, even though Blackboard was much less technical and more content oriented than the web quests.

The tension between using technology at the grass-roots level and securing administrative support for such efforts remain. It is easy to say we need to adhere to what NCATE demands but it takes a core critical mass to carry this out. While bottom-up initiatives need to occur, top-down support needs to be in place in order for any grass-roots effort to continue to develop.

Shelley's Story

Background. I spent many years developing my technology skills so that I could teach a graduate level reading/language arts course and teach an introductory graduate course in educational technology. Because of a change in responsibility from faculty to administration, I was slow to learn new technology applications. I also decided to serve as a university supervisor of student teachers, rather than a course instructor, to get into the schools and to see how far I could go in promoting the use of technology.

Responsibilities. I decided to use this project to study what I needed to do to help my student teachers succeed with a technology requirement. Each student teacher had to use computers for four of the eight formal lessons I observed. For two lessons, they had to have the students work with a website to support their instructional plan. They could

demonstrate the website and/or have students actually interact with it. For two lessons, they had to have students work with a software application. They also had to complete an electronic portfolio.

A Technology Learning Specialist (TLS) was available at the University to train and mentor the student teachers about software applications, website selection and development, and multimedia development. Both student teachers were placed in the University's Professional Development School with two third grade teachers who were very proficient with technology. These two cooperating teachers had been using technology for ten years, and used software and websites on a regular basis for integrated lessons. They each had 5 desktop computers in their classrooms, and they shared a portable wireless lab that enabled them to have one computer available for every two students.

Findings. The first finding relates to the technology skills required. My technology interest and skills gave me the wherewithal to require student teachers to use technology in their teaching. However, because I was in a supervisory role and not an instructor role, I felt that I did not have to be an expert with my technology skills, and in fact was not. I found that I depended on the TLS to impart technology skills. In one journal entry, I wrote about our TLS, "He's the linchpin to the success of this project because he can work with the student teachers on an as-needed basis."

During the interview, when I asked my two student teachers what they would recommend for someone in my position and what they wished that I had done to make their lives easier, Cheri said, "Luckily I had a teacher who used it all the time, and I think that if you don't have a teacher that uses it all the time then the supervisor has to take a bigger role in it by telling us how you can infuse it." Both commented that they wished that they were more prepared through coursework so that they would have felt more comfortable working with technology earlier in the student teaching semester. Cheri, with prior technology knowledge, wished that her coursework helped her to have a better idea of how to use it with students. Kelly, with minimal technology skills, wished that she had used different software programs, and had practiced with the Internet before student teaching.

A second finding has to do with my context, and the importance of the classroom teachers for my student teachers' success with technology. The cooperating teachers willingly worked alongside the student teachers to insure that they met their technology requirements by helping them plan lessons, arrange for the availability of equipment, and troubleshoot as the student teacher implemented the lesson. They also had students who were exposed to computers in previous grades. These student teaching placements provided the optimal context for technology integration for any prospective elementary education teacher.

Student teachers commented during their interview with me that they came to realize that they were expected to use technology because "the school uses it all the time." They observed that computers gave their students a way to be creative, work at their own pace, and get excited about a topic.

They talked about the demand on their time in their journals. Cheri wrote, "It takes twice as long to create a technology-based lesson, and you have to have a back-up lesson in case the technology fails." They also found that they had to do more modeling and hand holding in the beginning for students to get the gist. Kelly wrote, "I needed to create step-by-step directions so that my students had the directions right beside them."

The student teachers also talked about age-old issues with the computers. As Cheri said in her journal, "Although I tested all of the computers, half of the computers would not connect the day of the lesson. Next time I will make sure to have extra computers on hand as well as a back up lesson." In the end, and because they felt supported and saw their students benefit, they both commented that they would "definitely use it in the classroom."

A third finding has to do with my responsibilities. I served primarily as a catalyst and focused mostly on monitoring. The school--or context—enabled me to serve in these two capacities. I did not have to plan or instruct because the cooperating teachers planned with the student teachers, and the TLS instructed them on applications they needed to learn. However, I needed to devote more time to student teaching

supervision. In my role as catalyst, I also had to spend more time interacting with the Office of Field Experiences to find good placements for my student teachers. I made the technology assignments, arranged for the necessary instructional training and mentoring, and sought support from the cooperating teachers and principal. Had the TLS not been available, my students would not have received the necessary help.

In my role as monitor, I worked closely with the student teachers to help them reflect on the strengths and weaknesses of their lessons in relation to students' responses and achievements. The role of catalyst and monitor cannot be underestimated. Had I not required technology-based lessons of my student teachers, they may or may not have developed them, and certainly not showcase-quality. Had I not helped them to look at what they were doing in relation to students' performance, they might not have thought about the impact of the technology on students' learning.

Two issues emerged from my experience with these two student teachers: (1) the technology skills and responsibilities required of university supervisors; and (2) the responsibilities of Schools, Colleges, and Departments of Education (SCDEs) to insure that university supervisors have the necessary technology skills to do their jobs well. If universities are responsible for insuring that student teachers have technology competencies, especially given national accreditation expectations, and student teaching is a capstone experience for evaluating such competencies, the university supervisor should be able to recognize good use of technology. However, given that universities typically hire adjunct faculty for the position of university supervisor, it poses an additional challenge.

SCDEs should be responsible for developing and informing student teachers of any technology requirement, not individual supervisors. Institutions, specifically the Office of Field Experiences (OFE) that hires and assigns university supervisors, should determine the technology skills that university supervisors possess to determine how best to use them. Those who oversee OFE should work with the faculty and administration to offer university supervisors useful professional development opportunities with technology.

OFE should develop an inventory of school districts that promote and support technology use. While a perennial problem to find student teaching placements, it nevertheless is important for student teachers to be placed in classrooms where technology is used. Every triad should have at least a cooperating teacher or a university supervisor who is skilled with technology. The quality of the student teachers' technology-based lessons truly is dependent on the combined competencies of the members of the triad.

Discussion

As the case studies revealed, we had different expectations for our students that reflected what we knew and could do with technology and what was valued and supported in our respective contexts. Yet, we developed common concerns about the impact of context on integrating technology into teacher education. Nancy had to work with technology-barren courses that did not require field-based experiences. Liqing had to cope with reticent students, minimal technical assistance, and lack of peer support. Shelley had to deal with unevenly technologically proficient student teachers, unclear expectations for student teachers' purported impact on children, and the lack of technical expectations for university supervisors.

Three major themes emerged from the common and unique features of our contexts: (1) technology integration can and should be defined variously; (2) the interdependence of technology skills, teaching/supervisory responsibilities, and contextual complexities must be addressed; and (3) the notion of context can be mediated and broadened.

Technology Integration Can and Should Be Defined Variously

Technology integration is not a "one size fits all" concept where faculty members need to do the same things for their teacher candidates. Technology integration also does not have to be activity driven where there are specific skills that each faculty member must possess to be competent in using technology. Each of us took a different path to using technology because of our own unique backgrounds, responsibilities, and

contexts. Nancy had her students learn how to become informed users of reading/language arts software and websites. Liqing had his students, in a similar type of reading/language arts methodology course, become proficient with web-based learning. Shelley, while interested in both types of technology, had her students make optimal use of the technology available in their classrooms.

We had our students use different types of technology for different purposes, yet all of our students used some type of technology for teaching. While we recognize the importance of helping teacher candidates meet the standards established for our field (for example, ISTE), we also need to accept that our contributions have to be anchored within our own realities that encompass our skills, content demands, and context. For example, one institution that has a team of technology educators and a technical support staff can require candidates to enter student teaching with a specific set of technology skills and expect them to teach six to eight lessons with technology. Another institution, with no educational technology personnel and limited technology and technical support should not place the same demand on teacher candidates and should not expect faculty to be as intense with technology integration as an institution that has an abundance of resources.

Literacy faculty should determine the technology knowledge and skills that teacher candidates and literacy specialist candidates should have to succeed in their teaching situations, and determine how to provide and assess such proficiencies. The breadth and depth of technology integration in a program will vary because of the technology skills that faculty bring to their courses, the level of institutional support for such integration, and their willingness to shift responsibilities to develop technology-based courses and field experiences. All options for teacher candidates should be considered; for example, technology integration in regular coursework, specific technology courses or modules, assigned lab work, one-on-one or small group training, modeling, and mentoring, or attendance at specific institutes and workshops.

The Interdependence of Background Knowledge, Teaching/Supervisory Responsibilities, and Contextual Complexities Must Be Addressed to Use Technology

To understand the meaning of this theme, it is important to look at a teaching responsibility such as reading in K-6 classrooms. It is possible for an entire school district or geographical entity such New York City to require all its teachers to use a prescribed reading program such as Balanced Literacy. Assumptions are made about the teachers that enable such an edict to be made. The teachers need to teach reading, are expected to know how to teach it, and are expected to help their students pass standardized tests in reading. In contrast, it is more difficult to require teachers to teach with technology because one cannot assume that teachers have the necessary equipment, competencies, and packaged curriculum to do this. Teaching is not necessarily a content area that is tested. Rather, it is a mechanism for enhancing and enriching other content areas (Iding, Crosby, & Speitel, 2002; Pittman, 2003). It is therefore more difficult to have standardized expectations for all teachers in all contexts (Pierson, 2001), especially given dramatic variations in equipment availability.

Literacy educators face similar challenges in that while they are trained in, for example, the discipline of reading, they are not necessarily trained in the discipline of technology at the same time. To use technology for reading methodology courses, literacy educators do not have the opportunity to use prepackaged curricula, but instead have to develop their own repertoire of skills to use it. Guided by the goal to make teacher candidates good teachers, literacy educators rely on their own abilities to learn technology skills through, for example, workshops, networking, and trial and error. Their background knowledge, teaching responsibilities, and contexts could help or detract from their ability to use technology effectively.

The net result is reflective of the way in which these three factors work together. At least a modicum of skills, a supportive context, and a willingness to shift responsibilities need to be in place for a faculty member to use technology. And, each faculty member should assess the degree to which each of these three factors exist or can be put into place

to realistically determine one's own ability to integrate technology. A standard cannot exist because the combination of these three factors is unique for each person and university. For example, if one is skilled with technology, yet suffers from an unsupportive context, one needs to determine the type of contextual support that exists and does not exist, and the degree to which one is willing to assume responsibility for contextual deficiencies. Liqing, who came to his situation with a strong set of technology skills, immediately determined that while computers were available, the existing labs were not accessible for instructional time. Moreover, adequate technical support was not available to enable his students to use appropriate educational software. To compensate for his unsupportive context, he was willing to dramatically shift how he would teach his reading methodology course.

Nancy, who came to her teaching situation with more basic technology skills than Liqing, knew that she could capitalize on her context to virtually accomplish all of her goals. The support from her context provided enough motivation for her to make the necessary shifts in planning and teaching responsibilities. Other faculty in Nancy's situation, while possessing the same level of technology skills and working within the same supportive context, might not accomplish what Nancy did with technology integration because of their lack of willingness to shift responsibilities.

As technology goals are established for candidates, it is important to try to determine whether faculty technology knowledge matches faculty responsibilities in relation to available resources. If there is a mismatch, adjustments need to be made accordingly.

The Notion of Context Can Be Mediated and Broadened

Contexts should not be thought of as one directional force constraining or allowing for technology integration. Efforts should be made to mediate the contexts to call forth proximal conditions for technology integration. Mediating the context calls for an awareness that, based on contextual opportunities and challenges, a certain level of technology skill is needed and responsibilities shift with more or less emphasis on different role responsibilities. Liqing had to expand his role

in planning to secure equipment and appropriate support by negotiating beyond his immediate context. He also had to train himself further to have the necessary skills to do what he ordinarily would expect a technology specialist to do. Shelley had to spend additional time as a catalyst to prepare her students to use technology to compensate for the university's lack of standardized expectations for student teachers. At the same, because she was skilled in spotting a good technology-based lesson, she could enjoy the creativity of the lessons coming from the student teachers because of the positive influence of the cooperating teachers. Nancy, who had glorious hardware and technical support, nevertheless had to revise her course syllabi without input from her peers because they were not inclined to use technology in the same course.

Context, as it relates to the availability and accessibility of technology, needs to be viewed from both a physical and conceptual perspective. Usually, when we think of technology, we think of hardware placed in labs and classrooms. While it is physically present or available in a specific context, it might not be accessible because of limited lab hours, lock-ups, placement in remote locations, or minimal technical assistance for set-up. This lack of accessibility often reflects one's view or conception of technology as a separate entity housed in a separate area rather than an integral part of teaching. When faculty and administrators view technology as essential for teaching, it becomes accessible because it is placed in classrooms so that faculty have easy access to the equipment. Additionally, technology personnel are available to instruct with technology and provide technical support. The more that faculty are aware of this distinction, the better able they will be to mediate this important component of their context.

In addition to mediating context, we should think about broadening the definition of context for technology integration in teacher and literacy education programs. It should be broadened to include internal factors (the factors unique to one's institutions), external factors (national and state mandates and initiatives), and professional and social networks that promote collaboration, assistance, and support. This broadening is necessitated by the need to continue learning with and about emerging technologies because of changes on a daily basis.

We note that the present study does have a major limitation because it is based on three case studies, and we must be cautious in generalizing the results. However, we believe that the present study helps to broaden our view about the impact of the interaction of three factors on technology integration: faculty knowledge and skills, the context in which faculty find themselves, and the degree to which faculty can and are willing to shift the way they teach to assume this additional responsibility. What is considered technology integration to one faculty member at one university might be very different to another faculty member at a different university because of the many different individual and contextual factors that come into play. Attempts to standardize the way in which technology is integrated at the same university also can be difficult because of individual differences in skill sets and dispositions toward technology and the context in which technology is available.

Top-down prescriptions as to how to integrate technology might not be as effective or as realistic as the bottom-up efforts by faculty members in using it in their own contexts. Realizing the value of technology integration in literacy education might be more important than personally possessing advanced technology skills, though the latter would be needed at its basic level.

Conclusion

We should not specify what teacher educators should be doing with technology. Although this statement is counterintuitive to what organizations such as ISTE are promoting with standards for teacher educators, we believe that teacher educators are better served if they set realistic goals for themselves. These goals should be based on the relationship between their skills, their context, and their willingness and ability to shift responsibilities, rather than pre-established standards that have been created with anonymity. Instead of believing that all of us must possess the same skills to perform the same technology tasks with our teacher candidates, we found that, if we can discern what actually exists, we can figure out ways to make our unique profiles work for us. Future studies that examine literacy educators' specific uses of technology in relation to their own contexts and shifting responsibilities is one way to contribute further to this paradigm shift for understanding

factors that contribute to getting technology integrated into literacy education programs. At the same time, and as literacy educators continue to plan for integrating technology into their programs, they can conduct more in depth studies of their own skills, contexts, and changes in responsibility to determine what is truly feasible with this ever-challenging necessity.

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Shelley B. Wepner is a faculty member at Manhattanville College, Purchase, NY, Liqing Tao at CUNY Staten Island, NY, and Nancy M. Ziomek at Widener University, Chester, PA.