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Naturalistic Inquiry  
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# **Through Their Eyes: Perceptions of Student Teachers Regarding Valuable Technology-Related Teacher Education Experiences**

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# Through Their Eyes: Perceptions of Student Teachers Regarding Valuable Technology-Related Teacher Education Experiences

## Introduction

### The Problem

As a teacher in the elementary schools, I have seen the motivational power that technological tools (particularly computers) have upon students. However, at present, the majority of elementary teachers seldom incorporate the technological resources into the daily curricular activities in their classrooms. Research indicates that this slow integration into the elementary classroom is due to many reasons, among them lack of access to the computers, lack of training for teachers in technological skills, and the teaching styles and personalities of the teachers themselves (Northrup & Little, 1996). Once these issues are resolved, there is still resistance among elementary classroom teachers to integrating technology into their daily curricular activities. As research indicates, the majority of teachers feel under-prepared to initiate the integration in the classroom (Colon, Willis, Willis, & Austin, 1995). Why would this be so?

Perhaps, the answer lies in the type of training that is being given to the teachers. Research also indicates that student teachers given training that incorporates technology integration into their methods classes increases the likelihood that, as teachers, these students will utilize technology to a greater degree (Handler, 1993; Wetzel, Zambo, Buss, & Arbaugh, 1996). At present, student teachers are not likely to receive this type of training for two reasons. First, the professors in charge of the student teacher cohorts are struggling with this integration themselves and are unable to give guidance, model the technologies, or model

integration into daily instruction. Secondly, the student teachers are placed in a field experience with cooperating teachers who themselves have little or no training, and as a result, cannot support this type of training or model appropriate technology integration. Therefore, the current training given to student teachers relies heavily on developing personal skills that can be provided in a stand-alone technology class (Northrup & Little, 1996). Thus, the following question must be asked: How do teacher educators prepare student teachers to integrate technology into their instructional practices?

## **The Focus of This Inquiry**

The technology class offered at this Southwestern research university is *Educational Computer Literacy*.<sup>1</sup> As one of the teaching assistants for this class, I have observed the students as they wrestled with the new vocabulary, participated in the frustrating learning curve for acquiring these new skills, and dealt with the technical aspects of problem solving that must occur for students to be successful. I have seen firsthand the positive impact that completion of this course has had upon the students with regard to continued use of computer technologies.

Not only does the class set out to present the students with a variety of technical skills, but the course is designed so that as students work on developing personal computer skills, they are completing projects that are designed to be relevant to teaching situations that the students will later encounter as student teachers. In addition, the students develop a unit of study throughout the semester. At the conclusion of the semester, the students design and teach a lesson related to the unit in a "microteach," a situation where the student actually teaches a brief technology-integrated lesson to a small group of fellow classmates.

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<sup>1</sup> Pseudonym has been substituted for actual course name.

The course requires a great deal of student time and effort, and upon its completion, the students should have personally developed competent technical skills and have been exposed to a small amount of modeling in the hopes of promoting the integration of technology within classroom situations. But, does it? Do the students feel that the modeling is a factor in integration? Do the students feel that this is enough modeling to affect integration? Which of the activities modeled for the students will they perceive as valuable for their own instructional purposes?

Therefore, the focus question for this study, which utilizes naturalistic inquiry methods, will be:

*What are the technology-related events and/or experiences in your teacher education that you believe will most serve you in your daily classroom instruction?*

## **Background Information**

There are three areas of research that have informed the design of this study. First, this study has been informed by research focused on the perceptions and values possessed by the student teachers who will have been shaped by their technology training, as well as their access to technology in their student teaching situations. Therefore, what is the status of technology use in the schools today and what kind of training should our student teachers have regarding its use?

Secondly, these student teachers are being asked to utilize skill knowledge as application knowledge by transferring their knowledge regarding how to personally use the computer or technology into activities and lesson plans that their students will complete. Therefore, as transfer of knowledge between acquired skills and applied skills will inform the

research for this study, what does the research tell us regarding the ability of students to transfer acquired skills to applied skills in different situations?

And, third, what does the research indicate regarding the impact that the personal issues creating concern within novice teachers may have upon the integration of technologies into their teaching?

## **Technology Training**

As technology slowly becomes more available to teachers in the classroom, administrators expect teachers to significantly increase their use and application in classroom instruction. In a recent survey, the Office of Technology Assessment (1995) found that despite more hardware and software in the schools, teachers felt inadequately prepared to effectively use them in their daily instruction, and therefore, little use is being made of the increased access to technology. In fact, many teachers rely upon student teachers, recently trained in the newest technologies, to provide the much needed support and training (Northrup & Little, 1996). However, a recent survey of university graduates reveals that, within their preparatory classes or field experiences, only a small percentage of student teachers were required to teach a lesson with technology; and therefore, the majority of these graduates did not feel prepared to teach using technology (Colon et al., 1995). Of those student teachers who did participate in methods courses and field experiences where technology was available and utilized, the observed student teachers did demonstrate their ability to teach with the technology (Handler, 1993).

The most current benchmarks for student teacher preparation programs, such as those proposed by Northrup and Little (1996), recommend that infusion of technology into all methods classes would be the ultimate goal, but recognize that, at this time, would be

impossible to achieve as methods faculty are themselves struggling to acquire these same skills. The solution that is proposed at this time is the inclusion of technology throughout all methods courses as faculty members are able to provide the modeling, but with the bulk of the training being provided by a basic technology course. This course would teach students technical skills through problem-oriented projects, with some integration skills included (Northrup & Little, 1996).

In addition to these benchmarks that have been recommended, standards established by the International Society for Technology in Education in 1998 recommend that teacher preparatory programs include technical training that allows the students to become competent in personal and professional use of the technology, as well as "planning and delivering instructional units that integrate a variety of software, applications, and learning tools" and "reflect effective grouping and assessment strategies for diversity." (ISTE Accreditation & Standards Committee, 1998)

The student teachers chosen as informants for this study have been participating in methods classes that provide minimal modeling of technology use within an instructional setting and rely upon a basic computing tools course, plus a media competency. The basic computing tools course incorporates problem-solving projects with the planning and implementing of a lesson. These projects and lessons are designed to address the personal and professional standards outlined within the NCATE/ISTE 1998 standards/benchmarks. The media competency course provides training for other technologies such as laser disks, slide projectors, tape recorders, VCRs, and TVs. There is minimal opportunity for students to experience the opportunities of participating in or designing of technology-infused lessons that are suggested by the standards for application of technology in instruction.

## Transfer

Today, it is generally accepted that successful technology training incorporates "hands-on integration, training that extends over time, modeling, mentoring, and coaching, and posttraining access"(Roblyer & Erlanger, 1998-1999, p. 59). Indeed, successful transfer of skill knowledge to fit the situation has long been associated with cognitive apprenticeships (Brown, Collins, & Duguid, 1989; Collins, Brown, & Newman, 1989). Through an apprenticeship process, the learner observes, receives coaching from their mentors, and is given time to practice. Pressley and McCormick (1995) describe the process as using a mentor to provide the student with "assistance when it is needed but not so much that the student becomes dependent on it nor so little that the apprentice falters. Just as the scaffold of a building is removed as the building becomes freestanding, so it is with mentor scaffolding, with less of it provided as the apprentice is able to go it alone" (p. 233).

Hadley and Sheingold (1993) noted that the most important factor attributed to teachers successfully integrating technology within their instruction, other than personal motivation and commitment to learning and access to the technology, was the support they received from their peers and administrators in the form of on-site help, local training opportunities, mentor teachers, and other teachers making the effort to integrate technology into their daily teaching practices.

Therefore, teacher preparatory programs that strive to provide student teachers with experiences that simulate or incorporate teaching with technology seem to be promising success. Willis and Mehlinger (1996) describe several models, including:

- Methods courses which view teachers in the field, via two-way video and audio, as they instruct their own students demonstrating certain pedagogical techniques
- Working conferences model in which students divide into small groups, evaluate software, demonstrate the software, and create lessons involving selected software.
- Video opportunities or CD-ROMs that demonstrate pedagogical techniques that are presented and discussed in group sessions

Wetzel, Zambo, Buss, and Arbaugh (1996) describe their success utilizing a two week training workshop attended by the student teacher and their mentor teacher in which the team learns hardware, software, troubleshooting, and instructional materials development.

The student teachers chosen as informants for this study have been participating in a student teaching field experience that reflects many of the field experiences across the nation, in which there is little or no consideration for placement of student teachers in situations that provide mentor teachers who successfully integrate technology themselves (Wetzel et al., 1996).

## **Phases of Concern**

A survey of teachers designated as accomplished at technology integration, which was conducted by Hadley and Sheingold (1993), found that most of the teachers that had successfully integrated technology were not novice teachers, but had experience (13 years of more) and were older than most novice teachers (more than half between the ages of 40 and 49.) Therefore, the concerns that occupy novice teachers and student teachers may have some impact upon whether or not they are able to utilize their training within their field experiences.

Novice teachers, either student teachers in their first field experiences or beginning teachers in their first classroom, appear to share a common set of concerns. Based on the studies of novice teachers conducted by Frances Fuller (1969), developmental phases of

concerns were identified. During the first phase of concern, the novice teacher expresses concerns related to themselves, such as ability to control classes, developing abilities to design lessons, ability to perform to the satisfaction of supervisors, and ability to be liked as a teacher and person. As the teacher acquires more experience, the concerns shift to concerns related to tasks, such as how to design appropriate classroom instruction, creating systems of managing the classroom and the paperwork, and teaching the appropriate curriculum. Finally, additional experiences move the teacher out of task concerns and into a level of concern that addresses the impact of the instruction on the learning needs of the student, such as individualizing instruction to provide for the special needs of students or incorporating new and improved teaching techniques (Fuller, 1969; Fuller & Brown, 1975).

For practicing teachers, it is often at this level of concern about impact of the teacher on the student's learning that the integration of technology into daily classroom instruction seems to occur. Time is often a factor in helping teachers use technology as instructional tools, and may indicate a need for one-to-one mentoring and coaching programs for new teachers or student teachers in their field experiences (Benson, 1997).

## Method: Naturalistic Inquiry

Naturalistic Inquiry is the methodology chosen for this exploration of the perceptions of technology-based activities that student teachers deem valuable. Defined as "the investigation of phenomena within and in relation to their naturally occurring contexts"(Schwandt, 1997, p. 101), Naturalistic Inquiry relies upon a study design which allows the findings to "emerge" from the data as the value systems of the researcher and informants "interact in unpredictable ways to influence the outcome" (Lincoln & Guba, 1985,

p. 41). Therefore, in order to document the phenomenon as it emerges, certain procedures for data generation and analysis consistent with the principals of Naturalistic Inquiry, as described by Lincoln and Guba (1985) and Erlandson, et. al. (1993), have been followed. These procedures include the selection of a purposive sample, development of a "Person as Instrument" statement and maintenance of the researcher's Reflexive Journal, preparation of case studies, and collection and analysis of data from which the working hypotheses emerge. Further naturalistic techniques, including member checking, peer debriefing teams, and triangulation of multiple sources of data, are utilized to insure trustworthiness of the study.

## **Person as Instrument**

According to Lincoln and Guba (1985), a naturalistic inquiry "*demands* a human instrument" which will "build upon his or her tacit knowledge" (p. 187). The human instrument is "value-based" and interacts with values of others in order to "identify and take into account (to some extent) those resulting biases" (p. 40). Erlandson, et.al.( 1993) acknowledge that "a record needs to be kept on the primary human instrument that is being used in the naturalistic study" (p. 108).

In order to establish the values and biases that I, the researcher, bring to this study, I have prepared a "Person as Instrument" statement. (See Appendices, p. X) Within this statement, I attempt to inform the reader of the values and perceptions that I hold, as well as the experiences that have molded those perceptions and values regarding the topic of this study: student teachers and the technology-related activities they deem valuable to their instructional practices. The statement describes my twenty plus years of teaching experience in the elementary school as a classroom teacher and librarian and my strong beliefs that the role of the teacher is to serve as a facilitator or mentor, rather than expert. Teaching

experiences, as well as my experiences as a parent, have impacted my beliefs about the power of the computer to motivate and stimulate learning in our children, creating within me the deep belief in the responsibility educators have to prepare our students to participate in a global society in which technology is a necessary tool. Within the statement, I also discuss my perception that, with the pervasiveness of technology in the minute to minute execution of daily living that provides instant communication around the globe, a society unlike any previously experienced by mankind is emerging. My unshakeable faith that the time has come to provide teachers with the tools to support their students in this information world drives my personal exploration into this topic of study.

A second form of documentation, a reflexive journal, is included, per suggestions from Erlandson, et. al. (1993). The reflexive journal provides the researcher with a record of insights regarding his or her reflective thought processes throughout the entire research process. Entries from the journal record the decisions the researcher makes throughout the research process, the reflections upon new information or readings which influence the researcher, the strategies for working with informants, the difficulties within the research process, and they provide a chronology of the research study. (See sample of reflexive journal entries in Appendix, p. 70)

These two tools not only serve as a means of keeping the researcher focused upon the biases and values brought to the study, but also support the trustworthiness of the study by providing a means of establishing credibility, dependability, and confirmability.

## **Purposive Sample**

Perhaps, the heart of naturalistic inquiry is the use of purposive sampling and thick description of the phenomenon to "maximize discovery of the heterogeneous patterns and

problems that occur in the particular context under study" (Erlandson et al., 1993, p. 82).

Information richness is provided by selecting participants "that will most help to answer the basic research questions and fit the basic purpose of the study" (p. 83) and bring a diversity of backgrounds, perceptions, and experiences to the discovery process.

Therefore, in order to provide as much diversity as possible within the purposive sample, four informants, two male and two female, were selected from the list of students who had completed the *Educational Computer Literacy* course and were currently involved in field experiences of the elementary student teaching methods block. These parameters were established for the purpose of providing the perceptions of informants with similar technology training backgrounds. The sampling includes a broad variety of informant experiences based on gender, unique student teaching situations, and experiences student teaching at various grade levels K-6.

According to Lincoln and Guba, (1989, as cited in Erlandson, et. al, 1993) "in a naturalistic study, the obligation for demonstrating transferability belongs to those who would apply it to the receiving context" (p. 33). The provision of a diverse sampling of sources to inform the research process provides the reader with an information rich context, in which those conclusions can be drawn.

## **Data Generation**

"In the collection and analysis of data, it is sometimes hard to distinguish between when the collecting ends and when the analysis begins, for gathering and analysis are complementary, ongoing, and often simultaneous processes" (Erlandson et al., 1993, p. 85). However, three sources of data, interviews, documents, and artifacts, were gathered for the purposes of this study.

First of all, an emergent interviewing process was conducted with all four participants of the study. This process is characterized by an open-ended interview situation which is initiated through a single question. The interview process began with the following question: "What are the technology-related events and/or experiences in your teacher education that you believe will most serve you in your daily classroom instruction?" During the ensuing dialogue, the researcher continuously sought to clarify the meanings of the participant perceptions through follow up questions and a process called "member checking." Member checking refers to the researcher "soliciting feedback from respondents on the inquirer's findings"(Schwandt, 1997, p. 88), through the process of reviewing the summarization of the participant's statements with the participant at three points in the data generation. First, the summarizations are checked with the participant during each of the interviews. (See sample of Level 1 Member Checking, Appendix, p. 57). After the interview, the researcher reviews all data generated, and forms a second summarization of the perceptions of the participant. Level 2 Member Checking occurs when these perceptions are revealed to the informant who clarifies and refines these perceptions for the researcher. (See sample of Level 2 Member Checking, Appendix, p. 58). The participant is given a third chance to review and clarify the data at the conclusion of the data generation, by reading and responding to the written case studies generated from the data. (See sample of Level 3 Member Checking, Appendix, p. 59)

In addition to the emergent interviews, documents generated for the study included e-mail conversations between participants and researcher for the purposes of providing further data, for providing clarifications for member checking, or for providing participant reflections regarding the study topic. (See sample of E-Mail Documents, Appendix, p. 60) Documents, such as the field notes generated during an interview when a recording device was

unavailable, were also generated. . (See sample of Field Notes, Appendix, p. 61) Artifacts, such as the samples of databases constructed by two of the participants, were also collected and provided insights into the technologies deemed valuable to the participants. (See sample of Artifacts, Appendix, p. 62)

Through the use of multiple sources and multiple methods of data generation, the researcher addresses the need to attain "triangulation of multiple data sources, methods, investigators, or theories" in order to provide greater "confidence in the observed findings" (Erlandson et al., 1993, p. 139).

## **Data Analysis**

Data analysis in a study that uses naturalistic inquiry methodology is inseparable from the data generation and collection. Because the researcher serves as the human instrument through which data generation and analysis flows, the process of data analysis begins with:

the first available data and immediately forms very tentative working hypotheses that cause adjustments in interview questions, observational strategies, and other data collection procedures. New data, obtained through refined procedures, test and reshape the tentative hypotheses that have been formed and further modify the data collection procedures" (Erlandson et al., 1993) p. 114).

Therefore, data analysis began with the first interview, which was tape-recorded, transcribed, and analyzed. Analysis is a process that involves three steps:

- Unitizing data, the process of "disaggregating data into the smallest pieces of information that may stand alone as independent thought in the absence of additional information other than a broad understanding of the context" (Erlandson et al., 1993, p. 117.
- Development of common categories that emerge from sorting of the unitized data
- Development of themes or working hypotheses which can be defined as "general statements applicable to the specific context under investigation" (Erlandson et al., 1993, p. 61)

As new interviews, documents, and artifacts were generated, the new unitizations were compared with the current categories and themes, and adjustments in categories and themes were made to accommodate the emerging information.

To further assure credibility of the data generation and analysis, a peer debriefing team was utilized to review data generation, test data analysis against emerging themes, and generally provide a sounding board for the researcher's ideas, questions, and conclusions. The peer debriefing team met on a weekly basis to review data, data generation techniques, revise coding procedures, confirm emergent themes and working hypotheses as logical and proper, and provide final edit suggestions.

## **Case Studies**

Case studies are used by the naturalistic inquirer as a tool to "chronicle and render at the factual level, (and) to engage in interpretation for research" (Lincoln & Guba, 1985, p. 361). The case study format allows a vehicle to paint a thick description of the phenomena, allowing the reader to judge the information held within the case study and make decisions whether or not the themes that emerge can be transferred to their own situations. Therefore, the case studies that follow are reports constructed with the help of the participants, and they are meant to depict the perceptions and beliefs that four student teachers currently held regarding the technology-related events that they have experienced and that they deem valuable to their daily classroom instruction. As graduates of the *Educational Computer Literacy* course, the participating student teachers share common technology training backgrounds, but have experienced a variety of teaching situations, situations with varying amounts of access to technology, and situations which vary according to the age of the elementary students with

which they are working. Indeed, the following case studies represent the value of technology-related teacher education experiences as seen "through their eyes."

## **Agatha's Case Study**

*There's no question in my mind that courses like the **Educational Computer Literacy** class are essential because there are people like me who are totally clueless and will benefit only from a hands-on, guided experience.*

Agatha's technology related experiences included completion of the media competency component and completion of the basic computer literacy class. Agatha entered the basic computer literacy class familiar with the word processing capabilities of the computer which she gained from a six hour, word-processing seminar. She had previously experienced "nothing with spreadsheets and databases and things" that were covered in the computing class. In fact, she stated that "the computer course I took was, for me, a very important course because other than word processing skills at some level, I was not computer literate, and would not have had any idea" how to work with other applications. She expressed satisfaction in her training by stating that the "benefits of the course are outstanding. There's no doubt about that because I came in (to the computing class) being a person with extremely limited computer abilities and grew to one who now has, well, less limited capabilities." She laughed, and continued, "I'm far from being a computer expert, but I am more fluent on the computer. I recognize that I still have a lot to learn, but I probably have more ability to learn by myself now than I did before. So, the benefits were spectacular."

In addition to being more confident with her own personal technology-related skills, Agatha was delighted to describe a veritable array of activities that she felt would be useful in the classroom. Agatha did, however, express a preference for certain technologies that she

had experienced in her technology training which she felt would be the most valuable in her daily classroom instruction.

Agatha feels that one of the most important skills she has acquired is the "ability to move back and forth between the Internet and a database format, or between anything and the use of the database." She frequently retrieves information or pictures from the Internet and stores the information in a database, and feels that the "ability to store and manipulate information in a variety of ways" allows her to create valuable reference resources. "Moving information between various documents, taking information from databases and putting them in documents, taking internet information into various kinds of documents" provided flexibility, "so I think the flexibility, knowing how to move around between different computer applications is useful...increases the ability to use what you have." And, to emphasize the importance of storing and manipulating information in this fashion, Agatha has created a database that lists useful websites in a variety of teaching subjects and has shared that database with other teachers and administrators who have found it to be very useful. (See Database Sample in Appendix, p. 63.)

Agatha also feels that learning how to access and manipulate the Internet gave her the ability to utilize vast resources, "not just on a teacher-to-teacher interactive basis, that is, getting information from other teachers around the country, but the access to government and cultural sites. There are also online dictionaries and online encyclopedias. Many of these could be found in a well-financed library, but in most elementary schools, and most middle schools, the access to this kind of information through the Internet far exceeds what could possibly be made available in a school library." Not only does the Internet present students and teachers with abundant resources, but no matter what "a student's interest is, there will be

something on the Internet" that meets that student's needs and therefore, "drives literacy."

Agatha explained further, "(The Internet) helps improve literacy because you have to read it to make use of it." As a result, she feels the Internet to be a valuable addition to her classroom instruction.

The ability to use word processing skills to prepare documents for archival purposes or as a means of sharing communications with others is also perceived by Agatha as a valuable tool. Agatha states, "handwriting is always harder to read, also generally takes up more space, and it's not as easy to pass it around. So, fundamental word processing I find very helpful." In addition, Agatha envisions teaching students "how to use the computer as an aid in developing written materials and presentations." Agatha feels that at the middle and high school level, students are "asked to do a number of reports of various kinds, and knowing how to use the computer, (especially) the word processing portions, ... including outlining, ... can be a great timesaver for students. So, it's something that helps them as well as provides a nicer looking product for the teacher to review."

In addition, Agatha mentioned that the preparation of slide shows, such as those prepared with Microsoft Power Point or ClarisWorks Presentation, or video presentations become "tremendous tool(s) because they incorporate a variety of skills that the students can use...(including) writing skills (and) speaking skills." As students are frequently asked to make presentations in class, those "who are particularly creative may find a means to use presentation programs available on the computer to do things that they might not otherwise have the ability to do." In addition, video recordings of student presentations or dramatizations for reflective feedback and critique provide constructive closure to student

projects. Agatha can envision the use of slide shows and video presentations as a means of encouraging her students to use technology as a part of their classroom activities.

Other higher-end technologies that Agatha feels she will be incorporating into her classroom instruction include using TV/VCR combinations and laser disks to present visual materials "because they bring alive things that students otherwise see only flat on the page."

Agatha visualizes utilizing technology as a part of classroom tasks that are well-defined, in which the responsibility of the teacher is to present clear expectations of the expected student outcome of the project and guide her students through the discovery process in order to focus student creativity. And, she realizes that "technology is fun to play with, and students like playing with it, and everyone likes doing it," but she possesses the strong belief that "technology should be used to improve something (within the student learning activity). It's expensive; it's time-consuming; so what can technology do to make (student learning) better? What can it do to make teacher planning and implementation better?...What can it do to save teachers time?" She gives an example of "an instance when technology can add something to a learning activity" in which students are working on a dramatic presentation to the class. By "getting in groups and writing down ....the theme, characters, the plots, and drafting it all out so that putting it together with the movie camera becomes a small part, (perhaps, the fun part, but a small part) of what they do. Otherwise, they'll all play around with the camera and spend a lot of time of planning 'involving the technology' rather than using the technology to implement what they have already planned." Agatha feels that the teacher makes critical decisions when preparing activities that incorporate technology. She feels that "using the computer should confer additional benefit. (Learning via the computer) is not group oriented, so it's difficult to do cooperative learning on the computer. (The learning

on a computer) is interactive between student and the computer, as opposed to students to students, so... in order for the technology to be useful, a teacher has to sit down and decide what using the technology can add."

As Agatha began her student teacher field observation experience in one of the fifth grade classes of one of the local, low socio-economic level elementary schools, she became acutely aware of the limitations of using technology in real world situations. Three of the concerns that she shared include access, appropriateness, and time concerns.

Agatha expressed concern over the lack of access to computers, software, or the Internet in the local schools. Although a computer is located in the classroom where she is observing, she has yet to see it turned on, and the school's computer lab is seldom visited by the class. "The computer technology in the classroom itself seems to have limited utility according to what software is available to the teachers." Internet access is not available within the school. And, because of economic factors at the school, computer activities that were to be implemented would need to be "incorporated into the classroom time...and not turned into homework assignments (because students had no access to home computers,) but...used in a way that all students could use it."

Incorporating technology into instructional design appropriately was also among Agatha's concerns. For example, Agatha stated that "in the elementary schools, many types of computer technology don't seem to have as much application, at least in teaching directly." Agatha feels that it is inappropriate for the computer to provide all direct instruction, especially expository teaching. She commented that educational software programs tend to promote expository teaching, "even though it was interactive," She added, "I would like to guide the general direction, and I'm responsible for it in terms of the test in relation to the

certain learning that should be accomplished. And, I don't have confidence that turning students loose on the computer will necessarily get them there." Additionally, although Agatha values the graphing and calculation capabilities of the spreadsheet application, she prefers "for the students to make these graphs and charts themselves to understand the process that goes into them. Learning how to manipulate data using spreadsheets and the graphing function is fun for students who have manually prepared a chart or a graph, which I think is an important thing for students to do."

However, time constraints appear to be the most troubling issues with which Agatha must contend. First of all, in order for the teacher to design activities to integrate technologies, Agatha feels that the teacher must have spent a great deal of time acquiring:

- the skills necessary to work with the students, or "being familiar with a variety of computing tools in order to teach the students,
- the skills necessary to implement technology into the lesson, or the knowledge to be able to "help the students know how to use (the tools) so they could work independently."
- and the skills that allow customization with lesson presentation to fit the instructional goals, even though "most of the time teachers aren't going to have the time to put these things together,...there is great potential for things like PowerPoint or ClarisWorks."

Secondly, Agatha feels that time is needed within a lesson that integrates technology for the students to use discovery and exploration of the technology. Yet, Agatha says, "The creative exercises where technology really comes in handy could be time-consuming, and teachers are always pressed for time. If teachers are going "to accomplish focusing on the TEKS and the TAAS test and things like that, the truth ... seems to be that there simply is not time for the type of free creative exploration that comes with the use of certain types of technology."

Finally, time is also needed within the lesson for the teacher to "just right out have fun with or model what can be done with technology."

Agatha believes that by implementing technology into her classroom instruction in a manner that is appropriate to the instructional goal and accessible to all of her students, she will " simply do things in a more fun way on a computer than ...without it." Therefore, she is very interested in future inservice training that will:

- maintain her current skill level and develop advanced skills
- use hands-on, guided experiences with step-by-step explanations
- include preparation for and strategies for dealing with the question, "What kinds of things are likely to go wrong, and how do you correct them?"
- and include written suggestions, such as "20 ways you can use technology in your classroom that will make your life easier and your lesson more interesting to students."

Agatha summarizes her beliefs about the necessity of technology training by stating that "a teacher who doesn't know technology is a teacher who can't teach the students technology, and that's a shame!"

## **Peter's Case Study**

*I didn't even know how to turn the computer on when I entered the **Educational Computer Literacy** class. And, because I became computer literate at such a late age, the class was just invaluable. And, although I'm not totally competent, I have such a good strong foundation.*

Although Peter had no previous experience with technology before the basic computing tools class and the media competency, Peter finds it hard to image his life without the technology tools, and explains, "Oh, my goodness, I have used e-mail, FirstClass, Netscape, and Word Processing, just in what I was doing today! I have even saved to disk today. And, I am using the applications on a constant basis....spreadsheet, I never thought I would use spreadsheet, but today, I was working from four different lists of words, and decided that I would use the spreadsheet to make my own list of target words." He elaborates his point further by trying to

think of the things that were included in his training that he felt were unnecessary, "but so far, I think we've used everything we learned in class, and if I haven't used it, I can see where I will use it in the future through the schools."

When asked what technology related events and activities he would find useful for daily classroom instruction, Peter responded with several technology based activities that he feels are invaluable to his classroom instruction.

First of all, Peter felt fortunate to belong to the Reading and Technology cohort<sup>2</sup>, a group of student teachers who are provided with laptop computers during their student teaching field experiences. In addition, these student teachers are required to submit assignments through FirstClass, an intranet that allows students in the College of Education to communicate via bulletin boards, e-mail, and chat. Peter feels that the ability to "link to other student teachers has been invaluable as an extension of classwork," as his fellow student teachers utilized the e-mail capabilities of FirstClass to "talk about what goes on during the day, exchange ideas, and ask for help or suggestions." The use of FirstClass as a communication tool allowed the student teachers to participate in "as much reflection as teachers do and need to do" by providing a community of support that "allows you to talk to someone else 24 hours a day. It's really nice to know that I can post a message to my professor in the morning before I go to school, and when I get home, I'll have the answer."

Peter envisions sharing this sense of community with his students by "hook(ing) up to classrooms in other parts of the country, or the world." He had been given the opportunity to observe a classroom project in which the teacher, using grant money, had set up an e-mail system for her bilingual classroom in order to communicate with a classroom in Mexico. Peter expresses his belief that the opportunity for his students to participate in an experience

that allows the students "to realize where the technology is and what kind of world we are living in now" is important because these experiences develop student understanding of a world in which it is "easy to get in touch with somebody, even on the other side of the world with just the click of a computer button." In addition, Peter feels that correspondence with other cultures and communities through e-mail opportunities would enhance student perceptions of "multiculturalism" and "dealing with goodwill between foreign countries."

Peter further envisions the use of e-mail as an opportunity to invite experts into the classroom by setting up an exchange of e-mail messages between his students and topic experts. In fact, Peter has designed a unit on oceans that included an activity in which his students would write "letters to experts that are available through the Internet about special animals in the oceans." Although his school does not have Internet resources at this time, Peter may "take (the student) letters, scan them, and send through the Internet either through the website e-mail or regular e-mail as an attachment," so that the time spent waiting for an expert to respond would be reduced from "days" to "the same day or overnight."

A second technology related activity that Peter feels would be a valuable addition to his classroom instruction are the resources and activities that can be constructed by using the Internet. Peter equates the Internet with an "in-class library," and feels that often, topic searches and accessing "journal articles through the net" would be a superior method of searching for information than using print media. "Books are great, but it takes time to search and find them out. I'd rather be able to tell (my students) to pick a topic, such as our topic on oceans, and take off." Peter feels that this type of resource gathering "pushes the kids to be creative, pushes them to organize, collecting data and discovering or constructing that knowledge themselves."

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<sup>2</sup> Pseudonym has been substituted for the actual name of the cohort.

And, although his student teaching situation does not have access to the Internet, Peter describes a scavenger hunt activity designed by a fellow student teacher that would allow the students to explore teacher-designated websites, an activity which he feels would be suitable for classroom use. "They had a list of websites to go to and a list of things to find. There was no problem engaging the kids in the activity and getting them to complete it. She claimed that what really made her whole unit was that one lesson. She was able to teach the whole unit because the kids just kind of took off with the research."

The capability to create multimedia presentations through HyperStudio is a third technology that Peter feels would be valuable within his daily classroom instruction. Peter states that HyperStudio gives him the flexibility to "create something that is very useful and very adaptable for (his) students exactly" without being a "computer genius" or "having major corporation behind you." The teacher has the ability to "design (the instruction) exactly for where your students are. You can make it as simple or complex as you want to, and you don't have to go through a software company to make changes in prepackaged software." He describes a basic map skills program that he created for his social studies methods class. By using these types of programs, Peter feels that he was:

"truly a facilitator. The teacher is allowed to step down from the 'sage on stage' kind of thing. The students can just go in and just do it themselves at their own pace, and go where they want to go and learn it the best way for them to learn it. You don't have to worry about whether you're hitting all of those different intelligences. The students are allowed to use their best method for learning...which is what the teacher is trying to accomplish."

Other applications that Peter perceives as valuable would include the applications that are included with an integrated application program, such as the word processing, spreadsheet, database, and draw functions of ClarisWorks. The word processing capabilities are useful to Peter "for papers that I write, to organize and publish unit plans for my methods classes, and in

the classroom to do sheets of class lists, compose letters to parents, and all that." He envisions classroom activities in which his "students use the word processor for publishing", "creating newsletters," and "word processing stories to make booklets the students can illustrate on the computer." And, by utilizing the spreadsheet function, Peter has been able to organize grades and students by "making lists (of students in group assignments) on the spur of the moment." Peter feels that designing activities that utilize the database capabilities of "classifying and sorting,... of putting together databases of a wealth of information that the kids collect, and then use it by sorting (the information)... and using the database to find specific answers" are very useful for classroom instruction. He also values the capabilities of draw programs to provide a "different medium for students to work in" may allow students "who may not feel that they are very artistic" to be "artistic" using "paint programs, and being able to download pictures from the internet to include in a presentation in lieu of showing a picture from a book." Peter feels that these computer experiences "really open up another opportunity for kids to be successful" when they may not otherwise feel like they can be successful.

However, as a student teacher in a multi-age 2<sup>nd</sup>/3<sup>rd</sup> grade class, Peter has found that "involving the student in technology occurs little," unless he counts the fact that the "classroom planning and organizational kinds of things that I do on the computer indirectly affect the students."

Peter perceives that there are two reasons for the lack of technology infusion into the daily classroom. First, although there are four computers within his current teaching situation, the lack of access to the Internet eliminates many of the activities that Peter would like to design for his students, such as e-mail to experts and other classes, or individual topic-

information gathering searches. "The Internet is not there and that would be necessary for the teacher to really be able to extend the resources beyond the blackboard and overhead."

Secondly, finding time within the daily schedule to "make way for 30 minutes for students to use the computers" is hard to plan. The skills that the students need to "do their projects quicker because they have had the training" should find a place within the instruction, so that "when the students use the word processor for publishing, they (won't) spend a week typing in a paragraph!" Designing activities that allow the students to participate with the technology takes teacher-planning time. Peter "hasn't figured it out yet, with everything else there is to do. It's just an ingenuity that teachers need to have to get it done! I think there's definitely a way to get all the kids on the computer everyday whether it's using a CD-ROM that's part of a unit or time spent just practicing those keyboard skills, learning how to do simple word processing. I definitely think it's important; the sooner you can get the students literate the better."

Peter feels that his technology training has served him well. Others, such as his cooperating teacher, look at him as a computer expert although Peter claims, "I'm not that much of an expert, but I guess I have shown that I can do a lot of things on the computer...I have a certain level of comfort around computers." Peter only regrets that he hasn't "had the time to figure out how I could have used technology with the students. It will take time to sit down and figure out how I would integrate technology into my teaching, but is certainly something that I will do over the summer. I will incorporate technology into every aspect of the day." Therefore, if he could add anything to his present training, it would be to have someone show him how to incorporate it into his activities with his students by "having the process modeled for me of how it could be done, and just exactly how you would do it."

Although Peter had participated in a microteaching situation in his computer class, which gave him a "pretty good example in how to do it," he was astounded by the amount of time that it took for him to prepare the one ten minute lesson needed for his class microteach. Multiply that activity by "four or five content areas a day, five days a week for nine months," and Peter feels overwhelmed. So, in addition to having the activities modeled, Peter would also appreciate training that included shortcuts for creating activities that could be used in many content areas. "You come up with those outlines, and those formats, and just put the information in."

Peter envisions a future "where technology is not just kids doing research over the Internet. We're talking about the future where everyone has a laptop. The computer is just another tool we can use to hook the kids into learning." And, Peter wants his students to participate in the technology that is available today. "I really do think that there are educationally sound activities that are computer based. Kids are hooked, and something that has to do with computers means that they are immediately engaged. Kids and computers...that's got the spark going right there. It's just the fact that you are doing it on the computer."

## **Cindy's Case Study**

*Had I not had **Educational Computer Literacy**, my naivete about computers would keep me from wanting computers (in my classroom). I would think, "I don't know enough about them, how can I get my kids to use them?"*

Cindy feels that the course, **Educational Computer Literacy**, was pivotal in preparing her to use computers personally and with her students. Because of this training, Cindy states, "I lost

my fear (of using computers) and could see how even something as simple as word processing could be used, and I would use it. I would have (computers) as an integral part of my classroom."

Cindy received additional computer training as a member of the Reading and Technology cohort, and was allowed the use of a laptop during her student teaching field experience semesters. When asked to share the technology related events and experiences that she would find useful in her daily classroom instruction, Cindy enthusiastically proclaims that "having FirstClass itself was fabulous!" Cindy feels that this particular communication tool, along with every member of her cohort having access to a laptop, provided a needed support structure within her student teaching experience. "FirstClass is useful, accessible, and understandable. I use it all the time." By providing the student teachers with a forum in which the student teachers in the group could e-mail each other regularly, post messages on bulletin boards, and participate in real time chats, "there was a level of cohesion amongst us that could never have been reached had we not been in touch that way. We were all kept abreast of what was going on with each other...not only in our school experiences, but in our life experiences." In addition, Cindy feels that the e-mail capability of attaching assignments and "sending it to the professor electronically was heaven. We were doing our classroom observations (in the public schools) and wouldn't have to drive back to campus to drop off a paper. Then, we would get immediate feedback, or get our grades that way. I can't praise FirstClass highly enough from a student perspective."

Cindy also envisions using e-mail in the future as a means of collaborating with her professional peers. "I would use it to talk to my former professors for ideas and feedback...such as "I'm stuck on what to do. How can I teach fractions?" Or compare notes

with my colleagues and put the word out that I'm doing a unit on science fiction. "Does anybody have any ideas or has anyone done this?" And, perhaps, in the near distant future, Cindy even envisions using e-mail as a means of communicating with the parents of her students.

I can see having a list of all of my parents, and if I have a message to go out, put the parents on my address list, and send out an e-mail that discusses what we're doing. That way the kids don't have to take a paper home and make sure it is seen. The parents can take on a little more of that responsibility; and they can't say "Johnny never showed it to me" or "I never got that." I could see sending report cards home that way...oh, I would love that!"

Another technology related activity that Cindy emphatically embraces is the use of the Internet to acquire information, pictures, and lesson plans.

I use the web now for lesson plan ideas, lesson plans, and topic research. I pull graphics off the web to decorate my units. I am doing a language arts unit on the author-illustrator Chris Van Allsburg, so I got on the web and found that there was a "Get to Know the Author" website. The website contained a question/answer interview with the author and a picture. So, I was able to bring in a picture of Chris Van Allsburg to show the students, and read from the interview some of the questions that other kids had asked him, like "since you wrote the book, Jumanji, what did you think of the movie?"

She created a science unit on bats, which relied heavily on Internet materials. And, to supplement her social studies instructional unit on explorers, Cindy located a homepage on Christopher Columbus, which she used as the basis of a computer lab activity for her students, an activity that her cooperating teacher requested she plan.

My cooperating teacher is at the functioning level of computer literacy; therefore, she is scared to death to take her kids in the computer lab. So, last week, when she discovered that I knew at least how to navigate the web, she asked me if I would take the class to the computer lab this week. So, I took the class to the lab, got them on the web, got them to the Christopher Columbus site,

let them play around at the site. Then, we went to another web site. At least the kids now know how to get to the web, and how to put in a web site address, and what button to push to get there.

Other activities that Cindy feels would be valuable in her classroom instruction are the use of word processing, draw applications, and clipart software. Cindy was fortunate to have spent time observing in a classroom in which the teacher "was techno-savvy." Cindy was able to observe the teacher encouraging the students to type out their finished writing assignment for publication. "The kids loved doing this, and if I had computers in my classroom, I would encourage my kids to use them." In addition, Cindy observed the teacher using MacDraw, a draw and paint program, with the multi-age K/1<sup>st</sup>/2<sup>nd</sup> grade students.

She taught them that basically everything you can draw can be broken down into circles, squares, and triangles, so she taught them to make a house out of a square with a triangle on top. And, the name of her class was "the Busy Bees," so she taught them to manipulate the circle to make an oval and put a circle on it to make the bee's head. Straight lines did the antennae. (The activity) was good for me to see because it never would have occurred to me to tackle that topic with K/1<sup>st</sup>/2<sup>nd</sup> grade.

For other art work needed, Cindy would use clip art software packages to "zip (her documents) up a little bit just to make it more fun."

Cindy also had the opportunity to observe how the teacher meshed technology with learning centers by allowing the students to participate in a series of rotating centers, some which utilized CD-ROMs as the activity for that center. Cindy gives this example of a viable use for CD-ROMs:

The kids would come in first thing in the morning, and they had rotating centers. On Monday, Johnny would be in the reading center. On Tuesday, Johnny would be in the writing center. On Wednesday, Johnny would be in the math center. And the teacher would have the table set up with books, if you were in the reading center that morning, paper and pencil if you were in the writing center. If you were in the math center, the teacher might have problems on the table and a set of manipulatives, and you would sit and work at those, or you could get a CD. And they were math, fun, animated CDs, and the students could use their math time that way.

Although Cindy is enthusiastic about utilizing e-mail/FirstClass, the Internet, word processing, draw/paint, and clipart software, she cautions that "in a perfect world, many of the things that I learned in the only class I had, *Educational Computer Literacy*, were wonderful," but the reality of the time constraints within her student teaching experiences have led her to approach other technologies cautiously. "The thought of getting on a computer to do a presentation or do HyperStudio now, when I think of the agony that it caused me and the hours of preparation time I spent as a student when I presumably had more time, isn't even within my realm of thinking. I laugh at the idea!" In fact, Cindy describes her concerns about using technology within her daily classroom instruction as centering on time constraints and inequitable access of the technologies.

Cindy feels that time is such a precious commodity for student teachers that spending time generating lessons that utilize technology often consume more time than other kinds of lessons. She gives the example of preparing her web search activity for her students in which "I spent a good three hours on Sunday going through the web looking for good Christopher Columbus sites. I think that a regular classroom teacher who had been doing this for a long time would say, "I'm not going to spend three hours surfing the web just to come up with a Christopher Columbus site when it's all in the book anyway."

Cindy can see the benefits for other applications, such as "having a spreadsheet for grading purposes," although she explains that "my comfort level with spreadsheet is minimal, so at this stage of the game, it's faster for me just to record something into a grade book by hand. And, then, at the end of the term, I will have to average them all by hand! And, I don't know if it would save me time if I went ahead and took the time to plug those into a computer now."

In addition, she would "love to have the time to (design) lessons using HyperStudio and presentations (slideshows)," but she remembers how time-consuming the creation of such projects can be.

I keep thinking of another student's incredible HyperStudio geography lesson that was unbelievable. His lesson stack started with the school; and the next card would be the school as if fits into the neighborhood; then the next card would be the neighborhood as if fits into the city; and then the city as if fits into the state; and the state as it fits into the United States; and the United States as it fits on the globe, and it was so cool. But I also know that it took him probably three weeks to create that project. If I had something like that I would definitely use it, but I wouldn't be the one who would put it together! I would borrow it from my friend!

Cindy also shares her concern that, in her student teaching experiences, the access to computers was not equitable. For example, the classroom in which she spent her observation field experience had eight computers, and the teacher was able to engage the students in a multitude of technology related activities. Cindy had the opportunity to observe how technology could support classroom instruction. However, her teaching field experience is situated in a classroom with only one computer. The classroom computer is strictly allocated for use with a district-wide reading program. Teachers assess and design reading instruction with *The Accelerated Reader*, a program that "the teacher uses to determine the reading level

of the kids, and then the kids use it to take tests on books that they have read in order to advance to the next reading level." Class technology activities take place in the school computer lab, where Cindy's fifth grade classroom is scheduled for one hour every other week. Feeling the inequity between the abundant access of her observing situation to the limited access of her student teaching situation, Cindy exclaims, "You know, one hour a week isn't going to do much!"

With her awareness of the constraints of time and access, Cindy feels that any additional training that she would undertake must serve two purposes. First, now that she is actually out in the classroom, she would like to review the educational software programs that are available. "When you are a student, and you haven't been in the classroom, these packages mean nothing to you. You can't envision whether you could or couldn't use the software in your classroom." And, secondly, Cindy would enjoy visiting with "educators who were successfully using technology in their classroom who would come and share with us how they are doing it, and what they are using it for, how it's making their lives better, how it's making the children's lives better, and how it's making the children's schooling more successful. " Having people who are using technology model the techniques, rather than "learning from people who theorize how it might be put to use" would be something Cindy would personally be interested in learning.

Cindy might even find that if these accomplished educators "were using HyperStudio all the time, and (considered) it the greatest thing since sliced bread, that would encourage me to take a course and learn it myself! I want to know first hand from somebody that it's wonderful, and this is how we use it in the classroom, and it's worth the time that it takes to learn because it will make things so much better."

## Leo's Case Study

*I think that getting the full-blown ClarisWorks workout in the **Educational Computer Literacy** class was great because I had never looked at databases before!*

Leo was no stranger to computers when he entered the **Educational Computer Literacy** class. His prior experiences with computers began with his TRS 80, one of the first computers available in the early 1980's, and he had previously worked with a friend building personal computers. He is quite comfortable modeling the use of technology for his cooperating teacher, and has been "educating his fellow teachers on how to use (database applications)," and is interested in "showing the teachers how to make documents or to use draw features." In addition, Leo is also in the Reading and Technology cohort, which provides its student teachers with a laptop and training so that the student teachers can communicate via e-mail, chat, and bulletin board postings.

When asked what technology related activities he would use in his daily classroom instruction, Leo pragmatically stated, "Internet, laptop, and e-mail, and all that stuff has nothing here. There's nothing. No help at all. It is physically a fact that there is no technology here." However, Leo does have one computer in his classroom of which he makes extensive use for administrative and organizational activities.

Leo has found the database application of ClarisWorks to be invaluable. "We have class lists, and we can manipulate that. Since we (referring to his teaching team) both have fourth and fifth graders, we might need a roster for TAAS writing; we need a roster for spelling groups; we need a roster for all these different things, and we can certainly spit out different little lists and checklists." In addition, Leo has utilized the database to create posters

for the classroom that detail class jobs (See Database Example in Appendix, p. 63 ), seating charts for the different groups that Leo instructs, and calendars that denote group rotation and assignments. Leo created a "word wall" with the computer, 26 sheets of paper with one large letter of the alphabet upon each sheet," and then laminated each sheet "so we could work on it with an erasable pen." Leo describes using the word wall when "someone doesn't know how to spell something, we put (the correctly spelled word) up there under the letter that the word starts with." Leo even personalizes his grade book by using the database to create a "list of the names for each group, printing them out, and gluing them onto the gradebook. So, everybody is sorted by groups, and it makes recording the grades so much easier."

Although Leo feels that "the old technology seems to be the most helpful," he does make the exception for word processing and database. Word processing has been very useful for "coming up with worksheets based on exactly what the students are using rather than using the dry things that come with the materials." And, he further explains, "Word processing is certainly better than a mimeograph machine. You know, it's a way to compose things that look like everything else that these kids see which is well done. They are used to seeing things done in type on the computer, and I think that's a good thing. I think it would be really cool to have kids compose newsletters, too, or local papers. So, I would use the word processing, database, and a draw package of some kind."

However, if access to the technologies was not a problem, Leo would find it feasible to incorporate other technology based activities into his instructional activities. Leo describes an activity that he designed in which he used a laser disk to supplement four lessons on landforms. "We were doing landforms, and there was one laser disk that had all these different volcanoes and different things, like earthquakes, that happen in the world." Leo feels

these kinds of activities are valuable because the laser disk "had a better explanation with graphics and stuff...much better than me standing up in front of the room explaining it. The laser disk even stopped for you after a little byte of information. It froze the screen so you could stop and check for understanding."

In addition, Leo would like to teach his students how to search the Internet for topic resources. For example, his class is currently working on rain forest reports. Leo feels "it would have been great to have the web so they could look up sugar gliders, or just the rainforest in general." However, Leo cautions that he would not allow his students to do a report based "only on the stuff they got off the web. The students would have to use books as part of a "balanced diet" of sources for a report," because he feels that "the web is a great place to go and find a quick overview. I don't think it's that good for in-depth knowledge about a subject. It's a good place to start, to know where to go to look after that."

Leo feels that if he had access to "projectors and computers for everybody, everyone could get into Hypertext. We could do HyperStudio reports. That would be really fun, and educational besides being cool." And, if he had access to software, he might explore *The Accelerated Reader*, "where they use computer testing so students can read at their own pace and test out of the book, and go on to the next book. There are prizes for finishing x number of books, and I think that's a cool program."

Leo shares that there are certain responsibilities that he believes the teacher must be aware of when utilizing technology based activities. First of all, there are certain issues with equitable access. "Effectively, " Leo states, "if you can't use it equitably then, you can't use it at all." With only one computer in the classroom, "the kids really don't get much computer

time." However, he has arranged, on a rotating basis, for his students to use CD-ROMs such as Math Blaster and Museum Madness during free time.

Secondly, Leo feels that there are issues of appropriateness with certain technologies that teachers must address. For example, when discussing Internet uses within the classroom, Leo explains, "I don't want to get the students into things like chatrooms because that's for them to do at home or somewhere else. This is a place to learn, and not a place to play. You know, you can sometimes play and learn, but I don't want the students exposed to commercial sites while they are on my clock," referring to commercial sites "like Disney Online, or anything where they are trying to sell, or basically anything that has a 'dot-c-o-m.'" In addition, "never being able to find exactly what you are looking for" on the Internet may limit the appropriateness of using the Internet for research.

Leo, also, feels that the use of e-mail possibly undermines the skills needed for the students to "write letters, and address envelopes. They need to do that manual thing with the pencils and the stamps and the whole nine yards." He does feel that having e-mail available might be valuable for that "teachable moment" in which the immediate correspondence would be important.

Even though Leo has been issued a laptop computer, he hasn't found using it necessary, as he has a computer at school and one at home. In fact, Leo is less concerned about the lack of technology in the schools than the other informants, because he has a computer at home. "And, so if they don't have (what I need) at school, I'll do my work at home. And, I would never be without a computer. It's as important as....well, I don't have a dishwasher, but I have a computer!"

## Findings

The goal of this inquiry is not to formulate generalizations that will be true from situation to situation, but to "illuminate a particular context and provide working hypotheses for the investigation of others (Erlandson et al., 1993, p. 45). By providing thick description of the perceptions, values, and situations experienced by the four student teachers who served as informants for the study, this study endeavors to describe the factors that are unique to this context. Analysis of the data generated from the informants was categorized into data units, which were then categorized into chunks. Themes emerged from the chunks. A process of constant checking of the themes against each new bit of data generated from the informants resulted in the emergence of the following four "working hypotheses." These working hypotheses are not meant to be generalizable to other situations, but to provide direction for "the investigation of others " (Erlandson et al., 1993, p. 45).

### ***Working Hypothesis #1: Student teachers, as well as their cooperating teachers, perceive technology training as invaluable to using technology in the classroom.***

Positive perceptions of the value of technology training are evident among the perceptions of each of the four informants. Because their training encompassed a continuum of activities from beginning tasks to advanced use of the applications and technologies, each of the informants felt that they had developed a certain comfort level with computers and other technologies. Peter described his abilities as not quite "expert", but could show "that I can do a lot of things on the computer." Agatha described her capabilities as "fluent" and felt that she now had the ability to learn other applications by herself. Cindy discussed her abilities as involving different levels of comfort with different applications, but perceived value in using

all applications within her classroom instruction. To resolve the dilemma of dealing with computer applications with which she expressed a lower level of comfort, Cindy was prepared to either seek out commercially prepared applications that would suit her instructional purposes, or "would borrow it from my friend" who had already constructed the activity. Finally, Leo shared a multitude of organizational and administrative activities that he had developed as a result of his exposure to the variety of class projects incorporated within the technology training. Although Leo came into the technology training with a broad background in computers, the additional media training broadened his use of technologies. For example, his use of laser disks within class instruction would never have occurred before the training because he "wouldn't have thought to even look for a laser disk until then."

Not only do the informants view the training as invaluable, each of them expressed surprise at being viewed as a technology expert by their cooperating teachers and other professionals in the field. Leo was already modeling the use of database and draw technologies for his cooperating teacher and her team members when our interviews began, and he was looking forward to having the time to demonstrate a few other techniques to the teachers. Peter summed up his experience when he stated, "My cooperating teacher looks at me as a computer expert--something was wrong with the computer, and he asked me to look at it." I detected from the wry grin on his face as he related this experience a sense of delighted accomplishment from this student who "didn't even know how to turn the computer on" when entering the training. Even Cindy, who still qualifies her abilities by her level of self-perceived proficiency, enthusiastically embraced the teaching of her class of fifth graders how to "surf the web" immediately after her cooperating teacher learned of her abilities. And, Agatha's supervising teacher was so grateful to acquire Agatha's database, a collection of

useful website resources she had gathered from the Internet, that she immediately shared the database with team members and other professionals.

***Working Hypothesis #2: The student teachers perceive the coursework activities, as well as the applications used to create them, as valuable and are able to modify the activities to fit their needs in the classroom.***

Each of the four informants eagerly shared activities that they felt would be valuable to them as they began integrating technology into their daily classroom instruction. These activities, as described in detail in the case studies, were reflective of the project activities that the informants had completed as part of their technology training. For example, Cindy revised a Web Scavenger Hunt activity that she completed in the *Educational Computer Literacy* course to fit the instructional purposes needed for her initial "surf the web" activity of her teaching situation. Leo manipulated the database to create spelling lists, calendars, seating charts, class rosters, job charts, checklists, grade books, and serve as an administrative aid for completing other tasks. Such a variety of database creations reflects Leo's ability to utilize projects similar to those he completed during the *Educational Computer Literacy* course and fashion them to meet his current organizational needs. Agatha created individual notepads, a "goodbye" gift for her students, using a draw application to construct the text and pictures for the notepad, which is a unique application of one of the draw projects she had completed with the course. Peter stated,

"Now I am using what I learned...actually applying stuff that I thought at the time I was learning that I would never use... spreadsheet.... I thought I would never be able to use spreadsheet, and I remember our professor saying that I could make class lists and keep grades, and now I enjoy the ability to make lists as a teacher on the spur of the moment."

The student teachers are not drawing only upon activities that were presented in the *Educational Computer Literacy* course. Activities from the Media Competency training are evident, as well as activities that were demonstrated within the student teaching field experiences. Leo's use of the laminating machine to create Word Walls and the laser disk to supplement his landform lessons are examples of activities completed in the Media Competency training. Agatha also extrapolated from her Media Competency training when she explained the use of the video camera as an important tool in providing students with an opportunity for constructing closure to student projects. Cindy discussed her willingness to use a draw application with kindergarten students because she had seen her cooperating teacher demonstrate such an activity, and Peter could visualize using collaborative internet software to post information teachers share rather than requiring teachers to share the information in a face-to-face faculty meeting.

Perhaps, Peter summed up the perceptions of the informants best when he stated, "I think we've used everything we learned (in our technology training), and if I haven't used it, I can see where I will use it in the future through the schools."

***Working Hypothesis #3: The technology activities that the student teacher perceives as valuable are directly related to the student teacher's perception of the role of the teacher.***

Frazeo and Rudnitski (1995) describe the role of the teacher in the classroom as forming a continuum. At one end of the continuum, we have teacher-centered instruction, which proposes the belief that learning is a "result of direct transmission of knowledge from teacher to student." Located at the other end of the continuum is student-centered instruction,

which proposes that learning is "a result of a student's ability to understand and process information" with the teacher acting as a facilitator (Frazee & Rudnitski, 1995, p. 203).

Each of the informants described their perception of the role of the teacher in the classroom through statements that reflected their attitudes towards the control of the learning situation (teacher-centered versus student-centered) or preferred structure of classroom lessons (structured/whole group versus flexible/experimental/variety of group sizes). The informant's perception of the appropriate role of the teacher could influence the activities that the informant perceived as valuable due the focus of the technology use (teacher-centered versus student-centered.)

Leo, for example, felt that "the old technology is the most valuable," with the exception of word processing, database, and perhaps, draw applications. He was using the computer within his classroom on a daily basis to create a multitude of administrative and organizational tools with database, word processor, and draw applications. Although his students were not using the computer in the classroom for more than playing educational games during free time, Leo envisioned technology use with his students as occurring within carefully controlled situations, as his class was a "place to learn, and not a place to play." Leo stated that he was cautious about allowing students free exploration of the Internet because of the possibility of exposure to chatrooms and commercial websites. The Internet would be valuable to activities in which Leo's students used web information as "a quick overview" of information available, a "good place to start" collecting data. In addition, Leo did not see many uses for e-mail as he preferred his students to develop the skills needed to "write letters and address envelopes" or "do that manual thing with the pencils and the stamps and the whole nine yards."

Agatha envisioned using technology in such a way that the technology enhanced the instruction, and yet brought an element of "fun" to the instruction. She expressed a preference for applications that allowed the retrieval of text, graphic, and video information, such as Internet and e-mail, storing and manipulating information between applications by using an integrated applications software that incorporates word-processing, database, spreadsheet, and draw, and presentation technologies such as video recordings, laser disk or slideshow softwares. Agatha was using technology in these ways personally, and could see great benefit for students if they could obtain the skills needed to retrieve, manipulate, and store data in the same methods. Agatha strongly expressed her belief that the role the teacher in technology-related activities involved a "guided discovery" process, in which she would guide her students through technology-based activities by presenting well-defined tasks and clear expectations of the project outcome. She further stated that "a teacher who doesn't know technology is a teacher who can't teach the students technology."

Cindy enthusiastically embraced the telecommunication technologies within her personal use and classroom instruction. She viewed the opportunity for collaboration through e-mail with students, colleagues, or parents, and the use of the Internet for information, pictures, lesson plans, and collaborative projects as activities valuable to her classroom instruction. She described small group, publishing and learning center CD-ROM activities that she would incorporate into her instruction. Cindy further explained her use of a computer lab activity that used the Internet to provide the initial lesson for her social studies unit on explorers. She talked of encouraging her students to use word-processing, clipart, and draw applications, in presenting finished student projects. She expressed her desire to collaborate

with and learn from teachers who have successfully accomplished the integration of technology-based activities into their daily instruction.

Peter visualized the computer as "another tool we can use to hook the kids into learning," and envisioned his teaching role as stepping down from the "sage on stage kind of thing. The students can just go in and just do it themselves at their own pace, and go where they want to go and learn it the best way for them to learn it." Peter described many ways in which he felt that technology could be useful for all of his students, including multimedia creation, Internet exploration and e-mail projects, classroom activities that include use of "word processor for publishing, creating newsletters," and publishing booklets that the "students can illustrate on the computer." Peter regretted being unable to dedicate sufficient time during his student teaching experience to "sit down and figure out how I would integrate technology into my teaching." He emphatically stated, "I will incorporate technology into every aspect of the day."

***Working Hypothesis #4: The student teachers shared common concerns regarding possible barriers to their ability to successfully integrate technology into their daily teaching.***

As the focus question centered on experiences that would be valuable in daily teaching practices, perhaps, the most surprising theme emerging from the data generation was that the student teachers shared common and genuine concerns regarding integrating technology-based activities into their daily teaching. The student teachers felt varying levels of frustration with these concerns and expressed the fear that these issues could delay their ability to integrate technology successfully into their daily teaching.

Time issues were the first area of concern. The student teachers were concerned about the time that technology-related activities took to plan and implement within their lessons. Cindy gave the example of spending three hours searching the Internet for an appropriate website to support her unit. Leo expressed his experience that "you can never find exactly what you are looking for (on the Internet). You always find neat stuff, but if you go looking for something specific like a lesson plan about sugar gliders, you'll never find it. But, if you go looking for the size shoe you want for a giraffe, then you'll find the lesson on sugar gliders." Peter shared his example of the two weeks of preparation that had been necessary for him to prepare a 10 minute lesson that he was to teach for the *Educational Computer Literacy* course. Peter was overwhelmed to think about the preparation time that would be needed to prepare "four or five content areas a day, five days a week for nine months."

In addition, Agatha added her experience that time was needed for the students to use discovery and exploration with the technology, as well as develop the skills needed to work independently. Peter stated that simply finding time within the daily schedule to make way for computers remained a challenge. However, he was encouraged by observing a teacher who had provided each of her students with individual computer time during the week for the purpose of practicing keyboarding skills and learning how to do word processing.

Secondly, the issue of access to the technologies in the classroom and access to technology-based experiences made integration difficult. As Cindy was the only informant that had access to a technology-rich teaching environment, she, alone, had witnessed the modeling of technology integration within the classroom. In addition, the student teachers were limited in their experimentation with incorporating technology into their teaching because the technology was simply not available. Agatha had never seen the computer in her

classroom turned on. Peter jokingly commented that with the state of technology acquisition in the school district, he might "forget all the knowledge he had worked so hard to master in the *Educational Computer Literacy* course," a process he did not relish going through again! Leo stated that he felt that with such limited access to computers, it was essential to provide his students with equal access because "if you can't use it equitably, then, you can't use it at all."

The lack of access to field experiences which permitted the student teachers to implement and design technology-based activities and the lack of models for teaching with technology resulted in a concern that the student teachers would be able to develop a viable method for infusing technology into their classrooms. Agatha felt a need for future training that would increase her technical skills and provide her with "ways to use technology in your classroom that will make your life easier and your lesson more interesting to students." Leo suggested additional training that would highlight troubleshooting and strategies for dealing with the types of problem solving that is required with technology use. Cindy and Peter both felt that they would be supported in their process of infusing technology into their teaching if they could visit with educators who were successfully using technology in the classroom and, as Cindy stated, "find out how they are doing it, what they are using it for, how it's making their lives better, how it's making the children's lives better, and how it's making the children's schooling more successful." Peter was conscious of the need to acquire training that would "have the process (the steps for integrating technology within a lesson) modeled for me."

Finally, the student teachers were concerned about the impact that technology had upon the quality of instruction. Agatha stated that "technology should be used to improve something" (within the student learning activity.) She felt that technology should be infused

into the instructional situation only when technology was the more appropriate choice. She commented that the technology should add a quality to the learning situation that could be accomplished with no other tool, such as the use of video or laser disks to supplement instruction because they "bring alive things that students otherwise see only flat on the page." Cindy also expressed the belief that the technology should make the instruction better or "children's schooling more successful." Peter claimed, "I really do think that there are educationally sound activities that are computer based," and should be included because "the sooner you can get the students (technologically) literate, the better." Leo cautioned that free exploration of certain technologies, such as Internet surfing, could be an inappropriate use of technology for the elementary classroom. He envisioned using specific websites that he had previewed and approved for classroom use.

## **Lessons To Be Learned**

Although the lessons to be learned from the research presented in this inquiry are generally decisions that remain the responsibility of the reader, the findings tend to suggest certain implications for transferability to the context of teacher education and technology training.

First, the perception of the value of training that these student teachers have expressed is reflected in many research studies, such as (Campbell, 1992; Delcourt & Kinzie, 1993; Liu, Reed, & Phillips, 1990; Troutman, 1991). These studies have indicated that self-efficacy with technology use, or the belief that users hold regarding their ability to be personally effective with computers, increases with familiarity and training. The depth of training experienced by the student teachers interviewed for this inquiry included advanced application use, and rendered them quite competent technically. Their colleagues and cooperating teachers within

the schools viewed these student teachers as "experts" and sources of professional development, a nationwide pattern of "teachers relying upon recent graduates of teacher preparation programs to gain expertise in the latest technologies" (Northrup & Little, 1996, p. 213). Therefore, the quality and depth of the training, as well as familiarity, appear to be significant components of training.

Secondly, if student teachers value technology-based activities that are similar to the activities they encounter in their training, the implications for designing technology competency training of future student teachers could center around developing activities that would provide:

- A model for integrating technology within lesson plan design
- Incorporation of a wide variety of technologies within the training
- Incorporation of multiple experiences of designing and presenting lessons that integrate technology

The training should also address some of the concerns that student teachers felt could become barriers to their successful integration of technology within their daily teaching. Informants of this inquiry would see the inclusion of opportunities to visit with educators who are successfully using technology within their classroom and opportunities for student teachers to experiment with lesson design and implementation as valuable additions to technology training for student teachers. Not only would opportunities such as these address their concerns with preparation and implementation time, but would serve to provide some discussion regarding their concerns about the appropriate use of technology within a lesson design.

Other concerns indicated by the informants as possible barriers to their infusion of technology into classroom instruction included access to hardware and peripherals within the school, scheduling enough computer time for the children, and scheduling computer training

during the class day. These concerns are among the top seven barriers indicated by a survey of "accomplished teachers," teachers who were chosen by their colleagues as successfully integrating technology within their daily teaching practices (Hadley & Sheingold, 1993). These findings would seem to suggest that preparing student teachers for the "real world" of technology use within the classroom could become an important part of training. Although being aware that these are problems that all teachers working with technology share may be sufficient to diminish fears of student teachers, training could offer "troubleshooting" components or suggestions for handling the day to day problems of time, space, supervision of students, lab access, and operation of the equipment.

Another finding from this inquiry involves the technology decisions that the student teachers made regarding valuable technology activities as related to their personal perception of the role of the teacher in the classroom. The student teachers who expressed a preference for technology activities which were more teacher-centered, such as using the computer as a professional tool for the teacher, also expressed the most concern with controlling the structure of the learning situation. For example, Leo expressed the most concerns regarding using technology in the classroom with the students, and although he was extremely competent in his personal use of technology, demonstrated the least amount of technology use within his daily classroom instruction, preferring to use the old technologies. Agatha could envision many uses of technology within student-centered lesson activities for students, but expressed the concern that the activities would be successful only if the teacher were to lead the students in guided discovery. In addition, she stated that a teacher must know the technology before using it in the classroom. Cindy incorporated technology within her student-centered lessons and could visualize using technologies even if she did not feel a level of competence with

those technologies. Peter, who stated that he preferred the role of facilitator, could see the value of everything he had learned regarding technology, and would "incorporate technology into every aspect of the day."

Saye (1998) describes teachers who use technology as falling somewhere on a continuum between two categories. (See Table 1. Characteristics of Teachers as Accidental Tourists and Voyageurs.) On one end of the continuum are the Accidental Tourists, teachers who have embraced technology as a means of supporting their use of traditional, teacher-centered instruction. These teachers view their role as a teacher to be one of knowledge expert, or dispenser of information. Accidental Tourists value efficiency of instructional delivery and incorporate word processing, drill and practice programs, and tutorials for student use, and organizational tools, such as databases, word processing, or slide show presentations as valuable personal uses. On the other end of the continuum are the Voyageurs, teachers who have embraced technology for its ability to empower student learning. These teachers view their role as a teacher to be one of facilitator, coach, or "guide on the side." Therefore, Voyageurs use technology to provide active, student-centered investigations which often employ self-paced research, interactive simulations, or problem-solving situations.

	Accidental Tourists	Voyageurs
Personality Characteristics	<ul style="list-style-type: none"> <li>• Desire for predictability, control, structure</li> <li>• "I am the teacher; the student is the learner"</li> <li>• Serious Business orientation--no-nonsense mastery of practical, basic skills</li> <li>• Conserve time-honored standards for schooling</li> </ul>	<ul style="list-style-type: none"> <li>• High tolerance for uncertainty, experimentation</li> <li>• "We are all teachers; we are all learners."</li> <li>• Learning as Adventure orientation--learning as lifelong activity that occurs in all contexts</li> <li>• Question traditional methods and procedures</li> </ul>
Classroom Characteristics	<ul style="list-style-type: none"> <li>• Lesson focus: Teacher-centered; Lower-order thought; Coverage-oriented; Discrete facts</li> <li>• Climate: Structured; Orderly; Predictable; Quiet</li> </ul>	<ul style="list-style-type: none"> <li>• Lesson focus: Student-centered; Higher-order through; Process-oriented; Integrated knowledge</li> <li>• Climate: Open; Flexible; Experimental; Playful</li> </ul>

Table 1. Characteristics of Teachers as Accidental Tourists and Voyageurs. (Saye, 1998, p. 225).

on a continuum similar to the one that Saye describes. Leo, who stated that his classroom was a "place to learn, and not a place to play," utilized the computer as a professional tool, but had difficulty seeing the value of many of the technologies for the elementary classroom, appears to demonstrate many of the characteristics of the Accidental Tourist. However, because of his broad experience with many different technologies, Leo was able to visualize the use of multimedia and publication applications with his students. Agatha, on the other hand, was able to describe a multitude of useful applications of technology within lesson situations and would seem to share many of the characteristics of the Voyageurs. However, her concerns regarding structure of the lesson and mastery of technology skills before using with students, traits more closely aligned with the Accidental Tourist, pull her placement to the middle of the continuum. Because Cindy described a variety of learning situations for students that

incorporated technology and discussed her tendency to experiment with technologies, she appears to share more Voyager characteristics. As does Peter, who stated that he viewed his role as a "guide on the side" and desired to infuse technology into every aspect of the instructional day.

This "human element" of technology integration may imply for teacher educators that, at some point in the training experience, the role of the teacher in the classroom should be discussed with the intent of helping the student teachers identify their true inclinations towards perception of role. Saye (1998) states that teachers may make decisions about incorporating technology based upon their ability to admit risk, ambiguity, and adventure into their classrooms. If teachers could identify their "dispositional comfort," their comfort level with risk, ambiguity, and adventure (Saye, 1998, p. 232), and understand how this affects the perception of their role in the classroom, then choosing technologies that match these perceptions of role and dispositional comfort would allow the individual to develop instructional techniques and advanced skills with those technologies that most nearly match the individual's characteristics and preferences.

To summarize, the lessons to be learned from this inquiry indicate that, within the experiences of the student teachers who served as informants for this inquiry, teacher education training could be informed by assuring the inclusion of the following:

- Quality and depth of the training, as well as familiarity, appear to be significant components of training.
- Incorporating components within the student teacher training experience that address concerns that could later serve as barriers to technology integration would be valuable within training.
- Including a discussion within training regarding how the perception of the role of the teacher and the teacher's "dispositional comfort" may affect decisions made regarding technology choices, plus appropriate choices that could match these individual characteristics, could be conducive to helping an individual develop their full potential for integrating technology within their classroom instruction.

Again, the purpose of this inquiry was to describe factors that were dependent upon and unique to the context of this inquiry. The "human element" that is the reader must decide if a look "through the eyes" of these student teachers as they struggle to integrate technology while developing daily teaching practices provides meanings or insights valuable to the readers' own struggles and experiences.

# Appendices

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## **Samples of Each Type of Data Collected**

## Interview Transcription Samples

### Member Checking Level 1

Q: OK, so let me see if I am getting this correctly! First, we talked about that in a perfect world, you would use presentations, HyperStudio and FirstClass

A: Well, I would use HyperStudio...I would love to have the time to do lessons using those...FirstClass doesn't fall into that category...FirstClass is useful, accessible, understandable, I use it all the time...those other two, in perfect world, I would love to, but they took way too much time...\

Q: Am I understanding you correctly? Time to prepare?

A: Yeah

Q: And, then you went on to say that in a perfect world, it took too much time to prepare, and you mentioned that you had used word processing...no, your cooperating teacher had used word processing

A: Oh, yeah...and she also used MacDraw with her K/1/2

Q: Could you elaborate on this?

A: She taught them basically that all...just about everything that you draw can be broken down into circles, squares, and triangles, ...and she's right, you can make just about everything you need to make by using shapes...so she taught them you know if you want to make a house, all you need is a square with a triangle on top and they were called the Busy Bees...that was the name of her class...and so they learned to make ...you know you can manipulate the circle to make an oval...and then they put a circle on it to make the bee's head, and then they could do straight lines to do the antennae, so she had them use that and that was good for me to see that it never would have occurred to tackle that with K/1/2, so they could illustrate their stories to some degree which of course, they just loved.

Q: So, that was at your first school, and the situation you are in right now, the big use is with Accelerated Reader and that's within the classroom. Is that right?

A: Every classroom. I think it's a district wide...the district sunk in a ton of money, and I think all the schools in Del Valle, of course, its not that big a district and that's not that many schools, it takes in 175 miles that it encompasses, but its teency compared to AISD

Q: Then, you mentioned that you had gone to the computer lab with your class and did an activity on the web

A: Social studies activity. .yeah,

## **Member Checking Level 2**

Q: What I did was summarize the things we talked about and I kind of grouped them into major areas. One of the major areas that we talked about were the applications and the way that you have been using them, and you mentioned HyperStudio and presentation and FirstClass. You mentioned that FirstClass had been especially valuable because it helped you keep in touch with the others in your cohort, and you also thought it was important because you enjoyed the capability of turning in papers electronically and getting feedback from professors electronically...and you mentioned software packages that you could personalize that would fit into your teaching situation and you mentioned word processing

A: Wait, go back one...I don't remember the software....

Q: Ah, you just said that there were probably software packages out there that could be personalized to fit into your teaching situation...

A: Oh, yeah, yeah, yeah

Q: you talked about word processing, particularly you have used it or seen it used for the final version of student writing and publishing, and the students would type their own stories if they were short, and if not, the parents would come in and type it...You mentioned Accelerated Reader and how it was used, CD-ROMs, email which you thought was valuable for talking with former professors and staying in touch with people, and in the future, you might even be able to communicate with parents. And, the use of the internet was a valuable application. You had actually the website Get to Know the Author website and located and picture and interview of Chris Van Allsburg to use with your students

And you had relied heavily on the internet for materials on your unit on bats

And you had located lesson plans and used the web for topic research,

And then you mentioned your laptop and how it provided a level of cohesion among the members of your cohort was one of the cohorts...so those were the applications that we mentioned when we talked the first time

A: Yep, good summary...

### **Member Checking Level 3**

Q: You've had time to review the case study? Do you think it fits with your perceptions and ideas?

A: Oh, yes, there was only one place where I didn't like what I had said...just because I was talking and it doesn't flow too well on paper. Could you just add these two words to what I said and I think it will make more sense. (Agatha hands marked copy of paper to researcher indicating where to insert the words.)

Q: You bet, anything else?

A: No, it seems to accurately tell what we talked about and how I feel about integrating technology into the classroom. Do you think that I sound too traditional....not enough talk about discovery learning?

Q: No, not at all. These are your perceptions, and remember, the study was focused on just the experiences that you have had. As long as we are depicting the experiences that you feel will be valuable to you in your teaching, with snippets of your own words to match those perceptions, we have accomplished our goal. So, what do you think? Do you want to go with this, or is there more I should change?

A: This is just fine!

## E-mail Correspondence Sample

### Question to Informant

TO: Agatha  
From: Candace Figg  
Subject: Question for You!

Dear Agatha:

I waited to send you this message until Monday...so "your" computer setup would be up and running! I'm working on your case study and analyzing the many ideas you have given me, but I did have just one more question....just when you think we are finished, I need more!

Anyway, we talked about the types of training that you felt would be valuable to you as a teacher to maintain your skills, and we also talked about the value of the training that you had already received. You mentioned that it would have been nice for you to have a written resource by subject area that would show you how to implement these technologies with the students. Could you tell me more about areas that you feel would be useful to you, especially areas that were not covered in your training?

We'll visit soon!

☺

Candace

### Response from Informant

To: Candace Figg  
From: Agatha  
Subject: RE: Question for You!

Dear Candace:

I'm back! With an enormous (17") monitor that makes me want to lean back in my chair. No reading needed for this screen!

The answer to your question is "no." Not having been in a real classroom teaching situation yet, I have only a few clues about what I really will need for effective teaching. But, I sense from my own experience so far that teachers need to be exposed to technology frequently in order to develop and maintain their knowledge and skills. Some teachers will do this on their own, while others may need to be encouraged and given incentives. Perhaps an active technology coordinator, on-campus and available to all teachers, would be a valuable asset - but an expensive one. This person could work directly with teachers to integrate technology into the classroom and curriculum, taking some of the planning burden off of the teachers.

See you around 11:00 on Wednesday? Or do you need more than about a half hour? I don't want to make you go to campus any earlier than necessary, but I want to be sure we can cover whatever materials you want. I hope I'm not going to regret this... I'm not in trouble with Dr. B about my responses or anything, am I?

Agatha

## Field Notes Sample

Field Notes recorded by Candace Figg while interviewing Gene Brandon

11/08/98

(Technical problems....tape recorded did not record)

Q: Where are you in your program of certification and what is your teaching situation?

A: I am student teaching at Travis Heights Elementary school in a multiage grouping of 2<sup>nd</sup> and 3<sup>rd</sup> graders.. Right now, I am starting my Total Teach as we have been doing Math Investigations until this week and I will be adding in Math to my week this next week. I am really enjoying the multiage groupings as there is "no stigma, the kids just look at each other as members of their class" rather than by grade levels.

Q: What are the technology related events and activities that you encountered in your teacher education that you feel will serve you in your daily classroom instruction

A: Oh, my goodness...well, just today, I have used email, TeachNet, Netscape, and Word Processing just in what I was doing today. Today, I have even saved to disk. And, I am using the applications on a constant basis...spreadsheet, I never thought I would use spreadsheet, but today, I made a list of spelling words. I was working from four different lists of words, and decided that I would use the spreadsheet to make my own list of target words because I don't want to use the same words that I have used before.

I am trying to think of the things that I learned in EDC 371 that I felt were unnecessary, but so far, I have used slide shows, the microteach project that I put together with HyperStudio for my social studies methods class for a lesson demonstration, and in fact, I was the only one.... no wait, there was one other girl in the class who used technology. She did sort of a salesman pitch of a prepared package that could be used with Laser Disk, her husband was in this business, so she had access to a variety of laser disk programs and did kind of a salesman like pitch of a prepared package. So, I was excited to show something that I had actually created, and I was the only one who did that. I really did design the project so that I could use it, it was a Basic Map Skills lesson that was not too fancy, but could be placed on the desktop of a computer so that the students could use it easily.

## **Artifact Samples**

**Database Constructed by Agatha  
Job Sheet Printout from Leo's Database**

**Database Constructed by Agatha**

## **Job Sheet Printout from Leo's Database**

## Person as Instrument Statement

# Person as Instrument Statement

### A Story

*I had recently completed the automation of our East Austin elementary school library. The school was known in Austin as an innovative teaching environment for difficult children, and today, I had arrived at school ecstatic that finally the computer monitors for the automated system would be installed. On this day, I witnessed the motivational power of technology in the classroom. As quickly as the first monitor was hooked up, the kids swarmed all over the machine. And, those children, many of whom had severe reading difficulties, were fascinated by that ugly green text presented on the screen. As first, I nonchalantly attributed their interest to the novelty of the computers, but time went by. Even after a couple of years, students continuously expended great effort to acquire the information that could be gleaned from that ugly green text on the screen.*

*During these same years, I had purchased a computer for my own household, and found that my youngest son, who still to this day believes assigned literature readings all start with the title "Cliff Notes," began to become very interested in learning new computer programs and downloading files from the Internet. I was amazed to find that in a few short months, his reading skills had improved dramatically. The comprehension skills required for this type of technical reading had boosted his reading almost three levels.*

*I became convinced then that technology motivates different learners in positive, yet different, ways, and I still believe today that technology should be available to every classroom teacher.*

Very often, we find that, in our personal lives, it only takes a few experiences to shape the foundation for our deepest beliefs and strongest values. Therefore, I will describe three contexts in which multiple experiences in my life have led to the construction of deep-held beliefs that could become influential as I choose research topics to explore, develop designs for studies, manage the collection of data, and rely upon my own interpretations of such data in order to draw conclusions.

### Teaching and Learning

I come from a long line of Southern teachers. My great-grandmother was a teacher; my grandmother was a teacher; my aunts, uncles, and cousins were all teachers; and my parents were teachers. I have always wanted to be a teacher, and I intend to teach until I turn over the torch to the next generation. I have taught for sixteen years ("officially" counted by the State of Texas) as a 5<sup>th</sup> and 6<sup>th</sup> grade teacher, all-level Music teacher, all-level Librarian, and Primary Reading Teacher. The remaining seven years were spent as a substitute teacher, a homebound teacher, and a parent classroom teacher. My belief as to the characteristics and qualities that a "good" teacher must embody has been shaped by the many years I have spent in the classroom, as well as the values passed down to me through the generations of teachers in my family. I believe that any teacher "worth her salt" provides a learning environment that promotes active, student-constructed learning in a secure, nurturing environment, structures

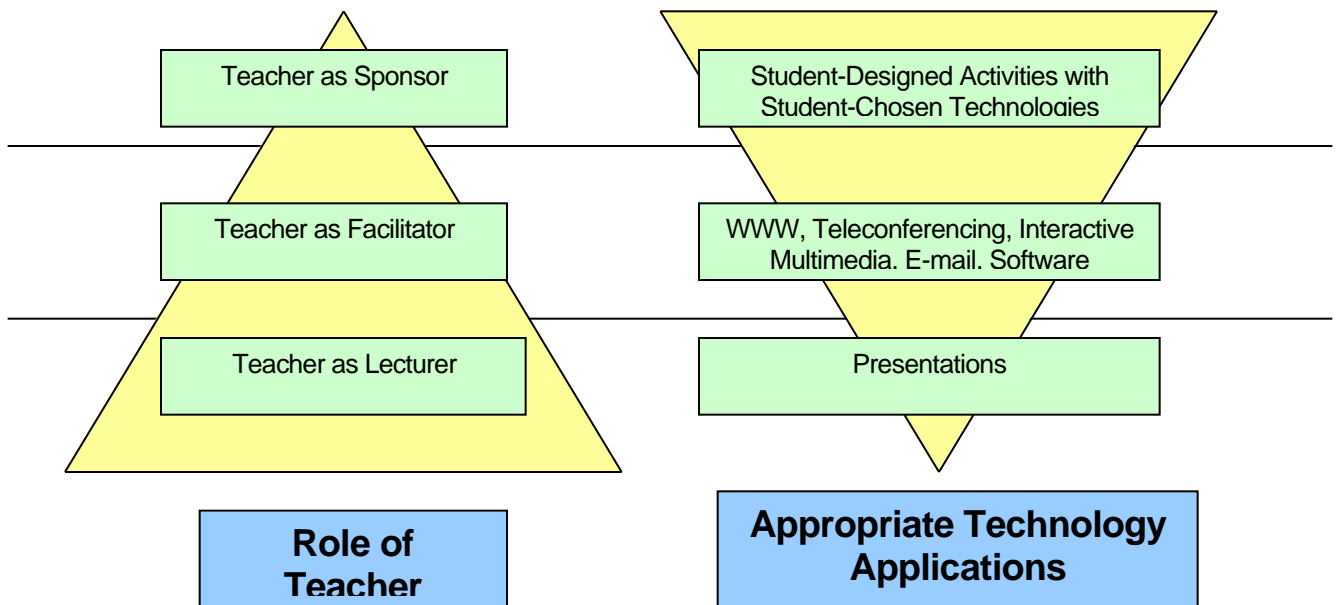
activities that are relevant to the student, assesses these activities fairly and according to standards that are acceptable to student and teacher, and demonstrates enthusiasm in sharing the content and learning experience with the students. I believe that a good teacher is a life-long learner and enthusiastically encourages others to pursue learning for the enjoyment of learning.

These standards that I have established as criteria for excellence in teaching fit in nicely with my field of instructional technology. My experiences as a teaching assistant for the basic computing skills class (that must be taken by all education majors before they begin their student teaching block methods courses) have only strengthened my standards. I have come to believe that teachers who invite their students into the discipline by promoting an apprenticeship relationship ensure their deeper processing of the physical and cognitive aspects of working with computers. I deeply believe that students learn the skills associated with this field best when immersed into this apprenticeship in which the teacher serves as a facilitator, rather than expert. We all have life experiences to share. Some of us just happen to have *more* experiences to share!

## **Role of the Teacher in Curricular Integration of Technology**

Reports from the field bemoan the fact that educators have access to such wonderful technologies today, and yet so few teachers actually integrate technology into the curriculum. I believe that this harsh judgment comes from a lack of a definition of the term "integration." If "integration" means utilizing technology to teach every subject or content, then few teachers will meet this goal. However, if true "curricular integration" means selecting the right tool to meet the instructional needs of the students, and technology-based tools are chosen to enhance learning only when they are the appropriate choice for the job, then, I believe that teachers in the field have been quite successful in using all modes of technology, including graphing calculators, video, laser disks, computer programs, web-based instructions, teleconferencing, and interactive multimedia, to present curriculum in the classroom.

I also believe that how the teacher views his or her role as the instructor influences the actual depth of integration of technology. As a participant in a group project this summer, we devised a visual that depicts the limitations of technology integration based upon the instructor's view of his or her role in the delivery of instruction. At the bottom of the pyramid, we find a teacher who views the instructional role as that of "filling empty vessels known as students with knowledge." This teacher will rely upon lecture as a primary mode of instruction, and there will be little available time for the integration of technology into this style of teaching, except for perhaps presentation modes such as PowerPoint or Authorware. The teacher who views the instructional role as that of a "facilitator" (the middle of the pyramid) will design activities that allow the student to explore many technologies, such as intranets, interactive multimedia, teleconferencing and telecommunications, internet and web-based instructions, plus integration of many other software packages. In this view, the teacher integrates technology based upon student and curricular needs. And, the instructor who views his role in instruction as sponsoring the students as they choose their independent projects and technologies sits at the top of the pyramid as teacher as sponsor. Students choose technologies based on their predictions of need rather than because of any teacher direction.



Note: Triangle represent the available time for using technology for learning by the students. As the teacher plays less of a role in dispensing information, a variety of different technologies are able to support the learner-centered activities.

I believe that the role of the teacher, especially for K-12 and undergraduate students, should be classified as "middle-pyramid" and should revolve around the student and curricular needs. Therefore, curricular integration would occur often, within a variety of contexts, and utilizing a variety of technologies as deemed appropriate by the teacher and/or students. The key to curricular integration is the ability of the teacher to adjust to the role and teaching style that will best promote the use of technology within the curriculum.

### **Technology -- Pervasive Necessity**

And, finally, why should we even bother with technology? We have educated our students for hundreds of years without technology, why now? In addition, there are many other perfectly good ways to teach that do not require the expense, the hassle that comes with maintaining complicated and quickly evolving technology, or the time factor needed for training and implementing such a program. It is my firm belief that technology, especially computer technology, is changing the very structure of our social culture, much as the industrialization of car manufacturing did earlier in our history. The invention of the car did not alter our society, but the advent of easy access to cars through assembly-line manufacturing changed the social fabric of our society. Cars have become such a pervasive part of our culture that historians often refer to the "American love affair with cars." I believe that the pervasiveness of computerized components which control many of the tools that direct and dictate our daily lives (such as alarm clocks, stoves, televisions, cars, banking, shopping, etc.) and the accessibility to instant communication are only part of the revolution. As access to a personal computer becomes easier and within reach of a majority of families, we can almost envision a paperless society! It is my firm belief that it is the responsibility of

educators around the world to prepare our students to participate in this global revolution, and the revolution could start with future teachers.

## **Contexts to Research**

I would like to explore areas of research that would relate the contexts of quality teaching/nature of learning, the role of the teacher in integrating technology, and preparing our future faculty to utilize the technology that is beginning to pervade our daily lives. I am interested in questions such as:

- What is the process that student teachers go through to develop as teachers who integrate technology into their daily curricular instruction?
- Are student teachers entering their field experiences with the experiences to integrate technology into curriculum, or do they just possess computer skills? Are computer skills enough to lead them to integration?
- What is the current state of integrating technology into our public schools? What are student teachers finding when they enter the public schools? How does this differ from what they expected? What can be done to close the gap between expected and reality?
- Why do teachers use technology? Why are some more motivated than others to incorporate technology within their curricular instruction?

Based upon the contexts that I bring to these explorations, I would expect to find that student teachers will feel that they are prepared to work with computers, but are unable to actually create learning situations that promote active learning and integrate technology because they have never seen these types of instruction modeled. Perhaps, I will find the frustrations so prevalent in the beginning experiences of new computer users also prevalent in these student teachers' experiences with integrating the technology into their daily curricular instruction.


I would also be willing to discover student teachers who felt that the computer skills provided by their education was sufficient to motivate them to integration, if I could document this integration through observation or lesson plan documentation. However, I believe so strongly that teachers must learn to utilize technology in order to prepare students for the future that I would be unwilling to discover that teachers and student teachers were not utilizing technology simply because there are other ways (lower tech, lower cost) to implement the instruction. I believe strongly that if technology is the appropriate tool for the student and curricular need, then that technology should be integrated regardless of the accessibility of other methods.

I would hope that any revelations from exploring such questions would further our understanding of the relationship between technology integration and an active learning process, first by the student teachers or teachers as they go through the process of developing integration techniques, and secondly by the students as they receive the benefits of the integrated instruction. Perhaps, the results can be used to adjust our training techniques for student teachers and teachers, or provide insight into adjusting teaching styles that would enable teachers to further integrate technology. Perhaps, the results will point to additional research that could be conducted with students and their learning relationship with a teacher who utilizes technology integration.

## **Why Use Naturalistic Inquiry For This Topic?**

Many research studies in the field of instructional technology compare the new, computerized way of instruction with the old paper and pencil methods, which is, as a friend of mine often states, "like comparing apples to oranges." In working with computers, the learner goes through a process which is very personal and varies significantly from individual to individual. I believe that this process needs to be documented, not in numbers and measures, but with narratives and personal revelations. Integrating technology into a personal teaching curriculum depends upon the individual's perception of integration, teaching style preferences, prior knowledge of computer skills, and a vast array of other individual preferences and perceptions. I believe that only a naturalistic inquiry allows the informants to engage in personal inquiry, reflection, and communication about integration. Naturalistic inquiry can document any changes or common ground between informants which could be a useful foundation for explaining the process teachers and student teachers undergo as they increase their computer skills and knowledge of the uses of technology as a tool to implement curriculum.

## Reflexive Journal Sample

<p>September 14, 1998</p> <p>I shared my diagram of the items I thought would be pertinent in my Person as Instrument Statement with my Peer Debriefing Group.</p> 	<p>Peer debriefing meeting went wonderfully today. Nancy will be a wonderful addition to our group and I think we will work very well together. We described to each other what our study subjects would probably involve, and discussed a little bit about "paradigm" and its effect on our studies. I was able to bounce several ideas off of them, i.e., what kind of study could I pull out of the things I am interested in....I know that any study I do will involve student teachers who have already been through our EDC 371 class, will also involve how they integrate technology into their daily curricular activities, and I am curious to know what type of modeling of these behaviors have been available to them as they went through this process. My questions at this point are:</p> <ol style="list-style-type: none"> <li>1. How are you using technology in your current student teaching experience?</li> <li>2. How does this differ from what you expected to find?</li> <li>3. What is needed to get from current experience to expected, or vice versa?</li> <li>4. Were you prepared to integrate technology into the curriculum?</li> </ol>
<p>September 15, 1998</p> <p>Created Person as Instrument Document</p> <p>At this point, some of my questions involve:</p> <p>What is the process that student teachers go through to develop as teachers who integrate technology into their daily curricular instruction?</p> <p>Are student teachers entering their field experiences with the experiences to integrate technology into curriculum, or do they just possess computer skills? Are computer skills enough to lead them to integration?</p> <p>What is the current state of integrating technology into our public schools? What are student teachers finding when they enter the public schools? How does this differ from what they expected? What can be done to close the gap between expected and reality?</p> <p>Why do teachers use technology? Why are some more motivated than others to incorporate technology within their curricular instruction?</p>	<p>But, I still don't see how these questions could fit into a study or a study focus. I have this "working hypothesis" that these student teachers will feel that technology training should include experiences in actually using the technology in the classroom and allow them time to learn how to integrate technology into daily activities, rather than just gaining the skills. I personally know that they have no experiences that would further their development in their abilities to integrate the technology, and there is often little incentive for this or encouragement for this from their cohort professors.</p>

## **Peer Debriefing Group Minutes Sample**

### **10/12/98 Minutes Peer Debriefing Group Meeting**

Kris Sloan, Nancy Miller, and Candace Figg attending  
Central Market Restaurant

Our peer debriefing group meeting this evening began the minute we all walked into the door! Nancy and Candace were all fired up from doing their first interviews with their informants, and concerned as to what the next step would be. Usually, we kind of chit-chat until our food arrives, so that we are able to take notes regarding our discussions, but we were so full of concerns and checking to see how the other's interviews progressed, that we began immediately.

First, we discussed the consent forms, as Kris was having to get the consent forms at the same time that he conducted the interviews tomorrow. Next, we discussed the issue of "snowball" interviewing, in which one informant makes suggestions as to whom the next informant for the study should be, and how the second interview also starts with the same questions. This led to a discussion about the permissibility of revising questioning during the second interview, as long as we kept track of the first question and recorded these decisions into our reflexive journals.

Nancy expressed concern that during her first interviews, she wasn't sure that she got the "real thing" or the information for she was looking, so discussed the process of asking each informant the same questions as opposed to the open-ended questioning of NI. Kris expressed the opinion that that form of interviewing was a no more or less valid way to conduct the study, and might perhaps be easier to analyze the data if everyone answered the same questions. However, Candace responded that with tools like NUDist, the analysis part of the process seemed simple enough. We concluded that this form of analysis would just be a matter of getting use to doing it. This part of our discussion concluded with Nancy suggesting concerns that using structured questions might stem from paradigmatic beliefs that could be inconsistent with NI qualitative studies, and wondered how her committee would react. Kris mentioned that it was his understanding that there was almost always a methodological challenge during dissertation defense, particularly if the doctoral student didn't have his/her beliefs established and well thought out.

Then, our discussion turned to interviewing techniques, such as rewinding the tape player when a conversation has been interrupted, the pitfalls of interviewing informants in a restaurant, etc. Our meeting concluded with Nancy jokingly expressing her concern that she would begin coding during her interview based upon so much of her background reading that she has done regarding motivational theories. Kris thought that might be entirely possible....we are indeed a part of our interviews, but he suggested a new strategy....conduct all informant interviews at Crested Butte!

# List of Labels and Definitions with Themes

## Super-Themes: Drawn from the Label List

1. Informant Perceptions regarding activities that can be used in the classroom:
  - Organizational/personal activities (All came from EDC 371, Media Competency Training, or methods classes)
  - Activities that can be integrated into curriculum use with their students
2. Informant perceptions regarding the role of the teacher in using technology in the classroom
3. Informant perceptions regarding limitations with using technology in the classroom
4. Informant perceptions regarding the skills needed for teachers to use technology in the classroom:
  - Pre-requisite skills level necessary before teachers can begin to use technology
  - Necessity of continued training and supplemental resources

## Possible Themes or Working Hypotheses (with Definitions):

1. Technological activities that are similar to activities in which student teachers have received training are perceived as valuable.

Technological activities would include the descriptions of the many activities that the student teachers would consider using in their classrooms, both the organizational activities that the student teacher performs for personal use and the curricular integration activities that the student teacher perceives as valuable for using with their students.
2. A student teacher's perception of the role of the teacher is consistent with the technology activities that the student teacher perceives as valuable.

The role of the teacher as perceived by the student teacher would include not only the perception of how a teacher delivers instruction, but also

  - the student teacher's attitudes toward the using technology in the classroom,
  - attitudes towards the skills that would be required of students in the classroom before the technology could be used,
  - and the role of the teacher in modeling the use of technology for students.
3. Student teachers perceive the integration of technology-related activities into curricula as having certain limitations.

Technological limitations would include:

  - access issues, such as no access to Internet, little or no access to computers, and computer lab scheduling
  - time issues, such as squeezing the training of students into an already packed curriculum, increased planning and preparation time for activities that integrate technology
  - appropriateness issues, such as choosing the technology tool to present content only when it is the more appropriate choice
4. Student teachers perceive technology training as invaluable to using technology in the classroom.

Perceptions regarding the value of training will include:

  - Level of confidence in knowledge about technology encourages integration
  - Need for continued and more advanced training
  - Need for technology resources to supplement training
  - Advantages of laptop computers to supplement training

## **Unitized Coding Labels (with Definitions): Informant Training (Prior Knowledge to Study)**

- Context of informant's field experience
- 371 training of informant
- 371 training of informant: drawbacks
- Entry skill level of informant (description of prior knowledge)
- Laser Disk training of informant
- Media Competency Exam training
- Technology use in coursework (informant's use of technology in coursework)
- Modeling (professor to student teacher)
- Personal Use of Computing Skills

## **Informant's vision of use of technology in classroom**

- Attitudes towards use of technology in the classroom
- Pre-requisite Student Skills (Skills students need to use computers)
- Modeling (teacher to students)
- Teaching role (how informant sees role of teacher in use of technology in the classroom)

## **Technology Activities that can be used in the classroom:**

### **Computer Applications**

- Multiple application use (Use of several applications to produce project)
- Computer use (general activities and use)
- Database limitations
- Database mention of importance
- Database reason (states reason why Database is important)
- Database examples (examples of uses and activities)
- Drill software example
- Email reason (states reason why email is important)
- Email examples (examples of uses and activities)
- Games example
- Internet examples (examples of uses and activities)
- Internet mention of importance
- Internet reason (states reason why Internet is important)
- PowerPoint examples (examples of uses and activities)
- PowerPoint mention of importance
- PowerPoint reason (states reason why PowerPoint is important)

- Software example
- Spreadsheet examples
- Spreadsheet limitations
- Word Processing examples
- Word Processing mention of importance
- Word Processing reason (states reason why word processing is important)

### **LaserDisk**

- Laser Disk mention of importance
- Laser Disk reason (states reason why laser disks are important)

### **Video/Video cameras/Digital Photos**

- Digital camera example
- Video mention of importance
- Video reason (states reason why video is important)
- Video examples (examples of uses and activities)
- Video limitations

### **Other Technology Tools**

- Overhead mention of importance
- Tape recorder/headphone mention of importance
- CD-ROM resources

## **Limitations of Technology Uses in the classroom**

- Access limitations
- Technology Limitations (limitations of use of technology in general)
- Issues of time

## **Skills teachers need in order to be able to use technology in classroom**

- Written resources
- Pre-requisite Teacher Training (Skills teachers need to use computers)
- State of technology in classroom (informant's observation classroom)
- Laptop Computer Use Among Student Teachers
- Teaching use of skills (to student teachers)

## **Inservice Training Suggestions**

- Inservice suggestions (Informant suggestions for inservice training)
- Inservice training limitations
- Role of helpers (Role of trainers in helping teachers learn to use computers)
- Training issues (for inservice/preservice teachers)

## **Other**

- Icebreaker

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