To the Faculty of Washington State University:

The members of the Committee appointed to examine the dissertation of YU-FENG DIANA YANG find it satisfactory and recommend that it be accepted.

______________________________
Chair
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The completion of a dissertation is an astounding work. Its achievement would be impossible without the supports of my committee members, loving professors, my important friends and my family.

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Dissertation is an astounding work, but I did it!
The purpose of this study was to explore the process of teacher learning of teaching with technology by viewing teacher-learners as active agents. It argued the importance of understanding the process teachers go through to reach the ends of their learning and the roles they play in the process of reaching those ends, which are rarely emphasized in current studies. It also sought to understand how multiple factors interrelate and interconnect, and how teacher-learners act on these factors in real situations rather than how single factor influences teacher learning.

This study employed a qualitative case study approach. One K-12 practitioner who had ESL/bilingual students in her classrooms and who was taking an on-line course during the study period participated in the study voluntarily. The study data resources included fieldnotes, interviews, a questionnaire, and documents. The constant comparison method (Glaser & Strauss, 1967) was mainly employed in the data analysis procedures.

This study developed three understandings: 1) Teacher-learners bear ultimate self-generated learning goals in mind while learning to teach with technology; 2) Teacher-learners approach their learning by setting ultimate learning goals, developing solutions, learning plans,
and learning strategies for their ultimate learning goals, and reshaping solutions, learning plans, and learning strategies; 3) Teacher learning is an ongoing process that consists of changing in solutions and self-efficacy, and an interactive process containing the interplay and interaction of multiple factors. These findings expand understanding regarding how teachers reach the ends of their learning. It challenges views of teacher-learners as passive information receivers, teacher learning process as the constitution of specific linear phases, and teacher learning as single factor effect.

Recommendations for future studies included: 1) teacher-learners’ self-generated learning goals; 2) the influence of teacher concerns; 3) teacher control; 4) thinking beyond ACOT’s existing framework; 5) interplay and interactions among multiple factors; 5) the careful interpretation and use of self-efficacy; 6) learner differences; 7) culture; 8) experience of teaching with technology; 9) the process of becoming mindful technology-using teachers.

Implementations for teacher development stakeholders included 1) important phenomena in the teacher-learners’ learning process; 2) concepts or materials that are particularly useful for teacher-learners.
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CHAPTER ONE
INTRODUCTION

Background

Many scholars (Chaika, 1999; Kozma, 1991; Roblyer, 1989; Salomon, 2000; Sandholtz, Ringstaff, & Dwyer, 1997) and researchers (Baker, 1999, 2000; Christmann, Badgett, & Lucking, 1997; Cohen, 2001; Draude & Brace, 2001; Matthew, 1997; McCoy, 1996; Tierney et al., 1992) have discussed and studied the potential of using computers in education for decades. Advocates of computer use suggest that some features of computer technology are useful for student learning and teacher instruction (Butler-Pascoe & Wiburg, 2003) Some teacher educators and scholars suggest that, when used and integrated appropriately, the use of some computer technologies can provide a constructive learning environment for learners to build knowledge in meaningful ways (Jonassen, Howland, Moore, & Marra, 2003; Jonassen, Peck, & Wilson, 1999). In addition, use of computer technology can foster students’ learning in a learner-centered environment (Brandl, 2002; Sandholtz et al., 1997)

Many researchers have reported that some specific features of computer technology can support both student learning and teacher instruction. In studies related to multimedia, some researchers have found that the features of task-based multimedia simulation can support student understanding, promote student autonomy, and provide student opportunities for problem-solving (Meskill, Mossop, & Bates, 1999). Other researchers have proposed that the use of multiple modalities of multimedia can assist students with vocabulary development (Al-Seghayer, 2001; Chun & Plass, 1996). In addition, in studies related to telecommunication and the internet, some researchers have
reported that the use of Computer-Mediated Communication (CMC) can provide a collaborative learning environment, facilitate comprehensible and contextualized interaction, and promote learners’ self-correction (Kitade, 2000); encourage learner engagement in meaning negotiation (Fernandez-Garcia & Martinez-Arbeláiz, 2002); foster understanding and appreciation of the target and native cultures and provide opportunities for interacting with an authentic audience (Osuna, 2000; Singhal, 1998). Finally, other researchers have reported that the use of the Internet can develop learners’ critical thinking ability and provide a rich environment for searching for information (Baker, 2000); constructing knowledge cooperatively (Baker, 2000); and interacting with each other actively (Baker, 2000; Meskill, Mossop, & Bates, 1998).

Educators and researchers are aware of the potential of some educational technologies. However, the pace of emerging technologies in society and the workplace has raised concerns about preparing students with adequate technology competence for their future. Under this pressure, politicians, industry, parents, school administrators, educators, and researchers are encouraging teachers and institutions to bring more computers into schools and to integrate technology into the curriculum. Partly due to this pressure, the numbers of computers and Internet connections in schools has increased dramatically (Anderson & Ronkqvist, 1999; Becker, 2000b). Becker (2000b) reported that the total number of computers in private and public schools is slightly more than one per five students.

While many stakeholders are enthusiastic about the increasing number of computers in schools, many scholars and researchers argue that the research does not suggest that any use of computer technology will definitely enhance student learning.
Students do not learn just by sitting in front of computers themselves or when teachers use computers in classrooms. Rather, students can benefit from using computers or teachers’ use of computer technology only if it is used appropriately (Cognition and Technology Group at Vanderbilt, 1996; Dede, 1998a). However, appropriate use cannot be accomplished without teachers’ careful and pedagogically sound lesson planning and appropriate facilitation during the class (Bransford, Brown, & Cocking, 2000; Salaberry, 2000). That is, teachers play an essential role in using technology for instruction.

Teacher Readiness

As discussed above, teachers play an important role in the process of integrating technology into classrooms. However, being able to integrate computer technology legitimately requires teachers to know how and when to use it and when not to use it, and how to integrate it appropriately. Are teachers ready? Current research shows that teachers are struggling. A study of the National Center for Education Statistics (2000a) indicated that only 23 percent of teachers acknowledged that they felt well-prepared to integrate computer technology into their teaching in 1999. Becker (1999) also reported that teachers' limited technology experience interferes with Internet use in the classroom. In that study, most of the teachers implied that they did not know how to teach students these skills without knowing the computers themselves and felt that they are falling behind in the technology era. Therefore, based on a national-wide telephone survey of 600 public and private school teachers between January and February 2001, NetDay (2001) reported that although 87% of teachers are comfortable with using the Internet, 67% of the teachers report that the Internet is not well integrated in their classroom.
The National Center for Education Statistics (2000a) pointed out that 66% of public school teachers reported using computers and the Internet during their class time nation-wide. However, being able to use technology in teaching does not necessarily mean that its use is pedagogically sound or useful. In Becker’s (1994) national survey study, only 3% of the 3rd to 12th-grade teachers of academic subjects were identified as exemplary technology-using teachers based on the teacher’s goals for computer use, the frequency with which students used computers, the saliency of the computer approaches used for the major learning activities in the classroom, the amount of experience students had with using certain types of software, and the general functions that the computer played in the classroom. However, many researchers criticize that some of the exemplary technology-using teachers recognized seem not to integrate technology in their classrooms appropriately and thoughtfully. Pierson (2001) reported that one of the three exemplary technology-using teachers recommended by school administrators in her study did not have a sound pedagogy for his technology integration lesson. She pointed out that it was Steve’s own enthusiasm for computers that was the driving force behind computer-involved projects he chose. A good example was his teaching of Web page creation to publish the results of students’ research. He expressed in an interview other goals, however, that he had for the project. “Well, I always like to make home pages. You know, something about the Internet really intrigues me…I want to show them that making a Web page is simple.” The inference to be made here is that, although the project was indeed a publishing outlet for student writing, his underlying intent was to share an intriguing computer application. (p. 419)
The Knowledge Innovation for Technology in Education (KITE) database, which has collected exemplary technology-using cases from Iowa, Missouri, and Oklahoma, also indicated that some of the exemplary technology-using teachers need assistance. For example, in one case, the teacher was having trouble identifying appropriate Web sites for her instruction. Using a Web site that was advised to be appropriate for children, she described what did not go well in her class:

We did an Olympic unit and we did a scavenger hunt that was published by the company or had gone in conjunction with the Web site. The scavenger hunt was to go into the Web site and find information about the different venues, the different sports in the Olympics, and it was a lot harder than expected. I had gone in there thinking, okay, this is going to be very simple for them and set out right. But we had to do a lot of hunting to get to the material. We had to show…it was more difficult than expected. (n. p.)

These two examples indicate that among the small percentage of exemplary technology-using teachers, some do not use computer technology with a sound pedagogy in mind. The preparedness of teachers of teaching with technology is inadequate.

As we believe the use of technology in classrooms should be pedagogically sound and thoughtful, many exemplary technology-using teachers’ lessons may be viewed as technocentric or poorly designed. Yet, without sufficient quality professional development opportunities that guide teachers to integrate technology into the classroom, teachers should not take all the blame. Research shows that teachers are receiving limited education to learn to integrate technology in their classrooms, both in the working context and the learning context. Taking a technology-related course in the teacher preparation
program is not encouraged in half of the states in the United States. Based on a survey of state departments of education in 2003, *Education Week* (2003) reported that only 18 states in the United States require teachers either to have coursework in the use of technology or to take a technology skills test to receive an initial teacher license.

In addition, professional opportunities are limited after teachers enter the field due to time and funding factors. According to a survey of the Milken Family Foundation (Solmon & Wiederhorn, 2000), among the 27 participating states, teachers received an average of only 12.4 hours of training in technology use in the year of 1999. In addition, the National Center for Education Statistics (2000b) also reported that 82% of teachers acknowledged that they were not given enough time outside of their regular teaching duties to learn, practice, or plan how to use computers and other technologies. The way in which school administrators divide the technology funding also limits teachers’ professional development opportunities. The Market Data Retrieval (2002) indicated that only 15% of the school budgets in technology are devoted to staff development. The rest of the 85% is used for maintaining and purchasing hardware and software.

**The Needs for the Study**

In order to assist teachers in planning and carrying out pedagogically sound and useful technology-integrated lessons, providing quality professional development opportunities for teachers is essential. However, the design of a quality professional development opportunity cannot be developed in a vacuum. The foundations of quality course design rely on what research says regarding teachers learning to use technology in their classrooms in terms of course content, course activities, and teacher facilitation. Yet, current research regarding learning about teaching with technology does not provide
adequate information for educators to visualize how to plan useful courses and to guide
teachers to teach with technology thoughtfully. Current research regarding teachers and
technology addresses three aspects: 1) barriers to technology use (why some teachers do
not use technology in their instruction); 2) conditions of technology use (under what
circumstances and conditions teachers would use technology in their instruction); and 3)
current practices of technology use (how technology-using teachers carry out technology
integration practices in their teaching). However, these aspects only provide limited
knowledge about teachers and technology. Limited research regarding the process of
teacher learning has been conducted. With little understanding of the process of teacher
learning, it is very difficult for teacher educators to know what should be included in the
course content and how they can facilitate teachers in the process of learning. Under
these circumstances, research regarding teachers learning to use technology is needed.

Significance of the Study

In order to understand how teachers learn to use technology in their instruction,
researchers need to explore teachers’ learning processes. The focus of this study was to
explore the process of teachers learning to use technology in their instruction. With an
attempt to posit theories for teacher learning, I hope the findings of this study will
contribute to research regarding the process of teacher learning and the journey of
becoming a thoughtful technology integrator. Understanding teacher learning processes
will help teacher educators to understand how to better facilitate and scaffold teacher-
learners. The results of the study can also benefit education course designers and teacher
educators by helping them to build instructional components with a goal of supporting
the learning process of teacher-learners. Finally, teachers who are in the process of
learning to use technology in their instruction can benefit from understanding processes they might go through in order to develop learning strategies for their learning.

Conceptual Context

My personal teaching and research experiences have motivated me to focus on how teachers learn to use technology in their instruction. Being a teacher educator and researcher in teacher education is my career goal. In order to design an effective teacher education program and become a better teacher educator, I continue to study trends, problems and issues in the field of teaching and learning. In these past few years, designing a useful course to assist teachers with technology integration has become my main interest. However, such work cannot be carried out wisely without an understanding of how teachers learn to use technology in their instruction. My interest has mainly developed from my experiences as a former ESL/bilingual teacher, a researcher, and an online ESL endorsement course instructor and developer. These experiences and their impacts on me are described below.

Experience in Schools

My research interests in ESL teachers’ professional development in the use of technology stem from my experience in the previous schools where I taught. As a former ESL/bilingual teacher who uses computer technology frequently in her instruction, I was invited by the school technology coordinator to provide in-school workshops and training about designing technology-integrated lessons for bilingual teachers who have limited technology backgrounds and experiences. Through this experience, I came to realize that these experienced teachers encountered many difficulties and concerns when integrating technology in their teaching. For these experienced in-service teachers, the integration of
technology in their lessons seemed to challenge their original ideas about their lessons, classroom management, and class time.

In order to better prepare these teachers for such integration, I attended workshops and conferences to seek better ways for teacher preparation. During these professional development experiences, I heard different voices from other K-12 teachers about technology integration in the high-tech planet, Silicon Valley. These teachers were disappointed that the materials the workshops provided were extremely distant from their classroom reality, and the lack of scaffolding in the workshops discouraged the teachers to carry out such practices in their classrooms. Many of them asked “How does this relate to what I am doing right now?” and “Why does the instructor introduce us to problem-based learning? I already know this stuff and I am here to learn about technology.” Obviously, the existing programs and workshops have failed to provide these in-service teachers with what they think they need and has disappointed teachers about what they thought they would learn or might be helpful for them. The course design and the course content seem to be problematic. The gap between what instructors perceive teacher-learners should learn and what teacher-learners think they need to know remains. Therefore, for teacher-learners, such learning seems not to be meaningful.

First-Year Research Experience in My Doctoral Program

I noticed the same gap between instructors’ views and teacher-learners’ views about “what should be learned” and “what they need to know” in order to use technology in their instruction repeatedly while interviewing practicum teachers who took an educational technology course during the first year of my doctoral study. Many practicum teachers in this study complained that the educational technology course they took was
not very useful. They pointed out that they never learned the software/computer programs their schools expected them to use in the educational technology course, and what they learned to do in the educational technology course was unrealistic in their teaching contexts with regard to their time, school policy, and curriculum. The voices of practicum teachers in the field kept me reflecting upon these questions as a teacher educator: “Are we teaching the right thing?” “What should we teach in order to bridge the gap between theory and practice?” and “How can we make the learning experiences more meaningful and useful for all teachers?” However, I still cannot answer these questions based on the current research.

**Experience as An Online Course Co-Designer, Technical Coordinator, and Instructor**

Similar questions arose again during my teaching and research assistant assignment. Since 2002, I have had the opportunity to be part of a grant team that designed online courses for in-service teachers for their ESL endorsement. I have had many interactions with the participant teachers as a co-designer, technology coordinator, and instructor. Yet, from these interactions, I started to realize that I have limited myself to looking at teachers’ professional development in the use of technology as an instructor and course designer (e.g., what I can do to make students participate actively, reflect, and think, based on a course designer and instructor perspective). However, I have not paid adequate attention to students’ voices and perspectives. As students are the ones who experience their learning journey, how they feel and whether the course is meaningful or not for them is important for educators to know. Their perspective is equally important as exploring learning from an instructor’s and a course developer’s perspective.
A Pilot Study

My awareness of the importance of teacher-learners’ perspectives encouraged me to conduct a pilot study focusing on teacher-learners for a course project in spring 2003. The purpose of this pilot study was to explore language teachers’ learning experiences of the use of technology while attempting to put theory into practice in their local contexts. This study emphasized teacher-learners’ experiences and their perspectives on how they could prepare themselves for technology use in their local contexts. A course designed based on situated learning (Brown, Collins, & Duguid, 1989) was selected as the study site. Brown, Colin and Duguid (1989) suggest that knowledge is contextually developed when practitioners respond to the specific context in which they operate. The course situated teacher-learners to their teaching contexts by requiring them to think about practice contextually and to use the resources in their local contexts while completing their assignments for the class. The design of this course allowed me to explore participants’ learning experience in the use of technology in their teaching that was suitable for their local contexts.

Literature Review

In my pilot study, I reviewed literature discussing how pre-service and in-service teachers apply the knowledge they gain from coursework in educational technology to the classroom context. This literature, included below, started with a discussion of the effects of the coursework on teachers’ attitudes toward technology and technology competency. Then, the literature reviewed the interaction between coursework and teachers’ practice of technology integration in their classroom. In addition, it discussed factors influencing
teachers’ classroom practice on technology integration and presented recent research on technology-using teachers.

Interaction Between Coursework and Teachers’ Technology Competency and Attitudes

The first part of this review discusses how educational technology coursework affects teachers’ attitudes and confidence in using technology. A large number of studies indicate that educational technology courses have a positive impact on pre-service and in-service teachers’ attitudes toward computers (Lam, 2000; Milbrath & Kinzie, 2000; Yildirim, 2000); confidence in using computers (Knezk, Christensen, & Rice, 1996; Yildirim, 2000); and computer competency (Albion, 2001; Milbrath & Kinzie, 2000; Yildirim, 2000). For example, in Yildirim’s (2000) study, the participants reported that the educational technology course they took opened their eyes to the power of computers in education. They also reported that it was easier to carry out tasks by using a computer after they took educational technology courses. In addition, they gained more confidence in their own ability to use a computer. Milbrath and Kinzie (2000) also provided examples of successful changes in teachers’ attitudes toward computers and computer competency. They pointed out that although the changes in attitudes and self-efficacy take time, the computer training that pre-service teachers received plays a very important role during these transitions.

Interaction Between Coursework and Classroom Context

Educational technology courses influence pre-service and in-service teachers’ integration of technology in classroom practice. Currently, there are three common types of educational technology courses and training programs for preparing and training pre-service and in-service teachers to integrate technology into the curriculum: the single
course approach, the technology infusion approach, and the field experience/situated approach.

The single course type consists of a technology-specific course within a teacher preparation program (Gillingham & Topper, 1999). This course type provides a model for learning how to use different computer applications and programs. The course offered by the Instructional Technology Department at San Jose State University for their teacher credential program is based on this model. Keirns (1992) reported that teachers who took the course believed that the coursework had extended their skills and directly affected their outlook toward the use of computers in their teaching situation, both for personal management tasks and instruction. However, according to the study data, integration of computers into the curriculum was absent. Teachers’ use of technology was limited to creating teaching materials, managing school resources, and providing software as a game in the classroom. The study data did not indicate that they had integrated what they had learned about the computer application programs in the coursework into the curriculum of different subjects. Langone et al. (1998) also investigated the extent to which the project graduates integrated technology into their work after they took the Special Education Technology Program (SET). This study showed that the technology use of these graduates was more on a surface level and not interwoven with ongoing IEP linked activities. Moursund (1999) suggested that formal stand-alone information coursework (a single course approach) does not correlate well with scores on items dealing with technology skills and the ability to integrate information technology into teaching. Duhaney (2001) analyzed the causes for the single course approach. He concluded that one of the problems is that “...common teacher preparation curriculum in
which most experiences with technology are focused in a single course that concentrates on learning to use the technology rather than learning how to facilitate learning with technology” (p. 25).

The second type of educational technology course is the technology infusion approach, which places aspects of technology with each course in a teacher preparation program (Gillingham & Topper, 1999). Such a course provides students with a model of how to teach these subjects with technology rather than just how to use technology. Moursund (1999) reported that these instructional hours are more highly correlated with other variables in the survey than are single-course approach credits. He suggested that K-12 classroom preparation and training institutions should increase the level of technology integration in their own academic program. Francis-Pelton, Farragher and Riecken (2000) described a pre-service technology course taught at the University of Victoria using the elementary science, math, and social studies curricula as the focal point. After the instructors introduced available computer applications to students and showed them how to use computers as information tools, analytical tools, graphing/statistics/transformation tools, and for creativity and communication, assignments and small activities were used to help pre-service teachers apply the computer applications in their particular subject areas. Hargrave and Hsu (2000) supported this model and stated, “…such integration should be provided through improved synchronicity (i.e, more hands-on experiences for pre-service teachers with realistic educational assignments) and increased modeling of technology by college faculty in both content and methods courses” (p. 304). Beck and Wynn pointed out that survey results from schools, colleges, and departments of education (SCDEs) on pre-
service students’ use of technology showed that pre-service teachers who took educational technology courses based on the technology infusion model integrated technology in on-campus classes positively. However, researchers have found that pre-service teachers’ use of technology drops off during student teaching (Beck & Wynn, 1998).

The third type of educational technology course, the field experience and situated approach, provides an authentic environment and case-based context for pre-service and in-service teachers (Gillingham & Topper, 1999). Ringstaff, Yocam, and Marsh (1996) reported that participating teachers learned by observing and working extensively with accomplished Apple Classroom of Tomorrow (ACOT) teachers and students during the school year. The participating teachers created a learning environment using different technologies in various subject areas. Teachers' teaching styles changed after they received the training. More cooperative learning and inquiry-based learning activities were used. Students were more engaged in their learning processes. Moursund (1999) also suggested that student teachers need more opportunities to apply information technology during field experiences under qualified supervision. However, according to his survey results, although most institutions report that information technology is available in the K-12 classroom where student teachers get their field experience, most student teachers do not routinely use technology during field experience and do not work under master teachers and supervisors who can advise them on information technology use.

Factors Influencing Classroom Practice on Technology Integration
Although various types of educational technology courses are offered in teacher preparation and training programs, the practice of technology integration into the curriculum is still very limited because of various difficulties. A large body of studies has been conducted to investigate the factors influencing student teachers’ and classroom teachers’ practice of technology integration into their current teaching environment (Albion, 2001; Rogers, 2000). Inadequate time, technical support, and resources are the three main barriers that hinder technology integration (Albion, 2001; Rogers, 2000). This implies that what the education technology course offers may not be easily applied to the realities of the classroom.

Technology-Using Teachers

As more emphasis has been put on the impact of the course work itself, Galloway (1996) suggested that there is a need for research that asks what computer experience teachers need to gain, how they actually use computers, and how they learn to use and adopt computers in the ways in which they actually use the technology. Researchers then began to investigate and study the characteristics of technology-using teachers. It has been argued that if the goal of the educational technology course is to transfer the knowledge into practice, we need to know the results of successful transformation. In other words, as Meskill et al. (2002) point out, “transformation into what?” (p. 2). This issue has been investigated with regard to expert technology-using teachers’ perceptions of the role of technology, expert technology-using teachers’ teaching philosophy, and expert technology-using teachers’ beliefs in types of learning theories. Meskill et al. (2002) examined the difference between expert technology-using language teachers and novice technology-using teachers. Their findings suggest that expert technology-using
language teachers focus on learners as the agency of the learning process and how they can use the technology, rather than the machine as an agency of the learning process and the features of the technology as the novice teachers. They further suggest that expert technology-using teachers are more learner-centered, rather than teacher-centered. Expert technology-using teachers believe in using technology to empower students, rather than managing students as novice teachers. Finally, expert technology-using teachers emphasize the process rather than the product in their instruction.

Teaching philosophy is another criterion for the transformation matter. Some researchers have reported their assumption that teachers who use constructive ways of teaching may be able to integrate technology into the curriculum in a meaningful way (Jonassen et al., 1999), although only limited research (Becker, 1999, 2001; Dede, 1998b; President's Panel on Educational Technology, 1997) has been conducted to study this correlation. These studies suggest that using technology for instruction (e.g., simply presenting teaching materials to students) and using technology for student construction (e.g., having students make a PowerPoint presentation on their research) are at the end of the continuum of expert technology-using teachers and novice technology-using teachers. For example, Becker’s (1999) survey study showed that the preferred teaching strategies and styles of teachers usually determine or shape their patterns of technology usage. Those he calls “transitional” teachers are far less apt to allow students to use new technologies than “constructivist” teachers, even when they have five or more networked computers in their classrooms. Becker’s research points to the need to do much more than teach technology skills to teachers. We must also convince them of the value of engaging students in program-based or project-based learning with these new tools. In other words,
this study implies that changing teachers’ teaching philosophy to constructivism can result in the use of technology in their teaching, and that training constructivist teachers should be one of the goals of an educational technology course.

The study of Ertmer, Gopalakrishnan, and Ross (2001), however, suggested that exemplary technology-using teachers incorporate technology in their teaching based on their belief of how their students learn and the goals of their instruction. The exemplary technology-using teachers in this study incorporated technology into skill-oriented, content-oriented, process-oriented, or overlapping orientations instruction. Egbert, Paulus, and Nakamichi (2002) argued that teachers only learn what they actually need to use. Both the studies of Ertmer et al. and Egbert et al. suggest that student construction may not be the only way of using technology appropriately, and that training constructivist teachers may not be the end for developing technology-using teachers.

Freeman (1996b) suggests that teacher learning is a complex process. It can involve the contexts they are in, their personal backgrounds and experiences, and other factors around them. Clarke and Hollingsworth (2002) also suggest that the contexts of the teacher play an important role in their professional development. However, limited studies have been carried out addressing these aspects.

Educational technology or computing courses have proved to be the key to changing teachers’ attitudes toward computers (Lam, 2000; Milbrath & Kinzie, 2000; Yildirim, 2000), to increasing their confidence in using computers (Knezk et al., 1996), and to building their technology competency (Albion, 2001; Milbrath & Kinzie, 2000). However, such courses seem to have a very limited impact on real classroom practice (Beck & Wynn, 1998; Duhaney, 2001; Longone, Wissick, Longone, & Ross, 1998;
Moursund, 1999). Different factors influencing classroom practices on technology integration have been studied (Albion, 2001; Egbert et al., 2002; Rogers, 2000). Researchers have argued that what was provided may not be what teachers needed in order to integrate technology into the curriculum (Abdal-Haqq, 1995; Galloway, 1996; Hidalgo, Lu, & Miller, 2000). Therefore, given the complex nature of teacher learning and different learning environments (Freeman, 1996b), the cause-and-effect assumption in current research cannot explain the holistic and real picture of how teachers learn to use technology in their instruction, and furthermore suggests that teacher learning is a complex process.

In order to uncover the myth and the complexity of teacher learning about the use of technology, researchers need to investigate language teachers’ learning experiences of the use of technology, while attempting to put theory into practice in their local contexts (situated learning). The findings of this pilot study can contribute to the literature concerning teacher learning. It will also help teacher educators and researchers to understand the complexity of teacher learning and language teacher learning toward the use of technology. The results of the study can also benefit computer-assisted language learning (CALL) course designers and CALL teacher educators. Finally, second language teachers can benefit from the strategies suggested from the participants while learning to use technology in their instruction.

The purpose of this pilot study was to investigate second language teachers’ learning experience during a situated learning based course that required teachers to reflect upon their learning in their teaching contexts. From English as a second language (ESL) teachers who were taking an educational technology course designed based on
situated learning, I expected to discover their learning experiences of integrating technology into their teaching.

Methodology

As in the current study, qualitative research was used for conducting the pilot study. According to McMillan and Schumacher (2001), qualitative research describes and analyzes people’s individual and collective social actions, beliefs, thoughts and perceptions. In order to explore the complexity of teacher learning towards the use of technology in their teaching and to create a rich description of teacher thought processes in a situated learning environment, this pilot study used qualitative design and focused on exploring questions that have been less noted in previous research.

Because the goal of the pilot study was to investigate teacher learning in a real-life context that cannot be manipulated, it was designed based on qualitative case study methodology as in the current study. Yin (2003b) defines a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life contexts, especially when the boundaries between phenomenon and context are not clearly evident” (p. 13). He suggests that qualitative case study is “preferred in examining contemporary events, but when the relevant behaviors cannot be manipulated. It allows researchers to deal with a full variety of evidence such as documents, artifacts, interviews, and observation. Moreover, in some situations, such as participant-observation, information manipulation can occur” (Yin, 1994, p.20). When researchers are interested in understanding contemporary phenomena in one setting, one individual, one event or one institute with in-depth investigations, a qualitative case study that allows researchers to capture the complexity of particular phenomenon in real-life contexts with multiple
data sources is particularly useful. Because of the above reasons, qualitative case study methodology was used for the pilot study.

There are many types of case studies. The selection of the appropriate design is dependent on the purpose of the research study. Yin (1993, 2003a) identifies some specific types of case studies. An exploratory case study is used for “defining questions or hypotheses for subsequent study or to determine the feasibility of the desired research procedure” (p. 5). A descriptive case study “presents complete descriptions of a phenomenon within its context” (p. 5). An explanatory case study, however, explains how events and/or phenomena take place in its context and presents study data that imply or explain relationships between variables. Merriam (2001) also discussed three types of case studies. In his scheme, a descriptive case study, which is similar to Yin’s descriptive case study design, is used when researchers intend to present a detailed account of the study phenomenon, but to theorize the study data. It is particularly useful when there is little research for an area of study because such studies often develop a database for future comparison and theory building. On the other hand, interpretive case studies are designed to “develop conceptual categories or to illustrate, support or challenge theoretical assumptions held prior to the data gathering” (p. 38). In other words, interpretive case studies include analytical explanations and interpretations rather than solely descriptions. Evaluative case studies, however, include “description, explanation and judgment” (p. 39). These evaluative case studies are often used to evaluate the successfulness of a program or participants’ learning progress in a program.

The design of the pilot study can be best explained as an exploratory-explanatory case study (Yin, 2003a) or an interpretive case study (Merriam, 2001). With the intention
of exploring questions that have been less noted in previous research and conceptually explaining phenomenon observed in the study, the design of the pilot study contains characteristics of exploratory case study as well as explanatory case study. First, the exploratory design was used to define questions for subsequent studies of teachers’ learning of integrating technology. Such design allowed me to explore “what” is going on while teachers are learning to use technology for their instruction and to identify phenomena that are less noted in the current literature. Therefore, questions, such as “Do all teacher-learners have their own learning goals in mind?” “What might happen when a teacher-learner does not have a learning goal in mind?” “What types of learning goals do teacher-learners have while learning to teach with technology?” “Why do they have some types of learning goals?” were defined and formed for subsequent study. The explanatory design was used to interpret some of the observed phenomena. In the pilot study, it mainly helped me to develop an understanding of “why” teachers’ learning experiences were taking place as they were by establishing relationships between variables that were addressed by the study participants. For example, the reasons why the study participants had specific learning focuses were explained. In other words, in the pilot study, whereas the exploratory design was helpful for me to define questions, the explanatory design was useful to seek further understanding of some observed phenomena. Thus, the design of the pilot study can be explained as an exploratory-explanatory case study.

The design of this exploratory-explanatory case study also included site, participant selection, data collection, and data analysis procedures. These components are discussed below.

**Site**
In order to explore teachers’ contextual learning of the use of technology in their instruction, a course designed on situated learning (Brown et al., 1989) was selected as the study site. With a belief in “situated knowledge,” that knowledge is contextually developed when practitioners respond to the specific context in which they operate, all the tasks, discussions, and assignments in this course require students to think about practice contextually and to use the resources in their local contexts. The design of this course allowed me to explore participants’ learning of the use of technology in their teaching that is suitable for their local contexts.

The course selected for the pilot study was offered by the College of Education at a Northwest university located in the United States. The purpose of this course was to familiarize students getting an endorsement in English as a second language (K-12), a Master’s degree, or credits toward Professional Certification in the Northwest, with key concepts related to computer-assisted language learning (CALL). Because the main population of students in this course consisted of practitioners who taught at different locations in the state, the course was delivered by distance learning. Students visited an online classroom to turn in their assignments and participate in class discussions.

The course used for pilot study was a seven-week class that contained seven units as the course content. Each unit lasted approximately one week. The units were:

Unit 1: Introduction

Unit 2: The computer as a tutor in classrooms with ELLs

Unit 3: The computer as a creativity and production tool in classrooms with ELLs

Unit 4: The computer as a tool for inquiry in classrooms with English language learners
Unit 5: The computer as a communication bridge and/or collaboration tool in classrooms with ELLs

Unit 6: Computers and assessment in ESL contexts

Unit 7: Final Project

In each unit, students were required to complete a focus reflection, a task, and a final activity. They were also required to discuss with their classmates the readings and assignments, and to share their reflections in the online discussion forum.

The primary goal of this course was for students to become informed practitioners.

By the end of the semester, students would also meet the following objectives:

• Demonstrate understanding of language learning principles and their relationship to CALL practices

• Demonstrate understanding of the role of computers in language learning activities

• Critically evaluate software, Web sites, technology-enhanced projects, and activities for language learning

• Create and develop technology-enhanced tasks, activities, and lessons based on language learners’ needs and current available resources

• Adapt and modify existing technology-enhanced tasks, activities, and lessons based on language learners’ needs and current available resources

• Seek needed funding, support, and professional development opportunities for technology integration

• Demonstrate an understanding of and ability to apply the TESOL and ISTE standards for technology use
Participant Selection

Purposeful sampling was used in this study. Students who were teaching in ESL or bilingual classrooms at the time the class was offered were invited to participate in the study as typical cases (McMillan & Schumacher, 2001). Two non-ESL-endorsed teachers, who were teaching ESL in elementary schools and who were taking this course, volunteered to participate in this pilot study.

Data Collection and Procedures

Interviews, field notes, and documents were the data resources of this pilot study. In order to understand the participants’ teaching contexts, current teaching assignments, previous/current technology-using experiences, and in-depth interviews were conducted at the beginning of the class. Because of the distance and time limitations, interviews were conducted by phone. Interviews were audio-taped with the participants’ permission and were fully transcribed for data analysis purposes. Interviews were conducted after school or on weekends. The estimated time for each interview was thirty to fifty minutes.

Participants’ profiles were collected from the course director in order to document the basic information about the students’ backgrounds, teaching experiences, teaching philosophies, and so on. Other documents such as the class syllabus, the course unit content, class readings, and communication documents (email, MSN Messenger) were also collected. Observations regarding student progress were recorded in the instructor’s journal as field notes as the course progressed. Student assignments and class discussions were also collected to document participants’ learning development.

Data Analysis
As in the current study, I consulted Yin’s (2003a, 2003b) suggestions when analyzing the study evidence in the pilot study. Yin suggested that the analytic procedures for exploratory case studies are similar to Glaser and Strauss’ (1967) hypotheses-generating process. However, it is important to note that the goal “is not to conclude a study but to develop ideas for further study” (Yin, 2003b, p.120). Therefore, with Yin’s advice, I adapted Strauss’ (1987) hypothesis-generating procedures for the exploratory nature of the pilot study and then conducted the explanation building procedures for the explanatory nature of the pilot study. With an intention of exploring questions that have been less noted in previous research and conceptually explaining phenomenon observed in the study, both procedures were essential.

Coding and memoing were two major analytic procedures in the pilot study. Therefore, because of the significant differences between the two study participants, I first tried to identify the contextual variables in each case, and then discuss the aspects that needed further study, along with the data that might be needed for saturating the developing theory.

The data analysis procedure started with coding. Open coding was used in the initial stage of the coding process. The research examined the data in each case unit-by-unit and coded the data line-by-line and word-by-word. In this stage, indicators were located in the data and constantly compared. Categories, concepts, and core categories were generated through constant comparison strategies (McMillan & Schumacher, 2001), as explained more thoroughly in the current study. In addition, distinctions were made between concepts, categories, and core categories in order to generate dimensions and subdimensions (dimensionizing). Properties were also generated in the processes.
Generative questions, theoretical sensitivity, and theoretical sampling (Glaser & Strauss, 1967) were also used in the data analysis processes.

Axial coding was used for data analysis as well. The researcher coded the data around a category as an axis. Coding paradigm was essential in this process. By drawing conditions from the categories, events, and people, illustrating the interactions between them, and finding consequences of the conditions (the coding paradigm), mini-theories were generated. In addition, operational diagrams were used to cluster and make connections between categories. Theoretical sampling was also used to find instances for categories and relationships between categories.

Selective coding took place after the category emerged in order to achieve theoretical saturation. Integrated diagrams were used to show how categories, concepts, and properties related to the core category. In addition, data was revisited and reexamined for verification.

Analytical memoing also took place during the data analysis in order to record the researcher’s coding processes and thinking processes. The analytical memos were revisited and sequenced for the final write-up.

Analysis

As mentioned earlier, each participant was analyzed respectively due to their significant differences in this study. In this section, each participant’s learning experiences are reported. The findings of this study are reported below.

Participant I: Laurie

*Background and Context*
Laurie had been a second language teacher for more than five years. This was her sixth year of teaching. She had just moved to a new state two years ago and was still trying to understand how her “new” school works. Laurie spoke both English and Spanish. Laurie’s current school had fifty-seven percent English as a second language (ESL) students. Most of them were Spanish-speaking students and were from low-income families.

The goal of Laurie’s school was for 90% of the students in the school to meet the grade level standards. The school assessed students consistently to track their progress and demanded that teachers make efforts on student achievements. Laurie felt stressed and exhausted because of the high expectations of the school. She was concerned about everything she did and that she was accountable for her students’ test performance.

Laurie had taught in a bilingual class at the same school before the year she participated in the study. Therefore, her teaching assignment changed to teaching the pull-out ESL students in her school when she participated in the pilot study. She felt frustrated and depressed because she did not feel she was making a difference for her students. She felt hopeless because of the school’s high expectations on student scores, while at the same time offering little support for materials, classroom space, and time.

Laurie believed that providing students a healthy and caring environment was important. She felt that she always encouraged students to learn, to explore, and to ask questions. She reported that she liked to use a variety of methods in teaching and was concerned about students’ needs. She did not like to follow teacher manuals and thought they were very boring. She preferred to create materials by herself and was open to any new ideas for what to use in class. She wanted to be more student-centered, but reported
that she taught using a more teacher-centered approach because that was how she was
taught. She usually explained and demonstrated to students their assignments before
having the students carry them out. She believed that “real world” and hands-on
experiences were essential for her ESL students. She often provided students with
opportunities for exploring how the concepts they were learning in school were carried
out in the world.

Laurie had limited training about ESL students. She had received training on how
to use ESL materials and one type of teaching methodology in workshops before she
participated in the pilot study. In terms of theoretical basis, she reported that she had
some knowledge about language acquisition, but felt herself “unprepared” for teaching
ESL students.

Laurie’s experiences with computers seemed to be very rich. She had taken basic
programming courses, computer application courses (e.g., spreadsheet), and Internet
application courses (e.g., Email and World Wide Web). She had created two Web pages.
However, she felt that she did not know much about how computers can be incorporated
into class, although she already felt very comfortable with computer in terms of personal
use. Nevertheless, she had used computers in her teaching in various ways. For example,
when she was teaching in her previous school, she had her middle school students
exchange email with students from other states. She also had her students email her for
feedback, and even had her students using Web searching for research projects. She
believed those projects would be harder for primary students because of the lack of
keyboarding skills and their language levels.
Results

School context was the core category that emerged in Laurie’s case. The pilot study suggested that it influenced teacher concerns, decision-making and lesson-planning in Laurie’s case. The influences of the school context on teacher concerns, decision-making, and lesson-planning are presented below.

Teacher Concerns. Teacher concerns were the consequence of the school board’s expectations in Laurie’s case. As Laurie pointed out, her school had high expectations concerning student achievement and emphasized students’ test performance. She noted:

Reading is the number one priority [in our school district]. Our district goal is to have ninety percent of third graders reading on level by the end of the year, in English.

As Laurie’s school emphasized standardized tests, Laurie focused on preparing her students for the tests by following the school curriculum closely. She repeatedly mentioned and discussed her concerns regarding WASL, EALRs, standards, her school curriculum, student scores, and student performance during the class. She described the current situation of the technology uses in her school:

We use AR (Accelerated Reader) Reading at our school. Students read certain books for comprehension and then take tests on the books. We also have STAR, which is an assessment that tells at what grade level a child is reading. Computer assessments tend to be more multiple-choice than extended response. Our district will soon be using a program that is formatted much like the WASL. Short answer and extended answers are included. Teachers will grade these questions, and the rubrics are provided.
While Laurie’s school board had high expectations for student achievement and test scores, Laurie felt confused by the role of technology in these expectations. She questioned how the use of technology could help her students achieve the standards, and how the use of technology in her instruction could be aligned with the assessment. She discussed her concerns regarding the WASL and other assessments:

…Another concern I have is whether or not the use of technology will help students prepare for the WASL and other mandated assessments? Shouldn’t more time be spent with paper/pencil practice because that is how the students will be assessed? In our previous course we learned how instruction should be aligned with assessment. I am struggling with how instruction with technology aligns itself with our current assessment system.

Because of the inadequate understanding on how to align the use of technology with the EALRs, Laurie felt unprepared for integrating technology into her instruction:

I feel quite capable when it comes to using technology for personal use, but I am not as confident when it comes to integrating technology into my teaching. I don’t want to use technology just for the sake of using technology. Its use would have to be justified and be aligned with the EALRs. From what I have seen, there is very little use of computers mentioned in the EALRs. And if I did integrate technology with my reading instruction, would the results justify the immense amount of time it would take?”

As a teacher in an assessment-driven teaching context, Laurie constantly reflected upon how she could best incorporate technology into her curriculum. She revisited the following questions continuously: “Which programs are best used for language
acquisition? For science? For math?” “How much do these [drill and practice] programs actually help students?” “Will assessment align with instruction?” “How often and what types of assessment via computer?” She was anxious to learn “what technology would fit to her curriculum,” and listed “Are the objectives/expected outcomes aligned with the EALRs?” and “Will this software be easy to integrate with my curriculum?” as the two most important criteria for software evaluation. She stated:

Because integration with curriculum is very important, I would most want to know how this software fits in with what I already teach [highlighted]. Will it support and supplement what is being taught in the class?

She repeated the same concerns as the class progressed, and reported that “This word game would easily fit into the Open Court Reading curriculum, which in turn was meeting the EALRs” as her software evaluation results.

Laurie’s inadequate understanding of the role of technology in current standards, assessment, and curriculum caused her great stress. She worried about the teacher accountability issue and constantly questioned if she had done “right,” that is, what her school expected. She asked, “How am I expected to use them [computer technologies]?” “Am I doing my students a disservice by not using computers?” “In what ways should my students be using the computers to aid in English acquisition?” “How often should they be using the computers?” “Am I expected to cover these in a reading block, or is the regular classroom teacher responsible for these?” “Are students expected to be able to do this well with little or no keyboarding skills?” She explicitly stated her concerns regarding administrators’ expectations:
… because of the strain and stress on reading, if I'm taking reading block time to do computer "keyboard time," I don't think they [administrators] want me to do that a lot, even though it probably helps their writing. They're not going to get to keyboard on the WASL, so it's like, do I really need to do that? Or go back to pencil and paper because that is what they need to with the WASL. So…it is just to figure out what I need to do and how to help the kids who need to pass the WASL. They'll get that on the WASL, aligning that with the curriculum and the purpose not matched well.

Laurie’s concerns about the school administrators’ expectations and teacher accountability limited her use of technology in her current teaching context. Unlike conducting email exchange and other technology-related projects in her previous school, she mainly had her students use technology for keyboarding skills in her current school. In addition, she did not use technology that often in her current school compared to what she had carried out in her previous school at the beginning of this course. She noted,

In my current position, I rarely use technology. The kids take AR tests on the computer. Once in awhile they will play a skill/drill game. With my 3rd graders we spend some time on Fridays with the TypeWriters in order to give them keyboarding skills.

Although Laurie was implementing a technology-related project in her classroom during this course, her main emphasis was on the accuracy of students’ work. She described how she had her students use computers to type out their corrected written work:

I met with each student individually, showing them where corrections needed to be made. These corrections included punctuation, grammar, sentence structure,
and spelling. Once second drafts were completed we made numerous trips to the computer lab so that students could word process this document.

Teacher responsibility was another concern of Laurie’s. She referred to teacher responsibility as “what a teacher should prepare her students for” and “for what purposes.” She viewed teacher responsibility from three perspectives: her school board’s expectations, society’s expectations, and her own beliefs. When discussing teacher responsibility based on the school administrators’ expectations, Laurie viewed teacher responsibility as developing test-takers in her current teaching context. As she pointed out:

As I finish up my second year of teaching at the primary level, improving writing instruction is a major goal of mine. I teach some 4th graders and I need to better serve them in the area of writing as they prepare for the WASL. I need to make a more concerted effort to meet the writing EALRs.

She also felt she needed to help students to be computer literate because of the possibility of computer-based tests in the future. She said, “Who knows if all the tests will be computerized?” and “We do need to prepare our students for that.”

Laurie also discussed the issue of teacher responsibility based on society’s expectations. As she noticed changes in society and the existence of the “technology ecology,” she felt it was teachers’ responsibility to prepare students for the future. She discussed the change of the society and how it impacts education:

I'm amazed at how fast it's taken hold. The first time I was in college in 1978 at [name of the location] it was the key punch cards. I never took one of those classes because I heard horrible stories… Everyone said, "It's the hardest thing
I've had to do." It's just everywhere now. It's part of education. The kids have to know how to do it to survive and be proficient in this century. You might hate it with a passion--my oldest daughter hates computers with a passion--it's a way of life now. I'm amazed how things are like this. It's here and it's probably to stay. Embrace it willingly or embrace it somehow.

She addressed the importance of developing students’ technology skills so they can survive in the future:

…And whether we like it or not, they MUST have technology skills in order to survive in modern society. … I often fall into the trap of considering what is most comfortable for me as teacher instead of considering what is most beneficial for the students. We are there to serve our students and help prepare them for the future. The more technology-related skills we can give them, the better prepared they will be.

She further discussed the benefits of introducing technology to her low-income students:

Just being exposed to and learning how computers work is a major need for our students. Many of them come from low-income homes, and few have access to computers at home.

Therefore, because her accountability was held by the school administrators, Laurie often compromised teacher responsibility to the school with teacher responsibility to society.

She said:

To me technology means having students using the computers often for a variety of purposes…research, writing, corresponding via e-mail, etc. I think students would enjoy writing more if they could do it via computer. Unfortunately, that is
not how they are assessed, so I have to concentrate on getting them to write with pencil/paper.

Her personal beliefs about teacher responsibility also conflicted with her responsibility to the school. With a personal belief that teachers should prepare their students to be lifelong learners, she struggled with the use of assessment-driven reading materials in her school contexts. She said:

Mary’s task was an evaluation of AR (Accelerated Reader). We use AR in our school. It has both positive and negative aspects. I am wondering what other approaches are being done in your schools to promote a life-long love of reading?

She continued to show her concerns:

The kids are reading [for the test], but are they reading for the right purpose? Will this transfer into a life-long love of reading? That's the BIG question and should be the objective for all that we do.

Although Laurie felt it was her responsibility to prepare students for their future and help them to become computer literate, her administrators’ high expectations on the standardized test made her struggle with what she should do as a teacher. She compromised her own perspectives on teacher responsibility with what her school administrators expected.

The high expectation of student achievement in Laurie’s school influenced Laurie’s worries about how to survive as a teacher. The influence of the school climate on Laurie’s teaching context to her concerns cannot be ignored.

Lesson Planning and Decision-Making. Laurie’s decision-making on lesson planning can be discussed based on topic/content selections, material/tool selections,
students, reality, and classroom management. Among those factors, her concerns about the school board’s expectations, accountability, and teacher responsibility impacted her decision-making on lesson planning dramatically.

When designing lessons, Laurie mainly selected the topics and content area based on her school’s curriculum. She listed the school curriculum on the first line of her lesson plans:

For a future inquiry-based project that coincides with our City Wildlife unit in Open Court, I would like my students to research about the status of the burrowing owl in the Tri-Cities area.

In terms of materials/tools selections, Laurie discussed the appropriateness, usefulness, and effectiveness of the materials and the tools. She discussed appropriateness from the aspect of the age/grade level. When selecting computer-related materials, resources, and tools, Laurie repeatedly questioned whether the materials, resources and tools were age appropriate and level appropriate. For example, when inquiring about the software her peers have used, she showed her interest in the grade/age level of the students:

xxx, WOW! It sounds like you have a good handle on how to efficiently implement technology in your classroom. What grade/age level are your students?

She further suggested,

The program Accelerated English was mentioned in our readings as a program that presents naturalistic settings for discourse. I am familiar with AR and Accelerated Math, but have not heard of Accelerated English. Is it only intended for older audiences? Has anyone used this program before? Is there a component
to it that would be beneficial for transitional students in primary grades?... It'd be
great if a similar program for grade-school students would be created.

Laurie discussed the usefulness of the tools and materials from the aspects of
functions and accuracy. Laurie thought that software that could provide feedback was
more useful and interactive, and considers some software as deficient because “no
corrective feedback is provided for the students.” She also discussed how the function of
the software, *Hablemos Inglés: Curso Interactivo Completo*, could benefit her
monolingual students:

Our monolingual students could really benefit from *Hablemos Inglés: Curso Interactivo Completo*. I wish I would have known about that software, because I had a monolingual boy in my class earlier in the year. As I was instructing the other students in the class, Felipe could have been practicing listening and speaking in English. That would have been a valuable use of his time.

She made further inquiries about the usefulness of other software for teaching language:

Would *JumpStart Spanish* be a good tutorial for young learners who are learning in L1 before transitioning in L2? Does it actually teach reading in L1?

Laurie also took the accuracy aspect into consideration for computer-related material/tool selections. She discussed her concerns about the impact of using IRC, a chatting tool, on students’ spelling and writing skills:

I brought this topic up in a previous course, but in light of our readings, now might be an appropriate time to re-introduce it. In regard to students using IRC with friends, has anyone noticed a decline in students' abilities to write correctly with grammar and spelling? IRC has given rise to an entire new subculture
language that kids are using for hours on end. I actually had a middle school student turn in homework with IRC lingo. To her, the word 'for' is spelled '4', and that's how she turned in her paper. Is anyone else seeing evidence of this in the school setting?

When discussing how she selects Web sites for student research in an inquiry-based project, she said she would only consider using Web sites that contain “reliable” information:

Another concern is the reliability of some of the information. Unfortunately, anyone can print anything on the Web. I believe we must check the resources carefully for bias or untruths before we recommend those links as resources for our students.

Therefore, teaching critical literacy and developing students’ ability to examine the reliability of the materials were usually viewed as two major goals for an inquiry-based project. Teaching students to evaluate the materials critically, to compare different perspectives, and to identify the bias of the materials were listed as some of the important processes students go through in an inquiry-based project. Given the fact that anyone can publish on the web, learning those skills is even more essential for students. Therefore, Laurie’s emphasis on using “accurate” and “reliable” materials seemed not to match the original goals of an inquiry-based project. Critical literacy seemed not to be taken into account in Laurie’s inquiry-based project. Emphasis in her project had been placed on “reading the information” and learning the “facts.”

Laurie’s focus in her inquiry-based project seems to be contradictory to her concerns about teacher responsibility to society. Only introducing her students to
“reliable” information on the web may result in her students’ misconceptions that all the information on the web was “accurate.” She says,

The use of technology would greatly enhance my inquiry-based project in many ways. The students would be integrating technology skills while engaging in purposeful, authentic interaction in English with members of our community, thus reinforcing the fact that language has a variety of purposes and audiences, as stated in the general language learning principles. Students’ use of technology can be applied to further learning and real-life experiences in our technology-driven society.

This statement shows the conflicts between Laurie’s interpretation of teacher responsibility to school and teacher responsibility to society.

Laurie discussed the effectiveness aspect based on how the materials/tools can help teachers do their job more easily, how easily the students can use them, and how the materials/tools can improve students’ performance. When selecting software, Laurie examined the software to see if it included a management component for tracking student progress. She said,

[This] is important because teachers usually want records of what students have accomplished using the software. In this way, it can be used for evaluative purposes, to help assess the students’ progress, and shape further instruction.

She considered the lack of record keeping software as deficient, and critiques the software she evaluated:

I did not detect the game’s ability to save a game in progress or to keep a running record of where a player ended his last play.
She also discussed the effectiveness aspect based on how easily students can use the program:

   It’s also very important to me that the software be easy to use and doesn’t need a lot of supervision. I expect students to be actively engaged after a brief introductory lesson to the software. Directions should be available throughout the interface so that students can navigate easily through the program.

How the use of the materials/tools can influence student achievement was also discussed. Laurie thought interactive software could help students move to another grade level:

   Usually programmed in progressive levels, allowing the student to advance when s/he has successfully mastered a lower level. These provide immediate feedback, which is why students enjoy them so much.

She wondered how effectively the use of a curriculum software packet could improve her students’ performance:

   In our readings, it was mentioned that sometimes there is not a direct alignment with software and what we are teaching in the classroom. What about the software that curriculum companies are producing? Is it effective? I can see a real use for the entire curriculum being available on software in addition to the paper/pencil/notebook format. I’d love to have my Open Court stories on CD-Rom for my students to listen to, read and interact with the stories. I think the vocabulary exposure would be much richer!

Appropriateness, usefulness, and effectiveness were three criteria Laurie constantly reviewed for material/tool selections for a technology-related lesson during the class.
Student reaction was another factor Laurie took into consideration for lesson planning. Laurie considered the computer as a motivator for students and discussed how computer technologies can be fun and engaging for students. She described student excitement and engagement while using assessment-driven software:

They get very excited when the automated speed/accuracy scores appear as they monitor their improvement.

She also presented students’ positive reactions when they used other computer technologies:

Going to the computer lab has been very successful, even though the students’ keyboarding skills are minimal. Showing them how to indent, use the spellchecker, etc. has been very exciting for them. Spelling skills are very weak for most of my ELLs [ESL students], so the spellchecker is a wonderful feature for them. They enjoy seeing the red underlined word change to its correct form.

She also pointed out that the use of technology encourages her students to revise their work:

The students did not like having to re-write their story using paper/pencil (2nd draft), but I never heard any complaints when they had to word process it, which was basically the 3rd draft.

Laurie’s previous experience in technology-using lessons convinced her that the computer can serve as a motivator for her students. She seemed to interpret the computer as “the answer” for students’ inadequate motivation on specific tasks. She said,

The novelty of using a computer somehow motivates them [students]. Training them on how to use the spell check would alleviate so many problems with
spelling. Writing short stories with graphics in a PowerPoint would also be exciting for them. Creating an electronic portfolio for each child would be an exceptional way to track progress from year to year.

She further showed her interest in having students write by email or e-journal in order to motive them to write:

I also liked this idea. It gives a wonderful platform for the technology use to be extremely meaningful for communication purposes. Many of my students don't like to write (usually the boys). They may be more apt to try harder using different tools other than paper/pencil. Anything is worth a try!

She also believed the use of CD-ROM can motivate her students,

I think the vocabulary exposure would be much richer! My students moan every time I hand out a worksheet from Open Court curriculum, but I bet they'd enjoy doing them [on computer].

Laurie took student reaction into account for her lesson planning. She believes students enjoy computer-related lessons and are encouraged to write more when using computers.

Reality was another factor Laurie took into consideration for lesson planning. Available resources, time, and technical support and assistance influence Laurie’s decision-making on technology-related lesson planning. She stated that knowing what resources were in her local context was very helpful for her to understand what resources she can use. She said,

Although my task activity was an evaluation of Kidspiration, I am unable to efficiently use it with my students for this project because we do not have a site license. But in the future, if Kidspiration is put on all our computers, I would use
it for the webbing instead of the legal-sized paper, print out the organizer and then
proceed to PowerPoint.
She also took “time” into account when planning a technology-related lesson. She
discussed how much time she needed to spend on a technology-related lesson:

…In elementary setting my students do not have individual e-mail accounts.
Letters were sent back and forth via my own school account. This took longer on
my part and I didn't really think it was that valuable. For one, the students only
wrote the letters on paper and I keyboarded for them. Basically most of the work
was on my shoulders...just what every teacher needs...more work!
The availability of technical support and assistants also influenced Laurie’s decision-
making on lesson planning. She said:

If I experience problems with the software, how reliable is the company in
providing answers and solutions? Are they willing to walk me through the
process via telephone? Do they have a local representative who would be willing
to come and explain the software to me?

Available resources, time, and technical support and assistance in Laurie’s contexts were
taken into consideration for her lesson planning.
Classroom management was another factor which influenced Laurie’s decision-
making when planning technology-related language lessons. She discussed her concerns
about this issue and asks, “Will the classroom be out of control?” She said,

Using our well-equipped computer lab is a hard job for just one person. (I don’t
get an EA). In order to supervise and make that lab time as productive as possible,
I would like an assistant during computer time. The lab is divided into two sides
and supervision would be much more prompt and equitable if two people were in there with the students.

She further discussed the difficulties of managing her students well in a lesson using technology:

Management of technology-based lessons is always difficult. It’s difficult to monitor a whole classroom of kids on computers. It’s very important to know exactly where you want them to go if it’s on the Web and to know the sites very well.

She also wondered which tools would help her manage students’ assignments better for a technology-related lesson:

Do you think there would be a difference in managing the electronic journals vs. e-mail? Has anyone else used these for student reflection? Your comments on the effectiveness of them?

Her concerns about classroom management resulted in her perception of the need of familiarizing herself with the software first in order to evaluate whether she would be able to handle it in a classroom. She said:

I need to know more about the software, other than the brief synopsis which accompanies it. I also need the time to play with the software, get to know the program well and see how I would manage it in my classroom.

She continued to discuss this aspect during the class:

… Another key point is the management piece. How easy is it to implement and supervise?
In order to be able to manage her technology-related lesson, her instruction tended to be very structured. She described the design of her technology-related lesson:

My 3rd grade students will be creating a short PowerPoint presentation the week after spring break. Two 45-minute blocks of time have been reserved in the computer lab for this project. ...As a reference we are using the story “City Superheroes” in our Open Court reading anthology. Each student’s PowerPoint presentation will be six slides in length. A legal-sized paper with the outline of each slide has already been provided to each child. On this paper the students have pulled out the important information they wish to present about their animal. They will use this as they create their presentations. The six categories include: introduction, what the animal looks like, an imported picture of the animal, what the animal eats, where the animal lives, and the sources. I created a sample PPT that follows the guidelines mentioned above. This will be used as a model for the students.

Creativity seemed not to be encouraged in her technology-related lesson.

Similar thoughts were discussed for her inquiry-based project. She asked her peers how to make the lesson manageable:

I liked your idea about doing inquiry-research about the states. To me that is a very broad subject. Would you narrow the fields of choice down so students would be more focused in their search? For instance, would you expect them to read about the history of the state, current resources, job opportunities, education, etc.? I can just imagine students asking questions about areas that hadn't been
researched yet. What would be the most important information for your students to know about a state?

As Laurie was concerned about the manageability of technology-related lessons, she recommended that her peers take one step at a time while carrying out the lesson. She said,

…Sometimes the magnitude of what's available for our use overwhelms us. I encourage you to take 'baby steps' as you begin to incorporate technology into your instruction. Start out doing something very small and build on that. The small steps don't have to be very time consuming.

Summary

In Laurie’s case, school contexts seemed to have a huge impact on her concerns and decision-making about lesson planning. Because of her school board’s expectations, Laurie listed curriculum as the first priority when planning lessons and selecting materials. Therefore, the lack of understanding about administrators’ expectations and the role of technology in the curriculum resulted in Laurie’s concerns about “teacher accountability,” and also influenced her decision-making about technology use in her classroom. With different beliefs in teacher responsibility, Laurie showed her struggles to plan technology-related lessons in her current teaching contexts.

Participant II—Cindy

Background and Context

Cindy was a very experienced ESL pullout teacher. She had taught ESL for thirteen years. However, she had not received any ESL-related training and was serving
as a non-endorsed ESL teacher when the pilot study was carried out. As a teacher who valued direct teaching, most of Cindy’s teaching focused on language skills (reading, writing, listening, speaking, and grammar). She tested students about what they had learned by asking them questions and having them complete worksheets. Cindy spoke both English and Spanish. As the only ESL teacher and the only migrant resource teacher in school, Cindy’s student population included K-6.

The goal of Cindy’s school regarding ESL was unclear. Cindy’s school did not provide an ESL curriculum for teachers. Cindy was often confused about what she should cover in class in order to meet state standards. Therefore, official assessments still took place. Cindy did not like assessment and thought giving students those assessments destroyed their confidence. There were approximately seven hundreds students in Cindy’s school. One third of the students were ESL students, all of which spoke Spanish as their first language.

Cindy had limited official training on the computer; her only training had been in the SHARE 105 project many years ago. Her knowledge about how computers work was limited. Therefore, she knew basic computer skills and could use Word processing, email, and was able to manipulate software. However, she was often frustrated about computer breakdowns and the complexity of new applications.

In terms of using computers for teaching, Cindy valued “drill and practice” programs. She felt this type of program helped students to build their receptive vocabulary in an unthreatening learning environment. Before and during the pilot study, the type of software program used in her classroom for drill and practice was “Reader Rabbit.”
Result

The core category was “self” in Cindy’s case. Cindy mainly focused on “self” during the class. Her attitude towards technology, her teaching style, and her anxiety were the three main themes in Cindy’s case.

Attitude. Cindy’s attitude toward computers was negative at the beginning of the class. She described her negative feelings about the computer and suggested that “it is not worthwhile spending time on computers for students’ learning.” She said:

The reading lab is networked and it’s Jostens, which is now Comptons, but I’m not crazy about ESL on the computer. They have nice books that go with it, Words with Wings, and that’s good. But it wouldn’t be worth it…..I am not that hot on it. It’s not worth my time or their time.

She wondered why she needed to use computers when other materials could be used for teaching:

…That’s what we use for our reading lab. There are 6 units for ESL. I like the worksheets and paper units, but I’m not crazy about the computer stuff.

She did not consider students’ use of the computer as learning and suggested, “…The computers just give them [the students] a break…”

Cindy also had negative feelings about the Internet. Her negative attitudes towards the Internet were a consequence of a school internet scandal. She described herself as a technophobe with regard to the Internet,

You have internet connection? I don’t, and with all the filters and internet hazards, internet scares me.
As the class progressed, Cindy felt threatened as a human because of the emerging technologies. Her statement implies her concerns about being replaced by the computer:

I realize there are more sophisticated spell-checks then, but I haven’t seen anything that can beat a person.

Cindy’s attitudes did not change as the class progressed. She remained negative and anxious about the computer except for one week, when she showed her excitement while learning about some new computer technologies on a Web site:

The Cover Story in April, 2003 NEA Today is about computers and technology. …The things they are doing in regular classrooms is awesome-animate long division problems, diagram the parts of a cell, complete a spelling quiz their teacher “beams” to them…WOW.

Teaching Styles. Cindy believed in direct teaching. She suggested that direct teaching and repetition were the most effective ways to teach ESL. However, she struggled with using computers for her teaching style and was confused about the need for using computers when teachers and students can be both present in class. She argued that computers should not be used if the teacher and the students were both in the classroom:

…I prefer the direct instruction. If they are here and I am here, they should work with me [rather than with the computer].

As a believer in direct teaching, Cindy viewed the computer as a babysitter. She recalled the reason for using technology in her classroom for the first time. She says:

It was a rainy day and no recess. It gives them a break and something else to do.
Cindy’s teaching style (direct teaching and belief in repetition) influenced how she viewed the computer. She considered computers as teachers who presented materials to the students and believed that the computer should adjust the grade level to match students’ needs. She described,

I only saw the demonstration and what I liked was how it corrected and went to a new level according to the answer. It generated their next level if they needed to move up or needed more repetitions. It depended on their answers.

Teacher Concerns. Teacher concerns were the consequence of teacher anxiety in Cindy’s case. Teacher anxiety was discussed from two aspects: computer competency and peer pressure.

Computer competency seemed to be Cindy’s major concern. At the beginning of the class, Cindy reported a problem when posting her assignment to the online classroom and demonstrated her lack of confidence in using technology. She stated,

Sorry, Mary [surname]. I thought I had posted it in the right place. You can see I have lots to learn.

Cindy evaluated herself as a low-computer-proficient teacher. She constantly reflected upon her computer competency and showed anxiety about her limited technology knowledge during the class. She described herself as an “inexperienced software buyer” and pointed out that she did not know what questions she should ask when purchasing software.

Cindy felt that she needed to learn everything about technology before being a technology-using teacher. Therefore, she felt overwhelmed when learning the emerging technologies and pointed out that she likes the “old” computer applications better:
I need to learn just about everything for technology and for computers. However, I have a more immediate need of learning why my Word 98 at school is so much easier to use while this Word—a new version, I think—keeps jumping all around the place, popping up windows, making elephants roar, monkeys swing, and, in general, losing everything I’ve just done. I wish Works 3.0 were still alive!”

“…When I first started using Word 98 at school, it used to irritate me too, cause it treats you like you’re stupid, and won’t let you type what you want to type. This newer version REALLY sets me off!!

Cindy’s limited technology skills resulted in her anxiety about using technology in her instruction. As she pointed out,

…I REALLY need help—I’ve never done anything like this with computers and students—I just don’t know how.

Her anxiety about her computer competency also influenced how she selected software. She listed “How long is it going to take for ME to learn how to use it?” as one of the software evaluation criteria. In addition, she reported that she preferred to use easy-to-manage technology-related materials in order to prevent giving students instructions about how to use them. She listed “easy use by student-will the student’s time be spent learning English or learning how to use the software?” as one of her software evaluation criteria. She suggested that children can learn technology much faster than she can, and feels it is best if students can figure out how to use the software by themselves:

…So I just let them play on the computer and hope that I can figure out the program, which doesn’t always happen.
With negative attitudes towards the computer, limited knowledge about computer technologies and limited understanding of the benefits of using technology, Cindy was confused about the value of learning to use technology in her instruction. Therefore, as the class progressed, she started to become anxious about learning how to use computers and computer-related tools because of peer pressure. She compared her understanding about technology with her peers and reported that her peers knew more than she did about the technology:

I can see both of you are way ahead of me technology wise. I have never had my students use a translator—I have no idea what that is.

The feeling of falling behind motivated Cindy to overcome her fears and to learn more about technology. In order to catch up with the others, she felt that she needed to know more about the technology itself before using it. She suggested that:

I need to explore exactly what resources are available to support my needs…

She then focused on computer resources very closely and constantly posted resources she found on the Internet to the class discussion. Starting in the middle of the second week, most of her postings to the class discussions were mainly resources. However, her participation in other discussions was less active. In addition, she started to set her goals for technology learning carefully. She described what she might need to know as a technology-using teacher:

At this point, I can’t say specifically what additional training I might need. I’m still trying to find my way through the fog. Some knowledge of different systems would be nice, so when I request computers and systems, I have some idea of
what I’m doing. I definitely need to know about the use of internet, and if it can be realistically used with students…

Although Cindy started to set up her goals for learning the computer technologies, her anxiety remained. In spite of her anxiety, she started to show interest in working with other teachers in her school district for further “technology adventures”:

I would LOVE to sit down and discuss software with other teachers-what they want, etc. Am I the only one there having time to talk with teachers? Is it a problem? I would love to also send an email to my teachers at school as to what they would like in ESL software.

Summary

Cindy focused on “self” in her learning process. She constantly reflected upon her attitudes towards technology, her teaching styles, and her anxiety during the class. Her attitudes towards technology, her teaching style, and her anxiety influenced how she set up her goals of learning to use technology in her instruction, and were a reflection of what she has carried out in her classroom in terms of the use of technology.

Discussion and Conclusions

The pilot study described above opened my eyes regarding how complex teacher learning processes can be. Although the time constraints of the pilot study project and the course schedule only allowed me to complete a partial analysis of the study data and development of preliminary study findings, I have learned several things from this study as a researcher who is interested in teacher learning and as a teacher educator.

Through the Lens of a Researcher
As a teacher learning researcher, four points are worth noting and can be significant for the research of teacher learning. First, what sources can influence teacher-learners’ learning experiences and why? Previous research has addressed how coursework can influence teacher-learners’ attitudes, competency, and practices. However, limited research has explored beyond the scope of coursework. The current study explores sources other than coursework that have a role in teacher-learners’ learning experiences. The preliminary study findings suggest that influential sources on teacher-learners’ learning experiences seem to exist. Teaching context and self can be other sources for teacher learning. For example, Laurie’s school contexts influence her learning experience and are the sources that guide her learning processes. On the other hand, Cindy was mainly influenced by herself in her learning experiences. However, are those the only sources that can influence teacher-learners’ learning experiences? What other guiding sources can play a role in teachers’ learning about teaching with technology?

In addition, the preliminary study findings suggest that influences on teacher-learners’ learning experiences not only exist, but can also vary, depending on individuals. For example, while Laurie was influenced by her school contexts and struggled with how to survive under her administrators’ expectations, Cindy was mainly influenced by herself in terms of her attitude, teaching style, and personal anxiety. Why did each teacher-learner in the study only take one into account but not the other? Could it be mixed for other teacher-learners? More research needs to be done in this area. Understanding this aspect can help us to have a deeper understanding of the roles of environment, individuals, and other sources in teacher-learners’ learning, and then to comprehend reasons of teacher-learners’ learning focuses.
Second, what is the role of teaching contexts in teacher-learners’ learning experiences? Given the importance of the teaching context, as suggested by Brown, Collins & Duguid (1989), it is not surprising that Laurie’s learning experience responded to her teaching context and focused on problems, issues and challenges encountered in her school. However, the other participant, Cindy, seemed to present a different aspect of teacher learning about the use of technology. Based on the study data, teaching context did not seem to be Cindy’s focal concern. She did not mention or address the needs of her teaching context and did not respond to her teaching context in her learning. Why does teaching context seem to play a limited role in Cindy’s learning experience? What do Brown, Collins & Duguid (1989) miss in their theory?

During the analysis process, another point I found interesting was teacher learners’ individual learning focuses. Laurie and Cindy seemed to have certain expectations for themselves as teacher-learners. That is, they seemed to have their personal learning focuses while taking the course. While Laurie kept reporting that she wanted to fulfill her needs in the school context, Cindy revealed that she wanted to equip herself with computer skills. This finding is confirmed by the research of Egbert et al. (2002). They suggest that teacher-learners would only learn what they need. However, do teacher-learners always have personal learning focuses and always know what they need? Are there teacher-learners who do not have personal learning focuses? If so, how do they respond to the training curriculum and act in the course?

Finally, the preliminary findings suggest that some teacher-learners have personal learning focuses. However, although the study data showed the participants’ learning focuses, it is unclear how they approached their learning to fulfill those individual needs.
In other words, what do their learning processes look like for the goals they had in mind? Do they compromise and negotiate with the existing training curriculum, or do they abandon and ignore the training curriculum designed by the teacher educators? In other words, how do they adjust their learning with their personal learning focuses in mind? What strategies do they use to accomplish their goals?

Clearly, many questions remain regarding how teachers learn to teach with technology. This pilot study has opened some questions related to teacher learning that should be further explored.

**Though the Lens of a Teacher Educator**

As a teacher educator, I have learned about elements that might be important for designing and teaching a course for training teachers to teach with technology. Although more research needs to be done in this area to ensure major components of teacher education course design and significant principles for teaching teacher-learners, this section can serve as a starting point for reflection by teacher educators.

First, consider the needs of all teacher-learners. Based on the preliminary findings, the teacher-learners in this study have their personal learning focuses. In other words, the course content that is suitable for them can be different based on their learning needs. For example, while activities and content that aim to encourage teachers to consider their teaching context might be valuable and meaningful for Laurie, activities and content that focus on equipping teachers with computer competency might be as valuable and meaningful for Cindy. With a goal of addressing all teacher-learners’ needs, both types of course content can be important for teachers who are learning to teach with technology. Therefore, a course that addresses and covers various elements of technology-using
lessons (e.g., learning about the technology tool itself, understanding current trends, developing lessons that suit one’s teaching contexts) might be useful and could accommodate more teacher-learners.

Second, provide opportunities for teacher-learners to explore and research. One participant in this study reported that her school board’s expectations about teaching with technology were not clearly addressed. For many teacher-learners, this aspect might be confusing, since teaching with technology is still a relatively new area. If teacher educators can provide opportunities for teacher-learners to conduct research and explore how they are expected to perform in their school or use other schools’ experience to understand their responsibilities, it might be helpful for them to understand the perspectives of the school and to communicate them effectively.

Third, encourage teacher-learners to reflect upon their needs and develop their personal learning focuses. While teaching this course, I found that the study participants often actively discussed topics related to their personal learning focuses and inquired into other students’ opinions. This action not only helped them to explore topics they really cared about in their learning, but also created many discussion opportunities between them and their peers. Therefore, opportunities for exchanging authentic problems in their teaching situations and on their mind are then created.

Chapter Summary

My teaching and research experiences have developed my research interests in second-language teachers’ learning in the use of technology in their instruction. However, many questions—how teachers take part in their learning, how they approach their learning and why, and how they learn to teach with technology as active agents—remain
unanswered. In the current study, I attempted to answer some of the questions by viewing teacher learners as active agents. Thus, the pilot study helped to define questions that can be further explored and investigated.
CHAPTER TWO
LITERATURE REVIEW

Introduction

In order to explore more about how teachers learn to use technology in their instruction, I turned to current literature regarding teacher learning and the use of technology. This section adds to the literature of the pilot study and discusses research regarding: 1) teacher learning; 2) teacher learning in the use of technology in instruction; and 3) language teachers and technology.

Teacher Learning

Learning and learning to teach have overlapping meanings for teacher-learners. However, in addition to knowing the content of subject areas, learning to teach also includes learning the methodology of teaching within a subject area, learning the tools for teaching in the subject area and also learning skills related to that area. In addition, learning to teach includes knowledge and experience in carrying out teaching practices in real teaching contexts (see Feiman-Nemser & Floden, 1986 for a summary of research on aspects in teaching practices). In these ways, learning to teach is far more complex than simply learning a skill or a set of content concepts. In order to understand teacher learning, this literature review first discusses more specifically what “learning to teach” means in the field of education. Aspects of teacher learning will then be discussed, with a focus on teacher learning processes.

Definitions of Learning to Teach

The term “teaching” needs to be defined first in order to understand “learning to teach.” With an increasing awareness of learning differences and learning styles, changes
of learning goals, understanding of multiple intelligences, and modifications of learning
theories, the culture of learning and teaching has changed. Currently, there is growing
agreement that student learning should be moved beyond “recall, recognition, and
reproduction and toward evaluation, analysis, synthesis, and production” (Lieberman &
students:

Test and apply ideas…look at concepts from many points of view…develop
proficient performances…evaluate and defend ideas with careful reasoning and
evidence…inquire into a problem using a productive research strategy…produce
a high-quality piece of work and understand the standards that indicate good
performance…solve problems they have encountered before. (p. 96)

That is, the expectations for students have shifted from their being a recipient of
information to becoming critical thinkers and creators of information. The culture of
learning has changed.

Along with the shift in learning, the goals of teaching come changes in for
learning. In these decades, teaching is no longer viewed as the task of increasing
students’ performance and test scores or delivering information to the students (Dunkin &
Biddle, 1974; Leinhardt & Greeno, 1986). Rather, teaching becomes guiding, facilitating,
scaffolding, and supporting student learning. Creating an appropriate learning
environment, understanding learners, aligning assessment with the curriculum, knowing
the content of the subject matter, appropriate use of pedagogy, educational resources and
tools, and being familiar with the classroom context, school environment and society are
all part of teaching (Ball & Cohen, 1999; Johnson, 1999; Richards & Lockhart, 1994).
Because teaching includes multiple aspects (as noted above), the phrase, “learning to teach” must also reflect this complexity (National Center for Research on Teacher Learning, 1988). In the current literature, learning to teach is regarded as a complex phenomenon that researchers are still studying; it is a term commonly used, but ill-defined (Feiman-Nemser, 2003; Feiman-Nemser & Remillard, 1996; Freeman, 1996b). Different ideas about learning to teach have been proposed by teacher educators, policy makers, and researchers. It has been described as teacher changes (e.g. the change of teacher behaviors and the change of teacher perceptions and attitudes; for a discussion regarding teacher change, see Richardson & Placier, 2001; for a summary, see Feiman-Nemser & Remillard, 1996), gains in subject knowledge, and the transformation of the knowledge gained in professional development to observable actions in teaching (for a discussion, see Richards & Lockhart, 1994). However, as teaching includes multiple aspects, these oversimplified definitions only address partial pictures of learning to teach (Clarke & Hollingsworth, 2002).

Some researchers view learning to teach from a broader perspective. For example, Shulman (1986b; 1987; 1990) distinguishes “pedagogical content knowledge” from subject matter knowledge and teaching skills. He stresses that pedagogical content knowledge is practical and situational. In his case study of a Canadian high school teacher of English, Elbaz (1981; 1983; 1991) explored one teacher’s “practical knowledge” that focused on the action and decision-oriented nature of teacher work in her teaching situation. Based on Shulman’s and Elbaz’s views, learning to teach is like solving a puzzle that includes all of the aspects listed previously (Eggleston, 1979; Grosse, 1991; Johnson, 1999; National Institute of Education, 1975). Within their
personal teaching philosophies, teachers need to figure out ways to put the pieces of the puzzle together meaningfully so that their learners can benefit from their lessons (Johnson, 1999; Shulman & Elstein, 1975). In real teaching contexts, this puzzle construction is not an easy task because each piece in the puzzle is dynamic and situational. Needless to say, it is even more difficult for those who are new to teaching or new to one or more of the pieces of the puzzle.

Aspects of Learning to Teach

As teaching is situational and dynamic, learning to teach seems to be more complex than originally thought (Clarke & Hollingsworth, 2002). Current literature on learning to teach considers three aspects of teacher learning: the outcomes of teacher learning, the content of teacher learning, and teacher learning environments. First, some researchers have investigated the outcomes of teacher learning (Darling-Hammond, Chung, & Frelow, 2003; Farnan, Fisher, & Frey, 2003; Timperley & Phillips, 2003). Their studies often focus on what teacher-learners become or turn into after they receive some “input” or education. In addition, the outcomes of teacher learning are determined based on the objectives of teacher education or professional development courses. In one study, Timperley and Phillips (2003) examined how a six-month professional development course influenced literacy leaders and teachers’ expectations of low-income student literacy progress, views of low-income student literacy achievement, and knowledge of low-income students’ literacy practice. Thirty one literacy leaders and teachers from eight schools participated in the study. Data collection included pre-course and post course questionnaires and follow-up interviews. The study results indicated that after professional development, the study participants lowered their expectations of low-
income children’s literacy progress in school, had a better understanding of what low-
income children know about literacy when they arrived at school, and changed their focus
from blaming the students to focusing on ways of improving their teaching. Darling-
Hammond et al. (2003) also examined the outcome of teacher learning. In their 1998
survey study of 3000 beginning teachers in New York City, the feeling of preparedness
of beginning teachers (3 years or fewer learning experiences) who received different
types of educational programs were examined. They reported that beginning teachers
who entered from education programs felt better-prepared than those who entered from
an alternative program or without preparation. Discussing the outcomes of learning to
teach allows researchers and teacher educators to understand the ends of teacher learning
based on teacher educators’ perspectives. However, it does not help us to understand
what processes teachers go through to reach those ends (Feiman-Nemser & Remillard,
1996) and what roles they play in the process of reaching those ends.

Next, some researchers have considered the content of teacher learning or the
knowledge base of teacher learning (Berliner, 1986; Borko & Putnam, 1996; Freeman,
what teachers need to know and be able to do in order to teach (e.g. knowledge, skills,
dispositions). A large body of research literature has studied the difference between
novice and expert teachers and how they are different in teacher knowledge and skills
(Berliner, 1988; Leinhardt & Greeno, 1986; Sabers, Cushing, & Berliner, 1991). For
example, Berliner and his colleagues (Berliner, 1988; Sabers et al., 1991) compared the
interpretation of classroom situations among expert teachers, advanced-beginning
teachers (student teacher and high-quality first-year teachers), and novice teachers (no professional training) by using tasks simulating different aspects of teaching. In one task, the participants watched a lesson displayed simultaneously on three video screens that showed the lesson from different camera angles. They reported that high-beginning teachers and novice teachers found the video confusing and their interpretations of the classroom situations were inconsistent. The expert teachers, however, were able to capture the complexity of the classroom situation quickly and interpret and make hypotheses about student needs and the nature of the ongoing activity. Berliner (1988) and Sabers et al. (1991) concluded that the expert teachers had developed context-embedded and situated knowledge of classroom activities and were able to interpret what they saw.

Finally, some researchers have used Shulman’s (1986a; 1986b; 1987) framework of teacher knowledge as the basis for their research. In his conceptual paper, Shulman (1986a; 1986b; 1987) categorized seven types of knowledge that he believes teachers should gain in order to teach. Shulman believes that teachers should have the following knowledge in order to teach: 1) subject-matter knowledge; 2) curriculum knowledge; 4) knowledge of children’s learning; 4) teaching skills; 5) teaching styles; 6) classroom organization; and 7) assessment. Shulman (1986a; 1987) identified the differences between pedagogical content knowledge and conceptual knowledge and, stressed that recognizing this difference underlies the importance for learning how to teach:

A second kind of content knowledge is pedagogical knowledge, which is going beyond knowledge of the subject matter per se to the dimensions of subject matter knowledge for teaching…within the category of pedagogical content knowledge I
include, for the most regularly taught topic in one’s subject area, the most useful forms of representations of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations—in a word, ways of representing and formulating the subject that make it comprehensible to others. Pedagogical content knowledge also includes understanding of what makes the learning of a specific topic easy or difficult; the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning of those most frequently taught topics and lessons. (pp. 9-10)

Based on this framework many researchers have examined the role of content of teacher learning in teaching practice. In one study, Richards, Li, and Tang (1998) investigated the contribution of subject matter knowledge and teachers’ pedagogical reasoning skills to English as a Second Language (ESL) teachers’ lesson planning. Richards et al. (1998) compared how twelve teachers planned lessons to teach ESL students literature based on their reactions to assigned literature texts, their descriptions of how they would use the assigned texts to teach ESL students in Hong Kong, and a questionnaire documenting their backgrounds, approach to teaching, attitudes toward literature and their approach to teaching literature. Teachers with different majors and experience in teaching literature were recruited and divided into three groups for their study (Group A: English Literature major with experience teaching literature in an ESL context; Group B: English Literature major without experience teaching literature in an ESL context; Group C: Non-English Literature major without experience teaching literature in an ESL context). The results indicated that the non-English major teachers in their study did not have thorough subject matter knowledge and were unable to recognize the literacy features in the English
literature. Thus, their ability of turning literacy content into appropriate teaching plans was limited. However, all of these research studies emphasize what expert teachers can do and what novice teachers cannot. The processes of how a novice teacher becomes an expert teacher are unexamined.

The research on the content of teacher learning has informed teacher educators what knowledge and skills expert teachers have but novice teachers do not. The study results pointed out that without a certain type of knowledge, teachers will be less proficient in their teaching. However, the evidence of these studies did not show that having those types of knowledge would automatically transfer to the teaching profession. Kennedy’s (1991b) study argues that subject knowledge does not transfer to teaching practice automatically. In other words, having subject knowledge does not ensure that teachers will teach better. Johnson (1996a) also pointed out that many language researchers have also begun to recognize that “what teachers know about teaching is not simply an extended body of fact and theories but is instead largely experiential and socially constructed out of the experiences and classrooms from which teachers have come” (pp. 766-767) (Freeman, 1993, 1994; Freeman & Richards, 1996b; Johnson, 1992, 1994, 1996b; Kessels & Korthagen, 1996; Richards & Nunan, 1990). Addressing the content of teacher learning (e.g. subject matter, class management, learners, assessment, and curriculum) tells us what teachers should know or what teacher educators expect teachers to know in order to teach. However, it does not explain which components are more useful and meaningful for teachers and how teachers learn to cope with the complexity of their work by using these contents (Johnson, 1999). In order to help us to understand how teachers reach the end and learn to use the content of teacher learning in
their work, the process of teacher learning needs to be emphasized, along with a related but secondary focus on the learning environments that can influence the process of learning (Clarke & Hollingsworth, 2002; Feiman-Nemser & Remillard, 1996). However, limited research has been conducted to explore the processes of teacher learning (Clarke & Hollingsworth, 2002; Feiman-Nemser, 1983; National Center for Research on Teacher Learning, 1992). Because of the importance of understanding teaching and the gap in the literature in this area, the aspect of teacher learning processes is proposed as the focus of the study.

The Process of Learning to Teach

The process of learning to teach might mean rather different things to different people. Therefore, in this paper, the process of learning to teach refers to an ongoing journey teachers go through that continues to prepare, shape, and reshape them for teaching and rethinking/redefining their teaching. Various experiences can take place in this ongoing journey. These experiences include teachers’ formal schooling experiences before entering the teacher education program, teachers’ family education, teacher education programs, in-service teacher development opportunities, teachers’ teaching experience, and other personal learning experiences (Feiman-Nemser, 1983).

In these experiences, researchers often consider members (people who are relevant to the teacher-learners), learning events (tasks that teacher-learners engage in or carry out), and learning environments (the context of learning, including teaching-as-learning contexts and contexts of the courses and professional development opportunities) as the three major components that teacher-learners come in contact with. Teacher-learners interact with these components spontaneously and interchangeably. The next
section will define each of these three components and present their possible interactions with teacher-learners. It will then discuss issues and problems noted in the current literature regarding the interactions between teacher-learners and these three components during teacher learning.

Members

“Members” in teacher learning processes refers to people who can influence and impact teacher learning. The current literature considers instructors, peers, and learners as the three major members in teacher learning processes, although there are others, such as administrators, who can have an indirect impact. In teacher learning processes, instructors are often viewed as the authority for teacher learning. In many research studies, learners are considered as passive members whose behaviors and thinking will be changed because of instructors’ roles, beliefs, characteristics, and behaviors (Leh, 2002; Wepner & Tao, 2002; Wepner, Ziomek, & Tao, 2003). For example, Leh (2002) conducted an action research to examine how the role of the instructor as a facilitator, instead of an information-giver, influenced teacher-learners’ learning behaviors in a course entitled “Advanced Computer Applications in Education.” In addition, Wepner et al. (2003) conducted a mixed-method study to identify how the shift in responsibilities of three teacher educators influenced 39 pre-service teachers’ learning when infusing technology into a methodology course. However, how teacher-learners can approach their learning and go through their learning processes as active agents is not mentioned in these studies.

Studies regarding how peers can influence teacher learning emphasize several aspects. First, some researchers discuss how a “community of practice” can influence teacher learning (Chao, 2001; Hall, 1996; Little, 2002). A community of practice refers to
a community in which similar goals are shared among people with similar or different beliefs, values, and perspectives (Wenger, 1998). For example, in her mixed-method dissertation, Chao (2001) explored whether a community that is developed through the interactions among the students meets individual students’ needs in an online language education course. She concluded that although the learning community was maintained by each member in the learning community, students’ needs may not be met because of different pace of the individual students, member willingness to accept opposing opinions, and the temporary and fragile nature of the learning community.

Research regarding professional collaboration also addresses the interactions among teacher-learners and the role of collaboration in teacher learning (Boshell, 2002; Rosaen, Hobson, & Khan, 2003). For example, based on his personal experiences, Boshell (2002) examined the narrative anecdote of his struggle of understanding a “quiet” child in his fifth-grade bilingual science class in Spain. He reported that the nonevaluative dialogue (one way to carry out professional collaboration) with his colleagues outside of his own institution allowed him to find “his own answers to his own problems.” Boshell’s report supports how collaborative inquiry can expand teachers’ thinking from a broader perspective. Finally, in some scholars’ work regarding network participation, or teacher networks with colleagues in their teaching context, the idea of peers’ influence in teacher learning is also discussed. In their conceptual paper, Lieberman and McLaughlin (1994) present how colleagueship constructed by teacher networks can offer teachers new ways of approaching their learning based on others’ arguments and research. They argue that networks allow teachers to engage members in different activities and create an encouraging environment for members to exchange
ideas. Research regarding community of practice, collaborative learning, and network participation demonstrate the value of group work and idea sharing, as well as the value of the beliefs and cultures every peer-member brings to the learning context. However, many of these studies only emphasize how communities of practice, collaborative learning and network participation influence teacher learning. The active roles of teacher-learners are often neglected in these studies, with the exception of Chao’s (2001) and Hall’s (1996) research.

Chao (2001) and Hall (1996) have started to focus on teacher-learners by viewing them as active members and active agents in their own learning. That is, teacher-learners have the power to decide what they want to do and to influence their own learning processes. In their research, how teacher-learners interact with their peers and participate in the community of practice has been studied (Chao, 2001; Hall, 1996). For example, Chao (2001) examined the experiences of six participating pre-service teachers and analyzes how they perceived the sense of community and meaningful learning in an online language learning class. Through a qualitative study, Hall (1996) also found that the role that learners played in the interaction with expert technology users influences the culture of the community of practice and alters the focus of the community. However, only limited research has been conducted to address this perspective.

Learning Events

In addition to members, learning events are important in learning to teach. Learning events in the process of teacher learning refer to tasks, activities, and learning opportunities that can encourage, stimulate, mediate, and hinder teacher learning. Current research suggests that learning to teach can take place through the following learning
events: observation, teaching practice, reflection, inquiry and reasoning, and social interaction. These are discussed below.

Learning to teach through observation. Current literature suggests that teachers learn to teach by observing how others teach. This concept is described as apprenticeship, but through the lens of teacher-as-learner and teacher-in-preparation/teacher-in-practice. Through the lens of teacher-as-learner, many scholars conclude that teachers have been learning to teach since they became learners (Bailey, Curtis, & Nunan, 2001; Feiman-Nemser, 2003; Feiman-Nemser & Remillard, 1996; Johnson, 1999). Lortie’s (1975) study _Schoolteacher: A sociological study_ is the most influential research that addresses the role of teacher-learners’ schooling experience in learning to teach. Being “students” in their formal schooling, teachers observe how their teachers teach and ways their teachers handle the complexity of teaching before they enter teacher education programs. This twelve-year “apprenticeship of observation” (Lortie, 1975) is described as a foundation of teachers’ conceptualizing instruction and is often called upon when teachers plan their first lessons (Johnson, 1999). Many researchers have found that the prior knowledge of teaching gained during “apprenticeship of observation” develops strong conceptions of teaching practice. This prior knowledge of teaching often hinders teacher-learners’ ability to capture alternative views (Holt-Reynolds, 1992; Johnson, 1994). It also plays an important role in shaping beginning teachers’ teaching practice (Book, Byers, & Freeman, 1983), their conceptions of teaching (Warford & Reeves, 2003) and their learning in teacher education programs (Bird, 1991; Hollingsworth, 1989).

Through the lens of teacher-in-preparation/teacher-in-development, many researchers theorize that teachers learn how to teach by observing models of teaching
conceptually (Collins, Brown, & Newman, 1989; Zeichner & Tabachnick, 1981). Collins et al. (1989) describe this as “cognitive apprenticeship” that can assist teachers to envision how certain lessons can be carried out and how certain teaching situations would look in real teaching contexts. Based on an examination of the research literature, Bailey et al. (2001) concluded that learning to teach can take place when teacher candidates or in-service teachers observe models of teaching during student teaching, internships, field experiences, teaching cases, or workshop demonstrations. In their interview study of twenty-nine student teachers, Zanting, Verloop, and Vermunt (2003), however, found that observing a mentor’s lesson did not elicit student teachers’ practical knowledge. Other support or elements might be needed for developing student teachers’ practical knowledge of teaching.

Learning to teach through teaching practice. Other researchers have suggested that teachers learn to teach by teaching (Ball & Cohen, 1999; Feiman-Nemser, 2003; National Center for Research on Teacher Learning, 1993; Waller, 1932). When teachers are asked how they learn to teach, they often point out that they learn to teach by trial and error in the classroom and in their school contexts. Based on her experience as a teacher educator and on previous research, Johnson (1999) illustrates how novice teachers in her teacher education program come to realize the difference between “understanding teaching” and “being able to teach.” She used an example of the chaos that novice teachers usually face in their first days of teaching and describes how the teachers realize that the “perfect picture” of teaching that teacher education programs introduce does not work in real situations. In addition, through the analysis of rich descriptive data resources (field notes, interview data, videotaped lessons, stimulus recall reports, and journal
entries), Johnson (1996b) found that one pre-service teacher’s teaching experience during her practicum experience challenged her version of being a second language teacher and shaped her practical knowledge of teaching. She reported the changes of the pre-service teacher in the study:

Maja’s [the pre-service teacher in the study] perceptions of the TESOL practicum seemed to be shrouded in tensions—tensions that seemed not only to affect what she said and did, but also her understanding of what teaching is and what it means to be a teacher. For Maja, the most overwhelming tension rested in the gap between her vision of teaching and the realities she faced in the classroom. To a large extent, she perceived these realities as being due to the nature of the TESOL practicum itself. Maja complained that these were not her classes, the students were not her students, nor was there enough time to establish a relationship with them. She complained of constantly having her limits tested, of spending more time and energy dealing with behavior management than actual teaching, and of feeling that these realities were beyond her control. Unfortunately, Maja’s experiences are not unique. In mainstream educational research, a large body of recent research suggests that the realities of the classroom rarely conform to pre-service teachers’ expectations or images (Kagan, 1992). Moreover, since pre-service teachers generally lack the practical knowledge they need to deal with these realities, they tend to teach in ways that fail to promote learning, but instead simply maintain the flow of instruction and classroom order. (p. 46)

Ball and Cohen (1999) suggest that “…teachers can certainly learn subject matter, as well as knowledge of children, learning, and pedagogy, in a variety of courses and workshops.
But the use of such knowledge to teach depends on knowledge that cannot be learned entirely in advance or outside practice” (p. 12).

**Learning to teach through reflection, inquiry, and reasoning.** Although many researchers suggest that teachers learn how to teach through “apprenticeship of observation,” “cognitive apprenticeship,” and teaching, it is possible that teachers remain “unlearned” when such opportunities are provided. Researchers argue that other learning events need to take place so that teacher learning can occur. For example, Johnson (1999), Richards and Lockhart (1994), and Richards and Nunan (1990) claim that reflection needs to take place during teacher learning. Moreover, Zeichner and Liston (1987) indicate that there is a significant role for reflection in student teaching based on their literature review critiques of eight studies carried out in an elementary student-teaching program.

Many scholars and teacher educators believe that the required learning events that serve as mediation for teacher learning include reflection, inquiry, and reasoning. Dewey (1933) defined reflection as a mental problem-solving process that “requires active and deliberate consideration of action in light of any and all relevant knowledge and beliefs” (p. 34). Building upon Dewey’s concept of reflection, Schön (1983) suggests that teacher reflections can take place while teaching (“reflection–in-action”) and/or before or after teaching (“reflection-on-action”). Johnson (1999) also stresses the role of critical reflection in teacher education and proposes that it “enables teachers to recognize how their knowledge and beliefs are tacitly embodied in their practices” (Johnson, 1999, p. 134). In other words, it is commonly believed that reflection enables teachers to refine their lessons or to be aware of the possible problems that can occur during the class.
However, limited research concerning the role of reflection in teacher education has been conducted. Braun and Crumpler (2004) conducted a descriptive study to examine how memoir writing, one type of autobiographical writing, could initiate pre-service teachers’ reflection in a social studies methods course. Through narrative analysis of students’ autobiographical writing, they concluded that pre-service teachers were able to reflect upon how significantly their experience has shaped their identities through memoir writing.

Researchers and teacher educators also believe that critically inquiring about teaching can mediate teacher learning (Feiman-Nemser, 2003). Johnson (1999) refers to critical inquiry as a reasoning process of teacher behaviors, thinking, and articulation. It is a means to “explore why teachers teach as they do” with a goal to develop teacher robust reasoning. Ball and Cohen (1999) propose that teacher candidates should be provided with opportunities for examining the ongoing work teachers do in real classroom contexts, such as student assignment, instructional units, and trying different classroom organizations.

With an assumption that teaching is a problem-solving task, some scholars believe that teachers learn to teach by examining the problems and solving the problems they have encountered in their teaching. Action research (Lewin, 1984) and case analysis (Shulman, 1992; Sykes & Bird, 1992) are usually used for such problem-solving exercises. Starting with posing problems, teachers brainstorm possible solutions that they could use for solving the problems through action research. After critically evaluating possible solutions, teachers select one best solution for their problem-solving task and observe the outcomes for their solution as a resource of the actions they might take next.
time. Using a similar concept, cases (Shulman, 1992; Sykes & Bird, 1992) are often used in teacher education programs to engage learners in an authentic teaching context by analyzing the problems and discussing how the problems can be solved in the case. Some researchers have studied the use of cases in a teacher education course (Harrington, 1995; Kaste, 2004; Moje, 1997) and the impact of action research (Burbank & Kauchak, 2003; Torre & Rolon-Dow, 2000). For example, Harrington (1995) studied the use of cases in a first block course in teacher education that required students to analyze four cases from “Case Studies for Teacher Problem Solving” by Silverman, Welty and Lyon (1992). She reported that the use of the case method increased her students’ competency in 1) identifying problems in teaching contexts, 2) being aware of alternative perspectives, 3) visualizing possible solutions to problems in teaching contexts, 4) considering consequences of their attempted actions, and 5) being aware of their limitations. Through qualitative data, including videotaped class sections, in-class observation, group work centering on cases, her own reflection journal, and four students, Kaste (2004) studied her use of self-generated cases in her literacy methods course for pre-service teachers. The results of her study indicate that using cases with a conceptual framework expands pre-service teachers’ notion of teaching, learning and diversity. While analyzing the cases challenges the participating pre-service teachers’ beliefs, it also provides opportunities for them to practice a diverse constructivist perspective.

**Learning to teach through social interaction.** Some researchers found that teacher’s intellectual work, such as reflection, inquiry, and reasoning, is constructed individually (see Clark & Peterson, 1986). However, many scholars argue that the value of social interaction and teacher community to such intellectual work cannot be ignored
Vygotsky (1978) stressed the importance of the role of social interaction in learner growth and suggested that cognition is socially mediated and influenced by others in social interaction. Such social interaction can take place between teachers and teachers, or between teachers and supervisors, mentors or teacher educators.

Research has found that occasions for social interaction, including class/workshop discussions and other mentoring processes during which teachers interact with their school supervisors, mentors or teacher educators, provide opportunities for teacher learning (Feiman-Nemser, 2003; Lieberman & McLaughlin, 1994). For example, in her ethnographic study, Britzman (1991; 2003) explored how two student teachers learned to teach high school students. She reported that the interactions between the student teachers, cooperating teachers, administrators, teacher educators and others shaped student teachers’ knowledge of teaching. That is, learning to teach is socially negotiated, and teachers’ knowledge of teaching is constructed through experiences in and with members of their professional community. In addition, Oprandy (1999) reports how the participating ESL teachers benefited from a collaborative conversation with a teacher educator and a doctoral student in his study when examining children’s interactions in the participating ESL teacher’s class. The study results indicate that collaborative conversation provided social interaction opportunities to the participating teacher and enabled her to reexamine, reshape, and discuss her teaching practices. It removed the participating ESL teacher from the isolation of thinking and deciding how to teach her
ESL students. Such discussions are usually fruitful and important for teachers in solving problems present in their classrooms.

In addition, social interaction can also take place in a “community of practice” context (Wenger, 1998) where common beliefs, goals, and ideas are shared, as mentioned previously. The participation of “expert” and “novice” teachers (Lave & Wenger, 1991) can motivate teacher reflection, teacher thinking, and teacher perceptions (Johnson, 1999). Some of these research studies overlap with the research regarding “members” in the previous section. For example, in her study of exploring how female elementary teachers learn to integrate computers into the curriculum, Hall (1996) reported the social interactions between novice/experienced teachers (novice in computer use; experienced in teaching) and expert computer users (i.e., the researcher herself, the students, and the experienced/experienced teacher who is an expert in computer use and who is also experienced in teaching, parents) help novice/experienced teachers reflect on their own practices and brainstorm new ideas of technology integration. One of her participating teachers described how her interactions with the researcher helped her growth in technology integration:

Having you here made me really think about what I was doing…Just talking to you or listening to you promoted exploration on my part and generated ideas. So, it was like having somebody to brainstorm with. It was helpful. It made me think more about what I was doing with computers. (p. 135)

All of these research studies support the important role of social interaction in teacher learning.
Based on the research studies discussed previously, teachers can learn to teach through observation, teaching, reflection, inquiry, reasoning, and social interaction. However, these learning events do not usually take place one at a time. Rather, they can occur interchangeably and interactively in the process of teacher learning (Feiman-Nemser & Remillard, 1996). Therefore, from the perspective of viewing teacher-learners as active agents in their processes of learning, it is unclear how teacher-learners approach their learning and take a part in the process of their learning.

**Learning Environments**

In addition to members and learning events, learning environments play a crucial role in teacher learning. “Learning environments” refers to conditions that can support and encourage teacher learning (Clarke & Hollingsworth, 2002; Feiman-Nemser & Remillard, 1996). Learning environments are often created with multiple principles of teacher learning by course developers or teacher educators. Based on others’ research regarding adult learning and a consensus of how adult learners learn, Lawler and King (2001) and Lawler (2003) discussed six principles of creating a learning environment for teachers as adult learners. These principles include creating a climate of respect, encouraging active participation, building on experience, employing collaborative inquiry, using learning for action, and empowering the participants. Other scholars have also summarized principles of creating good learning environments for teacher-learners based on the current research literature (Bransford, Brown, & Cocking, 1999).

Many researchers have discussed how learning environments should be designed for teacher learning conceptually based on others’ research (Holmes et al., 2002). Course designers and instructors are often viewed as the authorities who decide principles and
conditions that should be included in a learning environment. For example, Holmes et al. (2002) describe factors that can affect professional development for technology integration and discuss how the design of the Capital Area Technology and Inquiry in Education (CATIE) Program’s mentoring approach addresses those factors. Some course designers/researchers have studied the effects of their model on teacher-learners (Joia, 2001; Mitchem, Wells, & Wells, 2003; Spencer & Logan, 2003). Yet, the power of learners and their own influences on their learning environments are often ignored. For example, questions about when they choose to participate actively or passively and how that choice influences their learning environments remain unanswered, and there is a dearth of information on how their thinking and actions influence their learning environments. Although recent literature has started to recognize the power of teacher-learners (Richardson & Placier, 2001), limited studies on learner agency have been conducted. Many questions about the interactions between teacher-learners and their learning processes remain unanswered.

**Summary**

In the process of teacher learning, teachers are often viewed as passive members who interact with assigned members, learning events and learning environments. However, teacher-learners’ power to decide what to focus on, how they want to go through the process of their learning, and their own influences on their learning processes cannot be ignored. Clearly, many questions need to be answered about the process of teacher learning.
Teacher Learning in the Use of Technology for Instruction

The second section of this literature review specifically emphasizes how teachers learn to use technology in their instruction. Studies of teacher learning and the use of technology have been conducted more recently compared to studies of teacher learning in general. However, following a similar path as the studies of teacher learning, most studies on teachers learning to use technology in their instruction emphasize the outcomes (Albion, 2001; Beck & Wynn, 1998; Duhaney, 2001; Gillingham & Topper, 1999; Keirns, 1992; Milbrath & Kinzie, 2000; Wiencke, 2002; Yildirim, 2000) and content of teacher learning through the lens of teacher educators and course developers (Wiebe & Taylor, 1997; Zhao, 2003). The effects of the education programs (Albion, 2001; Keirns, 1992; Knezk et al., 1996; Milbrath & Kinzie, 2000; Yildirim, 2000), the design of the courses (Beck & Wynn, 1998; Duhaney, 2001; Duran, 2001; Gillingham & Topper, 1999; Langone et al., 1998; Ringstaff, Yocam, & Marsh, 1996), and the effectiveness of the approaches that are used in the educational technology program are often the foci in this field (Francis-Pelton et al., 2000).

Effects of Educational Technology Courses

Research regarding the outcomes of teachers learning to teach with technology is often conducted through educational technology courses. A large number of studies indicate that educational technology courses have a positive impact on pre-service and in-service teachers’ attitudes toward computers (Lam, 2000; Milbrath & Kinzie, 2000; Yildirim, 2000), confidence in using computers (Knezk et al., 1996; Yildirim, 2000), and computer competency (Albion, 2001; Milbrath & Kinzie, 2000; Yildirim, 2000). For example, in Yildirim’s (2000) study, the participants reported that the educational
technology course they took opened their eyes about the power of computers in education. They also reported that it was easier to carry out tasks by using a computer after they took educational technology courses. In addition, they gained more confidence in their own abilities to use a computer. Milbrath and Kinzie (2000) also provide examples of successful changes in teachers’ attitudes toward computers and computer competency. They pointed out that although the changes in computer attitudes and self-efficacy take time, the computer training that pre-service teachers receive plays a very important role during these transitions.

Although the studies discussed above provide evidence about the effects of educational technology courses on pre-service and in-service teachers’ attitudes, perceptions, and computer competency, none of these studies explain the correlation between the change in attitudes, perceptions, and confidence toward technology of teachers and teachers’ willingness to use technology in their teaching contexts. Further, they did not examine what the participants took away from the course and how they used that knowledge in their teaching. Finally, and most importantly, the process of pre-service and in-service teachers’ changes in attitudes, perceptions, and confidence toward technology was unexamined.

A fair number of studies discuss the interaction between educational technology courses and pre-service and in-service teachers’ integration of technology in classroom practice (Beck & Wynn, 1998; Francis-Pelton et al., 2000; Keirns, 1992; Longone et al., 1998; Moursund, 1999; Ringstaff et al., 1996). These types of studies usually examine the influence of an educational technology course that was designed based on a specific model of teachers’ practices of technology integration. Currently, there are three common
types of instructional models to design educational technology courses and training programs for preparing and training pre-service and in-service teachers to integrate technology into curriculum: the single course approach, the technology infusion approach, and the field experience/situated approach. The single course approach consists of a technology-specific course within a teacher preparation program (Gillingham & Topper, 1999). It provides a model for learning how to use different computer applications and programs. The course offered by the Instructional Technology Department at San Jose State University for their teacher credential program is based on this model. Keirns (1992) reported that teachers who took the course believed that the coursework had extended their skills and directly affected their outlook toward the use of computers in their teaching situation, both for personal management tasks and instruction. However, according to the study data, the integration of computers into the curriculum was absent. Teachers’ use of technology was limited to creating teaching materials, managing school resources, and providing software as a game in the classroom. The study data did not indicate that teachers integrated what they had learned about the computer application programs in their coursework into the curriculum of different subjects. Langone et al. (1998) also investigated the extent to which graduates integrated technology in their work after they took the Special Education Technology Program (SET). This study showed that the technology use of these graduates was more on a surface level and not interwoven with ongoing classroom activities. Moursund (1999) suggests that formal stand-alone information coursework (a single course approach) does not correlate well with scores on items dealing with technology skills and the ability to integrate information technology into teaching. Duhaney (2001) analyzed the causes for the single course approach. He
concluded that one of the problems is a “…common teacher preparation curriculum in which most experiences with technology are focused in a single course that concentrates on learning to use the technology rather than learning how to facilitate learning with technology” (p. 25).

The second instructional model for designing an educational technology course is the technology infusion approach, which places aspects of technology with each course in a teacher preparation program (Gillingham & Topper, 1999). It provides students with a model of how to teach these subjects with technology rather than just how to use technology. Moursund (1999) reported that these instructional hours are more highly correlated with other variables in the survey than are single-course approach credits. He suggested that K-12 classroom preparation and training institutions should increase the level of technology integration in their own academic programs. Francis-Pelton et al. (2000) described a pre-service technology course taught at the University of Victoria using the elementary science, math, and social studies curriculum as the focal point. After the instructors introduced available computer applications to students and showed students how to use the computer as an information tool, analytical tool, graphing/statistics/transformation tool, and for creativity and communication, they used assignments and small activities to help pre-service teachers apply the computer applications in their particular subject areas. Hargrave and Hsu (2000) supported this model and stated, “…such integration should be provided through improved synchronicity (i.e., more hands-on experiences for pre-service teachers, with realistic educational assignments) and increased modeling of technology by college faculty in both content and methods courses” (p. 304). Beck and Wynn (1998) pointed out that the
survey results of Schools, Colleges, and Departments of Education (SCDEs) on pre-service students’ use of technology showed pre-service teachers who took educational technology courses based on the technology infusion model integrating technology in on-campus classes positively. However, when no additional support is provided after the class ends, there is little continuity for pre-service teachers. Pre-service teachers’ use of technology drops off during student teaching (Beck & Wynn, 1998).

The third instructional model for designing an educational technology course is the field experience and situated approach. This model provides an authentic environment and case-based context for pre-service and in-service teachers (Gillingham & Topper, 1999). Ringstaff, Yocam and Marsh (1996) reported that participating teachers learned by observing and working extensively with accomplished Apple Classroom of Tomorrow (ACOT) teachers and students during the school year. The participating teachers created a learning environment using different technologies in various subject areas. Teachers' teaching styles changed after they received the training. More cooperative learning and inquiry-based learning activities were used. Students were more engaged in their learning processes. Moursund (1999) also suggested that student teachers need more opportunities to apply information technology during field experiences under qualified supervision. However, according to his survey results, although most institutions report that information technology is available in the K-12 classroom where student teachers get their field experience, most student teachers do not routinely use technology during field experience and do not work under master teachers and supervisors who can advise them on information technology use. The lack of mentors remains a problem in this model.
Factors Influencing Classroom Practice on Technology Integration

In order to understand ways to increase teacher willingness and the success of technology integration, barriers to technology uses have also been studied (Becker, 1999; Becker, Ravitz, & Wong, 1999; Ertmer, 1999; Rogers, 2000; Tomei, 2002; 2003; Windschitl & Sahl, 2002; Zhao, Pugh, Sheldon, & Byers, 2002). Although various models of educational technology courses are offered in teacher preparation and professional development programs, practical technology integration into the curriculum is still very limited because of various difficulties. A large body of studies has been conducted to investigate the factors that influence student teachers’ and classroom teachers’ classroom practice of technology integration in their current teaching environment (Albion, 2001; Egbert et al., 2002; Lee, 2000; Rogers, 2000). Inadequate time, technical support, and resources are the three main barriers hindering classroom practice of technology integration (Albion, 2001; Egbert et al., 2002; Rogers, 2000; Strudler, McKinney, & Jones, 1999). Additional problems, such as how to grade students’ technology-related projects, opportunities to observe technology-integration teaching demos, and how to manage the technology-integrated classroom, have also been reported as difficulties in technology integration (Strudler et al., 1999). Furthermore, inadequate knowledge of school administrators’ expectations and technology infrastructure in the teaching context have also been reported as barriers to technology integration (Windschitl & Sahl, 2002). The results of these studies imply that what the education technology course offers may not be applicable to the realities of the classroom. However, detailed studies of the processes of teacher learning in the use of technology in their instruction are still limited (Galloway, 1996; Windschitl & Sahl, 2002).
Technology-Using Teachers

Some researchers have also studied technology-using teachers (Becker, 1994; Egbert et al., 2002; Ertmer, Addison, Lane, Ross, & Woods, 1999; Ertmer et al., 2001; Windschitl & Sahl, 2002; Zhao et al., 2001). As the emphasis of the studies has been put on the impact of the course work itself, Galloway (1996) suggests that there is a need for research that asks what exemplary technology-using teachers do, how they actually use computer technology, and how they learn to use computers in their instruction. Researchers may then begin to investigate and study the characteristics of technology-using teachers. Galloway argues that if the goal of the educational technology course is to transfer the knowledge into practice, we need to know the results of successful transference.

The current literature has investigated demographic information about exemplary technology-using teachers, their beliefs in teaching and learning and their pedagogical styles, their perceptions of technology, and their teaching contexts. Studies concerning these areas are discussed below.

Demographics

In order to understand who the exemplary technology-using teachers are, some researchers characterize exemplary technology-using teachers based on their backgrounds and experiences (Becker, 1994; Zhao et al., 2001), their teaching contexts (Atkins & Vasu, 2000; Becker, 1994), their pedagogical styles (Becker, 1994; Zhao et al., 2001) their teaching beliefs (Becker, 1994), their perceptions of computer uses (Becker, 1994), their technological proficiency (Zhao et al., 2001), and their attitudes toward computers (Zhao et al., 2001). In his study, Becker (1994) reported that exemplary technology-using
teachers are most often male, have backgrounds in a content discipline, hold advanced
degrees, have formal training in computer use, and use computers more often than non-
exemplary users. Zhao et al. (2001) also reported that 80% of the exemplary technology-
using teachers in his study were proficient in basic computer applications including word
processing, e-mail, the World Wide Web, databases, spreadsheets, and educational
software.

However, Cuban and his colleagues (Cuban, 2001; Cuban, Kirkpatrick, & Peck,
2001) argue that demographic characteristics are not particularly helpful in explaining
technology infusion. Teacher beliefs in technology, the influence of the culture of the
school, their interpretation of the role of technology, and their pedagogical styles can
influence their teaching practice.

Teaching Beliefs and Pedagogical Styles

Teaching philosophy is believed to be one of the most important factors
influencing how teachers use technology in their instruction. Among the studies related
to teacher beliefs and technology uses, the correlation between exemplary technology-
using teachers and constructivism is widely discussed. Some researchers suggest that
teachers who believe in constructivism and use “constructivist ways” of teaching may be
able to integrate technology into the curriculum in a meaningful way (Jonassen et al.,
1999). They propose that using technology for instruction (e.g. simply presenting
educational

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Technology, 1997). With a belief that the best practice of technology use is “constructivist practice” that emphasizes student-centered, student construction, social interaction, and problem-solving, many researchers define expert technology-using teachers as believers in constructivism (Becker, 1994; Becker & Riel, 2000; Dexter et al., 1999; Jonassen et al., 1999).

However, limited research (Becker, 2000a; Dexter et al., 1999; Sandholtz et al., 1997) has been conducted to study the correlation between constructivism and exemplary technology-using teachers. In one study, Becker (2000a) report that teachers who use most types of software on a frequent basis have consistently more constructivist philosophies than the average teacher. Sandholtz et al. (1997) also report that when teachers use technology more frequently, their pedagogical styles then shift from teacher-centered instruction to student-centered instruction and belief in constructivism. Although this change and shift are a long process, “[when] enough time is given, the variety of approaches to using technology will homogenize into a constructivist approach” (Dexter et al., 1999 p. 222). These studies imply that changing teachers’ teaching philosophy to constructivism can result in teachers’ use of technology in their teaching, and that training constructivist teachers should be one of the goals of an educational technology course.

Some researchers disagree with this viewpoint and find weak correlations between constructivism and exemplary technology-using teachers. They suggest that exemplary technology-using teachers do not necessarily believe in constructivism (Ertmer et al., 2001; Windschitl & Sahl, 2002). For example, Ertmer et al. (2001) examined the teaching philosophy of exemplary technology-using teachers based on Becker and Riel’s (1999)
definition of constructivist teachers. Their findings suggest that exemplary technology-using teachers use technology for skill-oriented, content-oriented, process-oriented, and overlapping oriented instruction, but not necessarily for student construction. They point out that when teachers find a place for technology to achieve their teaching goals within their teaching beliefs, they are able to use technology in an appropriate way and are recognized as exemplary technology-using teachers.

Other researchers suggest that teachers who believe in constructivism do not necessarily use technology. For example, in Windschitl and Sahl’s (2002) two-year case studies on teachers’ use of laptops in a high-tech middle school, one of the participants who ended up believing in constructivism reported that using technology in his instruction was too much trouble. This participant pointed out that the wires in the classroom made it difficult for his collaborative lessons. He reported that students cannot move to their groups easily with all the wires around them.

From the studies discussed above, the correlation between constructivism and technology use remains uncertain. However, factors such as teachers’ instructional goals and class management seem to play an important role in teachers’ technology use.

Teachers’ perceptions of technology

A large body of literature documents the close relationship between teachers’ perceptions of computer technology and their use of technology in their instruction. The findings suggest that when teachers have the following perceptions of computer technology, they are more willing to use technology in their instruction:

1. When teachers recognize the positive impact of technology on their teaching

   (Egbert et al., 2002; Ertmer et al., 2001; Lam, 2000; Zhao et al., 2001)
2. When teachers recognize the positive impact of technology on student learning (Ertmer et al., 2001; Lam, 2000; Zhao & Cziko, 2001)

3. When teachers see technology as an mean to the end instead of an end itself (Zhao et al., 2002)

4. When teachers believe technology has a role in the curriculum (Ertmer et al., 1999)

5. When teachers feel technology can support classroom management (Zhao et al., 2001).

6. When they think computer technology is important to students’ future (Zhao et al., 2001).

However, teachers’ individual views and interpretations of technology vary the ways in which technology is used in the classroom. For example, Pierson (2001) conducted a case study and reported that when exemplary technology-using teachers view technology entirely as entertainment, the use of technology in the classroom becomes an add-on activity. Her findings further suggested that when exemplary technology-using teachers view technology as a future skill for students, computer technology then becomes a lesson itself. That is, they teach technology skills and separate this lesson from other subject matter. Finally, her findings point out that exemplary technology-using teachers who view technology as part of their daily life integrate technology in their lessons and make technology part of the daily routine of the classroom. Ertmer et al. (1999) reported similar findings.

Teachers’ individual views and interpretations of technology also influence how they conduct assessment of technology-related activities in the classroom. In Pierson’s
(2001) study, exemplary technology-using teachers who view technology as entertainment and use technology as an add-on activity did not carry out any student assessment. However, exemplary technology-using teachers who view technology as a future skill for students and teach computer literacy evaluate students’ technology-related projects based on how well they learn the computer technology itself (e.g. software). Finally, exemplary technology-using teachers who view technology as part of their daily life and make technology part of the daily routine of the classroom evaluate students’ technology-related projects based on the content of the projects.

Process of Learning to Use Technology to Teach

There are limited research studies regarding the process of teacher learning in the use of technology in their instruction. The longitudinal study of the Apple Classroom of Tomorrow (ACOT) (Ringstaff et al., 1996; Sandholtz & Ringstaff, 1997; Sandholtz et al., 1997) examines the process of teacher learning in the use of technology in a technology rich context. Through the cases of 500 teachers and mentors, five stages (Entry, Adoption, Adaptation, Appropriation and Invention) were recognized as the sequential processes every teacher needs to go through while learning to use technology in their instruction. Yet, in Hughes’ (2003) study of three teachers, the findings suggest that not all teachers follow ACOT’s linear model while learning to use technology in their instruction. Rather, different phases (the individual, an initial learning experience, reflection, exploration, technology use, evaluation, and rejection) can take place and teacher-learners can follow multiple pathways in their learning processes. In addition, she reports that the participants in her study “play a vital role in choosing and experiencing technology learning” within the “field of their previous knowledge and experience” (p. 13).
Hughes’ (2003) study provides other possible pathways that teacher-learners might take while learning to use technology in their instruction and addresses the influence of prior knowledge on individual learning goals. Teacher-learners’ interactions with learning events that take place from time to time and their reflections upon these interaction experiences are discussed. However, as Hughes explores technology-using teachers’ learning from time to time by using life-history interviews, only part of the learning dynamics in each learning experience are captured. More research needs to be conducted in order to explore teacher learning processes in detail.

Language Teachers and Technology

Little empirical research has been conducted specifically on language teachers' use of technology. Three major studies related to language teachers and technology are discussed here. First, Lam (2000) explored reasons second-language teachers decided to use or not use technology and factors that influenced these decisions. Ten second-language teachers from a wide range of backgrounds were invited to participate in this study. The study findings suggested that although many participants perceive computer technology as a potential tool that can enhance language learning, not all of them view computer technology as a useful or necessary tool in their particular teaching contexts. In addition, many participants reported that they did not know how using computers can relate to language teaching.

Second, Meskill et al. (2002) examined the difference between expert technology-using second-language teachers and novice technology-using second-language teachers. Their findings suggested that expert technology-using language teachers focus on learners as an agency of the learning process and how learners can use the technology,
while novice language teachers focus on the machine as an agency of the learning process and the features of the technology. They suggested that expert technology-using teachers are more learner-centered rather than teacher-centered. Expert technology-using teachers believe in using technology to empower students rather than managing students, as novice teachers believe. In addition, expert technology-using teachers emphasize the process rather than the product in their instruction.

Finally, Egbert et al. (2002) examined how language teachers apply what they have learned from computer-assisted language learning (CALL) coursework to their teaching. Their findings suggested that most of the participants limited their use of technology to administrative work, communication, and materials preparation in their teaching contexts. Egbert et al. argued that second-language teachers only learn what they actually need to use in their coursework, and that teacher educators need to take the teaching contexts into consideration while designing educational technology lessons for second-language teachers.

Chapter Conclusion

The literature above first provides an overview on how teachers learn in general. Some researchers have investigated the outcomes of teacher learning (Darling-Hammond et al., 2003; Farnan et al., 2003; Timperley & Phillips, 2003). Their studies often focus on what teacher-learners become or turn into after they receive some “inputs” or education. Discussing the outcomes of learning to teach allows researchers and teacher educators to understand the ends of teacher learning based on teacher educators’ perspectives. However, it does not help us to understand what process teachers go through to reach those ends (Feiman-Nemser & Remillard, 1996) and what roles they play in the process
of reaching those ends. Research on the content of teacher learning has informed teacher educators of some knowledge and skills expert teachers have but novice teachers do not. However, existing evidence suggests that having this knowledge will not automatically transfer to the teaching profession (Freeman, 1993, 1994; Freeman & Richards, 1996b; Johnson, 1992, 1994, 1996b; Kennedy, 1991a; Kessels & Korthagen, 1996; Richards & Nunan, 1990). Addressing the content of teacher learning (e.g. subject matter, class management, learners, assessment, and curriculum) tells us what teachers should know or what teacher educators expect teachers to know in order to teach. However, it does not explain what components of this content are more useful or meaningful for teachers and how teachers learn to cope with the complexity of their work by using this content (Johnson, 1999).

In order to help us to understand how teachers reach their goals and learn to use the content of teacher learning in their work, the process of teacher learning needs to be emphasized, along with a related but secondary focus on the learning environments that can influence the process of learning (Clarke & Hollingsworth, 2002; Feiman-Nemser & Remillard, 1996). However, limited research has been conducted to explore the processes of teacher learning (Clarke & Hollingsworth, 2002; Feiman-Nemser, 1983; National Center for Research on Teacher Learning, 1992). Because of the importance of understanding teacher learning and the gap in the literature in this area, the aspect of teacher learning processes is proposed as the focus of this study.

In the process of teacher learning, research has found that members, learning events, and learning environments can impact teachers as they learn. Current research often captures how one member, one event or one learning environment influences the
process of teacher learning; however, in real situations, each of these components does not stand alone. Rather, they can occur interchangeably and interactively in the process of teacher learning (Feiman-Nemser & Remillard, 1996). In addition, teachers act on these elements, but research rarely presents this perspective. This study views teachers as active agents in their learning process by looking at the interplay among teacher-learners and members, learning events and learning environments during the learning process. In this study, teacher-learners’ self-determined actions and intentions of approaching members, learning events, and learning environments constitutes active agency.

In order to understand how teachers learn to use technology in their instruction, researchers need to explore how teachers approach their learning and the learning processes they go through as active agents. The purpose of this study, therefore, was to explore the process of teacher learning in the use of technology for their instruction by viewing teacher-learners as active agents. It emphasized the behaviors/actions/thinking of teacher-learners in their process of learning and their role as active agents. By exploring what one teacher planned to learn, I then used her plans and actions as a guide to understand the reasons why she planned and acted in these ways. I expected to discover how teacher-learners approach their learning and the learning processes they go through as active agents.

The findings of this study will contribute to current research regarding the process of teacher learning and teacher learning in the use of technology. It will also help teacher educators to understand teacher-learners’ limitations, biases, problems, and frustrations in the process of their learning in order to better facilitate and scaffold teacher-learners in their process of active learning. The results of the study can also benefit teacher course
designers and teacher educators by helping them to build instructional components with the goal of supporting the active learning process of teacher-learners. Finally, teachers who are in the process of learning to use technology in their instruction can benefit from understanding possible processes they might go through in order to develop learning strategies for their learning.
CHAPTER THREE

METHODOLOGY

Introduction

In order to deeply understand the process of teacher learning to teach with technology, a qualitative case study was used. This method allowed me to obtain narrative and thick descriptions of teacher learning processes of teaching with technology and to interpret their learning processes by focusing on teacher-learners’ actions, behaviors, thoughts, intentions, expectations, and learning plans—in other words, the active roles teacher-learners take in their own learning processes. This exploration included observation, interviews, field notes, and documents.

As the pilot study described in Chapter One, a qualitative methodology was suggested for this research because the purpose of this study was to explore how teacher-learners approach their learning and the learning processes they go through as active agents. By exploring and researching teachers’ intentions, thinking, and actions, I started to develop an understanding for the reasons why the learning processes were moving in certain directions. Maxwell (1996) suggests that qualitative research methodology is suitable when the emphases of the study are on “understanding the process by which events and actions take place,” “participant perspectives of events and actions,” and the “particular context within which the participants act, and the influence that this context has on their actions” (pp. 17-19). For the above reasons, qualitative methodology was appropriate for this study.

As in the pilot study, the current research used an exploratory-explanatory case study methodology. In addition to the rationales stated in the pilot study methodology
section (Chapter One), a case study is appropriate when examining a setting, a single
document or one particular event in detail (Stake, 1994; Yin, 1989, 1994). Because I view
teacher learning in the use of technology as an ongoing event, I selected a case
methodology for the current study.

Unlike the pilot study, however, the current study used a single case study design.
A single case study design studies only one phenomenon and includes only one study
participant, one organization, or one institute as the sole research case (Yin, 2003b). It is
particularly appropriate for the following common circumstances and rationales (Yin,
2003b). First, a single case study design is suitable when the case “represents the critical
case in testing a well-formulated theory” (p. 40). This type of single case study design
aims to confirm, challenge, or extend a theory. In other words, it is used to “determine
whether a theory’s propositions are correct or whether some alternative set of
explanations might be more relevant” (p. 40). Second, a single case study design is
appropriate when the case “represents an extreme case or a unique case” (p. 40). This type of single case study design is used to explore phenomena that are rarely seen and to
document atypical or unique cases. Third, a single case study is also proper when the case
is “the representative or typical case” (p. 41). This type of single case study design aims
to “capture the circumstances and conditions of an everyday or commonplace
situation…The lessons learned from these cases are assumed to be informative about the
experiences of the average person or institution” (p. 41). Fourth, a single case study
design can be used when “an investigator has an opportunity to observe and analyze a
phenomenon previously inaccessible to scientific investigation” (p. 42). Under this
circumstance, the case serves a revelatory purpose. Finally, a single case study is useful
for longitudinal purposes. When researchers are interested in “studying the same single case at two or more different points in time,” a single case design is helpful to understand “how certain conditions change over time” (p. 42).

The current study can be justified as a single case study design by studying a typical case. The use of this typical case has allowed me to capture common activities in which teacher-learners might usually involve themselves in their everyday school lives. It also enabled me to study their regular interactions with the common members, events, and learning environment around them. Within this framework, the common learning process of typical teacher-learners can thus be understood.

The design of this single case exploratory-explanatory study also includes site selection, participant selection, data collection, and data analysis procedures, along with the researcher’s role, validity and limitations. These components are discussed below.

Site Selection

The purposeful sampling strategy (Patton, 1990) was used for this study. In order to explore teachers’ learning processes in the use of technology in their instruction, a course that offered teachers guidelines and opportunities to learn ways of technology integration in their instruction was selected for this study. As learning is ongoing and continuous (Dewey, 1938), it is difficult to maintain a study to a manageable level under time constraints if tracing the teachers for many years. However, when viewing taking a course as a part of teacher learning continuum, using this course as the study site allowed me to explore one length of teachers’ continuous learning process in depth. Follow-up studies of teacher learning processes could then be built upon by using this study as a foundation.
The selected course was offered in Fall 2003 by the College of Education at a Pacific Northwest university located in the United States. The main population of students in this course consisted of current teacher practitioners teaching at different locations in a state of the Pacific Northwest region. The course was delivered through the World Wide Web. Students of this course visited an online forum to turn in their assignments and participate in class interactions. Twelve students were taking the class during the study period. The purpose and the content of the course were similar to the one in the pilot study. Only some minor modifications in the course instructions were added.

In each unit, students were required to complete three assignments: a focus reflection, a task, and a final activity. Activities such as technology coordinator interviews, a CALL lesson design based on their teaching contexts, and software evaluation were included in the course content (see Appendix A for the outline of the course activities). Students were also required to discuss the course readings and assignments with their classmates, and to share their experiences and reflections in the online discussion forum for each unit.

Participant Selection

The purposeful sampling strategy (Patton, 1990) was suggested for participant selection. The purposeful sampling strategy allowed me to select information-rich cases (Patton, 1990) to study the processes of teacher learning in depth. This strategy also allowed me to locate participants who best matched with a population not fully explored in the literature and who also matched my interests.

The first step in the participant selection was to locate K-12 practitioners within the selected course who had ESL students in their classrooms, as mentioned above. A questionnaire was sent to all of the students in order to understand their teaching contexts
(see Appendix B). After locating these practitioners, an invitation was sent to recruit the target participants in the first week of the class (see Appendix C). Among these, one K-12 practitioner who had ESL/bilingual students in her classrooms during the study period participated in the study voluntarily. This case provided thick data for this study and was useful to address the research purpose.

I targeted K-12 teachers who had ESL students in their classrooms because there are fewer studies on their learning in the literature and because of my personal background and interests, as mentioned in the conceptual context earlier. Therefore, the findings might only apply to limited populations who are in similar settings and have similar backgrounds. However, it is an appropriate step to fill in the gaps in the literature.

Data Collection Procedures

Various data collection techniques were carried out in order to enhance the integrity and trustworthiness of the study. Observation, interviews, documents, and field notes were used as data collection resources for this study. Observation, which is particularly useful for exploring behaviors and events (Maxwell, 1996), was conducted to understand what teacher-learners did and said as the class progressed, the events that took place during the class, and the learning environments she participated. It allowed me to explore learner actions/behaviors/intentions, and how they approached their learning. Interviews, particularly useful for exploring learners’ thought processes, intentions, expectations, perceptions, insights and perspectives (Maxwell, 1996), were used to understand why certain learner behaviors took place, what in the contexts influenced their behaviors, and learners’ insights into their experiences. Interviews were also used to capture anything missed in the observation and to confirm the researcher’s interpretations
of the observation (Maxwell, 1996; Wiersma, 1995). Documents, especially useful for collecting supplemental information for the study and verifying study findings (Bogdan & Biklen, 1998) were used to collect participant profiles and to verify/support the findings of this study. In other words, documents and interviews were used to obtain participant profiles and information regarding teaching contexts, while observations, interviews, and documents were collected to answer the question of how teacher-learners learn to teach with technology as active agents.

The study was carried out during Fall 2003. The total study period lasted approximately ten months, including seven months of data collection and ten months of data analysis. There were three phases in this study. In phase one (before the course began), the goal of data collection was to obtain the participant’s background information and previous experiences with educational technology. An open-ended questionnaire was sent to the participant in order to document information about the participant’s background, teaching experiences, teaching philosophy, previous educational technology experiences, and expectation of the course. This document allowed me to provide a rich description of the study case and to describe the contexts of the study case in the later analysis.

The second phase of the study was carried out during the course. In this phase, the purpose was to explore how teacher-learners approach their learning and how they go through their learning processes as active agents. Observation, field notes, interviews, and documents were the resources of the data collection. Online class discussions were observed and field notes were taken in order to understand participants’ thinking, behaviors, and intentions during the class. Other documents such as student assignments,
the class syllabus, course unit content, class readings, communication documents, and course evaluations were collected for illustrating the research context, understanding participants’ thinking processes, and verifying the observation data. Taped interviews were conducted when appropriate during the course, with the goal of tracing and understanding participants’ thinking and perspectives on their experiences and confirming the observation findings. All the interview data were transcribed verbatim.

The study participant was interviewed three times during the course at the second week, the fifth week, and the seventh week of the course. An invitation for an interview was sent when I noticed indicators of changes and important thoughts during the ongoing data analysis. After the invitation was sent, the interview schedule was decided based on the participant’s soonest availability.

All the data collected in phase two were analyzed as described in the next section in order to generate interview questions for the third phase of this study. The third phase of the study took place after the class. Interviews were used as the main data collection method. Therefore, some communications and clarifications were conducted through email. The study participant was interviewed twice after the course was over. The interviews in this phase were used to further explore the themes discovered in the second phase of the study, to verify the researcher’s understanding, and to explain information that needed clarification or to collect other necessary details. In other words, all the interviews conducted during phase three were used to confirm the interpretations and clarification of the data obtained in the second phase and the tentative results of data analysis. All the interviews in this phase were tape-recorded and transcribed verbatim for data analysis.
I referred to an interview, observation, and document guide (see Appendix D) during the study in order to emphasize the purpose of this study. This guide helped the researcher to focus the intended research purpose and save time spent on data collection. Interviews were flexible and open-ended as well as the observation.

Data Analysis

The constant comparison method (Glaser & Strauss, 1967) was mainly employed in the data analysis procedures in the current study. The basic strategy of the constant comparison method is to code data at the early stage of the study and as the study progresses. Researchers start with one incident from an interview, a field note, or a document, and then compare each piece of coded data to the others as the analysis progresses. Through the process, themes and categories are generated and compared for developing the core categories from the data.

The constant comparison method was first developed by Glaser and Strauss (1967) as a means of developing cohesive theories that consist of links between categories and properties that emerge from the research data. However, it has been adopted by many qualitative researchers for data analysis. According to Merriam (2001), “because the basic strategy of the constant comparative [comparison] method is compatible with the inductive, concept-building orientation of all qualitative research, the comparative method of data analysis has been adopted by many researchers who are not seeking to build substantive theory” (p. 159).

The constant comparison method was selected as the data analysis strategy for this study for several reasons. First, Yin (2003a, 2003b) suggested that the analytic procedures for exploratory case studies are similar to Glaser and Strauss’ (1967)
hypotheses-generating process. However, it is important to note that the goal “is not to conclude a study but to develop ideas for further study” (Yin, 2003b, p.120). Therefore, with the intent of taking a fresh look at how teachers learn as active agents in the current study, using the constant comparison method to conduct inductive analysis at the beginning of data analysis allows the data to “speak” instead of forcing it to fit a pre-existing theory. In this case, I was able to accomplish the exploratory purpose of this case study.

In addition to consulting Yin’s (2003a, 2003b) suggestions for analytic strategies of case studies as in the pilot study, I also considered Merriam’s (2001) analysis advice in the current study. Merriam proposed that the constant comparative method (Glaser & Strauss, 1967) can be adopted to analyze evidence in all types of qualitative studies for inductive and concept-building orientation. With the goal of exploring the process of teacher learning in the use of technology for their instruction, an ongoing data analysis proposed by the constant comparison method helped me to describe detailed information about teacher learning. It also informed me when I needed to interview the participant, what I needed to ask, and what to focus on while observing the participants as the study progressed. In addition, by comparing teacher learning constantly as the course progressed, I was able to understand the changes, the differences, and the dynamics of the learners, the events, and the learning environments in the process of teacher learning. In this case, I was able to develop an understanding to fulfill the explanatory purpose of this case study. As a result, I adopted the constant comparison method for the exploratory nature of the current study as well as the explanation building procedures for the explanatory nature of the current study. The use of this analytical strategy helped me
understand the process of teacher learning and to build explanations of the underlying factors that contribute to teacher learning processes.

Cautions and Awareness

As discussed above, the use of the constant comparison method allowed me to conduct inductive analysis at the beginning of data analysis and allowed the data to “speak” instead of forcing it to fit pre-existing theories. However, Strauss (1987) reminds researchers that “whether we want to admit it or not, we cannot completely divorce ourselves from who we are or from what we know. The theories that we carry within our heads inform our research in multiple ways, even if we use them quite un-self-consciously” (cited in Sandelowski, 1993, p. 47). His reminder encouraged me to reflect upon the possible bias I might have because of my research background and my understanding of the existing literature. Therefore, I developed some strategies in an attempt to minimize the possible bias during the inductive analysis. For example, during the data analysis process, although I had some ideas about what might influence teacher learning, based on reviewing the literature and prior research experiences, I tried to be objective and allow the codes, concepts, and explanations to emerge from the data instead of forcing it to what previous research has suggested or what I have known.

Although Strauss and Corbin (1998) suggest that researchers’ familiarity with the literature and their professional experience can hinder what researchers see or do not see, they propose that if these two sources are used properly, they can serve as useful tools for researchers’ theoretical sensitivity during the data analysis process. Strauss and Corbin quote Dey (1993) who suggested the following:
In short, there is a difference between an open mind and an empty head. To analyze data, we need to use accumulated knowledge, not dispense with it. The issue is not whether to use existing knowledge, but how. (p. 63)

As we come across an event of interest in our data, we ask, “What is this?” Later, as we move along in our analysis, it is our knowledge and experience (professional, gender, cultural, etc.) that enables us to recognize incidents as being conceptually similar or dissimilar and to give them conceptual names. It is by using what we bring to the data in systematic and aware ways that we become sensitive to meaning without forcing our explanations on data. (p. 47)

Therefore, as Strauss and Corbin suggest, being objective is important for the constant comparison method, and they believe that being sensitive allows researchers to understand a certain phenomenon or to carefully think in theoretical terms as the data analysis progresses because of their personal experiences or familiarity with the literature. Thus, in order to maintain the balance of subjectivity and objectivity during the data analysis process, I reminded myself to allow the codes to emerge from the data first and then to use my theoretical sensitivity to support the codes that developed. I also tried to separate the terms that the study participants used during the study and what I was already familiar with in the literature to describe the properties and dimensions of the major categories of this study. Finally, I tried to remind myself to separate the interpretations drawn from my prior knowledge from the research participant’s perspectives.
Coding Procedures

Strauss and Corbin’s (1998) guidelines for the constant comparison method were followed in the data analysis procedure. Three principles were kept in mind during the coding procedures. First, I started the coding process at the early stage of the study and continued as the study progressed. Because the purpose of this study was to explore the process of teacher active learning, the data resources were analyzed week by week. After online interaction, field notes, and student assignments were collected each week, I started my data analysis process. Interviews were analyzed during the week they were conducted.

Second, during the data analysis process, I intended to take a fresh look at the study data and to allow the data to “speak” instead of forcing it to fit pre-existing theory. As mentioned before, although I had some ideas about what might influence teacher learning based on reviewing the literature and prior research experiences, I tried to be objective and allow the codes, concepts and explanations to emerge from the data instead of forcing it to match what the literature has suggested or what I already knew. In this attempt, I followed the principles of constant comparison method and allowed the concepts, themes, and categories to emerge from the data.

My perspective of viewing teacher-learners as active agents provided a means for me to see the emergent categories such as “strategies” and “solutions.” In addition, the conceptual context in chapter one and the literature review in chapter two served as the foundation of my theoretical sensitivity during the data analysis. While the categories and themes emerged from the data, I noticed that some concepts in my literature review and conceptual context reflected the categories and themes that emerged from the data.
Therefore, these concepts were used to support the categories and themes that emerged from the study data.

Third, the coding process was interactive rather than linear. I visited each stage back and forth as well as the codes that developed from the weekly data to generate tentative understanding and core categories in order to increase my understanding and the integration of the data.

With these three principles in mind, I analyzed the study data by identifying preliminary indicators; sorting, comparing, and categorizing; seeking relationships and explanations; comparing weekly data; and refining and verifying. These procedures are described below.

**Locating Preliminary Indicators**

The analysis process started with the goal of identifying preliminary indicators of activeness that emerged from the data. This process took place as soon as the first week’s data resources were collected and converted into word documents. First, I inserted the study data into HyperResearch, a software program designed to support qualitative data analysis, and read the data word-by-word and line-by-line. During this process, I located instances that were important to the participant. At the same time, I kept my research purpose in mind to help myself focus on codes that were important to the purpose of this study. The participant’s role of active agent in her learning processes and the shifts of her learning focuses were mainly pinpointed. For example, her self-determined attempts and actions were identified when phrases such as “I plan to,” “I want to,” “I am going to,” and “my goal is” were reported. Her undertaken actions were recognized when she carried out certain learning activities. Her changes or shifts of learning focuses were
indicated when phrases such as “I never thought that before,” “I thought…,” “I start to think…,” or “one thing that I am wondering about…,” were used in her reports. When these phrases and instances were found, I then cited preliminary indicators such as “focuses,” “want to know,” “attempt of changing,” “approach experts for resources” and “reading the whole thread and refer to her teaching contexts” next to the data of relevance by using HyperResearch software. Following the same procedure, I located preliminary indicators in the weekly research data resources and interview transcriptions by reading them line-by-line and word-by-word in HyperResearch software.

Sorting, Comparing, and Categorizing

After the preliminary indicators of the week were identified, the data analysis progressed with the goal of generating concepts, subcategories, and categories. During this process, I sorted, compared, and categorized the study data on a weekly basis. First, I sorted instances that included the same or similar preliminary indicators. For example, instances that include the preliminary indicators “want to do” were sorted together. By using the sorting function in HyperResearch software, I generated excerpt files that presented instances with the same preliminary indicators week by week. Then, the weekly excerpt files were used to compare and contrast the data segments of each preliminary indicator and to locate the overlapping or contrast indicators.

During this process, I read the generated excerpt files closely and highlighted the portions of the data segments that directly addressed the characteristics of the indicators. Then, I read the excerpt files again to identify emerging concepts. I wrote down main concepts (e.g., intentions; attempts; problems) or generative questions (e.g., Who did she interact with? Why did she do so? What did she interact about?) that emerged from the
data in my analytical log, and made notes on the excerpt files. In the meantime, I followed Strauss’s (1987) suggestion and consistently compared and contrasted the indicators that were identified in the weekly data resources. I then merged the indicators that shared similar characteristics into a tentative concept or a theme and distinguished indicators that were different from each other in my analytical log. For example, I compared the indicator “old way of learning” to the indicator “new way of learning” and then merged them to the concept “assumptions of what would work.” I also sorted the preliminary indicators “approach experts for resources” with “reading the whole thread and refer to her teaching contexts” and generated a concept “learning activities.” This process was interactive. I constantly revisited, revised, and refined the concepts by comparing and contrasting the preliminary indicators. Therefore, concepts (e.g., perceptions of technology; perceptions of teaching with technology) were then sorted into subcategories (e.g., perceptions). Subcategories (e.g., perceptions; teaching beliefs) were then sorted into categories (e.g., teacher knowledge, perceptions and beliefs).

The same procedures were followed to generate excerpt files for the data resources each week. As a result, tentative concepts that contained the same characteristics of indicators were generated.

**Seeking Relationships and Explanations**

As sorting, comparing, and categorizing were taking place, relationships between concepts, subcategories, and categories gradually emerged. In this process, I followed Strauss and Corbin’s (1998) suggestions to draw conditions of categories, events, and people and then identify consequences of those conditions. After recognizing these conditions and consequences, I then started to understand the interactions among
categories, subcategories, concepts, and properties. For example, in this study, one of the conditions that Amy felt that she needed to practice computerized materials before she gave them to the students (subcategory: teacher beliefs) was because she felt that the teacher needed to be an expert and be able to answer all the questions students have (condition: teacher expectations of their roles). The consequence of this condition (feeling a need to practice computerized materials) was that Amy took actions to practice the software programs that were available in her teaching contexts as one of her learning plans. Therefore, relationships between teacher beliefs (subcategory), teacher expectations of their roles (conditions of the subcategory), and teacher learning plan (consequences of the conditions) were established. I then established tentative relationships between the subcategories, conditions of the subcategories, and consequences of the conditions. (Amy made a plan to practice software programs because she expected herself to be an expert and be able to answer students’ questions when she gave the students assignments. In order to be the expert and be able to answer all students’ questions, Amy felt that she needed to be more familiar with the programs she had in her classroom. In order to do so, she planned to practice the software programs.) By drawing conditions of categories, events, and people and identifying consequences of those conditions, I was able to identify relationships that emerged from the data (e.g., X is part of Y; X is a type of Y) and build explanations of the participant’s actions and thoughts (e.g., X happens because of Y; X results in Y; X would happen under the condition of Y). Gradually, the relationships between concepts, subcategories, and categories were integrated.
Because the relationships between the categories, subcategories, concepts, and themes were intersected and complicated, I used diagrams to help me understand their relationships. These diagrams were used to cluster and make connections between concepts, subcategories, and categories (see Appendix E for an example of diagrams). In addition, I describe the connections between categories, subcategories, concepts, and themes drawn in the diagrams in a written format and to record my interpretations and explanations in my research memos. These diagrams and memos were used for further analysis and for writing the study report.

Comparing Weekly Data

Weekly data was compared and contrasted to increase my understanding of teacher learning process. The tentative relationships, concepts, and categories drawn from weekly data resources were compared and contrasted with the goal of seeking teacher learning and change instances. For example, I compared the kind of solutions the participant came up with or the actions she took in different weeks. Then, I laid out the solutions and actions of the week in a chart. Finally, I recorded the changes and shifts into my analytical log. By doing so, the changes and learning shifts were identified. I reviewed the weekly data even more closely when I noticed instances that demonstrated the shifting focuses of teacher learning or teacher changes. For example, when the participant reported things she found new or had never thought before (e.g., “I thought I putting students in front of the computer was the only way of teaching with technology…”; “I never thought that they could talk around the computer”), I marked the changes and record the important time on my analogical log as a reminder and for further deeper analysis. Therefore, these instances were used as a guide to identify the
participant’s shifting learning focuses or changes and to triangulate the results of weekly data comparison.

Refining and Verifying

During the data analysis process, the categories, relationships, and concepts emerging from the data were constantly refined and verified. As the tentative concepts and themes developed, I used data to confirm the themes and categories. I used the generated themes and categories and referred back to the data to verify the themes and categories that were relevant in the data. For example, I used categories such as “changes in solution,” “change in beliefs,” and “change in strategies” to confirm the study data reflecting those changes. Verification also took place in the data analysis to confirm and modify my understanding of teacher learning processes. Rather than confirming the categories or the concepts, verification sought to confirm the relationships between those elements.

As a result, six major categories emerged and showed their interconnected relationships. These categories include solutions, teacher knowledge, beliefs and perceptions, sources, teaching practice, strategies, and mediation. I will explain each of these categories in detail in the beginning of the data analysis section.

The Role of the Researcher

The researcher served as a participant-researcher of this study. As the instructor of this course, the researcher tried to remain self-aware of whose voices were recorded in the study data. When communicating with the participant through email, the instructor clearly identified her role as instructor or researcher in the subject line and in the email to avoid confusion and bias. In addition, the researcher was highly alert to her personal
subjectivity of the participant’s performance in the course in order to prevent potential bias of her findings. However, the intensive interactions with the participant allowed the researcher to gain deeper understanding of the participant’s learning processes and provided her with the opportunity of developing interpersonal relationships with the participant. The trust relationships were established between the researcher and the participant in the early stage of the study. Interview data demonstrates that the participant felt confident in acknowledging her lack of knowledge in some areas and examining her own teaching practices. It also demonstrates that the participant felt very comfortable talking to the researcher about things that took place in the process of her learning. For example, the participant reported her teaching weaknesses and asked for help in locating resources and getting suggestions about her teaching challenges.

Validity

My personal background could bias the interpretation of the study results. As a previous ESL/bilingual teacher who used technology in her classroom, my personal learning processes in the use of technology in my instruction could interfere with my data analysis and the study findings. Therefore, I tried to remain conscious about the possible bias I might bring to this study. On the other hand, however, this background benefited me since I understood the participant better because of my familiarity with teachers’ lives in order to make connections with them.

In terms of the validity of the study data, three strategies were used to enhance the validity of this study. Participant language and verbatim account, mechanically recorded data, and member checking (McMillan & Schumacher, 2001) were used in this study. First, all interview data were recorded by a digital audio recorder. Second, three of the
recorded interviews were transcribed by a professional transcriber who was a native
English speaker. The researcher then further checked the accuracy of the transcriptions
by comparing the transcriptions to the recorded interview. Two of the recorded
interviews were transcribed by the researcher herself. The transcriptions were then
checked by a professional transcriber who was a native English speaker for verification.
Third, member checking was also used to enhance the validity of the study. The
researcher constantly asked for clarifications and restatements during the interviews.
During the analysis process, the researcher also constantly asked for verifications and
clarifications by carrying out follow-up interviews and email communications. In
addition, observation, interviews, and document analysis served as the data resources for
triangulation. For example, after each data resource was analyzed, it was checked against
the results of the analysis from the other sources.

Limitations

The design of the current study includes three limitations. First, the issue of
generalizability of the study should be discussed. Criticism of the case study method
often addresses generalization as a limitation due to insufficient number of cases
(Giddens, 1984). In Yin’s (2003b) view, however, the issue of generalization for case
study design should be discussed from a different aspect. He proposed that the
generalizability issue of case studies is not a matter of generalizing from a sample to a
population (statistical generalization), but a matter of the kind of unit that is under study
(analytic generalization). Winegardner (n. d.), citing numbers of researchers’ views,
explained:

Stake (1978) describes the generalizability of case studies as “naturalistic,” that is,
context-specific and in harmony with a reader’s experience, and thus “a natural basis for generalization.” This means that case study findings often resonate experientially or phenomenologically with a broad cross section of readers and thus facilitate greater understanding of the phenomenon in question (Snow & Anderson, 1991). It is considered legitimate to generalize based on the degree to which a case is representative of some larger population. (pp. 14-15)

That is, a case study considers analytic generalization and aims at generating hypotheses and theories that can be applied or tested for future research. In this way, “even a single case could be considered acceptable, provided it met the established objective” (Tellis, 1997, p. 3).

Second, based on Glaser and Strauss’s (1967) proposal, the constant comparison method of analysis often seeks a fuller understanding of the observed phenomenon. However, this goal is beyond the time constraint and scope of this study. Therefore, the understandings developed from this study might only serve as a foundation for future study about teacher learning processes.

Third, changes or learning instances might not be fully captured in this study. Because of her busy schedule, the participant did not have time to write her learning journals and participate in interviews more than once in two or three weeks. Therefore, some instances that demonstrated her learning might be missing in this study.

Chapter Conclusion

Despite the limitations of the study, for example, that the study interpretation can be subjective or that the dual role of the researcher may cause bias, this research design is rigorous, the limitations are accounted for, and every attempt has been made to minimize
the limitations. In addition, this research design allowed me to explore the teacher learning process closely and to recognize important events that take place within that process.
CHAPTER FOUR

DATA ANALYSIS

Introduction

The purpose of this study was to explore the process of teacher learning in the use of technology for instruction through the lens of teacher-learners as active agents. The study emphasized the behaviors/actions/thinking of teacher-learners in their process of learning and the active role they take in their learning. By exploring what one teacher planned to learn, I then used her plans and actions as a guide to understand the reasons why she planned and acted in these ways. In this chapter, detailed background information about the study case is first presented. Next, categories that are important to explain and describe the study results are presented. Finally, the findings of this study are reported.

An understanding of teacher learning processes was developed from the study data. First, from the study results, I realized that teacher learning process is an interactive and ongoing change process. Second, as an active agent in her learning process of teaching with technology, the teacher-learner in this study actively participated in the decision making process of what she wanted to learn or focus on based on self-generated solutions. She also developed learning strategies and used them to prepare herself for the solutions she had in mind at the time.

The Study Case

Writing a description of a case involves making decisions as to how broad and thick the case descriptions should be and what content should be covered. That is, how to provide enough information so that the reader can understand the study case well, but at
the same time not being distracted by some unnecessary information; therefore, the
descriptions provided are thick enough for the study’s creditability. In making my
decision concerning writing the description of the case of my study after data analysis,
Berg’s (2001) advice helped me decide what to include in the case description.

As in any other research situation, one must determine how broad an area of
social life will be covered (Pierson, 2001). In most research, this decision is
largely dictated by the research question and the nature of the research problem
under investigation. When examining an individual case study, a similar type of
assessment must be undertaken. (p. 22)

Thus, I followed Berg’s suggestion and filtered out information that was irrelevant to my
research purpose and research findings. That is, I present the aspects that are important
for the reader to know in order to further understand the findings of this study. At the
same time, I include direct quotes from the participant in order to increase the
creditability of the description. Because the study participant’s education background,
teaching experiences, teaching contexts, and experiences and previous education with
educational technology are important for understanding the study findings, I provide a
thick description of each of these aspects in this section.

**Background of the Case Study: Amy**

Amy is a middle-aged Caucasian teacher. She has three grown children who live
away from the family and is a grandmother. Since the late 1990s, Amy’s children have all
gone to college or have started their own families. Thus, she has spent most of her time
with her husband, working on her teaching assignments and carrying out her professional
development.
Amy was an elementary major and English minor when she was in college. She had a Bachelor’s degree in education. During the time of my study, she had a K-8 teaching credential in Elementary Education, a 4-12 English teaching credential and a 4-12 Sociology teaching credential. She spoke English as her first language and she had learned Spanish as a second language for two years in high school. However, Amy reported that she could only speak a few simple words in Spanish and understand some simple dialogue. She pointed out she was able to read in Spanish.

Teaching Experience: A Brief History

Amy had six years of teaching experience as a middle school teacher. She taught in the Southwestern United States for the first two years of her teaching career. However, due to her responsibilities as a mother, she stopped teaching after the second year of her career. For the next twenty years, Amy worked as a full-time mother. She did not return to teaching until her youngest child graduated from high school. Therefore, at the time of my study, Amy had returned to teaching in the Northwest approximately four years previously.

First Two Years of Teaching. Amy began to teach in 1974. From 1974 to 1976, she taught 5th grade in a public middle school in the Southwest. All of her students were Caucasian native-English speakers. As a beginning teacher in this school, Amy reported that she relied on the experienced teachers’ suggestions and assistance a lot. She said in an interview:

…There were three senior teachers [experienced teachers]…they were in charge of the program and then there were two of us brand new teachers…I felt it was more than a good learning experience. I got to teach while I learned from other
teachers who are more experienced…those experienced teachers helped us to do
lesson planning….they gave us directions…and helped brainstorm ideas and
activities…(Interview 1, 11/2/2003)

She further added:

It was wonderful…If we had any questions or, you know, we had those
experienced teachers there that we can turn to, you know…I really had…it was a
very good two years, because I taught and I also had those teachers who taught a
lot…so I kind of watched them and learned from them, asked them
questions…(Interview 1, 11/2/2003)

The opportunities of working with experienced teachers were valuable for Amy when she
was a beginning teacher.

In addition to the support of the experienced teachers in the first school where
Amy taught, Amy also received school support for the administration aspect of her work.
Amy reported that the school hired assistants to complete the necessary paperwork. She
felt this allowed her to have more time for lesson planning. She reported how having an
assistant helped her as a teacher in the interview:

We each had our own 5th grade room. We each had our own assistant… and we
were able to get help for paperwork…that was nice, too…and we can spend a lot
more time on planning. (Interview 1, 11/2/2003)

Thus, Amy felt that the first two years of her teaching were very good years in her
teaching life.
Amy reported that she used the “teacher-directed” type of teaching in the beginning years (she later referred to teacher-directed teaching as the “old way” of teaching). She explained how she taught in her beginning years. She said:

Basically, when I taught in [the Southwest], I would say, it was more like I was taught, except for the big open classroom. That was definitely different. We were able to ability-group kids a lot there because a lot of us were working together… but it was basically the kind of teaching where you teach and the kids listened and they’d do what you asked them to do…then you would check it and then teach them some more. It was that kind of teaching…the teacher-directed type…It was more right from the book and lecturing type. (Interview 5, 5/31/2004)

She also gave an example of how she taught math in her beginning years. She stated:

I remember the math was right out of the book. We put some stuff on the board but we didn't have very many [pieces of equipment]...I don't remember using an overhead, I don't even know if we had one. It was just very teacher directed and the kids were expected to learn…I don't remember a whole lot of discussion. It was just more teacher directed. They did what they were told and if they didn't, there were consequences. (Interview 5, 5/31/2004)

**Stopping Teaching.** Amy stopped teaching in 1976. Her first child was born and her family moved to the Northwest due to her husband’s new job. These major life events restricted Amy’s continuation of teaching. Amy reported that she was concerned that her responsibilities as a teacher might hinder her responsibilities as a mother. Describing herself as someone who always devoted a lot of time to her teaching, she felt that she
needed to stop teaching in order to better take care of her children and her family. She then discontinued her teaching and worked as a full-time mother for the next twenty years.

Returning to Teaching. Amy returned to teaching in 1999. She worked as a sixth grade teacher in a public middle school in the Northwest. The subjects Amy taught included reading, math, language arts, social studies, science, an advising class, and an exploratory class. At the time of my study, Amy had been teaching in this school for four years.

When Amy returned to teaching in 1999, she reported that some of her friends told her that “it [teaching] is going to be SO different for [her] than it was.” In fact, the demographics of the student population had dramatically changed during the years she was not teaching. However, Amy reported she was not aware of the changes of the demographics until she entered her classroom. She reported:

I didn’t realize it has changed so much…I didn’t realize our community has changed so much until I saw it in the classroom. Maybe it was last year…when I first started…(Interview 5, 5/31/2004)

However, how does the change of demographics influence Amy’s teaching? Is teaching second language learners the same or different than teaching English native speakers for Amy? Amy reported that she did not really think of this question for the first two years of her returning teaching and did not felt that teaching was that different than it had been. Being familiar with the teacher-directed method of teaching native English speaking students, Amy reported that she followed similar procedures when teaching second language learning students reading when she retuned to the classroom. She said:
When I first came back to [the Northwest], I probably taught just like I did [in the Southwest] and just like I was taught… basically that's all I knew… that's what I learned when I was in college…(Interview 5, 5/31/2004)

She reported that all her students followed what she asked them to do, just like the native English speaking students she had had in the first year of her teaching. Therefore, she did not feel that her teaching should be any different than what she did before.

The third year of Amy’s returning teaching was a turning point for her. She reported that she had a “very hard” group of students that year and many things that used to work in her classroom were no longer working. She described:

I felt that everything was fine until last year and then with the group of kids I got last year…all the ways I'd done it before weren't working at all…The fifth grade teachers talked to us…you know…before we got that group…they said this is really a different group of kids, you're going to have to have more hands-on activities…you're really going to have to teach them different[ly]…but I really didn't know what to do different…last year was a hard year…All I'd done before didn't really work with certain kids [she later stated that those students were Hispanic second language learners]…they weren't responding… they weren't learning, they were causing trouble. (Interview 5, 5/31/2004)

She reported that the way she used to teach reading did not work for this group of students:

I remember when I first started, I read them a story and then I went over the vocabulary… Their scores were very low…or just… you know, in the [whole
class] discussion I just felt…their knowledge of the world, their knowledge of
different things is just very, very limited… (Interview 1, 11/2, 2003)

She also described that students’ performance was far below than she expected:

I found that a lot of times …they know their vocabulary, and they know those
words but they don’t really know what those mean….so…at first…that really
surprised me…you know…what I thought they know but actually they didn’t
really know…(Interview 1, 11/2/2003)

In addition, she reported that this group of students acted very differently in class and
many of her Hispanic second language learners were not following her instructions. She said:

I had some kids who would act out [she later stated that those students were
Hispanic second language learners]…you know…they just wouldn't do what you
asked them to do. I hadn't run into kids like that before…and I had some who
didn't want to do it or even if I had group things, they would get SO out of control
that the group things didn't work. They weren't learning and they were keeping
the other kids from learning the way they should be learning too. (Interview 5,
5/31/2004)

Thus, these instances inspired Amy to start to think there might be some differences
between teaching second language learners and native English speakers. That is, the third
year of her returning teaching was a turning point for Amy to see what her friends meant
when they said teaching would be so different for her. She reported:

I started realizing that…I had a very hard class last year so I think I was really
ready for these ESL classes, because I can tell that… you know… a lot of their
culture was different…I remember a lot of people told me that that is going to be SO different for you than it was…and I remember my first year, I didn’t notice that much difference. Last year, I really did. I think a lot of the…you know, the difference would be the culture, and maybe a lot just the family backgrounds. You know, the family dynamics. I had a lot of kids who didn’t have dads, just brought a lot of problems to school. And, some of that is culture and some of that is the family, too. I don’t know how they all tie in, but…(Interview 5, 5/31, 2004)

However, did this awareness change Amy’s teaching approach? To some extent, yes. Amy reported that “I [she] found myself [herself] slowing down a little bit more” in her instruction; therefore, Amy reported that she did not really know what to do while encountering changes in her teaching contexts. She found herself often puzzled and struggling.

**Teaching Beliefs: A New Understanding of Teaching**

Starting in the beginning of 2003, Amy started to receive different training and coursework. This training and coursework influenced Amy’s view of teaching; therefore, a new understanding of teaching was established. The schedule and names of the programs and courses are listed in Table 1 and described below.

<table>
<thead>
<tr>
<th>Dates</th>
<th>Courses or Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 2003</td>
<td>Foundation (ESL Endorsement)</td>
</tr>
<tr>
<td>Summer 2003</td>
<td>Diversity and Culture (ESL Endorsement)</td>
</tr>
<tr>
<td>August-October 2003</td>
<td>Assessment (ESL Endorsement)</td>
</tr>
<tr>
<td>August –December 2003</td>
<td>Literacy First Processes</td>
</tr>
<tr>
<td>August –December 2003</td>
<td>Love and Logic Program</td>
</tr>
</tbody>
</table>

*Table 1: Schedule of Coursework and Professional Training*
The end of the 2002-2003 year (the third year of Amy’s returning to teaching) and the whole 2003-2004 school year (the fourth year of Amy’s returning to teaching) was a big year for Amy’s school. Many school projects aimed at improving the school and improving teachers took place. Specifically, Amy’s school received a professional development grant for training teachers. Two major projects were carried out. First, the grant offered the teachers the opportunity to take a series of ESL endorsement courses through distance education offered by a university in the Northwest. Amy’s principal approached her and asked her if she would like to be part of the program. This was the third year of Amy’s teaching in the Northwest, and, as mentioned in the last section, Amy reported that she had a very difficult group of students and things that had worked in her teaching did not work any more. Therefore, she felt that she was “really ready for the ESL classes.” She decided that she would be a part of the program.

Before this study started, Amy had completed half of the coursework (three out of six classes). These courses included a foundation course that introduced who ESL students are, the demographics of ESL students, types of programs for ESL students, some common misconceptions of second language learning and second language learners, a cultural diversity course that presented the influence of culture in ESL students’ learning, values of different cultures, ways students from diverse backgrounds think, and an assessment course that taught how to design assessment for ESL students and how to accommodate ESL students in assessment. However, Amy had not yet taken the ESL methods course, nor the practicum course during the time of my study. Nonetheless, from the three ESL endorsement courses Amy had taken, she started to realize that teaching
second language learners and ESL students required social interaction. In addition, she noted that she found that the culture of students really influenced them to learn.

In addition to paying interested teachers to attend ESL endorsement courses, the professional development grant also built in a teacher training program called “Literacy First Process.” All of the teachers in Amy’s school were required to attend the workshop beginning with the school year of 2003 and continuing for three years. The Literacy First Process Program aimed to train teachers to understand how to teach reading through all subject areas. According to Amy, the training staff conducted whole-day workshops four to five times the first year when the program was carried out in her school (2003-2004). Reading research and reading strategies were the focuses of the program. However, although the speakers focused on the general student population instead of second language learners during the workshops, Amy reported that the content of the program encompassed the same ideas she acquired from the three ESL endorsement courses she had taken. She further believed that she needed to use the “new ways of teaching.”

Finally, Amy’s school also participated in the Love and Logic Program. All the teachers were required to be part of this program in Amy’s school beginning in August, 2003. According to the document collected and Amy’s report, the Love and Logic program is a discipline program that helps teachers to understand student behaviors. Speakers came to the school to give workshops about student behaviors nowadays. Amy reported that this program helped her to understand how students act nowadays and why her “detention system” that used to work did not work anymore. According to Amy, the concept introduced in this program was closely connected to the diversity and culture
class included in the online ESL endorsement and further convinced her about using new ways of teaching and doing things differently in her classroom.

Amy reported that the series of online ESL endorsement courses she had taken, the Literacy First Process Program, and the Love Logic Program had changed her views about how second language learners learn. She pointed out the importance of these resources to her change of view of how students learn in the interview when asked what accounted for her change:

…well a lot of the things I’ve learned in these ESL classes and is that, because it seems like the best way for kids, one of the best ways for them to learn English is to be able to talk it, you know…hear the words spoken and speak it, but their interacting…will help them and then also we’ve been learning at school…have you ever heard of it, [it’s] called Love Logic…it’s a type of a discipline program …I think it’s good, too, and what I read in that book, it goes along with what we learned and have been discussing about learning and learning in ESL classroom…I guess those two things are kind of changing my thinking…(Interview 1, 11/2/2003)

In addition, the students she had last year also influenced what she thought might work for her second language learners. She said:

…and then just the practicality. I had a really hard group of kids last year and I think, the other ways of learning would have been…even if I gave more help in that class…would have been much better for that class…(Interview 1, 11/2/2003)
Because of the online ESL endorsement program, the Literacy First Process, the Love Logic program and her teaching practice with her last year students, Amy has changed her views of what would work for her students. She described her change in the interview:

..., well I guess what comes to my mind is that I’m seeing that… teaching isn’t like it was and learning is not like what it was when I went to school, the teachers just [stood] in front of the classroom and talk, we did our work. It seems like teaching and learning work better when there’s more interaction among the kids. It used to be, you know, we just did our own work and that was it, but now it seems like…you know, it’s shown where kids, if they can tell what they’ve learned, then they’ll remember it, so, I find that…a lot of my teaching…is really changing and… it’s like all new, new ways that I can tell the kids that… it’s working better than the old way. (Interview 1, 11/2/2003)

Amy believed that she should use the new way of teaching instead of the old ways. She defined what the new ways of teaching meant to her:

Instead of just teaching a lesson and have all the kids listen and then do a…you know, answer questions and whatever, now, it’s more like, I teach it and then I’ll say ok, here. I have the kids right now sitting in pairs, have them share, something with their partner, you know, tell them or talk about it or whatever, or say it back to me, or I’ll divide the class up into groups and instead of having the kids all read everything, I’ll have one group read one part of it and then tell the other class, tell what they learned…That’s kind of been working better, and it makes us, I think it makes it more fun for all of us. I never remember doing that…you know, even in
the ‘70s, when my kids went to school, it was never like this. (Interview 1, 11/2/2003)

Experiences and Education of Educational Technology

Previous Education. Amy had some formal education about computer technology. She reported that she had taken two courses that related to educational technology before the study began. The first class introduced basic computer applications. Amy took this course because of the needs of the part-time job she had in an administration office in a community college before she returned to teaching. Amy reported that this class helped her to understand how to turn on a computer and how to use computer applications (e.g. Microsoft Excel; Microsoft Word). Therefore, she felt that Microsoft Excel and Microsoft Word were the computer programs with which she was most fluent. The second technology-related course Amy took introduced her to the Internet. This course was offered as a one-day workshop by her ESD. Amy reported that she took this course when she returned to teaching in 1999. However, Amy suggested that she was overwhelmed by the course content because of the amount of information in the class. She felt it was not a very useful class for her. She said:

…Probably the ones I didn’t like was when I was in education, they taught us how to use the Internet, how you use that…and I don’t know, I panicked from the minute I got the lesson. Because I got so much information at once, and it just all fell to me. I just felt overwhelmed. I didn’t want to go back to class…it’s not like I learned anything very well…(Interview 1, 11/2/2003)

In addition to the formal education, Amy reported that she also learned about technology and using technology for teaching from her colleagues in her school. This
learning usually took place in the informal conversations she had with teachers in the hallway, the teachers’ lounge or classrooms or in the preparation time they had together. For example, she heard about “Grade Machine,” a grading software program, from an experienced teacher (9-10 years of teaching) during her first year of teaching in the Northwest during an informal conversation in their preparation time. She also heard about “Type to Learn,” a software program focusing on keyboarding skills, from a fifth grade teacher when they talked in the hallway at the beginning of her fourth year of teaching. Finally, she reported that the professional development grant coordinator usually would go to her classroom to talk with her. From their informal conversations, Amy reported that she learned a lot about technology resources and got a stack of binders of website lists and lesson plans for using the Internet for teaching.

**Experiences of Using and Teaching with Technology.** Amy had used some computer technologies in her classroom before the study started. However, she had not used any computer technologies in the Southwestern school (she noted she could not recall seeing a computer in that school at all). Therefore, her use of technology started when she returned to teaching. Amy reported that she learned about the Accelerated Reader Program and had her students use it during the first year of teaching in the school at Northwest. However, she was not very familiar with the program and only had her students use it for a limited amount of time. In the second year of her returning to teaching, Amy reported that she had learned how to use Grade Machine for constructing student grade reports by reading the manual. She felt the program saved her a lot of time and continued to use it up to the time of the study. In the third year of her teaching in the Northwest, her students requested her to let them use Microsoft Word to type up their
writing work. They also asked to use the Internet to for doing research instead of using books. Finding that students (this was the group who was very difficult for her) had some interest in learning, she started to have the students use the Internet for research in her exploratory class and allowed them to type up their writing work in the language arts class at their request. However, Amy reported that she had never taken her students to the school computer lab, used other software programs with her students, or provided usage guidelines to the students when she allowed them to be on computers at their request before the study started.

Experiences of Applying the Technology Grant. Although Amy reported that she did not feel she knew a lot about teaching with technology, she mentioned that she had tried to apply for a technology grant before the study started. Two sixth-grade teachers she had worked with applied for the Gates Foundations Grant and received the funding in the first year and third years of her teaching in the Northwest. They encouraged Amy to apply for the grant; therefore, Amy took action in the fourth year of her teaching in the Northwest. Unfortunately, Amy reported that she did not receive the grant like the other teachers had. She said:

We have two teachers that applied for the Bill...Bill Gates Grant [Gate Foundations Grant]?...two years ago one of the teachers got it, last year another one got it and then I applied and I didn’t get it (laughing) and those teachers really got a lot good stuff in their classroom, a lot of computers, internet access and uh, one teacher was really knowledgeable and the other one, he’d gotten a master’s in technology, so they, you know, they are using it probably much more than the other classes. (Interview 1, 11/2/2003)
Teaching Context

The School

During the study period, Amy was teaching in the same middle school as the one that she had returned to teaching. The school was located in a Northwestern city with approximately 2,500 people. According to the demographic statistics provided by the USA Citylink, the Hispanic or Latino population represented 71.8% of the total population of the city (i.e. Mexican, Puerto Rican, and other Hispanic or Latino). The majority of the Hispanic or Latino population was of Mexican origin.

The city population reflected the school population in Amy’s school. According to the Office of the Superintendent of Public Instruction’s (OSPI) October 2002 report, 70% of the student population in Amy’s school was Hispanic. At the time of my study (October 2003), Amy reported that the population had grown to 75%. In addition, approximately 72% of the students were from low-income families (OSPI, October 2002 report) and “have both parents working at different shifts to make ends meet.” Amy reported the population had grown to 80% by the time of my study. Many students received the Free and Reduced Lunch/Breakfast Program from the government.

Amy reported that many of the Hispanic students came from other schools and did not have prior education in English. Their parents often did not have a high school education nor did they have academic English proficiency themselves. In this situation, Spanish was mainly spoken at home and was the first language of the Hispanic students in Amy’s school. The majority of the Hispanic students in Amy’s school were second language learners of English who could speak English fluently but were not able to read or write at an academic level.
Among these second language learners of English, some students were identified as English as a second language (ESL) students or Limited English Proficiency students (LEP) in Amy’s school. Amy learned from her administers that when second language learners of English entered her school, they were required to take the Language Assessment Scales (LAS) within ten days of their enrollment. If the students received scores below 3 (i.e. 1, 2, or 3) on the test, they were identified as ESL students. In addition to their regular classes with the other students, these ESL students were required to attend a pull-out ESL class for a certain amount of time every day based on the suggestions of the school district. However, this group of students was still struggling with understanding the daily conversation that took place around them, in their lives, conversation in classroom, and was even more behind their academic reading and writing level than other second language learners who scored higher than 3 on the LAS test.

The Classroom

During the time of my study, Amy was teaching sixth grade. The subjects she taught included reading, math, language arts, social studies, science, advisory, and exploratory class. She started her day with a reading class of 27 students in the morning, followed by spelling and language arts (26 students). Then she had an advisory class of 18 students in which she advised students for the problems they had in school. In the afternoon, Amy started with an exploratory class of 16 students, in which she educated students about cultural understanding, followed by a math class of 26 students. Finally, she had a social studies or a science class of 26 students as the last section of the class each day.
In all of Amy’s class, approximately 75% of her students were Hispanic second language learners (L2) and 25% of her students were native English speakers. Amy reported that although L2 learners were able to speak English fluently, they had very low “academic English skills.” That is, their writing and reading skills were below the 6th grade academic level. Because math, science, and social studies required strong reading skills, Amy observed that many of her L2 students were not able to understand the text in their textbooks. Thus, the concepts in these subjects were not easily acquired. However, Amy reported that not all of her L2 students were at the same level. Some of them demonstrated reading proficiency at the second grade level, while others were at the fifth grade level. In addition, two of Amy’s L2 students had just exited the ESL pullout program the year before. She reported that they often had trouble understanding her instructions in the classroom. In other words, Amy had a group of second language learners with a wide range of English proficiency levels.

Among these second language learners, Amy had some pull-out ESL students. Amy reported that the ESL students in her classroom were still struggling with the English that took place in their daily lives. They often had trouble speaking or comprehending interpersonal communication as well as academic English. Amy reported that when they interacted with other students in the school, they often spoke in Spanish. Amy reported that she often had trouble communicating with them because she has forgotten almost all of the Spanish she learned in high school. Therefore, she needed to rely on other students translate for them in her class. She said:

They couldn’t even understand what I was saying, you know, I had a couple of girls who would translate for them…and I would give them the stories in Spanish
because they just didn't understand… Maybe they did understand more than they let on, but they still needed someone to help them translate all the directions and everything…I don’t know…Anyway, they don't quite understand the classroom instruction and they hardly speak in class. (Interview 1, 11/2/2003)

There were three identified ESL students in Amy’s reading class among the 27 students she had. Two of these students were Hispanic and one student was from the Czech Republic. They were pulled out for their ESL classes by the middle school ESL teacher every day, for 90 minutes and 185 minutes, respectively. Thus, Amy had these three ESL students, fourteen language learners (already had exited), and ten native English speakers in her reading class for ninety minutes every day. Two more ESL students from Mexico came to Amy’s reading class toward the end of my study, and Amy reported that one of the students had an English proficiency level that was very low. In Amy’s math class, there were another three ESL students. However, Amy reported that “they know their English better” and their level was not as low as the ones she had in her reading class. Moreover, she also had the ESL student from Czech Republic in her homeroom class where she taught language arts and social studies.

Teaching Challenges

Amy reported that having a multi-level class mixed with English as second language learners at different levels and native English speakers, as well as ESL students, was challenging for her. She reported that her students’ English ability range was from kindergarten to the twelfth grade academic level. She consistently reported the challenges she had in her classroom during the study. She said:
I felt stress whenever I…oh…man… I try to meet all the different levels that I have in my classroom, you know, when you’ve got…it’s just so hard sometimes to try to meet all the needs…I mean…I know I cannot…But there are just so many different levels… You want the ones that are …the regular ones to move on and you want the other ones that can go right in, I want to be able to do that but it’s hard to do that …I have to keep those, the ones that are ready to go on learning and feel excited about it and not bored… (Interview 1, 11/2/2003)

She also reported that she had trouble using the same activity to teach the ESL students in her multi-level classroom. She said:

…I’m only giving them [the ESL students] five words; the rest of the kids have 20, and they’re [the ESL students] having trouble… I guess because the words are probably too hard for them because they’re 6th grade words that they’re having trouble just learning, you know, just following the five right by the end of the week, and I’ve had them… define them, I’ve had them draw pictures of them…where they put the card, their word on one card, a 3 x 5 card, a picture on another one, play a matching game and write in the words; they had to write the word 20 times and now like tomorrow, what else can I think of that would help them learn those words? (Interview 3, 12/9/2003)

She again reported her challenges in teaching ESL in her multi-level classroom:

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them when I can. I have them write about the story, but…when I ask them to write, I didn’t get sentences…I just got like phrases and then I got a whole page of them, so I asked them to write one or two sentences about what they read…and instead I got a whole page of just different phrases they’d picked out of the story; So I don’t know, you know, if that was good or bad …well…they seemed excited about it, so that was good, I knew…ok, that’s good …I just wish I could give them so much more of my time…in that class, and they are so willing to learn. (Interview 3, 12/9/2003)

She also verified that having a multi-level class was a challenge for her:

…In reading, the challenge was the wide range of abilities that I had to try to teach and the number of students, I had like 27, and that was hard… my challenge is trying to meet all the kids at their ability level, try to challenge them and help them learn and with the amount of time I have. (Interview 5, 5/31/2004)

Thus, teaching a multi-level classroom was one of Amy’s teaching challenges at the time. In addition to teaching a multi-level classroom, Amy also reported that she often had trouble teaching her L2 students. She reported that many times, her L2 students were not following her instructions and were not engaged in their learning. She reported:

I can tell the students knew how to read, but they were not understanding what they were reading at all. A lot of that, you know… learning a second language… a lot of it, you know… they say it is from the poverty backgrounds… a lot the things I just assume kids know but they don’t know. That is a big difference… (Interview 5, 5/31/2004).

Thus, it was obvious that Amy was struggling with engaging her L2 students.
Summary

In this section, I presented Amy’s teaching experiences, experience and education in computer technology, and her teaching contexts. Having a different group in her third year of teaching, she started to feel challenged and eager to learn how to help her students. Therefore, not knowing what to do, Amy continued to struggle in her multi-level classroom and in teaching L2. In the next section, I will present the learning process Amy went through while learning to teach with technology. I will first define the terms used in the emerged theory that described Amy’s learning process.

Data Analysis

Introduction to Categories

In order to better understand the results of this study, several concepts and categories need to be defined and explained first. Some of these concepts and categories are related to the end of teacher learning, while others are related to the processes of teacher learning. Because teacher learning includes both the end and the process, concepts and categories related to these two aspects are both useful to understand how teacher-learners learn to teach with technology as active agents.

Categories Related to the Learning End

Categories related to the learning end include teacher concerns and ultimate learning goals. Understanding these two categories can help us to comprehend what teacher-learners want to achieve as active agents and the reasons that constitute their motivations. Explanations and definitions of teacher concerns and ultimate learning goals are discussed below.
Teacher Concerns. Teacher concerns refer to worries teacher-learners have while learning to teach with technology. For the teacher-learner in this study, such concerns can relate to her own skills and her class situations. Therefore, with different concerns in mind, teacher-learners might have different ultimate learning goals in their processes of learning. In other words, teacher concerns are the resources that influence the development of teacher-learners’ learning goals as active agents.

Ultimate Learning Goals. Learning goals refer to the ultimate accomplishments teacher-learners intend to achieve while learning to teach with technology as active agents, that is, what teacher-learners of teaching with technology want to be able to do eventually. Because learning goals stem from teacher concerns, they are decided by teacher-learners themselves and are determined by the priorities teacher-learners have in mind. Therefore, through the lens of teacher-learners as active agents, these self-determined learning goals drive the flow of teacher learning processes. Thus, understanding the ultimate learning goals helps us to understand why teacher-learners carry out their learning plans and why their learning processes take place as in certain ways.

Categories Related to Learning Processes

Six major categories are important to describe and interpret the process of teacher learning. In order to help the reader understand how the interaction takes place and how the ongoing changes proceed, I will explain the features of these six categories and define them in this section.

The six major categories that relate to teacher learning processes and which emerged from the data are: sources, teaching practice, teacher knowledge, beliefs and
perception, solutions, learning strategies, and mediation. Their interconnected relationships as observed in this study and how they are relevant to teacher-learners as active agents are presented in Figure 1 and described as follows.

![Figure 1. Categories Related to Teacher Learning Processes and Their Interconnected Relationships.](image)

**Sources.** "Sources" refer to a thing, a place, and an activity that teacher-learners can get information, resources, or stimuli from. For the teacher-learner in this study, these
sources include professional development programs, workshops, coursework, tasks and assignments that were carried out for professional development (e.g. writing autobiographies; conducting interviews; designing lessons), learning community, and conversations, social interaction, and discussions with colleagues, other teacher-learners, instructors and other relevant members. Reflecting upon the literature reviewed in Chapter Two, members, learning events, and learning environments are all sources for teacher-learners. As active agents, teacher-learners approach and use these sources for their specific learning needs at different times.

**Teaching Practice.** “Teaching practice” refers to the “teaching experiment” teacher-learners carry out in their classrooms. As active agents, teacher-learners often conduct in-class experiments such as trying out new activities, using different teaching strategies, and implementing new materials in order to improve their teaching. That is, by performing types of teaching practices, they expect to learn something from their experiments and to advance their teaching expertise. For the teacher-learner in this study, such experiments are carried out in three different ways: learning by doing, learning with students, and learning from students. Reflecting upon the literature reviewed in Chapter Two, learning to teach by teaching is one learning event that takes place in “teaching practice” for teacher-learners. In addition, the use of action research, case analysis, and experimenting with certain teaching strategies or activities are all part of teaching practice.

**Teacher Knowledge, Beliefs and Perceptions.** “Teacher knowledge, beliefs and perceptions” represent the cognitive process teacher-learners engage in while learning. Teacher knowledge refers to what teachers know about teaching. For the teacher-learner
in this study, ideas that related to teacher knowledge include knowledge about teaching materials, knowledge of teaching approaches (in what ways can they be used for teaching?) and knowledge of teaching with technology (in what ways can technology be implemented into teaching?). Reflecting upon the literature reviewed in Chapter Two, pedagogical knowledge and personal knowledge are parts of teacher knowledge. In addition, teachers’ understanding of curriculum, their students, learning theories and school contexts are all part of teacher knowledge.

“Teacher beliefs” addresses the underlying assumptions teacher-learners hold for lesson planning, activity design, and course design. Three aspects of teacher beliefs that emerged from the study data are: beliefs in learning theories (i.e., how do teachers think students can learn?), beliefs in teaching approaches (i.e., based on teachers’ beliefs, what would work for students and in their classrooms?), and beliefs in teaching with technology (i.e., based on teachers’ beliefs, how should technology be used in their teaching?). For teacher beliefs in learning theories and teaching approaches, the teacher-learner in this study reported the “new ways of teaching” and the “old ways of teaching.” She discussed the differences between new ways of teaching and old ways of teaching by interpreting and comparing teachers’ roles and students’ roles in the classroom. Therefore, she reported the shifts of viewing herself as expert to facilitator and of viewing students as learners to experts during the process of learning to teach with technology. For teacher beliefs in teaching with technology, the study participant discussed the following assumptions during her process of learning: using technology for individual learning, engaging students by using a technology-oriented approach, engaging students with tasks and a balanced approach (using technology in combination with other teaching materials.
when appropriate). Therefore, at different stages of learning, the study participant reported that she believed she should use one of the above ways while teaching with technology; thus, that particular way will work for her students.

For the teacher-learner in this study, “teacher perceptions” include two aspects: teacher-learners’ perception of technology and their perception of their self-efficacy of technology uses. Perception of technology includes teachers’ perception of the role of technology in teaching (e.g., technology is a tutor or a tool; putting students on a computer or using it as a tool in the study data) and their values of technology in education (e.g., is technology a skill students must have for their future?). As an active agent, the study participant often took her perceptions into account while forming solutions. Teacher perception of self-efficacy refers to the level teacher-learners perceive for themselves as technology-using teachers. That is, the study participant in this study constantly monitored her own progress and self-evaluated her proficiency in teaching with technology. Thus, during the learning process, she rated her self-efficacy as novice, intermediate learner, and expert in different stages.

Solution. “Solution” refers to ideas teacher-learners come up with for their contemporary teaching problems, challenges, and difficult situations. It is closely tied to teacher knowledge, teacher beliefs, and teacher perceptions. In other words, as active agents, teacher-learners draw conclusions based on the knowledge, beliefs and perceptions they have in order to overcome problems and to deal with the challenges in their teaching practice. Such conclusions and solutions include knowledge teacher-learners think they should have or actions they should take.
Viewing teacher-learners as active agents, solution serves as a fundamental resource that drives teacher-learners’ learning plans. Their feelings about the needs of certain knowledge and actions influence teacher-learners’ decisions of what to do or to learn. Thus, with a goal of being able to carry out the solutions they have in mind at the time, teacher-learners then decide and determine their learning plans.

**Learning Strategies.** “Learning strategies” refers to ways teacher-learners use or attempt to use in order to prepare themselves for carrying out the solutions they have in mind. It is a link between “sources” and “teacher knowledge, beliefs and perceptions” and “solution” and “teaching practice.” As an active agent, the teacher-learner in this study used this pathway to approach the “sources” category and gained information or knowledge that she believed was useful for her. In addition, through this pathway, she also accessed the “teaching practice” category by carrying out her teaching experiment and obtaining understanding of the consequences of her teaching experiments.

Two types of learning strategies link that emerged from the study data include: an actual learning strategies link and a potential learning strategies link. When learning strategies are actually used, the learning strategies links are established and created. However, if teacher-learners have only thought of using such learning strategies, or attempted to use them but have not actually taken action, such a link becomes a “potential” one that might be established in the future, but has not yet been created.

It is important to note that learning strategies are used with learner-determined goals in mind rather than being assigned. In other words, viewing teacher-learners as active agents, learning strategies are self-triggered and aim toward self-determined goals. It emphasizes learner autonomy rather than the influences of other factors. In this case,
observation, reflections, inquiry, reasoning and social interactions, which are described as learning events in Chapter Two, can all be types of learning strategies teacher-learners use to approach their learning. Therefore, when and how to use such learning strategies are determined by learners themselves for their specific learning needs at the time.

**Mediation.** “Mediation” refers to a pathway that carries out new information or stimuli. When new information or stimuli occur in the “sources,” “teacher knowledge, beliefs and perceptions,” “teaching practice” or “solutions” category, such link is established to trigger potential changes in one of the above other categories. However, unlike the learning strategy link, the mediation link is not a pathway that teacher-learners use to take actions and approach other categories in their process of learning. Rather, it is simply a pathway that has transmission functions.

Viewing teacher-learners as active agents in their learning processes, it is important to note that the discussion of the mediation link emphasizes the use of new information and stimuli in this study. In other words, what interesting for me is not what brings about the triggers or the changes, but how teacher-learners use the stimuli and what they do with the new information in the process of their learning.

I will illustrate teacher learning processes as active agents by using the concepts and categories discussed in the next section.

**Results**

Through the lens of teacher-learners as active agents, teacher-learners’ self-determined learning goals serve as a useful framework to understand the process of teacher learning in the use of technology for their instruction. By understanding the end teacher-learners want to achieve, their activeness in the learning process can then be
interpreted and described. Because ultimate learning goals that address teacher-learners as active agents present why Amy carried out her learning plans, they are useful for understanding why her learning took place as it did. Thus they are used to present Amy’s learning process as active agents in this study. These two ultimate learning goals are: 1) overcoming teaching challenges and 2) increasing self-efficacy. The changes and processes observed in the study all aim toward these two ultimate learning goals.

As an active agent in her learning process, overcoming teaching challenges and increasing self-efficacy were the ultimate learning goals of Amy’s learning. These two learning goals stem from teacher concerns. Amy had two major teacher concerns while learning to teach with technology. They are: 1) her teaching challenges and 2) her self-efficacy. Because of these two concerns, overcoming her teaching challenges and increasing her self-efficacy became Amy’s learning goals as a teacher-learner of teaching with technology.

Using Amy’s ultimate learning goals as guides and as written presentation topics, Amy’s learning processes that aim toward her ultimate learning goals can then be described and interpreted. How Amy’s learning took place and her ongoing changes are illustrated by using the six categories that relate to teacher-learning processes. Because the learning process takes place over time, I decided to present the interactions and changes in a chronological order. Therefore, in this section, Amy’s learning processes are presented aiming toward achieving the two ultimate learning goals she had in mind as an active agent.
Ultimate Learning Goal One: Overcoming Teaching Challenges

As active agent in her learning processes, the first ultimate learning goal Amy held was to overcome her teaching challenges. As mentioned in the case description section, Amy had two major teaching challenges in her classroom, teaching a multi-level classroom and engaging second language learners (L2). Both of these teaching challenges motivated Amy to search for solutions. In this section, I will present Amy’s learning process aiming toward overcoming both of her teaching challenges.

Teaching Challenge One: A Multi-level Classroom

Aiming toward overcoming her first teaching challenge, teaching multi-level students, Amy conceptualized several solutions and learning strategies. However, her solutions changed over time with a focus on different teaching approaches. The learning strategies Amy used to carry out different solutions varied as well. In this section, Amy’s learning process aiming toward overcoming teaching challenges in her multi-level classroom is presented in a chronological order. Her learning process for overcoming her teaching challenge one is presented in Figure 2. The numbers listed in Figure 2 represent the sequence of activities that took place in Amy’s learning processes. The descriptions and explanations of Figure 2 are below.
Figure 2. Amy’s Learning Process for Overcoming Teaching Challenges in a Multi-level Classroom.

Starting Point and Beginning Stage: Individual Learning. The link 1 to link 6 in Figure 2 presents the starting point and beginning stage of Amy’s learning processes for overcoming her teaching challenges in a multilevel classroom. In order to overcome the teaching challenges she had in the multi-level class, Amy’s initial solution was to have each student use different materials that would suit their individual learning level before and at the beginning of the study. She verified what she meant by individual learning and said:

You know, it’s probably hard for them. I mean, if they’re having trouble writing it, so they’re probably just doing it from memory because they don’t have all…they don’t have the phonics skills to figure out how the letters go together, so maybe what I need to do is get like a 3rd grade spelling book for them and that’s probably what I should try to do…and the activities that go with the book that are
giving them the skills they need, not the 6th grade skills, but the 3rd grade skills.  
(Interview 4, 12/21/2003)

When I say that, I'm thinking of putting them on the computer so they can learn individually. So, I'm thinking of a program that would be like a teacher to those kids who were either really high or really low or in between, I guess. The ones I'm thinking of where there's just one of me, it would be nice if some kids can continue to learn on a program on the computer that would teach them where they're at...(Interview 5, 5/31/2004)

In other words, she intended to have each student use the materials that suited their needs by their own.

Amy carried out her individual learning solution for her multi-level classroom and had her students use books that were suited to their individual learning levels in her classroom. However, she reported that she did not have resources that could cover all the levels in her classroom. She said:

I don’t have any materials… I only have sixth grade materials… I wish I could put them somewhere where they could be learning something about reading on a level they could understand…Basically I would want something they could be on by themselves. (Interview 5, 5/31/2004)

Thus, she suggested that the computer is a “definite help for diverse students” and felt that a computer might be able to help her to solve her multi-level class teaching challenges.

In her learning of teaching with technology, Amy also initially conceptualized individual learning as her solution and attempted to carry it out in order to overcome her
teaching challenges in the multi-level classroom. She reported that she hoped she had a computer program that she could put her low level students on every day. She said:

…Last year I had one boy that was really, really low in my math class. He was so far behind and I kept thinking, I wish I…you know, he needs to be on his own most of the time, I was kind of thinking, oh boy, if I knew a computer program or had one, I could just put him on the computer every day…(Interview 1, 11/2/2003)

She also reported that she hoped she would be able to put students on computer programs that were appropriate for her students’ individual learning levels after she completed the online course. She stated:

I hope to learn some practical “computer-based” strategies to help ALL my students. I expect that when I finish this class that I will be able to put my three ESL students who cannot function at my sixth grade reading level on a computer program at their level as an alterative teaching and learning approach.

(Questionnaire)

It seems that Amy believed that putting students on a computer was the only way of teaching with technology. With her teaching challenges in multi-level classrooms, such teacher beliefs mediated Amy’s initial solution of teaching with technology (see link 1 and 2). Thus, Amy generated “putting students on a computer and having them use it on a one-on-one basis” as the only solution for overcoming the teaching challenges in her multi-level class in terms of teaching with technology at this stage.

However, how could Amy carry out this solution in her classroom? What did she feel she needed to know to take her action? It seems that Amy felt she needed to locate and have computerized materials that she could use for students’ individual learning and
be familiar with them herself at the beginning of this class (see link 3 to teacher beliefs). She stated:

I think its really good, I just…wish that I had some software in my classroom that every kid can work on…like the ones are ready to go on…or, you know, the Internet site I can send them to…Not just send them to anything, but send them to something that they can continue to work on whatever level of them, to help them learn. That’s what I hope to get from this class…you know, and a lot of it is that I just need the time to go use it myself. That’s the thing…(Interview 1, 11/2/2003)

Thus, Amy seems to solely focus on learning about the computerized materials in the available sources at this stage.

Amy believed that having and being familiar with computerized materials was important for her to carry out her solution. She generated two learning strategies to help herself locate and be familiar with the computerized materials (see link 4): 1) paying attention to and searching for computerized materials and 2) practicing and trying on the computerized materials found. First, Amy’s actions and thoughts showed that she was starting to pay attention to and search for computerized materials (e.g., software programs, websites) at the beginning of this study. At her beginning stage, she emphasized many of the school computerized materials discovered from conducting the course assignment at week 1, from the online course readings, and from the school professional development grant coordinator. For example, Amy reported that she had noticed several software programs in her school at week 1. She said:

5.2.1: Wholeheartedly agree!: (0) by: Amy 11/2/2003 9:10:56 PM (2)

Time is what I need more of, too! We have some programs at school just waiting to
be used like "Type to Learn", "Compass" and "Lightspan". I need to learn it on my own and then teach the kids, but I never seem to have the time. I am hoping that I will make time while taking this class. (Week 2 Discussion, 11/2/2003)

She seemed really anxious to try the materials she found.

In addition, Amy also paid attention to the computerized materials in the course readings and discovered more materials she had in school. She reported that she started to notice one of the software programs in her classroom because of the course reading in week 2:

…In our readings, one of those readings, I really liked that where it listed all the resources…it listed some software, like…you know, I found the Edmark one that we have, it’s supposed to be good…(Interview 1, 11/2/2003)

Amy was very excited when she found the Edmark software in her classroom. In fact, she reported that she opened up the software box that had not been touched for four years and started to realize she had some software programs in her classroom. Noticing the name of the software in the readings seemed to make more sources become visible to Amy in terms of locating software programs. Her knowledge of the available software was growing as well.

In addition to the resource in her school, paying attention to the name of the computerized materials in the course readings also helped Amy to consider software programs in her daily life. At week 2, Amy reported that she had identified one software program in the scenario of the course readings that was owned by her grandson and could be used for ESL students. She said:
To my knowledge this [Reader Rabbit] is not a software [program] that is used in our school. However, it was mentioned in our readings, Chapter 2, 1st scenario. Mr. Gilchrist mentioned using it for phonics development [in the course text]. My grandson used this software at home and he said, "I loved it!" I plan to use this as a tool for three ESL students who are at the 1st Grade level. (Week 2 Task, 11/1/2003)

Amy was very excited finding this software. She consistently mentioned it in the interviews and wanted to purchase it for her classroom. Therefore, sources that were useful for her further expanded. In addition to paying attention to the readings and searching for the computerized materials mentioned, Amy reported that she also approached the school professional development grant coordinator for a list of websites for her students. Then, she discovered that many good websites were blocked by her school filter system. Her knowledge of locating computerized materials continued to grow (see link 5).

All the examples provided above illustrate the strategy Amy used helped her to gain more knowledge about the options she had in terms of locating and searching for computer programs. Thus, while Amy continued to pay attention and to search for computerized materials in both her classroom and her daily life, her knowledge of computerized materials kept growing (see link 5).

In addition to paying attention to and searching for computerized materials, Amy wanted to practice and try out computerized materials before giving them to the students as the other strategy for overcoming her challenges in her multi-level classroom. She reported:
I feel that I do not have the knowledge of how to use the software that we have. I have had some training, but not enough to engage a classroom of 27 students. I hope to spend the time exploring these tools during this class. I am so excited about learning in this area. (Week 1 Task, 10/25/2003)

It seems that Amy felt that she needed to be proficient with the computerized materials before giving it to the students. That is, she perceived her role as an expert at this time.

Under this condition, Amy started to think about trying and taking the action of practicing the computerized materials she had located from the course readings, her school contexts, and her grandson. First, she felt that she needed to start trying the websites she had been reading about from the course readings. She said:

I’ve already read, you know, like so many good web sites or this and that. I need to start my own list, you know, like good ones for math and good ones for this and that, and then take the time to go search them out, you know, try them myself, I mean, and then have students do it. (Interview1, 11/2/2003)

She felt that she needed to make a list and then try each website before she gave it to the students (see potential link 4).

Second, she made plans to try and practice the resources found in her school when conducting her first week assignment (see link 4). She reported that she wanted to try the Lightspan that was owned by her school at week 2:

I was gonna read their chat, get on the Lightspan, that one our school has to search the Internet, but then I quit, so…(Interview1, 11/2/2003)

In fact, Amy did not practice and go on to the Lightspan in week 2. She reported that her discovery of the Reader Rabbit software and the urgent needs of her students changed her
mind. Therefore, she evaluated the Reader Rabbit (the software program that was mentioned in the scenario of the course reading and owned by her grandson) for her week 2 software evaluation assignment. She pointed out:

After reading [article in the course], (specifically Question #6), I changed my software choice to evaluate from Lightspan to Reader Rabbit. The reason I did this is because I have a concrete need to help three low ESL students in my Reading class of twenty-seven students ranging in ability from K-12. Help for them is more urgent than researching something for the rest of the class. (Week 2 Final, 11/2/2003)

Thus, Amy’s change of plan was to prepare herself for carrying out her initial solutions with a goal of overcoming her teaching challenges in a multilevel classroom. Thus, evaluating software programs that she believed would be useful for Amy provided her with an opportunity to access resources (see link 4) that might be most relevant to her specific needs at the time.

Although Amy’s original plan to evaluate Lightspan did not take place because of her urgent needs in her classroom at week 2, she tried the program and sent the results of her evaluation to the instructor at week 3. However, Amy seemed not to focus on the course unit content for her course assignment when she was evaluating the program. Rather, her evaluation focused on whether the program was suitable for individual learning. She wrote in her assignment:

Lightspan helps teachers assess students. Students love the curriculum, which is scientifically research-based, interactive and standards-based. Instruction is for reading, language arts and mathematics. The learning activities can be used in the
classroom, after school or at home. They include Web links and Web Trips.

Because Lightspan helps teachers and students on an individual basis, it helps each to reach his/her personal goals and objectives. (Week 3 Task, 11/8/2003)

It seemed that Amy was focusing on the individual learning features and curriculum component provided by Lightspan at this time. Therefore, Amy did not include or discuss the content of week (creativity and production in computer assisted language learning classroom) in her assignment. She explained to her instructor that she did not connect to the course content of the week:

When I looked back at the Unit 3 Task, it appears that I did the second part of the options. I wrote a "summary describing the feature/functions of the tool, the types of activities it supports, and how these meet your goals and objectives." I am not sure how Lightspan provides opportunities for student production and creativity, because I didn't do that part. (Week 3 Task Response, 11/8/2003)

This observation surprised me because Amy always followed the course instructions very closely. I started to wonder if something was missing or limiting Amy’s thoughts on individual learning. However, although Amy was still focusing on the computerized materials for individual learning at this stage, her knowledge about technology resources grew again because she carried out learning strategies to approach these sources as active agents. Therefore, the active roles Amy took in her learning (see link 4) provided an opportunity to expand her knowledge in computerized materials (see link 5) while learning to teach with technology. However, although her knowledge was expanded, with the same perceptions and beliefs, Amy’s initial solution to overcome her teaching challenges in multilevel classrooms remained the same (see link 6).
At this stage, Amy thought individual learning was the only way to teach with technology and focused on learning about computerized materials. Thus, she used some learning strategies (paying attention to and searching for computerized materials; practicing and trying out computerized materials) in order to carry out her initial solution, using computerized materials for individual learning, in her multi-level classroom.

**First Turning Point: Toward a Balanced Approach.** The link 7 to link 9 in Figure 2 presents the first turning point of Amy’s learning processes for overcoming her teaching challenges in a multilevel classroom. Amy initially thought that individual learning and putting students on a computer program all the time was the answer for her multi-level classroom in terms of teaching with technology. However, moving toward week2, she started to question whether this was a good solution. She said:

> I think the one thing that…comes to my mind is that…that’s just a tool, I mean, it’s just one way…a computer is just never to be going nearly the human side, and I’ve seen that happen. In fact, with my ESL kids, I went to talk to [Laurie], the ESL teacher, to ask her some ideas and she suggests to put all the kid to a software called *Colony’s Allusion* [name of a software program]. She felt that that’s good for them and I think it is, but I don’t…I can’t see them doing that all year long, that wouldn’t be good, and I don’t know if she meant that or not, but I can see, it’s a good thing to do sometimes but not all the time, but I think, the computer is a great tool, but you have to balance it out with other ways.

*(Interview 1, 11/2/2003)*

She further added:
… I think we’re gonna use a lot of different ways to teach kids…we cannot just…like me, I like to learn just, like, give me a book and I’ll go read it and I’ll learn it. But …in some kids, you know, they have to be shown, like some of the kids need to hear, like, all that kind of stuff. I think that’s true with all of us…there’s probably one way we can learn best but we need to…practice the other ways, too. So, I don’t think you can just put a child on a computer and then…it’ll help them, yes, but you can’t leave them there…So, just within the last two weeks I’ve been thinking about this. So, some might be good, but we don’t wanna have them on the computer all the time, either. (Interview 1, 11/2/2003)

The stimulus for her change was the new information received from the online course materials and the discussion with her peers in the online course. She reported what accounted for her change, saying:

….kind of interacting from the reading, so yeah, not just my own experience…I guess kind of back to that question, you know, what is educational technology, but it’s just tool, it’s just one way of teaching and learning but it’s not THE way, it’s one of the ways, so it’s up to them, we don’t wanna just… use it solely and nothing else (Interview 1, 11/2/2003)

The stimuli in the source influenced Amy’s perception of technology and challenged Amy’s original beliefs about using technology in her instruction (see link 7). It triggered changes in Amy’s knowledge, beliefs, and perceptions. Therefore, Amy’s learning process shifted.

At this stage, it seems that Amy started to reject the idea of individual learning and felt that she needed to look for alternatives. She started to propose using a “balanced
approach” for her multi-level classroom as an alternative solution for her multilevel classroom (see link 8). That is, she felt that teachers should seek other ways to teach students rather than just putting students on computer programs. Thus, Amy’s initial solution for her multilevel classroom altered.

However, what is a balanced approach in terms of teaching with computer technology? Amy reported that she did not really know. She said:

I never…I haven’t really known, like I said, WHAT to do with the kids on the computer, maybe typing a final draft or searching on the web, maybe for a project [on their own], but I really didn’t know. (Interview1, 11/2/2003)

Thus, she was puzzled and confused.

Not clear what a balanced approach really meant, it is not surprising that Amy still focused on the computerized materials at this stage. The only difference was that she started to view it as a supplement, although sometimes she still mentioned individual learning for her multi-level classroom. She suggested how she would use computerized materials for her multi-level classroom at the end of Week 2. She said:

I was thinking it would be good for those that need more help for their individual learning…, I was thinking it would be good for those, like those in my Math class who are really REALLY low, that need me…to actually help instead of yelling all the time...(laughing)...instead of, like, trying to pull out worksheets all the time, I can use a bit of Compass Learning as a supplement …It could be… ‘cause I think it’s fast. It’s great. …I mean…and they can continue learning, but from where they’re at, instead of not be able to do something in the Math class…Or I have some kids who get their work done really fast, and they can do something
else…instead of always pulling out a book to read…I mean…it’s good, but I would like to have more variety for them. If I have something not on a computer, then they could also do that. (Interview 1, 11/2/2003)

Thus, Amy’s solution of overcoming her teaching challenges in her multilevel classroom shifted. Instead of recognizing putting students on computers all the time when they are behind as her solution at the initial and beginning stage, she decided that computer technology should not be abused. Therefore, she believed that a balanced approach would be more appropriate.

However, not knowing what a balanced approach really meant in terms of teaching with technology (see link 9), the sources Amy was seeking at the time remained the same as at initial and beginning stage (see original link 4). Thus, Amy continued to focus on computerized materials as the content of her learning and use the same learning strategies, paying attention and searching for computerized materials and practicing them as at the last stage.

**Second Turning Point and Continuation: Interact Around Computer.** The link 10 to link 13 in Figure 2 presents the starting point and beginning stage of Amy’s learning processes for overcoming her teaching challenges in a multilevel classroom. Amy felt that teachers should use a balanced approach while teaching with technology at the first turning point. However, she seemed unclear as to what that meant herself. Toward week 5, she seemed to start to have a clear picture of what it meant. Amy reported that the course content of the week helped her to understand that there was more than one way to teach with technology (see link 10). She described her change:
I think...seeing that [it’s] not just a tool, where a student goes and does it by himself... Seeing it, and that’s how I probably pictured it before, and I didn’t really like the picture where you just put a student that can’t keep up with the rest of the class, you know, put them on a program and do that, but now I see it more... as not that way, but where, like we were talking about earlier, where two kids can kind of work together using a computer, so it’s more than just learning, it’s also a tool to get kids to communicate and work together and help them with language learning and their other kinds of learning, too. (Interview 2, 11/23/2003)

Thus, based on her statement, it seems that Amy started to visualize ways other than using a computer on a one-to-one basis. In fact, the readings for that week in the online course Amy took gave examples and guidelines of how teachers can design technology-integrated activities for communication and collaboration. This stimulus mediated Amy’s thoughts on using different ways to teach with technology and expanded her knowledge of how computers could be utilized in her teaching (see link 10). She started to figure out that having more than one student interact around the computer together was another way of teaching technology. Her knowledge grew again.

This new knowledge inspired Amy to think about a different solution for her multi-level class (see link 11), having students interact around computers. Thus, Amy’s learning process shifted.

Amy’s new solution encouraged her to rethink what she needed to know in order to overcome her teaching challenges in her multi-level classroom (see link 12). She then seemed to start to brainstorm some ideas while doing the course assignment as her
learning strategies (see link13). For example, she reported that she could match up students’ levels and personalities for her multi-level classroom. She said:

The "comment" feature in Microsoft Word would provide another opportunity for students to interact in my classroom using the computer as a tool. After responding to a writing prompt, I could ask students to evaluate each others’ work on the computer. To make this collaboration effective I would follow the suggestions in Chapter 4 of our text. For example, I would give each student the opportunity to be active by giving them the role of proofreading another student's writing. I would make sure that I matched up students' abilities and personalities [sic] as well as I could. (Week 5 Task, 11/21/2003)

However, no other learning strategies were observed or reported in this stage other than the brainstorming strategy used in the course assignment. Therefore, Amy noted that she wanted to learn more ideas about how to have students interact around the computers in S column in her KWLS chart (Know, Want to Know, Learned, Still Want to Learn) at the end of the class.

**Summary.** An active agent in her process of learning, Amy participated in many decision making activities and utilized many learning strategies to approach her learning. Because of the teaching challenges in her multilevel classroom, Amy set overcoming this teaching challenge as one of her learning goals. Picturing individual learning as the only way of teaching with technology at the initial and beginning stage, Amy started out focusing on computerized materials as her learning content. She used two major learning strategies to gain knowledge that related to computerized materials. By paying attention to and searching for computerized materials, and practicing and trying on the
computerized materials found, she tried to locate and become familiar with the
computerized materials that could be used for individual learning. Toward week 2 was
Amy’s first turning point. Amy started to propose using a balanced approach for her
multilevel classroom. However, not clearly understanding what it meant herself, she
continued to focusing on computerized materials as her learning content and used the
same learning strategies as at the initial and beginning stage. The second turning point
took place at week 5. The course content expanded Amy’s knowledge of teaching with
technology. Amy modified her solution for the teaching challenges in her multilevel
classroom to having students at different levels interact around a computer. As her
knowledge of how such options could be carried out was relatively limited, the learning
strategy she used was to brainstorm some possibilities to prepare herself for this solution.

Teaching Challenge Two: Teaching L2 Students

In addition to the teaching challenge of a multi-level classroom, Amy was also
struggling with teaching her L2 students (see the case description in this chapter). Amy
reported that the major challenges she had in teaching L2 students were to make the
students follow her instruction and to engage them in their learning. She defined what
engaging students meant to her:

Well, for one thing when I'm teaching, I see [that] an engaged student is one who
is looking at me…eye contact, you know, I can tell from their eyes that they're
really getting it, they're with me. They may not be raising their hands and
answering questions and all that, but I can tell that they're understanding and
they're following along…Or maybe times when I'm not just talking but when
they're actually doing something that we just learned, they're actively talking to
each other and working on something, and that's being engaged, too. (Interview 5, 5/31/2004)

Thus, as a teacher, Amy emphasized student engagement and believed students’ active participation was important to her teaching.

In order to engage students in their learning, Amy was constantly searching for solutions. During her process of learning to teach with technology, she conceptualized different solutions over time and developed different learning strategies in order to be able to carry out her solutions as the study progressed. In this section, I will present Amy’s learning process for overcoming her challenges in teaching L2 students following a chronological order. Her learning sequences are indicated in the number order of Figure 3. Her learning process aiming toward overcoming her challenges of teaching L2 students is presented in Figure 3. The descriptions and explanations of Figure 3 are presented below.

Figure 3. Learning Process of Overcoming Challenges in Teaching L2.
Starting Point and Beginning Stage: Engaging Students by Technology. The link 1 to link 4 in Figure 3 presents the starting point and beginning stage of Amy’s learning processes for overcoming her challenges of teaching L2 students. Similar to her learning process aiming toward overcoming her teaching challenges in a multilevel classroom, Amy developed several solutions for her challenges of teaching L2 students as an active agent. The initial solution Amy came up with to engage L2 students in their learning was to use computerized materials as motivation and engagement devices before and at beginning of the study (see link 1). Observing that L2 students often had positive reactions when they were using computers previously, Amy felt that “technology” could engage students (see link 2). For example, Amy reported that she found that students were often excited to get on the computers and “love[d]” and “want[ed]” computers. She also reported that one of her ESL students was highly engaged in his learning and was able to produce some work when he worked on a computer. She said:

10.4: Agree: (1) Amy 10/31/2003 8:43:33 PM (1) After reading a story this last week, I asked the students to write a summary. Joseph, one of my ESL kids, noticed some [students] writing their final draft on the computer. Up to that time, he had not written anything. He asked if he could write his on the computer. I agreed. He really focused, asked me questions on the details of the story, etc. He really produced when he could use the computer compared to pencil and paper.

(Week 2 Discussion, 10/31/2003)

These experiences convinced Amy that some computer materials could be an engagement device for L2 students (see link 3). Thus, observing that her students were not motivated by the Accelerated Reader program provided by the school, she felt that she would just
need to find the right ones. At this stage, her learning content was focus on the computerized materials as at the beginning stage of overcoming the challenges for her multi-level classroom (see link 4).

Amy wanted to find computerized materials that could engage her L2 students. However, she reported that she was clueless as to where to look before she took the online course. She said:

I should do that…to be able to have something [software programs] for them besides making the books available in our room…and making it really fun for them. But yeah, I would have never known where to start with the pick [choice], I probably would have just asked somebody, you know, and gone that way, but now I feel like I’m more capable of making my own choices. (Interview 1, 11/2/2003)

However, toward the end of week 1, Amy started to recognize some components that were important for engaging L2 students. From the course readings, Amy noticed that “authentic tasks” served as an important element for engaging students (see link 5). She said:

Of the "Conditions for Classroom Language Learning", the one I will focus on is number #3"Learners are involved in authentic tasks." I will endeavor to give my students authentic tasks. I hope to see more times in my class when students are actively involved in their work and they can proceed with skill, motivation and enough time to complete. Sometimes my assignments bring confusion, apathy and lack of motivation to do a good job. (Week 1 Discussion, 10/26/2003)
She started to believe that authentic tasks were the key to locating the “right”
computerized materials.

This new understanding helped Amy to conceptualize what she should look for in
software programs with a goal of engaging students. She built this element into her
software evaluation criteria and listed it as a priority for her software evaluation criteria
assignment at week 2 (see link 6). She wrote in her assignment:

A. Are the tasks auauthentic [sic]? Will they engage the students in interactive
and meaningful ways? Will the students have the skills, support and time to
complete tasks?

My list was compiled by reviewing the principles, conditions and standards
introduced in Unit 1. I think the most important criteria [sic] is if the tasks are
authentic. Authentic tasks will engage the students; they get caught up in
"learning" and this causes interacting with others. Students sense purpose and
pride in authentic tasks. (Week 2 Focus, 10/28/2003)

She then consistently used this software evaluation criteria list to evaluate software
programs or websites she located (see link 6).

First Turning Point: A Mixture of Engaging Students by Technology and Other
Technology. The link 7 to link 9 in Figure 3 presents the first turning point of Amy’s
learning processes for overcoming her challenges of teaching L2 students. Similar to her
learning process aiming toward overcoming her teaching challenges in a multilevel
classroom, Amy originally thought putting students on a computer program could solve
her teaching challenges of engaging L2 students. However, during the end of week 1 and
week 2, she started to consider using computers in a balanced way for her L2 students.

First, she felt that she should consider technology other than computers. She stated:

In our discussion we talked about the word "technology" and what it actually means. To me, it truly is synonymous with computers, but we should be mindful that it also includes books, videos and in the past chalkboards. (Week 1 Final, 10/26/2003)

Second, she felt that she should not allow students to be on the computer all the time, even if they liked it very much. She reported:

I know some of kids would be perfectly happy, you know, on the computer!! (laughing) and I can tell that they really love it…they really like it…so they need more time on it, you know…It’s not like I don’t wanna give them more time on it, but you know, they have to learn the balance, too (laughing). (Interview 1, 11/2/2003)

Third, she reported that she should only make students use books in her exploratory class even if her students requested and were eager to go on to the internet. She said:

…but I think though after the discussion we had in your class about the research lesson …I am going to….Now with this new group, I probably will just have them use books … ‘cause with the computer, I do see a lot of kids…spend a lot of time searching, (laughing) and you know, I think a lot of…maybe, you know, you can start to look at one thing… I didn’t think of this [before]…but maybe you can start looking for one thing …you can start one place…(Interview 1, 11/2/2003)

It seems that Amy had started to pursue a balanced approach of teaching with technology. This progress was similar to what happened for overcoming her teaching challenges of
her multi-level classroom. In fact, Amy reported that when she read about computers as only one type of technology and discussing with other teacher-learners about it in the online course she took, she started to consider using other technology in her teaching (see link 7). She then generated a balanced approach as the solution for engaging her L2 students (see link 8).

Although Amy thought that she should use computer technology in a more balanced way, the learning content she focused on was still on computerized materials as it was for her multi-level classroom (see link 9). Focusing on computerized materials at this time, Amy’s learning strategies at this stage also remained the same as in the last stage (see link 6). She continued to pay attention to and search for computerized materials that could be used for engaging students and attempted to practice them. For example, she reported that she wanted to practice software programs owned by school in order to engage her students. She said:

The problem I face is having the time to become familiar with these programs. Time to not only receive instruction but to actually practice the new skills so that I feel confident enough to engage my students. (Week 1 Final, 10/26/2003)

She also reported at week 4:

Using the resources online meets the students [sic] needs faster and greater than if I stood up in front of the class and taught them. They are actively involved in their learning and thus TECHNOLOGY HELPS STUDENTS ACHIEVE MORE EFFECTIVELY.

My "culture" class is a great inquiry-based activity. Technology helps the students focus on language and learn content. It can make learning fun and
motivating. The use of technology gives the teacher a chance to model critical thinking skills and to show them the steps in the inquiry process. (Week 4 Final, 11/16/2003)

Her posting at week 6 indicated that she continued to believe that authentic tasks should be provided by technology up to the beginning of Week 6. She reported:

ELL's can be assessed while working on the computer by observing them. The effectiveness of the technology can be assessed by noting if it engages the students or not. Are the learners working actively with other people around the computer or through the computer whom they come to understand and with whom they can use lanaguage [sic]? Does the technology give them interesting active tasks that they have the skill and support to complete? Does the technology give them enough time and feedback? (Week 6 Focus, 12/1/2003)

Thus, Amy still focused on computer technology at this time and used the same learning strategies as in her last learning stage.

Second Turning Point and Continuation: Engaging Students by Tasks. The link 10 to link 12 in Figure 3 presents the second turning point of Amy’s learning processes for overcoming her challenges of teaching L2 students. Amy thought she could engage her L2 students by providing them with some computerized materials or computer applications that included the authentic task component. However, toward the end of week 5, Amy’s solution of engaging L2 students began to shift. Instead of conceptualizing computerized technology as the engagement device for L2 students, she seemed to start to think that it was the tasks or the activities designed by the teachers that engaged the students. For example, she started to design materials or activities to engage
students rather than using technology to do so (see link 11). Thus, Amy conceptualized another solution for engaging L2 students that is, engaging students by tasks. Her learning process moved forward.

In order to carry out this solution and engage her students by tasks, Amy used two learning strategies to prepare herself (see link 12). They are: 1) practicing to build a task in her current lesson and 2) practicing the lesson designed in her teaching. First, Amy practiced how to build a task for one of her current technology-using lessons for her week 5 assignment. She focused on engaging her students by a task she created. She wrote:

In this 4 ½ week activity learners are immersed in the language throughout the task; the Web sites they visit on the Internet will largely be in the target language and will provide both textual and graphics support, and possibly also musical enhancement, for different learning styles. Students negotiate meaning with their partners while solving a problem, in this case, seeking information and organizing it into a visual presentation. (Week 5 Final, 11/23/2003)

This quote stood out for me because it was very different than what she had written in her week 4 final. Instead of stating that “technology helps students focus on language and learn content. It can make learning fun and motivating…,” she discussed that “learners are immersed in the language throughout the task.” Her knowledge and beliefs seemed to shift from computer as solution to teacher-designed task as solution.

In addition, Amy chose to build an authentic assessment for her week 5 assignment. Instead of just using it as an evaluation tool, she reported that her goal of building an authentic assessment was to engage her students. She said:
Yes, I have designed authentic assessments for three of the activities that I use in my "culture" class! These tools will help students to stay engaged, to be accountable and to keep track of their learning. (Week 6 Final, 12/7/2003)

Thus, Amy practiced building a component aiming toward engaging her students at week 6 (see link 12).

Amy was constantly thinking about ideas for engaging students even after the online course ended. For example, she reflected what she should do for engaging her L2 students. She said:

I guess in math, I haven’t really thought this through. but you said if they had . . . they had to learn how to add and subject fractions, then there is a lot of different ways than just the book and worksheets to get there; some of the kids were more successful at it, more manipulative, more something out there, they could get more personally involved, take responsibility for their own learning, you know… Some kids do fine with the book and the paper, but I can see with a lot of other kids, they just kind of set you off, unless they can get engaged somehow and then they go for it too. I can sure see, how… the two different teaching approaches are really different, one really engages kids and the other doesn’t. (Interview 4, 12/21/2003)

She further described:

I feel like I’m learning a lot about how kids learn, you know…like the scenarios in our readings and …of the way, of the interactions, the kids need to interact and what you give them and make it authentic, something they can relate to… There’s a lot more learning going on and…I’ve seen that and…we had two things, well,
the first thing I’ve talked about in class that one culture class I have. The way it’s set up is a lot like I’ve learned that ESL kids need to learn, and I think all kids. They picked the culture and then they do the research and they present it and create a, creative way, you know, either PowerPoint or posters…You know, all the way to smart kids that we usually cannot get them to do anything, they all seem to be really… involved in their learning and they come to class and they just get right to work…It’s not like the teacher, has to stand up there and talk…I just have to, I’m more like a helper…And then we had another thing…This last week of school … we had what we called a [decoration contest]…we each have one class and they said let’s have a contest and see … who can decorate the outside of their doors the best and then the principal gave that class a pizza party, so all the kids in my classroom, had to work, come up with ideas and work together on it and talk about it and then decorate, but I saw kids coming in after school to work on it or asking if they could get out of other classes to work on it…That’s such a kind of engagement, the kind of thing that we need to be doing in the other subjects, too, somehow, you know, they get really excited about it…You’re not, like, having to prod and push them…but they’re just excited about it, and I know that that’s the kind of teaching that I read about in the ESL classes and I really think it’s right…It’s just that I don’t really know how to apply that to my math and my other classes, but I saw that…they have to be engaged and…you wanna get them self-motivated to learn, for them to wanna learn and it’s really funny to see that happen, but I just need to keep finding new ways to make that happen in all the classes. (Interview 4, 12/21/2003)
It seemed Amy felt that she needed to know more about how to design lessons to engage L2 students in order to carry out her solution for overcoming her challenges of teaching L2 students.

Summary

This section documents Amy’s learning process of overcoming her challenges of teaching L2 students. The study findings suggest that this process is similar to the one she went through for overcoming her teaching challenges in her multi-level classroom. As an active agent in her process of learning, Amy made decisions about her learning contents that she believed were needed for carrying out her solutions for overcoming her challenges of teaching L2 students and utilized learning strategies to approach her learning. Her learning processes started with a focus on computerized materials and used those materials on an individual basis. The learning strategies used in this stage were the same as the initial and beginning stage of overcoming her teaching challenges in a multilevel classroom—paying attention, searching for, and practicing computerized materials. The first turning point was also a balancing act with the use of the same learning strategies as discussed in the multi-level classroom section. At the second turning point, her solution shifted to engaging L2 students by tasks. Thus, she practiced building such teaching activities and practiced the lessons she created to prepare herself to carry out this solution.

Lessons Learned

In this section, I presented how Amy learned to teach with technology with a goal of overcoming her teaching challenges as active agents. Two turning points were observed in both processes. The study results indicated that Amy perceived individual
learning (e.g., putting students on the computer) and engaging students by technology as the solutions for overcoming her teaching challenges at the beginning. At the first turning point, Amy shifted her solution and perceived that a balanced approach was the answer. Therefore, her solution was shaped again at the second turning point. She perceived having students interact around the computer and engaging students by tasks as her solutions. Amy generated some learning strategies based on what she believed what she needed to know or to do in order to carry out her solutions. Thus, the learning content she focused on was different depending on what she felt she needed to know at the time (computerized materials for the beginning stage; the same for the first turning point; ideas and example lessons about having students interact around computers and engaging students by tasks at the second turning point).

Believing that knowing certain content would help her to carry out her solution at different stages, Amy generated learning strategies in each stage. Paying attention to, searching for, and practicing computerized materials were three learning strategies she used at the beginning stage. Unclear about what a balanced approach meant at the first turning point, the learning strategies used at the time were the same as at the beginning stage. Brainstorming of ideas was used as a learning strategy for overcoming the multi-level class challenge, while practicing to build tasks and carrying out an example lesson were used for engaging L2 students.

For the two turning points for both processes, the available sources mediated changes in Amy’s process of learning. However, how the sources mediated Amy’s learning was beyond the scope of this study. Instead, how Amy used the resources and stimuli in the source category and the consequences of her actions were the main focus.
that related to teacher-learners as active agents. By constantly reflecting upon course readings and social interaction content, in other words, the resources and stimuli, Amy was able to modify her knowledge, beliefs, and perceptions. Thus, the consequences of her reflections and her modified knowledge, beliefs, and perceptions helped her to alter her solutions for her teaching challenges. Therefore, with the modified knowledge, beliefs, and perceptions, Amy then developed her learning plans to prepare herself for carrying out her solutions.

With her learning plans in mind, Amy then developed learning strategies that could be used to prepare herself for carrying out the solutions. While using the learning strategies she developed, she was able to approach the source category for the information and knowledge that she believed she needed. Such actions allowed her to gain more understanding of teaching with technology, and thus provided her with opportunities for reflecting the stimuli and information she gained. For example, at the initial and beginning stage, Amy’s knowledge of computerized materials grew because she used some learning strategies to approach the source category. Consequently, she was able to reshape her solutions and learning plans. All of the above help us to understand Amy’s learning processes as an active agent and the reasons why her learning shifted in certain directions.

**Ultimate Learning Goal Two: Increasing Self-Efficacy**

As an active agent in her learning processes, in addition to overcoming her teaching challenges, increasing her self-efficacy was the other ultimate learning goal Amy held. In this study, self-efficacy refers to teacher-learners’ perception of their level
as a technology-using teacher. In other words, do they see themselves as a novice, an intermediate, or an expert technology-using teacher?

Amy viewed herself as a novice at the beginning, an intermediate and gradually an expert technology-using teacher as the study progressed. Her learning plans were shaped by her self-efficacy. In this section, I will present Amy’s learning plan as a novice, an intermediate, and an expert technology-using teacher in a chronological order. Amy’s learning process aiming toward increasing her self-efficacy is presented in Figure 4. Her learning progress is indicated by the order of the numbers in Figure 4. The descriptions and explanations of Figure 4 are presented below.

**Figure 4: Amy’s Learning Process Aiming Toward Increasing Her Self-Efficacy.**

**Starting Point and Beginning Stage: A Novice Technology-Using Teacher.** The link 1 to link 3 in Figure 4 presents the starting and beginning point of Amy’s learning processes for increasing her self-efficacy. Before and at the beginning of my study, Amy perceived herself as a low-level technology-using teacher. As a teacher in her middle age, Amy reported that she was not used to the “computerized culture” and therefore felt that
she was behind all the younger people. She reported that she felt she could not just read on the screen like others did at week 2:

> I print off all this stuff on my [printer]... I don’t know (laughing), I often wonder if that because I’m older, I’m used to reading on my paper and then I can highlight it and it seems like I remember it better... I never just read on the screen... I like to underline...and make notes and do a bunch of stuff ...I don’t know if it is because I am old or what. (Interview 1, 11/2/2003)

She also revealed her uneasiness when her colleagues pointed out the fast change of technology at week 3:

12.5: Reply: (0) by: Amy 11/8/2003 4:35:14 PM (1) After following this discussion thread, my comment is "wait and see". Because of my age, I have seen many technological "wonders". They are wonderful and are "awesome" and "mind boggling" to me. I thought my H.S. graduation gift of an Olympic typewriter was the greatest. It served me well for many years, but now the computer is so much better. Who knows what the future holds? (Week 3 Discussion, 11/8/2003)

Thus, Amy decided she was a novice technology-using teacher at the start and beginning of the study.

According to Amy, she felt that she was as a novice technology-using teacher because of her age. She often stated that she was “very weak in the computer department” and “did not have a lot of experience” using computers in her teaching. She also reported the reason of rating herself as a novice-technology-using teacher:
I don’t know…I guess because I’m older and I figured all the younger people would have…a lot more knowledge about them than they really do...Now I think, and I’ve heard other people say this, too, that when we’re older…we were really afraid of computers and, you know, you’re afraid you might break it or something like that…And the younger…like, my grandkids, they get on the computer, they just do…they’re not afraid to push any button here, there and everywhere, you know…I just think the younger generation is a lot more comfortable with computers…maybe that’s why I got my idea, too. (Interview 3, 12/9/2003)

Thus, recognizing the differences between herself and younger generations made her perceive herself as a novice technology-using teacher.

While viewing that older people were less familiar with the computer and computer culture, Amy reported she felt behind and thought that other teachers in the online classroom and in her teaching contexts must know a lot more than she. She pointed out that she felt like she “was at the bottom before [she] started [the online course].” In addition, she thought that she did not know things that other people thought she should know as a teacher. She said:

I’m thinking about where we had to write, you know, what hardware we have in our classroom and what software we have in our classroom…To me that was really helpful. I’ve never really thought much about hardware and software…I mean just basic stuff like that… that I guess people assume everybody knows but I’m really not sure. (Interview 1, 11/2/2003)
Therefore, Amy thought other teacher-learners in the online course must know much more than she did, in addition to her age, so she rated herself as a novice technology-using teacher and felt she was behind.

Perceiving herself as a novice technology-using teacher, Amy’s feeling of falling behind is understandable. In fact, Amy reported that she felt that she had to try very hard to catch up with the group and increase her self-efficacy (see link 1). She reported that she tried very hard to become a higher proficiency technology-using teacher. She said:

7.4.1.1: Summary: (0) by: Amy 12/7/2003 10:39:38 PM (3) I am late in reading this thread, but have found it most interesting. I agree technology is here to stay and it has improved our lives in many ways. For example, after I finally learned to use the "Grade Machine, "it has saved me a lot of time compared to hand recording grades. It is more effective and efficient than I am. Older people do need "help" in learning about the technology; I have had to really push myself to learn in this new area. (Week 6 Discussion, 12/7/2003)

Therefore, she aimed toward increasing her self-efficacy of using technology and catching up with other teacher-learners in the online course.

In order to catch up with other teacher-learners, Amy felt that she needed to use the following two learning strategies to help herself (see link 2). These learning strategies were: 1) listening to and approaching experts to learn from them and 2) collecting models, examples, recommendations and suggestions related to technology use. Amy carried out these learning strategies (see link 3).

First, Amy intended to listen to experts and to approach them with questions. Though she thought that all the other teacher-learners in the online classroom must have
much more experience in terms of teaching with technology, Amy reported that she always browsed and read all the postings and assignment in the online discussion. She said:

I didn’t always do very well, but I always read everybody’s but sometimes it was the end on Sunday night. I would read everybody’s comments. I really do.

(Interview 4, 12/21/2003)

I also observed that Amy summarized the whole class thread or pointed out that she read the whole thread in the online discussions. Every week, she also responded to students’ individual assignments in the online discussion. In week 2, she also noted what she had learned by reading others’ assignments. It was clear that Amy attempted to “listen to” all the teacher-learners in the online discussion at her beginning stage.

In the process of “listening to” experienced teachers, Amy constantly reported her excitement and satisfaction when she located things that were useful for her (see link 4). For example, she was excited about finding one practical software evaluation criterion from reading all the assignments posted by other teacher-learners in the online course in week 2. She said:

My criteria are too lengthy and at times hard to understand. I printed a copy of [Laurie’s]. They're great! Concise and to the point. The first five criteria match up perfectly with those in the "A.D.A.P.T. Learning Technology" presented by the Learning Company. According to [Laurie’s] list the software "Reader Rabbit" is an excellent choice for language learners at the 1st Grade level. (Week 2 Task, 11/1/2003)
She was also glad she found one teacher-learner who pointed out things she had never thought of before. She said:

14.3.1: Thanks: (1) by: Amy 11/1/2003 8:45:27 PM (2)

Thanks for posting your Focus. I see that the cost of the product is something that I didn't even think about. I have never bought any and, therefore, have not [sic] idea what they cost. Also, a sight [sic] license is something that never occurred to me. So…thanks for sharing. (Week 2 Discussion, 11/1/2003)

In addition, she also felt that “listening to” one teacher-learner’s experiences was useful for her. She said:

14.1.3: Reply: (1) by: Amy 10/31/2003 8:21:24 PM (2)

I appreciated your comments because you speak from experience [about] using computer programs with students. You said that your top priority is that the student can use it on his or her own. I will keep that in mind when I critique the software that I see. I have only used the Accelerated Reader, so I thank-you for sharing your Focus criteria so I can benefit from your first-hand experience.

(Week 2 Discussion, 10/31/2003)

The above examples indicate that Amy was actively using the resources and stimuli she obtained from the sources category and reflected upon those resources and stimuli (see link 3). Thus, the consequence of actions helped her to shape her perceptions of her self-efficacy (see link 4).

In addition to “listening to the experts,” Amy also approached experts with questions in order to increase her self-efficacy (see link 3). For example, she approached
Nancy, one of the teacher-learners in the online course, to ask about what she should do for assessing students at week 3. She said:

11.1: Agree/question: (1) by: Amy 11/8/2003 4:28:59 PM (1) I agree about letting ESL students show what they can do rather than what they cannot. My question is how to assess them. I put them on a separate grading scale, modify their assignments and allow other students to help them. Do you have any other suggestions? I teach 6th grade and am referring to my reading class of 27, three of which are ESL students (1st to 2nd grade rdg. level). (Week 3 Discussion, 11/8/2003)

She also inquired into Nancy’s opinion as to whether the steps suggested from the course readings would be appropriate for some of her students at week 4. She said:

8.1: Agree/question: (1) by: Amy 11/15/2003 10:18:30 PM (1) I highlighted this part in the reading, also. I wondered if this would be a good process to give students who want to do individual research. What do you think? (Week 4 Discussion, 11/15/2003)

It seems that Amy was seeking for experts’ suggestions about her teaching situation and what she needed to do as a teacher.

In addition to “listening to” and approaching the experienced teachers in the online classroom, Amy also used the same learning strategies to learn from the experienced teachers in her school (see link 3). For example, she mentioned that she had been listening to the professional development grant coordinator in her school, had been inspired by her, and felt that she needed to continue to learn from her. She said:
The head of our [professional development] program joined us after serving in the Peace Corp. She gave me a three-inch stack of paper that contained lessons plans, ways that students could correspond with other people in different countries via e-mail, etc., which she strongly recommended. I was excited about the possibilities, than overwhelmed by them and now the stack is sitting in my file cabinet unused. (Questionnaire)

Moreover, she mentioned that she had approached the professional development coordinator for resources. She reported:

20.2.6.1: Comment: (0) by: Amy 10/26/2003 12:57:02 PM (3)

I have read through this thread and found it interesting; however, I do not feel I have much to add. The filter that our school uses is called, "Websense." I asked our [professional development grant] coordinator for a list of good websites for students and we found that many of them were blocked by our school filter. (Week 1 Discussion, 10/26/2003)

When verifying who in her school had an impact on her, she also said:

…There’s the [professional development] grant, the person who is in charge of that. She’s the one that told me all about that life singer in our school…She’s the one that really inspired me about that and the other thing. She printed about two inches of paper for me about the Peace Corps. I want to have my kids correspond via email with Peace Corps volunteers in other parts of the world. She told me all about it and she printed it out for me and she wrote a letter to all of us really encouraging all of us to do that. I hear it would be excellent. I guess they have a lot of really neat lesson plans that we could have access to, but it just one of those
things out there that I know about but I haven’t done it. She has really inspired me in terms of the Lightspan but this one is about the Peace Corps. She is the one that really, you know, got me inspired to do more things using the computer. She’s very knowledgeable about computers. So you’re making me think while we’re talking that I really need to learn as much as I can from her, because I have the feeling that she might not be around next year. I don’t know, it’s just a feeling she is ready to move on. And she’s so willing to help. We only have half a year left now, so I need to really take advantage of that. (Interview 4, 12/21/2003)

In addition, she also mentioned that she approached the ESL teacher in her school about how she should teach her L2 students with technology.

In this beginning stage, it is clear that Amy had listened to and interacted with experienced technology-using teachers in order to increase her self-efficacy. It seemed that she shifted her role back to that of a beginning teacher; thus, many of her actions were similar to what she did when she began to teach in the Southwest. Therefore, by listening to and interacting with other teacher-learners and expert technology-using teachers in her school context, Amy actively used the sources around her and approached the source category as an active agent. Thus, her use of learning strategies allowed her to expand her knowledge and to reshape her beliefs and perceptions.

In addition to listening to and approaching expert teachers, Amy also carried out another learning strategy in order to increase her self-efficacy as a technology-using teacher, that is, to collect recommended resources, examples, models and suggestions. Amy seemed to believe that collecting these materials would help her to know more about teaching with technology (see link 2). She developed a resource binder for all the
resources she collected and made notes for herself on the ones that were particularly useful for her (see link 3). For example, Amy reported that she printed out the resources and recommendations she thought would be useful and collected them for her resource binder. She said:

In Unit 2, I printed off several things. There’s one, it is called [name of course text]. Oh, it’s the Laurie one. I’m really impressed with the process of selecting software. There is a lot of good stuff in there. It is logical in its sequence. When I read it, I thought it was a good one. It is very easy to understand. Then your reply, I printed it off, and my two cents. Oh, I said I like your questions about other people’s experiences of using software. (Interview 2, 11/23/2003)

In addition, in week 3, Amy reported that she went to browse the resources in the online course library. She stated:

8: Library: (1) by: Amy 11/8/2003 4:09:22 PM I just spent some time checking out the Unit 3 Library. I found many good resources and wanted to point you to that direction if you have not been there yet. I found help in making rubrics and assessments, lesson plans, sites for students and webQuests [sic] to name a few.

(Week 3 Discussion, 11/08/2003)

She also reported that she printed the resources that she found useful and put them in her resource binder. This action again helped Amy to approach the source category and may activate a potential mediation to alter or expand her knowledge, beliefs and perception.

First Turning Point: An Intermediate Technology-Using Teacher. The link 4 to link 12 in Figure 4 presents the first turning point of Amy’s learning process for increasing her self-efficacy. Amy felt that she was a novice technology-using teacher at
the beginning and before the study. However, as the study progressed, Amy reported that she started to perceive herself as an intermediate technology-using teacher. Two sources mediated Amy’s change of self-efficacy. They are social interaction with other teachers and her actions of practicing computerized materials (see link 4).

First, Amy started to feel that she was an intermediate technology-using teacher through interacting with the teacher-learners in the online classroom. As Amy actively involved “listening to” and learning from experienced technology-using teachers in the online course, she gradually noticed that not all the teacher-learners were expert technology-using teachers. She reported that she found that many teachers were facing the same problems as she was in their learning of teaching with technology and did not use as much technology as she thought they had been. For example, in week 2, Amy reported her excitement when she found that one teacher-learner also felt short of time for practicing and browsing the computerized materials in school. She reported:

5.2.1: Wholeheartedly agree!: (0) by: Amy 11/2/2003 9:10:56 PM
Time is what I need more of, too! We have some programs at school just waiting to be used like "Type to Learn", "Compass" and "Lightspan". I need to learn it on my own and then teach the kids, but I never seem to have the time. I am hoping that I will make time while taking this class. (Week 2 Discussion, 11/2/2003)

At week 3, she noticed that one teacher also felt overwhelmed with the information learned. She said:

14.4.1: Comment: (0) by: Amy 11/8/2003 4:42:38 PM (2) I, too, feel overwhelmed in teaching. There is so much information given us as to how to do our job better and little time to reflect on it or to try it out in the case of
technology. This class is helping so much in that area. I have also told myself that
I, too, must start making my own list of software, websites, etc., or I may never
actually take the time to incorporate them into my classroom. I will just be more
information that I learned, liked and then “shelved.” (Week 3 Discussion,

She continued to notice that she had the same problems as the other teachers at week 4.
She reported that she also did not know how to organize the websites. She said:

5.2.1: Question: (0) by: Amy 11/15/2003 10:27:10 PM (2) Laurie's question is
also my concern. I know how to use a filing system for paper work, but I feel
“unorganized” when it comes to a filing system for websites, etc. Does anyone
have a solution? (Week 4, Discussion, 11/15/2003)

Noticing that some of the other teachers had the same problems as she did, Amy seemed
to start to feel that she was not the only one who was struggling.

Week 4 was a turning point for Amy as she recognized that many teachers did not
know about some available technology tools. In the online discussion, one student
pointed out that he had not heard about WebQuest before. Many students responded to
him and stated that they did not know about it before the class, either. Amy read the
thread and replied to it stating that she did not know about it, either. She said:

4.3.1: Ditto: (0) by: Amy 11/15/2003 10:31:06 PM (2)
I, too, did not know about WebQuests. I found one on "cells" which we are
studying in 6th grade Science and several on "Culture", which will come in very
handy. This group researches and I never had any guidelines for them on Internet
searches. Now, I feel I have some sources for them to go to first and then they can
This thread seemed to convince Amy that many teachers did not know as much as she thought and did not use that much technology. She reported:

I thought everybody was using…I mean all the other teachers…I thought most of them were using the computers a lot more but I’ve kind of got from the discussions and stuff that…you know, that a lot of people haven’t used them. I thought they had been (laughing)…so, I guess I kind of (relieved sound)…I didn’t know that. We’ve never seen in somebody else’s classroom and what they’re doing, but I kind of thought, you know, I can use that and I feel a lot more confident about using them more and realize that…the majority of the teachers don’t use them all that much right now, as I think that they are…My observation that seems… at least I’ve heard a couple of them in our discussion saying…I haven’t done this and I haven’t done that…and a lot of them said you know, we’ll just go…I’ll just go in and learn with my students and so I guess that’s ok to do, too. (Interview 3, 12/9/2003)

Thus, interacting with other teacher-learners in the online course helped Amy to understand that she might not be as novice as she thought in terms of teaching with technology (see link 4).

These findings gradually convinced Amy that a lot of teachers were at a similar level as her and they were also clueless about what to do. She said:

I think just professionally knowing that…and I’m just right there in the middle, there’s some teachers that do a lot more than I do and there’s some that do a lot
less, and I just, you know, where I felt like I was at the bottom before I started, kind of feeling, you know, I still wanna keep learning more, but I know that there are a lot of other teachers out there feeling the same. We all know it’s really important, but we really didn’t know how to really get it into our classrooms.

(Interview 3, 12/9/2003)

Therefore, she started to feel that she was an intermediate technology-using teacher instead of a novice and gained more confidence in herself.

Practicing on the computerized materials also mediated Amy’s perceptions. As the online course progressed, Amy had practiced some software found in her school and websites either for the course assignment or her own use. She reported that such practice helped her to feel that she knew more about the programs herself. Thus, this activity built Amy’s self-efficacy as well (see link 4).

Amy felt that she was an intermediate technology-using teacher at the first turning point. Therefore, her ultimate goal for herself remained that same, that is, how to further increase her self-efficacy and become an expert technology-using teacher (see link 5). Her solution remained to continue to catch-up. At this stage, Amy seemed to believe that the following learning strategies could help her to pursue a higher proficiency of teaching with technology (see link 6). These learning strategies were: 1) continue to learn from advanced experts, 2) continue to collect resources, and 3) listen to recommendations of other teachers who had the same problems and were at the same level about how to pursue a higher professional in teaching with technology. Some of the same learning strategies were used when she perceived herself as a novice technology-using teacher.
Amy carried out these learning strategies during her learning process (see link 7). First, Amy reported that she continued to listen to experts and to attempt to learn from them when she felt that she was an intermediate technology-using teacher. As the course progressed, Amy started to recognize two advanced technology-using teachers (Sally and Nancy) in the online classroom. Attempting to learn from these experts, Amy continued to listen to them and to approach them with questions. For example, at week 5, she reported that she noticed Sally’s suggestions about how to track students’ learning when they were doing research. She said:

I’d like to give more guidelines. There was somebody [Sally] who said in the discussion board, I don’t know how they exactly do it, that they had some kind of way to have the kids record each day what they actually found and what they looked up. A little more accountability than just being able to get on for the whole period. I’ve got that in there somewhere [resource binder] because I think it’s important. (Interview 2, 11/23/2004)

During the same week, she also read Sally’s assignment and approached her with a question in the online discussion. She stated:

15.9.1: Comment: (0) by: Amy 11/22/2003 10:12:34 PM (2) Your Task was so well written. You are a very good writer and incorporated many of the terms in Chapter 4 and cited many of the main concepts. The Literature Circle/Discussion Forum like VTC [an on-line course space] would be software that would have to be purchased, right? I, too, have enjoyed this way of learning. I will have to take time to check out Blackboard.com, also. (Week 5 Discussion, 11/22/2003)

She continued to report what she learned from “listening to Laurie” at week 6. She said:
At the end, she reported that she was eager to meet with Laurie for more ideas:

...like [Sally], I always, I’m anxious to meet her. I enjoyed what she had to share.

(Interview 4, 12/21/2003)

Thus, as Amy continued to listen to and approach expert technology-using teachers with questions in order to increase her self-efficacy as an intermediate technology-using teacher, she gained more new information and stimuli that might potentially mediate changes in her knowledge, beliefs, and perceptions (see link 7 and link 8). Her learning continued to progress.

Second, Amy also continued to locate recommended resources and to collect them in her resource binder (see link 7). For example, she reported that she wrote down resources others recommended in her resource binder in week 5. She said:

And in Unit 5, I wrote down the path where...I just wrote it down in my own writing, like Nancy recommended the Global Schoolhouse, and Tom Snyder’s Revolutionary War [that] Josh talked about...and it has a website here. And what you recommended was the Global School to reach out to the world and that website. Just whenever I saw something that I thought was pretty useful...I’d copy it. (Interview 3, 12/9/2003)

She also reported that she continued to collect resources from the course library for week 6 and week 7. She said:
..and then I printed out all the stuff from the library (laughing). My binder is actually full of resources…I just printed out…I didn’t actually go to all the websites, but I printed off every section in there that gives the websites. Here is the assessment [week 6 library content]; It talks about the Rubistar, guide for educators assessment, stuff like that, all that. (Interview 3, 12/9/2003)

Thus, by actively using the resources around her, with a belief that collecting more resources was useful for her, Amy approached the sources category for new information and stimuli (see link 7). Her knowledge, beliefs, and perceptions may continue to be reshaped because of the new information and stimuli gained (see link 8). Therefore, her learning continued to progress.

Third, Amy started to pay attention to the suggestions of teacher-learners who were at the same level as she was, and tried to figure out what to do in order to be a more highly proficient technology-using teacher (see link 7). She reported what suggestions she had noticed from reading their suggestions. She said:

[from the discussion]…a lot of them said, you know, we’ll just go…I’ll just go in and learn with my student, and so I guess that’s ok to do, too. (Interview 3, 12/9/2003)

Using such learning strategies, Amy again approached the information and stimuli in the source category (see link 7). Therefore, by interacting with the teacher-learners, she received some ideas about how she could further increase her self-efficacy (see link 8). She concluded that the suggestions the teacher-learners recommended were useful and felt that she could learn to teach with technology by “teaching with technology” (learning
by doing) and learning with students in order to increase her self-efficacy as a teacher-learner of teaching with technology.

Amy thought the suggestion of learning by doing was a good learning strategy and started to carry out this learning strategy in an attempt to further increase her self-efficacy as a teacher-learner of teaching with technology (see link 9). She started to try different technology-using lessons other than the ones she had used before the study in her classroom. For example, at week 7, Amy reported that she had carried out a lesson proposed by the week 5 course readings in her classroom. She reported:

I’ve been having my ESL kids…., we have spelling words this week, and one day, they do it on the computer and I have them work in pairs and this was all mentioned in the book, you know, one would spell it and then we’ll record what they say; it prints off when they’re done and they get their words…before I would have never thought of using the computer like that. (Interview 3, 12/9/2003)

In addition, at week 5, she also attempted to carry out the key pal project and inquired about the possibility of collaborating with one of the teacher-learners in the online course. She said:

15.8.1.1.1:  Thank-you: (0) by: Amy 11/23/2003 9:47:57 PM (4) I came to the same conclusion as you as I read more about Keypals. I would love to talk with you more sometime as I, also, teach 6th grade in a Middle School. It would be fun to collaborate with you about schedules, etc. (Week 5 Discussion, 11/23/2003)

At week 7, she continued to report that she wanted to try to take her whole class to the computer lab to carry out the new inquiry-based technology lesson she had created for her week 4 assignment. She stated:
I have another class, the one that we have to do research and we’re gonna go in
the computer lab on Thursday and Friday, the whole class. And everybody would
go on the Internet and research and I wanna have my list done by then for them to
research culture, I think I’m getting a lot more confident with, you know, trying
these new things. (Interview 3, 12/9/2003)

She explained she wanted to learn to carry out the project by “doing” it and learning from
the experience:

…[We] will go in during the week and they’re working in pairs…they each have
a couple different things they are responsible for finding information [about]…so,
I thought I’d have them sit by each other, but maybe each use their own computer,
then if they’re going to different sites and they find something the other person
needs, they can talk back and forth about it…We have the first day this week, but
just the fact that I did it, I thought that was a big step. I think that because that
computer lab’s been there and I’ve never in four years taken a class down there to
use it, so I thought …that was a big step, I mean, I thought if I take a whole class
in there, I wouldn’t, you know, I’m not feeling like I really knew much, it would
not be a good thing to do…just a matter of saying hey I’m doing this, you know…
just…confidence now to take a whole group of kids to the computer lab and know
that we can do it…and we can learn from it. (Interview 3, 12/9/2003)

During the same week, Amy also reported that she wanted to try the new things that she
had been hearing about and reading about. She reported that she wanted to use the “Type
to Learn” program recommended by a fifth grade teacher at her school with her students
in her advisory class and the WebQuest learned from the online course. She described:
One of my classes go to the computer lab every Thursday now. I’ll go in there and...we’re gonna start with one program called “Type to Learn” and I hope to go out and let themselves get on WebQuest and, anyway, I wanna try...you know, some of these things that I’ve been reading about...(Interview 3, 12/9/2003)

She further explained what she wanted to do with the “Type to Learn” program in her advisory class. She said:

...At the beginning of the year, I had one of the 5th grade teachers come up and show me what she knew about it, and I took notes, but basically it sounds like it’s a program that helps the kids learn...to use the keyboard, and I don’t know much more than...but I know one thing, it sounded like...the lessons build on each other, and because you can progress at your own speed or...So I just thought we would try that because I know that’s on all the computers in there, and then I can kind of see what else is on there and then, I don’t know what, it’s just...it’s not really a content area class, it’s what we call an advisory class...It’s just a class of 6th, 7th and 8th graders...a small group. I have 7th [grade] and the main purpose of it is to get to know the students on a personal level and talk...like today we talked about embarrassment and how you can tell about how people feel...I thought well...maybe one day we could have a study hall...and one day we could go to the computer lab because it’s nice to get on the computer. (Interview 3, 12/9/2003)

She further reported that she could carry out some possible project or use new tools her school had. She said:
…Well you know, I still don’t feel comfortable, like…getting on the web with my whole class, and with, like, another class, so I don’t feel like I’m there yet, or I know in our school…when I had that interview with the technology coordinator in the beginning unit, he said that we have the…I forget what he called it now, but we have the capability to videotape our… is it videotape or, oh, videoconferencing, yeah, we have that and nobody in our school has used it. And they have the equipment to do that. Where I think that way with one class and then we can have an actual [meeting]…we can…take the other class on a screen and interact with them, but I don’t feel…I don’t think…when I’ll be ready to do that, but I could because we have the technology in our school, but I don’t feel ready for that. (Interview 3, 12/9/2003)

She further proposed:

…and the pen pal one sounded really good, but then…I don’t know, that again sounds like it would take a lot of time. Maybe with the class, if I have another class next year that only has like 16 or 17 kids in it, maybe if I started it at the beginning of the class with it, be pen pals all through the year, with a smaller group, but with 28 kids, and only 6 computers, but I don’t think I’m ready to try that, either, and I think it’d be a great idea and it sounds good…I think for my last time, I thought for my culture class that’d be great, if they could talk with somebody in that country that would be great. (Interview 3, 12/9/2003)

Thus, Amy came up with more and more ideas of what projects she wanted to try in her classroom and learning to carry out some of her ideas out by “doing” it. She took actions to try out new activities and approach her teaching practice category based on her beliefs.
of what could prepare her to be a higher proficiency technology-using teacher after interacting with other teacher-learners in the (see link 9). Therefore, when Amy tried out the activities, she then gained opportunities to reflect upon what she found and then triggered possible changes for her knowledge, beliefs, and perceptions (see link 10). Therefore, her learning process continued to progress.

In addition to learning by doing, Amy also carried out the learning strategy of learning from students in her classroom in an attempt to increase her self-efficacy. She reported that she had her students try out some of the computerized materials and observed their reactions. For example, she reported that she had the student who was very good at computers try to load Reader Rabbit and Edmark Imagination at week 4 and 5. She also reported that she had the same student try some computerized materials further discovered in her classroom and observed what she could do with the software programs she had in her classroom in week 6. She said:

…The software that I have in my classroom, you know, that was mentioned in our course during these past two months…I realize I have something really good here, so my students used…one of them last week to write a story for English, he’s real good with computers and he thought that he would use a program called the Writing Machine, he got it out and put it on, he loaded it on the computer and he wrote his story from that … They had to write a Christmas story and he wrote his on… using that software. [It] came out with a picture on it, when it printed out, it folded in four so it looked like a special little book…anyway, so his picture story had pictures in it from the computer and it folded in fours and opened up like a book. (Interview 3, 12/9/2003)
Thus, her use of learning strategies again helped her approach her teaching practice category based on her beliefs of what could prepare her to be a higher proficiency technology-using teacher (see link 9). Similar to the consequences of using other learning strategies, Amy then gained opportunities to reflect upon what she found and then triggered possible changes for her knowledge, beliefs, and perceptions (see link 10).

The positive experience of having her students try the software program convinced Amy that learning from her students was a wise way to learn about the computerized materials she had (see link 10). She reported that she further had her top student try a math website and listened to his opinions in week 7. She reported:

I have a couple math web sites that I picked out that I gave to my top kids last week. One of the guys said, well, you know, he did it the whole time, but he said that the problems were either too easy or they were too hard. I guess that’s kind of a tricky thing, too...finding out software or the site that can zero right in where they’re at and then get harder… So, I still feel like I… I guess I like to know exactly what they’re doing and I don’t yet… with the web, you know, I don’t really know what exactly is on the web site or the software that I give them, so I either just have to give it to them and then listen to their comments… but it’s still good practice, a little bit of review doesn’t hurt either. (Interview 4, 12/21/2003)

It seemed that Amy felt much more comfortable with learning with students and from students as the study progressed. She felt that the feedback and the observations gained from the students helped her to understand about how to teach with technology and the appropriateness of computerized materials.
Amy reported that her experiences observing students test computerized materials convinced her that it is okay for her not to be an expert in her classroom. She reported that she was not afraid of asking her students questions when she had problems with computer technology at end of my study (see link 11). She reported:

I think it’s given me a lot of self-confidence in using computers I didn’t have at all before and I found, though, I have a lot to learn, but I feel like I have…more confidence to just get on the computer with the kids and try things, you know, but more to do that and it’s good to learn with them, so I don’t have to know everything… I think it’s best that you do know it, but, I mean, I found I can learn a lot from interacting with the students, too, while they’re using computers.

(Interview 4, 12/21/2003)

Therefore, as Amy continued to hear and reflect upon her students’ feedback in her teaching practice, her knowledge, beliefs, and perceptions of teaching continued to be shaped (see link 12). Therefore, her actions allowed her to alter and expand her knowledge, beliefs and perceptions. If Amy continues to use various learning strategies with the goal of increasing her self-efficacy, it is possible that the consequences of her actions will continue to mediate her thinking and, thus, her knowledge, beliefs and perceptions of teaching with technology may then be reshaped many times. If this is the case, Amy’s learning may continue to progress.

Second Turning Point: Becoming an Expert Technology-Using Teacher. The link 13 to link 14 in Figure 4 presents the second turning point of Amy’s learning process for increasing her self-efficacy. At week 7, Amy seemed to start to perceive herself as an expert technology-using teacher in her school. In a meeting with her colleagues for the
school improvement project, she noticed that many teachers had not used as much technology as she thought they had been and seemed to need some ideas to include computer technology for the math curriculum they were building (see link 13). Amy reported that she helped the technology part in the school improvement program at the end of this study (see link14). She said:

In that [math] group, when we've met, technology was brought up, you know, what we can do in our school to help math as far as technology. One of the teachers that just teaches math, he was talking about how we are all set up for accelerated math in our school but nobody uses it… That's what we talked about, you know, what technology could we have for our school as far as math, that would be a help to all our kids? (Interview 3, 12/9/2003)

From the conversation with her school teachers, Amy started to realize that she was capable of giving suggestions in terms of implementing plans of teaching with technology. Thus, she seemed to perceive herself as an expert technology-using teacher in her school. Therefore, as teachers asked for more help, her next question could be how to help these teachers to understand and to gain more knowledge about teaching with technology. Amy’s learning continued to shift.

Lessons Learned

In the previous section, I reported Amy’s learning process as an active agent with the ultimate goal of increasing her self-efficacy. Two turning points were observed. The study results suggested that Amy perceived herself as a novice technology-using teacher at the beginning stage and an intermediate technology-using teacher at the first turning point. In addition, Amy started to perceive herself as an expert technology-using teacher
in her school context at the second turning point. At each turning point, Amy generated solutions and learning strategies for her professional growth. In order to catch up with experienced technology-using teachers at the beginning stage, Amy listened to and learned from them. She also collected resources, recommendations and suggestions that she perceived as useful for her. The same learning strategies were used when she perceived herself as an intermediate technology-using teacher. One new strategy (listening to teachers who were at the same level as her) was added for her to further pursue her professional growth. Thus, two learning strategies were generated when she took teacher-learners’ suggestions for her further development. By learning with students and learning from students, she was able to understand the results of her teaching experiments and to gain more knowledge and reshape her beliefs.

Approaching sources and teaching practice, Amy was able to use the information and stimuli mediated to change her self-efficacy. In other words, as an active agent who used varies learning strategies, reflections of new information and stimuli allowed Amy to gain knowledge, shape her beliefs, and refine her perceptions. Her learning processes then shifted. Taking an active role in her learning, Amy continued to grow.

Chapter Summary

Chapter 4 presented the descriptions of the study case, concepts and categories that are important to the study results and Amy’s learning process as an active agent. The background of the study participant, her teaching experience, her education and experience of teaching with technology, and her teaching context were described. The definitions and explanations of categories that were important for the purpose of this study were discussed. Two categories that emerged from the study data and related to the
learning ends were stated (i.e., teacher concerns, ultimate learning goals). Six major categories that emerged from the study relating to teacher learning processes were presented (i.e., solution, teaching practice, source, teacher beliefs, knowledge and perception, mediation and learning strategy). Finally, because the teacher-learner’s ultimate learning goals were closely related to the perspective of teacher-learner as an active agent in this study, the study participant’s learning processes aiming toward overcoming her teaching challenges and increasing self-efficacy were presented.

An understanding of teacher learning processes was developed from the study data. First, from the study results, I realized that teacher learning process is an interactive and ongoing change process. The four categories relating to teacher learning processes, solutions, teaching practice, source, and teacher beliefs, knowledge and perceptions, were constantly shaped and reshaped. The changes could be because the teacher-learner in this study was actively using the mediation results or was developing/using learning strategies to prepare herself for the solutions she had in mind at the time. In other words, the change in solutions, teaching practice, source, and teacher beliefs, knowledge and perceptions may mediate the other categories with one another. In addition, the interconnections between solutions, teaching practice, source, and teacher beliefs, knowledge and perceptions were connected by mediation and learning strategy links. While the teacher-learner in this study used the results of the mediation and the learning strategies she developed, she was able to gain new information and stimuli for her next learning cycle.

Second, as an active agent in her learning process of teaching with technology, the teacher-learner in this study actively participated in the decision making process of what she wanted to learn or focus on based on self-generated solutions. She also
developed learning strategies and used them to prepare herself for the solutions she had in mind at the time.
CHAPTER FIVE

CONCLUSIONS, DISCUSSIONS AND IMPLICATIONS

Introduction

This chapter concludes and discusses the findings of this dissertation. Recommendations for future studies and for instructors and course developers are discussed below as study implications.

The purpose of this study was to explore the processes of teacher learning in the use of technology for their instruction. The study emphasized the behaviors/actions/thinking of teacher-learners in the process of their learning. Viewing teacher-learners as active agents in their learning, I explored how one teacher-learner approached her learning and how she experienced her learning process of teaching with technology as an active agent. Using a qualitative case study approach, I documented the process of teacher learning by using field notes, interviews, a questionnaire, and documents.

Based on the results of data analysis, I developed several understandings about teacher-learner processes. These understandings are:

- **Understanding 1**: Teacher-learners bear ultimate self-generated learning goals in mind while learning to teach with technology.

- **Understanding 2**: Teacher-learners approach their learning by setting ultimate learning goals, developing solutions, learning plans and learning strategies for their ultimate learning goals, and by reshaping solutions, learning plans and learning strategies.

- **Understanding 3**: Teacher learning is an ongoing process that consists of changing focus on solutions and self-efficacy, and an interactive process containing the interplay and interaction of multiple factors.
Each of the understandings is summarized and discussed below.

Summary and Discussions

**Understanding 1:** Teacher-learners bear ultimate self-generated learning goals in mind while learning to teach with technology.

In terms of the end of teacher-learning, the study data suggested that the teacher-learner in this study bears ultimate self-generated learning goals in mind while learning to teach with technology. As mentioned in Chapter Four, these ultimate self-generated learning goals include: 1) overcoming teaching challenges, and 2) increasing self-efficacy.

The preliminary findings in the pilot study also suggested that teacher-learners approach their learning with ultimate self-generated goals. Such goals were understood as learning focuses in the pilot study. For example, one of the cases in the pilot study, Laurie, reported that she wanted to fulfill her school administrations’ expectations in her school contexts. Therefore, achieving her school administrations’ expectations about the standardized tests became her learning focus while learning to use technology in her instruction. The other case, Cindy, however, reported that her ultimate learning goal was to equip herself with computer skills. Her learning focus was very different than Laurie’s.

**Goal Setting**

The results that teacher-learners acquire with ultimate self-generated learning goals echoes Hughes’ (2003) study findings in which teacher-learners “play a vital role in choosing and experiencing technology learning” (p. 13). Roe (2004) also reports that the literacy teacher who participated in her study advanced her professionals with a “personal intent.” In other words, teacher-learners do not learn as empty vessels, but with primary thoughts about what they want to take away from professional learning. Therefore, the omission of teachers’ inclusion in
deciding learning goals can be problematic because teacher-learners and teacher educators often come with respective perspectives and different values about “good ideas” and “good practice” (Connelly & Clandinin, 1988). As embedded in “two highly different educational contexts: the ‘ivory tower’ of the university and the ‘trenches’ of the school building and its individual classrooms” (Sugrue & Day, 2002, p.49), it is not surprising that a dichotomy often exists between practitioners’ learning goals and teacher educators’ curriculum goals. However, by ignoring the role of teacher-learners’ self-generated learning goals in their learning process, researchers and teacher educators may be disregarding an essential component in understanding teacher-learners’ interpretations about what can be useful and meaningful for them. Therefore, more research needs to be done to understand teacher-learners’ self-generated learning goals.

Role of Teacher Concerns

Teacher-learners’ self-generated goals are important in understanding their learning process. Factors that constitute teacher-learners’ goals are important to discuss. The study data suggest that teacher concerns (i.e., things they worry about or the challenges they face) have a role in the development of teacher-learners’ ultimate learning goals. For example, Amy established her ultimate learning goals (e.g., overcoming teaching challenges, increasing self-efficacy) because of her teacher concerns (e.g., her teaching challenges and her self-efficacy as a technology-using teacher). In other words, while concerned about her ability to teach a multi-level class and her ESL students, and her self-efficacy in using technology, Amy aimed at improving her teaching professionalism in these two aspects; therefore, she developed her ultimate learning goals by aiming toward her needs.

The preliminary results of the pilot study also suggest that teacher-learners’ ultimate learning goals stem from teacher concerns. In Laurie’s case, for example, she was mainly
concerned about her school administrators’ expectations about student achievement in the standardized tests. Therefore, her ultimate learning goals aimed at preparing herself to better teach her students to gain higher scores on the standardized tests. On the other hand, Cindy focused on equipping herself with computer skills while mainly concentrating on her computer competency. Thus, the results of the current study and the pilot study both support that teacher concerns play a vital role in the development of teacher-learners’ ultimate self-generated learning goals.

This finding expands my understandings regarding the role that teacher concerns play in teacher-learners’ professional learning. As teachers in a changing society, the teacher-learners in this study and in the pilot study are facing new challenges and/or are having worries regarding their teaching (i.e., teacher concerns). As mentioned in Chapter Two, learning to teach is like solving a puzzle (Elbaz, 1981, 1983, 1991; Shulman, 1986b, 1987, 1990). As one piece of the puzzle shifts, the rest of the pieces need to be readjusted and refined meaningfully so that students can benefit from their lessons. However, the challenges of constructing the puzzle may be perceived differently because “teacher involvement in personal development depends on the assumptions and images teachers have of that development” (Tuohy, 1999, p. 153). Therefore, understanding how teacher-learners perceive their challenges and concerns within their specific context may be useful for researchers and teacher educators to predict the possible learning goals teacher-learners pursue. Further research needs to be conducted to capture the types of teacher concerns that teacher-learners might have in their specific contexts.
**Understanding 2:** Teacher-learners approach their learning by setting ultimate learning goals, developing solutions, learning plans and learning strategies for their ultimate learning goals, and by reshaping solutions, learning plans and learning strategies.

This study investigated the teacher-learner’s role as an active agent. From this perspective, the study data indicated that the teacher-learner in this study established self-determined goals and self-generated learning strategies for her learning. In other words, as an active agent in her learning process of teaching with technology, the teacher-learner in this study actively and constantly participated in decision making processes of what she wanted to learn or focus on based on self-generated solutions. Learning strategies were developed and utilized to prepare herself for the solutions she had in mind at the time. Therefore, it can be seen that teacher-learners are constantly reshaping and refining their solutions, learning plans and learning strategies during their process of learning. In Amy’s case, she did not adhere to the same solutions, learning plans and learning strategies she originally anticipated, but continued to modify those solutions, learning plans, and learning strategies throughout her process of learning.

The results of the current study answered the questions reflected in the pilot study, e.g., how teachers approach their learning while learning to use technology in their instruction. The pilot study suggested that teacher-learners learned to teach with technology with their personal focuses in mind. However, the pilot study did not deal with the processes by which teacher-learners approach their learning with their learning focuses. Yet, the current study explored how teacher-learners learned with their learning focuses in mind, and discovered that teacher-learners come up with solutions, learning plans, and learning strategies aiming on their learning focuses. In addition, the study also expanded my knowledge about the corresponding relationships among
ultimate learning goals, solutions, learning plans, and learning strategies, including the shifts in learning solutions, modified learning plans, and the strategies they use.

Teacher Learning Perspective: Self-Regulated Learning

The understanding regarding how teacher-learners approach their learning provides a different aspect to recent research that mainly focuses on teacher-learners as passive information receivers. The development of ultimate goals, solutions, learning plans, and strategies illustrates teacher-learners’ control in the process of their learning. While solutions, learning plans and learning strategies are developed, the contents of focus are then determined. As recalled by Amy’s process of learning, at one point, Amy did not follow the course instructions, but conducted learning activities to gain information for her personal urgent needs (e.g. research about the Reader Rabbit software program for her ESL students). Thus, learning takes place with choices rather than mandates. Such understandings shed a light on Zimmerman and Schunk’s (2001) “self-regulated learning” that promotes the idea that learners have a role in mastering their own learning process. Thus, teacher-learners’ role in their learning process cannot be ignored while attempting to understand their learning process. Being aware of the choices teacher-learners have made helps to answer questions such as why they only focus on some course content or use some curriculum materials but not others.

Amy’s case not only illustrated teacher-learners’ power of controlling their learning, but also demonstrated that, as with other learners, teacher-learners can be self-regulated metacognitively, motivationally and behaviorally (Zimmerman, 1990). As Amy “plan[ed], set goals, organize[d], self-monitor[ed], and self-evaluat[e]d at various points during the process of acquisition” (Zimmerman, 1990, p. 4-5), she became involved in her learning metacognitively. Showing high intrinsic interest in carrying out her learning plans, she engaged in her learning
process motivationally. Behaviorally, she made decisions to participate in the available learning environments and used various learning strategies to optimize her learning environments (e.g., creating opportunities for social interaction, observation, inquiry, reflections and etc.). Therefore, Amy was “metacognitively, motivationally and behaviorally [an] active participant in [her] own learning process” (Zimmerman, 1989, p. 329) and had “…self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals” (Zimmerman, 2000, p. 14).

From the perspective of viewing teacher-learners as active agents, self-regulated learning may be a useful framework for studying teacher-learners’ activeness and involvement in their learning processes. Instead of viewing learners who are merely influenced by external factors or as individuals who learn by themselves without any contact with the environment, the use of this framework can help to bridge the common socio-cognitive gap that exists in the current literature. As Butler et al. (2004) stated:

While a COP (Community of Practice) framework suggests that practitioners’ goals should be connected to authentic activity, models of self-regulated learning elaborate how learners, individually and/or collectively, can adaptively and dynamically, adjust performance in situ to achieve desire, authentic goals (p. 439-440)

That is, understanding how individuals strategically adapt within an environment to achieve authentic goals helps researchers to oversee how teacher-learners’ cognitive thoughts interact with contexts and how their metacognition, motivation, and behaviors act on their authentic contexts. Therefore, what takes place in their learning process can then be fully observed and captured.
**Understanding 3:** Teacher learning is an ongoing process that consists of changing focus on solutions and self-efficacy, and an interactive process containing the interplay and interaction of multiple factors.

The study data suggested that the teacher learning process is an ongoing, changing, and interactive process. Two major ongoing changes that took place during Amy’s learning process were changes in solutions for her teaching challenges and changes in self-efficacy of teaching with technology. In both ongoing changing processes, Amy underwent two turning points. Therefore, she conceptualized individual learning as her initial way of teaching with technology for her teaching challenges, modified it to using a balance approach, and finally reshaped it to having students interact in groups around computers. Her self-efficacy also changed from perceiving herself as a novice technology-using teacher to an intermediate technology-using teacher, and finally to an expert.

As changes are undergone, it is important to understand how and why factors that play a part in the changes took place. Besides teacher-learners themselves, the study data concluded that many other factors have a role in the ongoing changes in the teacher learning process. However, no single factor resulted in Amy’s changes in solutions and in self-efficacy. Teaching practice, teacher knowledge, beliefs, and perception, along with all other sources, have a role in teacher-learners’ ongoing change. Discovering that students are often positive about technology, believing that the use of technology is beneficial for teaching, having some knowledge about choosing a good software program, and gaining stimuli regarding the definition of educational technology from the online course all helped Amy to undergo her first turning point and shifted her solution to using a balanced approach. Therefore, because changes that occur in one factor trigger changes in another, the interconnected relationships between teaching practice, teacher
knowledge, beliefs and perceptions, and sources cannot be ignored. Thus, changes in teacher knowledge, beliefs, and perception, changes in teaching practice, and changes in sources all have a role in the changes in solutions and self-efficacy. Therefore, their interactivity constitutes the ongoing changes in teacher learning process.

**Sequential Stage or Multiple Pathways**

Consistent with the longitudinal study of the Apple Classroom of Tomorrow (ACOT) (Ringstaff et al., 1996; Sandholtz & Ringstaff, 1997; Sandholtz et al., 1997), the teacher-learner in this study had some similar learning experiences with teaching with technology. However, Amy did not experience the ACOT phases sequentially, as did the ACOT participants (see Appendix G for a description of ACOT’s Five Phases of Technology Integration). For example, Amy encountered resource management problems and was concerned about operating some software programs, and used the computer for grading tasks (as in the ACOT Entry Phase); reported that students produced more with the computer (as in the ACOT Adaptation Phase), sought telecollaboration project opportunities, carried out an in-class inquiry-based project by incorporating websites (as in the ACOT Appropriation Phase); encouraged students to ask questions, interact with each other, and encouraged students to serve as experts in assisting peers with technology issues (as in the ACOT Invention Phase). However, the study data suggested that before the study started, Amy had already reported that she valued social interaction and expected students to ask questions in her class (as in the ACOT Invention Phase). Therefore, it was not until Week 4 of the study that she started to encounter resource management problems as the information piled up (as in the ACOT Entry Phase). In addition, while Amy was planning to conduct her first teacher-guided inquiry-based project with an incorporation of websites (as in the ACOT Appropriation Phase), she had expected some of her students to be experts in her
classroom (as in the ACOT Invention Phase). Also, Amy had not taught her students about computer skills (as in the ACOT Adoption Phase) and had never used the computer as a reward or for free time activity in her class (as in the ACOT Entry Phase). Thus, it seems that Amy’s learning process of teaching with technology did not progress with ACOT’s sequential learning phases.

Amy not only ran through a different process than the ACOT participants, she also had some experiences that ACOT participants did not encounter. For example, Amy explored all the available resources around her, focused on the content of the computerized materials (e.g., software programs and websites), used computerized materials that were available in her school (e.g., skill-based, project-based, curriculum-based), and became convinced that the computer is a motivational and positive device based on students’ reactions. In addition, she recognized that technology could be a replacement for teachers, as an alternative approach, and that it was a tool in her process of learning. Moreover, she used the criteria learned in the online course to evaluate many computerized materials and developed a filing system to manage resources. Furthermore, she adopted the technology-integration examples learned from the online course readings, her colleagues, and other teacher-learners in the online class and tested them in her own classroom (e.g., she had students interact around computers using a word processor). Finally, she had her students try out software programs she was not familiar with, and expected to learn with/from them. Thus, Amy’s learning process challenges the ACOT participants’ sequential learning phases in terms of teaching with technology.

Although one case cannot reject the theory generated from the ACOT study, as a researcher, one must question whether every teacher needs to go through the phases in the ACOT study sequentially while learning to teach with technology. As illustrated in Chapter Four, Amy
entered her learning process with a set of prior knowledge and past experience in terms of teaching and technology. With this set of knowledge and experience (e.g., teaching experiences with multi-level students and ESL students, knowledge of teaching methods, experience with using technology with students), she perceived her specific teacher concerns (e.g., her current teaching challenges and needs) and then used her concerns as a guide to generate her ultimate goals. Aiming toward her goals, Amy then went through many learning instances, drew solutions, set learning plans, carried out learning events (e.g., observation, teaching practice, reflection, inquiry, reasoning, and social interaction) and constantly reshaped her solutions, learning plans, and learning strategies. Thus, her learning departures from 1) her prior knowledge and learning experience, 2) teacher concerns, 3) self-generated goals, evolved toward 4) the generation of solutions, learning plans, and learning strategies, and then progressed along with 5) multiple stimuli, new information, and knowledge and learning events (interchangeably), and then 6) the reshaping of solutions, learning plans, and learning strategies. Therefore, Amy experienced the pathway 4) to 6) continuously and cyclically.

The teachers in Hughes’ (2000; 2003) research demonstrated similar learning processes as Amy. They started their learning from 1) the individual (i.e., prior knowledge and past experience), moved to 2) an initial learning experience (i.e., as stimuli in Amy’s case), and then proceeded to 3) reflection, 4) exploration, 5) technology use, 6) evaluation, and 7) rejection interchangeably (i.e., as learning events in Amy’s case). Therefore, while embedded in different contexts of learning, participants did not take the same pathways. Some of them may have experienced 5) technology use first before they went through 4) exploration. Yet, aligning with Hughes’ research, this study supports that teacher-learners can experience different phases than
those of the ACOT participants and can follow multiple pathways in their learning process. As Freeman and Richards (1996a) emphasized about the nature of professional development, Individual teachers follow particular routes in the development of their pedagogical knowledge and skills, depending on their individual views of language, teaching, learning, and their changing understanding of themselves, their learners, their subject matter, and the nature of second language instructional tasks (p.6).

Thus, this finding may encourage researchers to explore teacher-learners’ learning process by thinking beyond ACOT’s existing framework or parallel frameworks (e.g. Gene Hall’s Concern-Based Adoption Model), rather than merely placing their study data within it. Since much research about teaching with technology often limits study data within these frames (Angers, 2004; Atkins & Vasu, 2000; Bitan-Friedlander, Dreyfus, & Milgrom, 2004; Martin et al. 2003a, 2003b; Mills & Tincher, 2003; Rakes & Casey, 2002) or abuses the criteria in the framework without considering the reliability issue or evaluating the data critically (see analysis in Cheung, Hattie, & Ng, 2001), researchers may face the danger of reaching a flawed conclusion or failing to consider alternative data. Exploring teacher learning process beyond these frameworks may allow researchers to visualize the ambiguous events during teacher learning, to understand how prior knowledge and past experience shape the process of learning, to document uncertainty while undertaking the reshaping process, and to capture how the use of multiple pathways can alter teachers’ learning process of teaching with technology.

In addition to questioning the sequential learning process of ACOT, this study also questions ACOT’s conclusion that 1) experiencing the use of technology alters teachers’ beliefs about student learning and teaching approaches 2) teachers’ use of type of technology have a sequential order starting from a) teacher production and management and teacher-directed drill-
and-practice b) student production c) use computer for project-based activity 4) teaching with computer combining other technologies.

**Source of Change: The Interplay and Interaction among Multiple Factors**

Besides documenting the learning process of teaching learning, this study also reported interactivity in the teacher learning process. This aspect draws attention to the interplay and interaction among multiple factors and concludes that their interplay and interaction served as a catalyst for Amy’s ongoing change in her learning process. Recalling Amy’s case, no single factor resulted in Amy’s changes in solutions or in self-efficacy. Teaching practice (e.g., in-class teaching experiment), teacher knowledge, beliefs, and perception, and sources (e.g., members, learning events, and learning environments) all had a role in her ongoing change. For example, while carrying out her teaching practice in school, Amy often reflected upon her experiment and discussed it with the teacher-learners in the online classes. Meanwhile, she was constantly involved in a reasoning process to examine her beliefs, perceptions and knowledge. Therefore, her teaching practices, reflections, reasoning and social interactions took place at the same time, and their interplay gradually shifted her knowledge, beliefs and perceptions, helping her to modify her solutions, learning plans and learning strategies. Therefore, unlike current research that suggests that a single factor (e.g., one member, one event, one learning environment, or one learning incident, or one teacher education program) (Albion, 2001; Francis-Pelton et al., 2000; Joia, 2001; Leh, 2002; Milbrath & Kinzie, 2000; Mitchem et al., 2003; Spencer & Logan, 2003; Wepner & Tao, 2002; Wepner et al., 2003; Yildirim, 2000) influences the process of teacher learning, Amy’s learning process demonstrates the dynamic and interactive relationships among multiple factors.
This finding concurs with Roe’s (2004) case study of one literacy teacher’s professional
development. Roe discovered that the learning of the literacy teacher, Mandy, involved a
“seamless interplay of events.” She reported,

To summarize, Mandy was not singularly influenced by one staff development initiative
or a series of staff development events. While we may want to place something in the
limelight, Mandy’s experience charts a different course. Instead, she acknowledges a
conflux of influences that serve as catalysts for professional learning: dialogue,
colleagues, district and state initiative, LSDT, and her theoretical and practical
framework. (p. 54)

Therefore, as teacher learning includes interplay and interaction among multiple factors,
professional development can no longer be viewed as a result of one stimulus or one factor
(Putnam & Borko, 2000). Thus, future research needs to better understand how related factors
intersect and what their continuous interactions provide to teacher-learners multidimensionally in
their process of learning. In this case, the role of each factor can then be captured and described.
Researchers can then understand their co-influences on the process of teacher learning from
multiple aspects.

The Role of Relativity

It is not surprising that Amy gained increasing confidence about teaching with
technology as she was taking the online course, and as she practiced and gained more knowledge
about computer technology tools. Recent research has already recognized that taking a course
can increase teachers’ self-efficacy of teaching with technology (Knezk et al., 1996; Yildirim,
2000). However, the finding of this study suggests that such statements need to be reexamined
more critically. Assuming that taking a technology course is the only factor that results in the increase of self-efficacy can be misleading.

This study indicated that “relativity” played an important role in the increase in Amy’s self-efficacy. In fact, Amy rated her self-efficacy of teaching with technology by comparing her own ability with others based on her own assumptions about them. Her self-efficacy grew with the meanings perceived from the learning community, students, and school members in terms of where she was at as a technology-using teacher compared to the others. As a reminder, Amy perceived herself as a novice technology-using teacher because of her age. She compared herself with the younger generation and assumed they knew more than she did because the “younger generation is a lot more comfortable with computers.” However, after discovering that many teachers were facing the same problems and had only limited knowledge about technology and using lessons incorporating technology, or that many teachers knew less than she did, she reevaluated herself as an intermediate technology-using teacher.

It is obvious that a teacher would not be able to become an expert technology-using teacher within an eight-week class. However, looking through the lens of relative ability, such a conclusion is possible. After taking the course, Amy participated in a meeting and discussed a school improvement project with her colleagues in her school. In the meeting, Amy realized that most of the teachers in her school had not used much technology, as she thought they had. Therefore, relatively, she perceived herself as an expert technology-using teacher who was able to give suggestions and advice to other teachers in her school.

From Amy’s learning process about self-efficacy, it seems logical to claim that teachers’ self-efficacy is a relative result from comparing with others rather than a definite ability indicator. One cannot deny that having confidence is important in some way, because it encourages
teachers to test their practice theories of teaching with technology and to discuss their practice with others actively. However, it might be dangerous if teacher educators or researchers were to use self-efficacy as the only indicator to rate ones’ ability of teaching with technology. As Kotrlik and Redmann (2005) reported in their descriptive study, teachers perceive that they are effective regardless of whether they have integrated technology or if they are encountering barriers. From this standpoint, it might explain why some teachers are still unable to carry out meaningful technology-using lessons even though they claim they are confident to do so or believe they have high self-efficacy of teaching with technology. Although more research needs to be done to confirm the influence of “relativity” to teachers’ self-efficacy, in future research careful interpretations about the increase of teachers’ self-efficacy is essential. In addition, the use of self-efficacy for participant selection may need to be accommodated with other approaches.

**Crucial Factors for Continuous Growth: Relevant Stimuli and Self-Generated Learning Opportunities**

Although multiple factors come into play for teacher-learners’ ongoing change, this study discovered two crucial factors for their learning continuation. First, the learning process can be fossilized if no relevant stimuli are provided from the teaching practice or the source. For example, although Amy received new information from the source (e.g., her friends told her that teaching would be very different for her when she returned to teaching) and the teaching practice (e.g., the student demographic had become very different), she did not feel that she needed to do anything different until the third year of her teaching because her teaching “worked.” In other words, these two stimuli were not relevant for her at the time. Thus, Amy’s learning process was fossilized and she had no intention of advancing her professional status. However, when her
teaching did not “work” anymore (i.e., a new stimulus in teaching practice) at the third year of her teaching, she then felt that she needed to make some changes in her teaching. Therefore, as such stimuli were relevant to Amy, she was encouraged to advance her professional teaching status. Another example is that Amy felt she only needed to learn about computerized materials at the first round of her learning process. When the online class started, all of her attention was on the computerized materials. However, when receiving new knowledge in regard to the role that technology can play in education, Amy gradually realized that its use cannot be abused. Therefore, if Amy had not received relevant stimuli (i.e., the role of technology in this case), it is possible that her learning would have continued to focus on computerized materials. Thus, Amy’s learning might not have shifted and her solutions might have become fossilized.

Although relevant stimuli are crucial for the continuation of teacher learning, teacher-learners’ active use of new information, knowledge and stimuli also creates lifelong learning opportunities. For example, during her process of learning, Amy actively used the new information, knowledge and stimuli gained from her learning experience. At one point, Amy read about the Edmark software program in the online course readings. Instead of putting the name of the software aside, she started to look for the program. She later discovered the program in her classroom and explored it. By doing so, Amy’s knowledge about the software program expanded. Now she not only knows the name of the software program, but also understands more about the content of the program.

Along the same line, while gaining stimuli from the course content about different ways of teaching with technology (e.g., having more than one student interact around the computer together), Amy reexamined her solutions and learning plans by taking the new knowledge gained into consideration. Therefore, she used the new knowledge gained as a reference to modify her
solutions and learning plans. Therefore, the use of the new knowledge gained provided her with a different pathway for her learning goals. In addition, she also took some teacher-learners’ suggestions into account in order to further her ability of teaching with technology. In addition to her original strategy, learning by herself, she took other teachers’ advice and started to carry out a “learning by doing” strategy. She reported her use of this learning strategy in the online class and continued to reflect upon the stimuli gained from her experiment.

For Amy, the information, knowledge, and stimuli she gained from her learning experience are not merely one-shot objectives. Instead, they serve as references for her further learning applications. Therefore, her active use of this feedback allows her to expand her knowledge, to further her understandings, and to reexamine her learning plans and solutions. As Dewey emphasizes, “…we do not just learn by doing; we learn by thinking about what we are doing” (cited in Shulman, 2004, p. 514). That is, interacting with members, conducting learning events, and being involved in learning environments is inadequate for learning. Teacher-learners’ active use of the information, knowledge, and stimuli gained from their learning experiences (e.g., interaction with members, learning events, and learning environments) is also essential for their further professional growth. Thus, more research needs to be done to understand crucial content factors for teacher-learners’ continuous growth.

Recommendations for Future Research

Drawing from the discussion of the findings of this study, nine aspects are recommended for future studies about teacher learning. They are: 1) teacher-learners’ self-generated learning goals; 2) the influence of teacher concerns; 3) teacher control; 4) thinking beyond ACOT’s existing framework; 5) interplay and interactions among multiple factors; 5) the careful
interpretation and use of self-efficacy; 6) learner differences; 7) culture; 8) experience of teaching with technology; and 9) the process of becoming mindful technology-using teachers.

**Teacher-Learners’ Self-Generated Learning Goals**

As the study reported, teacher-learners use their self-generated learning goals as a guide for their learning. By neglecting the role of teacher-learners’ self-generated learning goals in their learning process, researchers and teacher educators may be disregarding an essential component in understanding teacher-learners’ interpretations about what can be useful and meaningful for them. Therefore, more research needs to be done to understand the types of learning goals teacher-learners might have and the meaning self-generated learning goals bring in to teacher-learners’ process of learning.

**The Influence of Teacher Concerns**

Teacher-learners in the current study and in my pilot study seem to address different teacher concerns. This finding is confirmed by the research of Egbert et al. (2002) which suggested that teacher-learners would only learn what they need. However, how do teacher-learners who have different concerns approach their learning? Is it possible that teacher-learners do not have any concerns? For example, what if they perceive themselves as expert teachers and do not find any challenges or inadequate skills to fulfill? How does this influence their learning or their engagement in their learning processes? How do teachers with different concerns or teachers with no concerns respond to the training curriculum and act in the course?

**Teacher Control**

As discussed earlier, teacher-learners have a role in mastering their process of learning. In this case, self-regulated learning that believes learners’ control might be a useful framework to explore how teacher-learners approach their learning as active agents. With the use of this
framework, researchers can then capture how individuals strategically adapt within an environment to achieve authentic goals in their specific contexts. For example, how do teacher-leaders’ cognitive thoughts interact with contexts? How do their metacognition, motivation, and behaviors act on their authentic contexts?

Thinking Beyond ACOT’s Existing Framework

As discussed earlier, the study findings reported that teacher-learners may not learn to teach with technology by following ACOT’s sequential phases. In addition, they may take multiple pathways during their learning process. This finding encourages researchers to explore teacher-learners’ learning process beyond ACOT’s existing framework, rather than limiting their study data within it. Exploring the teacher learning process beyond ACOT’s framework allows researchers to capture possible missing pieces and to expand understandings of how things are changed, and why. For example, what ambiguous events may take place during teacher learning? How do prior knowledge and past experience shape the process of learning? What uncertainties might teacher-learners encounter? How could the use of multiple pathways alter teachers’ learning process of teaching with technology?

Interplay and Interaction of Multiple Factors

The study data reported that the interplay and interactions among multiple factors serve as a catalyst for teacher change. These findings encourage future research to better understand the co-influences on the process of teacher learning from multiple aspects. For example, how do related factors intersect, and what do their continuous interactions provide to teacher-learners multidimensionally in their process of learning? What is the role of each factor?
The Careful Interpretation and Use of Self-Efficacy

This study discovered that “relativity” has a role in the increase of teacher-learners’ self-efficacy of teaching with technology. Although more research needs to be done to confirm the influence of “relativity” on teachers’ self-efficacy, in future research careful interpretations about the increase of teachers’ self-efficacy is essential. In addition, the use of self-efficacy for participant selection may need to be accommodated with other approaches.

Learner Differences

The teacher-learner in this study was an active and serious learner who devoted a great deal of time to her coursework and to her teaching contexts. Her passion for equipping herself to be a highly proficient teacher of teaching with technology was obviously very high. For example, she spent a lot of time reading other teacher-learners’ and the course instructor’s postings and interacting with them in the online discussion. She also put a tremendous effort into the course assignment and carefully read the assigned course texts as well as taking an active role in her teaching contexts searching for what she wanted to know. However, comparable to other learners, it can be noted that some teacher-learners can be less engaged and active in their learning. With this learning difference, does that mean their learning process is often discontinued? Do they also play an active role as the teacher-learner in this study in some way?

Experiences of Teaching with Technology

One interesting aspect of this study is that the study participant seemed to interact with teacher-learners who had different experiences with teaching with technology. During the data analysis, the study participant reported that she recognized some teacher-learners who had much more or much less experience teaching with technology than she did. However, how do teacher-learners who have different technology-using experiences approach their learning of teaching
with technology? Are their learning processes similar to or different than the study participant? What role do they play in their learning processes? For example, for advanced technology-using teachers, what do they usually focus on and what actions do they take to search for what they want to find? What about novice technology-using teachers who do not have any experience in teaching with technology?

**Culture**

Cultural background might have a role in the teacher learning process. The teacher-learner in this study valued the “new ways” of teaching. That is, she started to believe that students can learn by interacting with each other and taking an active role in their learning instead of listening to a teacher’s lecture and practicing with a worksheet. However, teachers in different countries or with different backgrounds might value different teaching approaches. For example, in Vietnam or other Asian countries, such a teaching approach is not suited to their educational value or contexts. What are the roles of culture in the teacher learning process of teaching with technology? For teachers who come from these cultural backgrounds, how do they adjust their learning of teaching with technology while the “new ways” of teaching are promoted? Do they have problems learning and understanding the materials that present this type of teaching approach?

**Continuations**

While the study continued, the study participant was taking an online course. Although this course was not the only source she had when searching for answers and exploring what she wanted to know, it provided the teacher-learner of this study with a source to use when she needed it. After the study ended, the teacher-learner of this study had completed her coursework.
Therefore, this source is discontinued. Without this source, how will the teacher-learner’s learning progress in terms of teaching with technology?

The Process of Becoming Mindful Technology-Using Teachers

This study explored the process a teacher-learner went through while learning to teach with technology. However, because of the length of the study, it only captured the process a teacher-learner went through up to the time she started to use or planned to use technology for her instruction. If developing mindful technology-using teachers is the goal of teacher learners, it is important for researchers to explore the ongoing process teacher-learners might go through to entirely transform their practice as mindful technology-using teachers.

Recommendations for Instructors/Course Developers of Educational Technology Courses

The recommendations for instructors and course developers of education technology courses are drawn from the study results and from the interview of the study participant. There are two parts in this section. First, from the study results, there are some phenomena that are important for teacher educators to understand while guiding teacher-learners in the process of their learning. Therefore, the first part of the recommendations emphasizes understanding teacher-learners. Second, during the interview, the study participant reported some concepts or materials that were particularly useful for her. I have listed her suggestions in the second part of the recommendations as a reference for course developers of educational technology courses.

Understanding Teacher-Learners

1. Using technology for the sake of using it might be a learning process. During her learning process of teaching with technology, the study participant carried out the practice of teaching with technology as one of her strategies. However, it does not mean that she
always used technology mindfully. For example, the study participant reported that she planned to use “Type to Learn,” a typing program, for her advisory class because the program was available, instead of thinking about using the program to support her lessons. For teacher educators of teaching with technology, this statement might mean “using technology for the sake of using it.” However, it is important to note that when the study participant attempted to carry out this practice, she was aiming at learning by doing or learning to teach with technology by teaching with it. It is important for teacher educators to understand that this action might be part of a teacher-learners’ learning process, and that it is a meaningful learning event developed by teacher-learners. Providing some space for such practices and scaffolding them when appropriate, with a goal of developing a mindful technology-using teacher, might be useful for teacher-learners’ development.

2. **Teacher (mis)conceptions.** The study participant reported that she felt she was less competent in teaching with technology because of her age. Her perception resulted in low self-confidence and constantly searching for other teacher-learners’ opinions and suggestions. In this study, the participant was able to remove her misconception of her low competence of teaching with technology while finding that other teacher-learners had the same problems as she, and that they did not use as much technology as she thought they had. However, if such a source is not available for them, teacher-learners might remain worried and hesitate to be part of the learning group. Teacher educators might need to provide additional encouragement and support if this is the case.

3. **The focus on the tool.** The findings of this study reported that the study participant focused on learning the computerized materials for a period of time in her process of
learning. During this period of time, sometimes she did not follow the instructions for her course assignment, but aimed on what she wanted to know about the computerized materials. For teacher educators, her behaviors might be confusing and might result in the misjudgment of the clarity of course instructions or her understanding of the course instructions. It is important to note that this phenomenon might be part of the learner process of teacher-learners of teaching with technology. Therefore, teacher educators might want to consider thinking about ways to help teacher-learners progress to the next level of their learning or providing them time to go through this process with support.

**Useful Concepts, Materials, and Components**

1. *Provide opportunity for teacher-learners to be active and have control in their learning.*

   This study reported that learning plans provide teacher-learners with a pathway to activate the potential mediation link for their learning to progress. That is, when teacher-learners are actively engaged in making plans and taking action to search for answers to what they want to know or to how to practice what they feel they need to do, their learning continues. It might be helpful for course developers of teacher education to build this component in to help teacher-learners’ learning process continue. Having the teacher-learners explicitly state their learning plan and then modify it later on to reflect their new needs might be useful for teacher-learners. Having teacher-learners to write a proposal of what they want to learn at the beginning of the course might be useful as well.

2. *Providing variety of choices that might meet teacher-learners’ needs.* It was found that the teacher-learner in this study had individual needs for her learning. Taking teacher-learners’ ultimate self-generated learning goals into consideration can provide a more meaningful and useful learning opportunity for teacher-learners. With a goal to meet
individual teachers’ needs and teaching contexts, it might be useful to provide a variety of choices for teacher-learners for their course assignment. That way, teacher-learners could choose the tasks that were most meaningful and useful for them to learn and fulfill their needs in the teaching contexts currently being used.

3. **Useful concepts and course materials**
   - Technology is a tool: The teacher-learner of this study reported that the concept that “technology is just a tool” was important for her to understand, and helped her to see that putting students on a computer is only one way of teaching with technology. If one of the goals of educational technology courses is to help teacher-learners understand that there are multiple ways of teaching with technology, this concept might be important for course developers to address in the course content.
   - Software evaluation criteria: The teacher-learner of this study reported that the development of software evaluation criteria was extremely helpful for her as a novice technology-using teacher who had not purchased or who had limited experience using software in her teaching. She suggested that having the criteria helped her understand where and how to start selecting computerized materials. Therefore, she reported that the criteria served as a foundation for her to evaluate websites and other computerized materials. It is highly recommended that course developers build this component in the course content.
   - Examples of various ways of teaching with technology and teaching scenarios: The teacher-learner of this study reported that the teaching scenarios and examples provided in the course texts helped her to picture how different ways of teaching with technology might be carried out. For teacher-learners who have just started to teach
with technology, teaching scenarios and examples of teaching with technology might provide a starting point to see how such practices can be carried into a classroom. Course developers might want to consider using video cases, providing teaching scenarios, and having teacher-learners observe a technology-using classroom in the course content.

Conclusions

This chapter concludes and discusses the findings of this dissertation. Three understandings are summarized and discussed: 1) Teacher-learners bear ultimate self-generated learning goals in mind while learning to teach with technology; 2) Teacher-learners approach their learning by setting ultimate learning goals, developing solutions, learning plans, and learning strategies for their ultimate learning goals, and reshaping solutions, learning plans, learning strategies; 3) Teacher learning is an ongoing process that consists of changing solutions and self-efficacy, and an interactive process containing the interplay and interaction of multiple factors.

Drawing from the discussions of the findings of this study, nine aspects are recommended for future studies about teacher learning: 1) teacher-learners’ self-generated learning goals; 2) the influence of teacher concerns; 3) teacher control; 4) thinking beyond ACOT’s existing framework; 5) interplay and interactions among multiple factors; 5) the careful interpretation and use of self-efficacy; 6) learner differences; 7) culture; 8) experience of teaching with technology; and 9) the process of becoming mindful technology-using teachers. Recommendations given to course developers and teacher educators include: 1) important phenomena in teacher-learners’ learning processes; and 2) concepts or materials that are particularly useful for teacher-learners.
References


http://www.mtsu.edu/~itsurvey/stupaper.html


http://counts.edweek.org/sreports/tc03/


# APPENDIX A

## Outline of Course Activity

<table>
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<tr>
<th>Week</th>
<th>Topic</th>
<th>Assignment</th>
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| 1    | Introduction                                               | Focus Reflection: Reflecting what you have known and what you want to know (KWLS)  

Task: Conducting a school technology coordinator interview to explore the technological resources in school and school expectations of how teacher and student should use technology

Final Activity: Reflecting how to bridge the gap between what you already know and what you want to know

| 2    | Reading, Writing, Speaking and Listening in CALL Classrooms | Focus Reflection: Brainstorming ten software evaluation criteria           

Task: Evaluating software based on the software evaluation criteria developed in Focus Reflection; Reflecting the strengths and weaknesses of one’s software evaluation criteria

Final Activity: Creating an external document for the evaluated software program

| 3    | Creativity and Production in CALL Classrooms              | Focus Reflection: Reflecting current lessons emphasizing student creativity and production  

Task: Reviewing production or creativity computerized tool

Final Activity: Teacher Production (three options): a) produce something to help yourself as an instructor; b) produce something to use with your students; or c) develop a way for your students to create or produce

| 4    | Problem-Solving and Inquiry in CALL Classrooms            | Focus Reflection: Reflection on current inquiry-based lesson in classrooms  

Task: Exploring inquiry-based computerized tools (Evaluating WebQuest)
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<th>Communication and Collaboration in CALL Classrooms</th>
<th>Final Activity: Brainstorming ideas of how to enhance inquiry-based lessons by computer technology</th>
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| 5 | Focus Reflection: Reflecting current lessons that emphasize student interaction  
   Task: Exploring computerized communication and collaboration tools  
   Final Activity: Developing a unit plan emphasizing collaborative and communicative activities with the use of computer technology |
| 6 | Assessment in CALL Classrooms  
   Focus Reflection: Reflecting on how you are currently assessing your students  
   Task: Exploring computer assessment tools  
   Final Activity: Select one of the options  
   a) Search the Web for an assessment tool to use in your instructional situation. Evaluate the tool and in one page or less describe how appropriate it would be for your instructional situation. What about the assessment tool could be changed to make it more appropriate for your teaching situation and for ELLs?  
   b) Use the unit plan that you developed in Unit 5 and describe authentic assessments for three of the activities. Write a one-paragraph summary explaining the theoretical basis of the design of your assessment. What are the focuses of your assessment and why? How does the design of the assessment address the goals of your lesson and the needs of your students (particularly ELLs)?  
   c) Describe and explain how you would gauge the effectiveness of computer use in your classroom. Limit your document to one page. |
| 7 | Final Project  
   Focus Reflection: Reflecting what you have learned and what you still want to know (KWLS)  
   Final Project: Select one of the options  
   a) Write a grant proposal for technology funding.  
   b) Write a proposal to your school’s Technology Coordinator to request the purchase of |
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<td><em>Develop a lesson plan</em> on a topic that you will teach and show how different technologies might make the learning it supports more effective or more efficient.</td>
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<td>d)</td>
<td><em>Adapt a lesson</em> that you have used or have observed in the classroom.</td>
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<td>e)</td>
<td><em>Write a proposal</em> to your school principal or other responsible administrator requesting a faculty training workshop for technology that the school has. Describe why you think this training is important and how it will help to better serve ELLs in your school.</td>
</tr>
<tr>
<td>f)</td>
<td>Select ten Web sites that are suitable for your content area or level and create an annotated bibliography.</td>
</tr>
<tr>
<td>g)</td>
<td>Map the <em>NETS standards</em> onto a part of your curriculum.</td>
</tr>
<tr>
<td>h)</td>
<td><em>Develop a wish list</em> of technologies for your school or future teaching position.</td>
</tr>
</tbody>
</table>
APPENDIX B

Questionnaire

Instructions: Please answer the questions in this questionnaire as completely as possible. After you complete the questionnaire, please send it back to me at yuyang@wsu.edu. Please note this questionnaire is due at 10pm on October 19th (Sunday).

1. Please describe your current teaching assignment(s). Please indicate the school(s), grade level(s), program(s), content area(s), location, and student population(s) that you are currently teaching, and the length of time in position.

2. How many ESL students do you have in your class(es)? How often do you have contact with them (e.g. an hour per day, all day every week)? Among those students, how many are currently identified as ESL students needing additional help from the school?

3. How long have you been teaching?

4. Why are you taking this class? Please list all of your reasons.

5. What are your expectations for this class? In other words, what do you hope to learn in this course? What do you hope to achieve after taking this course?

6. Please describe your strengths and weaknesses as a learner. How will you make yourself successful in this class?

7. Please describe your professional development experiences related to technology and their usefulness regarding your teaching and lesson planning. For example, what technology-related workshops/courses/training/conferences have you attended and how useful are they for your teaching and lesson planning? What technology-related topics/issues/concerns have you discussed with colleagues, school administrators, and/or friends, and how do these discussions contribute to your teaching and lesson planning?

8. Please describe what technology means to you in your teaching and your opinions about the roles technology can play in your lessons. For example, how important do you feel it is to use technology in language teaching and why? How do you feel technology can be used in your classroom?

9. Please describe any lessons incorporating technology you have carried out in your classroom or have experienced or heard about in other classrooms. What were the objectives of the lessons? In what ways was the technology used? What were some instructional strategies used in the lessons? What were some difficulties/limitations/benefits when implementing and/or designing this lesson? How do you feel about these lessons?
Dear ____________,

How are you? How is everything going?

I have a BIG favor to ask. I am currently conducting a research study for my dissertation. In order to complete my research, I need to recruit ESL/bilingual teachers or teachers who have ESL students in their classrooms as my study participants. From my interactions with you during the first week of [course name], I think you will be a fantastic participant, and I wonder if you are willing to participate in my study.

The following information is provided so that you can decide whether you wish to participate in this study. It is important that you understand that your participation is completely voluntary. This means that even if you agree to be observed and interviewed, you are free to withdraw from the experiment at any time, or to decline to participate in any portion of the study, without penalty. In addition, if you do not wish to be observed and interviewed, it will not affect anything (e.g. your grades, your enrollment, etc.).

This research study is for my dissertation. The purpose of this study is to explore teacher professional development towards technology. In order to understand your learning, I will need to observe the interactions you have with other course members while taking [the course name]. In addition, I will need to interview you face-to-face, by phone, or by email for multiple times, in order to learn your personal perspectives, your thinking, your reflections and your life as a teacher. The face-to-face and phone interview conversation will be tape-recorded and the tapes will be placed in a locked file cabinet at my apartment until 05/01/2007. It will take approximately 40-50 minutes to complete each interview. In addition, all the course documents and other relevant documents (e.g. questionnaire, assignments, communication documents, surveys, demographic information, class evaluation and personal life history) will be used as supplements for this study. Follow-up interviews, email communications, and follow-up surveys will also be conducted if further clarification is needed.

All of the research data, your conversations with me, and your personal information will be confidential. Neither your name nor any identifying information about you will be associated with the findings in the study. I may also wish to see your student work and observe and videotape your class to have a better understanding of your implementation, if any. However, my academic advisor and I will be the only ones who have access to all the study data.

I will appreciate it very much if you are willing to participate in my study. I understand this is a busy time for you and will take your busy schedule into consideration while conducting the study if you decide to participate. Please indicate your decision of participating in my dissertation study by replying to this email. I look forward to hearing from you.

Diana
### APPENDIX D

**Research Guide**

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Interview Questions</th>
<th>Observation</th>
<th>Document Analysis</th>
</tr>
</thead>
</table>
| How do teacher learners approach their learning in the use of technology in their instruction? | *Ongoing interviews during the class period:*  
What have you been thinking this week?  
What accounts for your thinking?  
Please describe your experience of technology learning and teaching this week for me.  
What excited/disappointed you this week? How so? How did you approach/handle that?  
What do you want to learn more regarding technology and teaching?  
What are some of the issues you have been thinking about regarding technology, learning, and teaching?  
What are the most difficult things you feel regarding technology and teaching so far? How so? How are you thinking about handling that?  
I noticed you did/mentioned … this week | Classroom discussions:  
Participants’ actions, behaviors, reactions, thinking, wonders, concerns, worries and other relevant observable behaviors.  
Who did they talk to?  
What are the contents of their discussions?  
What did they say and what they do outside of the class? What are their intentions?  
Discussions addressing repeated topics, focuses, the change of topics/focuses learning intentions and expectations, descriptions of one’s learning and teaching, and other relevant narrative and reflections from time to time.  
Other relevant classroom discussions. | *Questionnaire:*  
Why do you want to take this class?  
What are your expectations of this class?  
*Student assignments/Communication documents*  
Documents presenting repeated topics, focuses, the change of topics/focuses learning intentions and expectations, descriptions of one’s learning and teaching, and other relevant narrative and reflections from time to time.  
Other relevant documents. |
(e.g. interactions), can you tell me more about it?

What are the most interesting things for you regarding technology and teaching this week? How so?

*After-class interviews:*

Please tell me what you have been thinking about these two months.

Please describe your learning experience regarding technology, learning, and teaching for me.

Please describe the most important/significant experiences regarding teaching, learning, and technology for you during these two months.

What difficulties have you encountered regarding technology and teaching?

What have you learned?

Please describe the most meaningful thing for you during the course period time. Why are they meaningful to you?

Others relevant questions generated from observation and previous interviews
<table>
<thead>
<tr>
<th>How do teacher-learners learn to teach with technology as active agents?</th>
<th><strong>During-Class and After-Class Interviews:</strong></th>
</tr>
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<tbody>
<tr>
<td>What have you been thinking this week?</td>
<td></td>
</tr>
<tr>
<td>What accounts for your thinking?</td>
<td></td>
</tr>
<tr>
<td>Please describe your experience of technology learning and teaching this week for me.</td>
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</tr>
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<td>What excited/disappointed you this week? How so? How did you approach/handle that?</td>
<td></td>
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<tr>
<td>What do you want to learn more regarding technology and teaching?</td>
<td></td>
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<tr>
<td>What are some of the issues you have been thinking about regarding technology, learning, and teaching?</td>
<td></td>
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<tr>
<td>What are the most meaningful things for you regarding technology, learning and teaching this week? How so? How does this influence you as a learner?</td>
<td></td>
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<tr>
<td>I noticed you did … (e.g, interactions), can you tell me more about it?</td>
<td></td>
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<tr>
<td>How did…(experience) influence you?</td>
<td></td>
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<tr>
<td>You say …is a very interesting topic for</td>
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</table>

<table>
<thead>
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<th>Classroom discussions:</th>
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<tbody>
<tr>
<td>The (un)change of the focus of class discussion</td>
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<tr>
<td>Discussions addressing repeated topics, focuses, the change of topics/focuses learning intentions and expectations, descriptions of one’s learning and teaching, and other relevant narrative and reflections from time to time.</td>
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<tr>
<td>Discussions illustrating interaction patterns and noting content of the interactions.</td>
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<tr>
<td>Other relevant classroom discussions.</td>
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</table>

<p>| Student assignments/Communication documents |
| Documents addressing repeated topics, focuses, the change of topics/focuses learning intentions and expectations, descriptions of one’s learning and teaching, and other relevant narrative and reflections from time to time. |
| Documents describing one’s interactions with others and teaching, any relevant narrative or reflections regarding actions they have carried out from time to time. |
| Teacher Profile |
| Other relevant documents. |</p>
<table>
<thead>
<tr>
<th>Question</th>
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<tr>
<td>you this week/these two months; how did you find out about this topic and explore this topic?</td>
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</tr>
<tr>
<td>What excited/disappointed you this week/these two months? How so? How did you approach/handle that?</td>
<td></td>
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<td>You mentioned you struggled with…; how did you handle this?</td>
<td></td>
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<tr>
<td>I noticed you did …this week/during these two weeks (e.g., interactions); what does this mean to you?</td>
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<tr>
<td>Other relevant questions generated from observation and previous interviews</td>
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APPENDIX E

Example of Diagram
APPENDIX F

Changes of Learning Plans

<table>
<thead>
<tr>
<th>Dates</th>
<th>Learning Goals</th>
<th>Learning Plans</th>
<th>October</th>
<th>November</th>
<th>December</th>
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<td>Week 1</td>
<td>Week 2</td>
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<td>Solution</td>
<td>Learning strategies</td>
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<td>Challenges</td>
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<td>Multilevel-</td>
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<td>classroom</td>
<td>Individual</td>
<td>Paying attention and searching for computerized materials for individual learning (emphasized low level students)</td>
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<td></td>
<td>Learning</td>
<td>Practicing and trying computerized materials (emphasized low level students)</td>
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<td>X</td>
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<tr>
<td></td>
<td></td>
<td>Paying attention and searching for computerized materials for individual learning (emphasized low level students)</td>
<td>X</td>
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<tr>
<td></td>
<td></td>
<td>Practicing and trying computerized materials (emphasized low level students)</td>
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<td>Engaging</td>
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<td>Students by</td>
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<table>
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<tr>
<th>Increasing Self-Efficacy</th>
<th>Novice Learner</th>
<th>Listening to and Learning from Experts</th>
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<td>Collecting recommended resources and examples, models, recommendations and suggestions</td>
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<td>Turning to teacher-learners who were at the same level</td>
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<tr>
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<td>Learning by doing and Learning with students</td>
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<tr>
<td>Expert</td>
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<td>Learning from students</td>
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<tr>
<td></td>
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<td>Providing advices and working with colleagues</td>
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</table>
# APPENDIX G

ACOT’s Five Phases of Technology Integration


<table>
<thead>
<tr>
<th>Phases</th>
<th>Descriptions</th>
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</thead>
<tbody>
<tr>
<td><strong>Entry</strong></td>
<td>Instruction is often traditional, with teacher-directed activities. Teachers use primarily text-based materials. Some common instructional technologies include blackboards, text-books, workbooks, and overhead projectors. When they begin to use computers, common problems include discipline, resource management, technical issues and personal frustration. Therefore, teachers spend most of their time learning about the basics of a technology (e.g. how to set it up and operate it). They worried about not having enough time to build up their computer skills. Computer is mainly used as rewards or free time activity.</td>
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<tr>
<td><strong>Adoption</strong></td>
<td>Traditional whole group lecture and seatwork still tend to dominate instructional strategies. Teachers’ concerns focus on using computers in their daily lessons rather than connecting them. Therefore, they adopted the technology to support familiar methods and materials. For example, teachers start to use computers to create quizzes and worksheets, to carry out grading tasks, and to direct skill-based lessons (e.g. drill-and practice). Common technology-using class activities often emphasize the build-up of students’ computer skills (e.g. keyboarding; word-processing). Although technical problems still exist, teachers are able to perform basic trouble-shooting.</td>
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<tr>
<td><strong>Adaptation</strong></td>
<td>Although traditional instructional methods remain the dominant forms of classroom practice, teachers start to provide opportunity for student-centered production. In addition, students are allowed to progress at their own pace. In this stage, teachers are learning more about planning and organizing technology-connected activities. Therefore, they begin to use software and application programs to support instruction. Production is a major theme in this stage. As teachers found that students can produce faster by using computers, students are given opportunities to use word processors, graphic programs, data base and computer-assisted instructional packages. In addition, teachers are learning to use computers to save themselves time, rather than creating additional demands.</td>
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<tr>
<td>** Appropriation**</td>
<td>Teachers’ instruction shift from teacher-centered to student-centered. They take on new roles and incorporate new teaching strategies that include team teaching, collaborative learning, and interdisciplinary projects. At this stage,</td>
</tr>
</tbody>
</table>

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| Invention | Teachers come to understand technology and use it effortlessly as a tool to accomplish real work. Teachers begin to focus on collaborative, project-based technology use and technology becomes one of several instructional tools. Both teachers and students have high computer skills. Teachers experiment with new instructional patterns and begin to see knowledge more as something students must construct and less as something to be transferred. Thus, teachers mainly facilitate students’ construction of knowledge. Students are encouraged to ask questions, interact with others, work together in more collaborative ways and serve as experts to assist their peers with both curriculum and technology issues. Teacher begins to develop different uses for technology, e.g., creates projects that combine two or more technologies. |