Assisting faculty with technology integration: A case study of a student/faculty mentoring program

by

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CHAPTER 1: INTRODUCTION

The purpose of this research study is to investigate how and why the Iowa State University (ISU) student/faculty mentoring model works to assist teacher education faculty to use and integrate technology in the Department of Curriculum and Instruction at ISU. The research investigates characteristics of a effective mentoring relationship, roles of student mentors and faculty mentees, and perspectives of both faculty mentees and student mentors on how and why mentoring helps them learn to use technology. This chapter is divided into six sections: 1) background; 2) statement of the problem; 3) purpose of the study; 4) research questions; 5) limitations; and 6) definition of terms.

Background

It is well-known that computers are used very little for classroom instruction by most teachers in schools (Cuban, 1998). Becker further (1999) states that even though computer acquisition continues to expand in most schools, only a small minority of teachers are using computers for instruction, learning, or productive work in the classroom. Most teachers still make frequent use of games and drills. However, there are a few teachers who use analytic and project-oriented software on a regular basis (Becker, Ravitz & Wong, 1999).

One major factor impeding the integration of computers at K-12 schools is the lack of training opportunities for teachers in the area of technology use and integration. The Office of Technology Assessment (1995) reported that teachers have little or no training in the use of computers in teaching. Hence, teachers lack the basic computer skills needed to integrate

computers into instruction. In addition, teachers do not have effective models that illustrate computers can be integrated into their classroom instruction to enrich the learning process.

Since many teachers lack computer skills or the skills to integrate computers into classroom instruction, some school districts have provided isolated inservice training opportunities in this area. Usually, school districts invite technical staff to conduct technology workshops that teach teachers about computer software. Most of these inservice training opportunities emphasize basic computer skills and seldom provide teachers with ideas on how to effectively integrate computer technology into the classroom. Consequently, many of theses inservice efforts have failed because they don't provide teachers with the necessary support on how to use and integrate technology in their classrooms. Since this type of inservice training has not been very effective, maybe it is time for a new strategy to assist teachers with technology use and integration..

Many researchers suggest that colleges and universities must take a leadership role in preparing perservice teachers to use technology (Espinoza & McKinzie, 1994; Office of Technology Assessment, 1995). Teacher education faculty should assume the responsibility to model effective uses of technology in teaching and learning. As Bitter and Yohe asserted in 1989, "the purpose of inservice should be to update skills, and the role of a preparation program is to develop competence" (Bitter and Yohe, 1989).

Two common approaches have primarily been used to integrate technology into teacher education programs (Office of Technology Assessment, 1995). One approach is to offer an undergraduate computer-related/instructional technology course. Preservice teachers are commonly required to take an educational computing course before graduation. In this course, preservice teachers typically learn basic computer skills and sometimes ideas for

classroom integration. This stand-alone course, however, is not always effective and sufficient in enough providing training in both technology skills and the ability to integrate technology into teaching. Many students who complete the stand-alone technology course may obtain the technical expertise to use computers, but rarely gain a critical understanding about how technology can be applied to enhance teaching and learning (Schmidt, 1995). The second approach is to integrate technology throughout all teacher education courses. This means technology is used and infused into the core curriculum courses of a preservice teacher preparation program. This approach offers opportunities for preservice teachers to experience using technology in all of their teacher education courses. It seems beneficial for preservice teachers to gain experience using technology in the teaching and learning context of methodology courses while observing instructional models of technology use at the same time (Office of Technology Assessment, 1995).

Although teacher education programs have made efforts to integrate technology throughout the teacher education program, more work needs to be done (Barksdale, 1996). There are few examples of teacher education programs where faculties are modeling instructional uses of computer technology in classroom teaching (Handler & Marshall, 1992; Office of Technology Assessment, 1995; Vagle, 1994). As Bitter and Yole (1989, p.22) pointed out, the integration of technology into the teacher preparation curriculum is the "single most pervading" issue in colleges of education relative to technology. Therefore, it is important to identify effective approaches that have been used to assist teacher educators with using technology in their courses and how those efforts can be supported to impact preservice teacher education.

Statement of the Problem

Many of the barriers confronting teacher education faculty are similar to those encountered by K-12 teachers (Becker, 1994; Office of Technology Assessment, 1995). In the report from the Office of Technology Assessment, faculty members identified several barriers they see as obstacles to the effective technology integration into their courses. These barriers include: time constraints, lack of knowledge about software and hardware, limited access to hardware and software, limited vision of technology's potential for teaching, and lack of institutional recognition (Office of Technology Assessment, 1995; Olcott, 1999).

The lack of training is often cited as a barrier to technology integration by college of education faculty. (Kortecamp & Croninger, 1995; Office of Technology Assessment, 1995). Teacher education faculty are reported to lack awareness and comfort in using technology in their courses (Rogers, 2000). They feel incompetent and unprepared to integrate technology in their teaching. In addition, they need more vision and insight into the appropriate use of technology in classrooms (Office of Technology Assessment, 1995). As Schmidt (1995) indicates, before technology use and integration throughout preparation programs can be realized, teacher education faculty must receive substantial amounts of training and support in using technologies. Thus, providing the necessary technology training for faculty members becomes a critical issue for teacher education programs.

Often the staff development models used in higher education to assist education faculty involve offering technology workshops or training sessions. Many times the workshop model fails to meet the individual needs of teacher educators because they have various levels of computer skills, knowledge, and experience using technology.

An alternative model of assisting teacher education faculty as they learn about technology is to pair teacher education faculty with a mentor. This one-on-one mentoring model is becoming well documented in the literature (Kortecamp & Croninger, 1995; Thompson, Schmidt, & Hadjiyianni, 1995). A few teacher education institutions have established mentoring programs that assist faculty in their use and integration of technology. Research on mentoring further reflects that "using college students to mentor college of education faculty has shown promise as a technique for integrating technology into the coursework for preservice teachers" (Kortecamp & Croninger, 1995; MacArthur, 1993; Thompson & Schmidt, 1994).

Additional research is needed to better understand how and why a mentoring model might help teacher education faculty to effectively use and integrate technology in their teaching. As more is known about how and why the mentoring model works, teacher educators will be better equipped to integrate technology throughout the teacher preparation program. Potentially, the effective integration of technology into preservice education courses could improve the amount and effectiveness of computer use in K-12 schools. Thus, an examination of a student/faculty mentoring program is necessary and meaningful.

Purpose of the Study

The purpose of this study is to investigate how and why a student/faculty mentoring model works to assist teacher education faculty with technology use and integration at Iowa State University. This research investigates characteristics of effective mentoring relationships, roles of student mentors and faculty mentees, and perspectives of both student mentors and faculty mentees on how and why mentoring helps learning about technology. A

qualitative approach is used to describe and analyze the dynamic process of mentoring. Results from this research study will provide information to design an effective mentoring model for teacher education faculty.

Research Questions

This study sought to address the following questions:

- What are the characteristics of effective mentoring relationships of a student/faculty mentoring program?
- What are the roles of student mentors and faculty mentees in the student/faculty mentoring program?
- What are the perspectives from teacher education faculty members about how and why the student/faculty mentoring program assists them to use and integrate technology?
- What are the perspectives from student mentors about how and why the student/faculty mentoring program assists teacher education faculty to use and integrate technology?

Limitations

This study was conducted with the acknowledgement of the following limitations:

1. This study examined the student-faculty relationship over only one semester period.

2. As with most qualitative work, the results of this study cannot be generalized to any situation. Before making any conclusion or expansion of the research results, one must thoroughly examine the research setting, description, and perspectives of the participants and researcher.

3. This research study focused on the teacher education faculty members in the Department of Curriculum and Instruction in the student/faculty mentoring program. Therefore, the research results can't be generalized before carefully examining the participants and research settings.

Definition of Terms

The following definitions of terms were used in this study:

Mentor

Students who meet with a teacher education faculty member on a weekly basis and assist faculty as they learn and use technology.

Mentee

Teacher education faculty who are mentored by a college student on the use and integration of technology.

Mentoring

The process by which faculty members learn more about how to use technology through weekly interactions with a mentor.

CHAPTER 2: LITERATURE REVIEW

The purpose of this chapter is to present a review of literature about the needs, barriers, and efforts made to integrate technology in teacher education programs. The chapter includes the following sections: 1) Need for integrating technology in teacher education; 2) Barriers to confront when attempting to integrate technology in teacher education programs; 3) Efforts used to integrate technology into teacher education. The last section will focus on common approaches used in teacher education programs and will include specific information about mentoring models.

Need for Integrating Technology in Teacher Education

Since 1990, the number of computers in education has increased dramatically (Ely, 1995). A National Center for Educational Statistics (2000) study shows that computers are in almost every school in the United States and 95% of the schools have network capabilities. In addition, the student computer ratio has increased from 1/75 in 1984 to 1/6 in 1999. Although the access to computers in schools has increased dramatically, computers are used very little by most of teachers.

Becker (1999) stated that even though computer acquisition continues to expand in most schools, only a small minority of teachers are using computers for instruction, learning, or productive work in the classroom. Few teachers use analytic and project-oriented software on a regular basis and elementary teachers still make frequent uses of games and drills (Becker, Ravitz & Wong, 1999). Furthermore, Cuban (1998) stated that computers are

limited to a small band of serious users among K-12 teachers, a slightly larger group of casual ones, and the majority are non-users in schools.

One major factor impeding the integration of computers at K-12 schools is that teachers have little or no training in the use of computers in teaching (Office of Technology Assessment, 1995). Because many teachers lack computer skills or skills to integrate computers into instruction, school districts have relied on inservice training to provide teachers with the support to foster those skills. Unfortunately, Most of these inservice training efforts have focused on teaching teachers basic computer skills rather than showing them how to effectively integrate computer technology into classrooms. The inservice training provided is not usually effective and has had little impact on the use of technology in classrooms (Darling-Hammond & Ball, 1997).

Since there has been some but limited success in helping inservice teachers with technology use and integration, maybe it is time to change the focus and begin providing help during the teacher's preparation program. As Bitter and Yohe asserted in 1989, "the purpose of inservice should be to update skills, and the role of a preparation program is to develop competence" (Bitter and Yohe, 1989). Thus, many researchers suggest that colleges and universities must take a leadership role in preparing preservice teachers to use computer-related technology (Espinoza & McKinzie, 1994; Office of Technology Assessment, 1995). A recent national survey of teacher education institutions reports that one best predictor of a graduate's use of technology in the classroom is the actual use of technology during college training (Moursund, 1999). The more preservice teachers experience learning in a technology-enriched learning environment, the better chance they will use technology in their future teaching.

How effective the use of technology is in teacher education program relies heavily on whether the teacher education faculty are models for preservice teachers. It is evident that preservice teachers must possess the technical skills, but also they must possess an insight on how to use technology effectively in the classroom (Barron & Goldman, 1994). Since teachers teach the way they were taught (Fulton, 1994), teacher education faculty do act as powerful role models for preservice teachers as they learn about becoming a teacher. Without proper modeling by teacher education faculty about the appropriate uses of technology in classrooms, preservice teachers may not be prepared to use technology in their own classrooms (Schmidt, 1995). Preservice teachers must be given examples of teaching content with technology during their preparation program, otherwise this might implicitly tell them that technology does not belong in the content areas (Brownell and Brownell, 1991). More and more, it is becoming the responsibility of teacher education faculty to help preservice teachers develop the necessary technology knowledge and skills to positively impact the use of technology in the K-12 schools (Becker, 1999). Consequently, teacher preparation programs must take a leadership role in preparing preservice teachers with the necessary skills and knowledge for future use in schools.

Therefore, it is apparent that technology should be integrated into teacher education programs to increase the use of computers in the K-12 schools. Without first exposing preservice teachers to learning experience where technology is used effectively throughout their preparation program, their using technology in their future classrooms are unlikely.

However, few teacher education institutions have incorporated technology throughout their teacher preparation programs (Vagle,1994). There are few examples of teacher education programs where faculties are modeling instructional methods that integrate

computer technology (Handler & Marshall, 1992; Office of Technology Assessment, 1995). Still, little has been done by teacher education institutions to help faculty model appropriate uses of technology to behave as a role model for preservice teachers. Therefore, it is important to identify what influence teacher educator's integration of technology. The following section discusses barriers confronting when integrating technology in teacher education.

Barriers to Integrating Technology in Teacher Education

Many of the barriers confronting teacher education faculty are similar to those encountered by K-12 teachers (Becker, 1994; Office of Technology Assessment, 1995). Faculty have identified several barriers they face when trying to effectively integrate technology into their courses (Office of Technology Assessment, 1995; Olcott, 1999). These barriers include: time constraints, lack of knowledge about software and hardware, limited vision of technology's potential for teaching, and lack of institutional recognition (Office of Technology Assessment, 1995; Olcott, 1999). Additional barriers cited frequently by faculty included lack of training, support, equipment, and funds (Spotts & Bowman, 1993; Roberts & Ferris, 1994; Okpala & Okpala, 1997; Novek, 1999; Dickson, 1999; Quick, 1999). Some of the barriers will be discussed further in the following.

Time

One barrier frequently mentioned by teacher education faculty is the limited time they have to learn to use technology. Spott and Bowman (1993) conducted a survey among 500 full-time teacher education faculty about obstacles for them to use technology. Results

showed that 80% of their 306 survey respondents reported that the time required to learn and use technology was the major barrier for faculty. Quick (1999) also reported lack of time available to learn how to use technology as a major impediment to faculty use. It takes time for teacher education faculty to learn the skills, practice skills, and then devise instructional activities to integrate technology into their courses.

Lack of administrative support

Administrative support is needed for faculty to use technology. Administrators should provide necessary support like hardware/software and desirable training to faculty members who are interested in using technology. Many researchers have reported that it is extremely important for faculty member to receive recognition and support from administrators about their effort to use technology in teaching (Spotts & Bowman, 1993; Inman & Mayes, 1998; Nantz & Lundgren, 1998; Miller & Husmann, 1999; Taber, 1999; Padgett & Conceao-Runlee, 2000). Without the support from administrators, teacher education faculty will not feel supported and motivated to make changes to incorporate technology into their courses. As Willis (1993) pointed out in his review of literature, administrative support was imperative to the integration of technology into teacher education courses.

Lack of resources and accessibility

Lack of resources and accessibility is another common barrier cited by faculty (Roblyer, 1994). Additional resources such as hardware equipment, computer labs, instructional software programs, and classrooms with Internet access must be available before teacher education faculty can use technology for instruction. Access to hardware/software ranks highest in importance as the most contributing factor that influences

facultys' attitude toward instructional technology (Spotts & Bowman, 1993; Nantz & Lundgren, 1998; Groves & Zemel, 2000). In addition, long-term planning to acquire technology resources including both hardware and software should be in place so faculty efforts are supported over time.

Lack of training

The lack of training for faculty development is widely cited by teacher education faculty as a barrier to technology integration in teacher education programs (Kortecamp & Croninger, 1995; Office of Technology Assessment, 1995). Willis (1993) stated that one difficulty associated with integrating computer-related technologies into courses is that faculty lacked necessary training and experience using these technologies. Rogers (2000) reported that teacher education faculty lack comfort and competency to use computers in their teaching. Therefore, teacher education faculty will require training in the area of technology integration. Before technology will be used and integrated throughout preparation programs, teacher education faculty must receive substantial amounts of training and support in using technologies (Schmidt, 1995).

In summary, barriers do confront teacher education faculty who attempt to use and integrate technology. Fortunately, teacher education programs have realized the importance for integrating technology into teacher education programs. There are efforts in place to use and integrate technology throughout teacher education programs. The United States Department of Education has taken steps to improve teaching and learning with modern technologies. The Preparing Tomorrow's Teachers to Use Technology (PT3) program awards grants that support national, state, and local initiatives to transform teacher preparation

programs. It is designed to "significantly increase the number of future teachers using modern instructional technology to improve student learning." (Office of Preparing Tomorrow's Teachers to Use Technology, 2000). Since 1999, the PT3 program has awarded 138 capacity building grants, 179 implementation grants, and 35 catalyst grants to teacher preparation institutions. Many institutions that have received this finding are using it to support innovative efforts to integrate technology throughout their teacher education program.

Efforts Used to Integrate Technology into Teacher Education

This section will discuss efforts made to use and integrate technology into teacher education. It discusses common approaches used by teacher education program to integrate technology and efforts made to assist teacher education faculty to use and integrate technology. Special attention is given to mentoring as an effective approach to assist teacher education faculty to use technology. The definition of mentoring, factors of effective mentoring relationship, roles of mentors and mentees, and established mentoring programs in the teacher education programs are discussed.

Common approaches used to integrate technology into teacher education

Two approaches have primarily been used to integrate computer-related technology into teacher education programs (Office of Technology Assessment, 1995). One approach is to offer an undergraduate computer-related/instructional technology course. Preservice teachers are required to take an educational computing course teaching them about basic computer skills and sometimes ideas for classroom integration. The second approach is to

integrate technology throughout all teacher education courses. This means technology is infused into the core curriculum of the preservice teacher preparation program. The two approaches are described in more detail in the next two sections.

Stand-alone instructional technology course

One typical approach used by many teacher education programs is to offer a stand-alone instructional technology or educational computing course. In 1995, 80% of the teacher education programs reported that they offer a formal, stand-alone course in instructional technology for preservice teachers (Office of Technology Assessment, 1995). Typically, the course provides instruction about basic computer skills and software. Common course topics often include desktop publishing, email, Internet, spreadsheets, databases, and multimedia. Students are usually required to create projects that demonstrate their ability to use the software and hardware.

This stand-alone course design, however, does not always correlate well with having both technology skills and the ability to integrate technology into teaching. Some researchers assert that a single course on technology in education does not adequately prepare preservice teachers (Office of Technology Assessment, 1995). Many students who complete the stand-alone technology course may acquire the technical expertise to use computers, but few of them gain a critical understanding about how technology can be applied to enhance teaching and learning (Schmidt, 1995). Additional findings on the impact of stand-alone technology courses suggest that the use and integration of instructional technology in classrooms should be infused into methodology courses rather than being limited to just one single course (Milligan, 2000).

Technology integration in methodology courses

A second common approach used to integrate technology throughout a teacher education program is to infuse technology into methodology course taken by preservice teachers. This approach requires preservice teachers to experience using technology in all of their courses. It seems beneficial for preservice teachers to gain experience using technology in the teaching and learning context of methodology courses while observing instructional models of technology use at the same time (Office of Technology Assessment, 1995).

The integration of technology throughout teacher education programs has implications on preservice teachers' development because it is well documented teachers teach the way they are taught (Fulton, 1994). Teacher education faculty members directly influence preservice teachers by effectively preparing them to have the knowledge and the ability to use and integrate computer-related technology to enhance teaching and learning (Moursund, 1999). Therefore, teacher education faculty should assume the responsibility of modeling appropriate uses of technology as an instructional tool for students in their courses. (Handler & Marshall, 1992). For preservice teachers to understand how to use technology in classroom, teacher educators must model effective technology use in their methodology courses. Without adequate role models for preservice teachers to observe in courses, it becomes difficult for preservice teachers to then design classroom activities that integrate technology on their own (Schmidt, 1995). Consequently, it is important for preservice teachers to see and experience using technology throughout their preparation program.

Although teacher education faculty realize the importance of technology in education, they have been slow to respond to the needs of the field (Barksdale, 1996). There are few examples of teacher education programs where faculties are modeling instructional methods

that integrate computer technology (Handler & Marshall, 1992; Office of Technology Assessment, 1995). Therefore, it is important to identify how teacher institution can assist faculty to integrate technology into their courses.

Efforts to assist faculty to integrate technology

Providing the necessary assistance and support for teacher education faculty who are interested in using and integrating computer-related technology is a challenge for most teacher education institutions (Kortecamp & Croninger, 1995; Smith, 1994). Recently, Florida Gulf Coast University surveyed 187 full-time teaching faculty members about their computer knowledge and skills, conceptions about learning, and experience in using computers in teaching and researching, and experience in distance learning. Results from this survey represented a wide and varied spectrum of technological skill levels, knowledge of learning theory, and experience in technology integration and distance learning (Bahannon, 2001). Thus, providing support for teacher education faculty when their needs and abilities are so diverse is a complex task. Support for teacher education faculty is commonly provided in two ways, by offering workshops and by establishing mentoring relationships.

Traditional technology workshop model

"Traditional" staff development models commonly used with higher education generally involve offering one or two hour technology workshops about a particular topic. The workshop model of professional development has the advantage of meeting many users' needs at the same time. These types of workshops are most effective when they are prepared for groups with the same or similar skill levels and goals. However, the reality is that faculty members have various levels of computer skills, knowledge, and experience in using

technology. In addition, Atkins and Vasu (1998) report that these workshops usually focus on how to use software and hardware, rather than developing ways the technology could or should be used to achieve curriculum objectives. Because the process of integrating technology into teaching is unique for each teacher educator, individual attention is more appropriate" (Thompson, Hansen, & Reinhart, 1996). Thus, a workshop model may be not sufficient in providing enough support for faculty to learn and use technology.

Mentoring models

In addition to offering traditional workshops, researchers have indicated there are other approaches to use with faculty. Faculty members are working with another person who has technology expertise one-on-one to improve the computer comfort level and competency in a flexible schedule. These approaches have the features: teacher education faculty work on their computers in their own office with a partner, focusing on teaching and learning more than the technology itself (Brearton, 1999; Clouse & Alexander, 1997; Davis, 1997b; Donlevy, 1998; Goldman, 1999; Honey, 1999; O'Brien Vojtek & Vojtek, 1998; Richardson, 2000; Sparks, 1998; Topper, 2000; Vojtek & O'Brien Vojtek, 2000; Wolinsky, 1999). This type of staff development concentrate on the conceptual/pedagogical aspects of educational technology beyond a brief hardware and software orientation (Willis, 1993). On the basis of these findings, one-on-one mentoring emerges as a promising staff development model to help faculty learn and use technology. This model caters to a more individualized approach to professional development for each faculty member with a self-paced workload focusing on the specific needs of the faculty member (Zachariades & Roberts, 1995).

Since 1990s, mentoring has becomes a theme that frequently mentioned in the preservice teacher education literature on existing technology integration models (Kortecamp & Croninger, 1995; Mergendoller, 1994; Thompson, Schmidt, & Hadjiyianni, 1995). In 1994, Judi Harris wrote stated that "one-on-one coaching was a very effective model for telecomputing training" (p10). Schmidt (1995) reports that one-on-one mentors for faculty is one promising approach to helping faculty effectively use the time they do have to learn about technologies. Furthermore, research on mentoring further indicates that using graduate and undergraduate students to mentor teacher education faculty has shown promise as an effective approach to integrate technology into the course design and development (Kortecamp & Croninger, 1995; MacArthur, 1993; Thompson & Schmidt, 1994).

In summary, it appears that staff development efforts that assist teacher education faculty as they learn to use and integrate technology must be multi-dimensional. Traditional workshops should be supplemented by other flexible forms of staff development models. Mentoring, which is characterized by using individualized instruction to meet specific needs of teacher education faculty, has shown great promise in assisting teacher education faculty as they explore the possibilities of technology. The following section will provide information about mentoring, key factors associated with the mentoring process, and established mentoring programs in teacher education.

Mentoring

This section focuses on mentoring. The section includes the following areas: the definitions of mentoring, the factors of effective mentoring relationship, the roles of mentors and mentees, and established mentoring programs in teacher education.

The definition of mentoring

The term "mentor" has its roots in Homer's epic poem, "The Odyssey". In this myth, Odysseus, who was a royal warrior, has been away fighting the Trojan War and has entrusted his son, Telemachus, to his friend and advisor, Mentor. Thus, mentor has been charged with advising and serving as guardian to the entire royal household (Anderson, 1987). Since then, a mentor is referred to an experienced person who helps foster career development and professional growth of another less inexperienced person. The mentoring process involves that the mentor and mentee work together to reach specific goals and to provide each other with sufficient feedback to ensure that the goals are reached. Now, mentoring has been used widely in business, higher education, adult development, and teacher induction (Alleman, 1986; Levinson, Darrow, Klein, Levinson, & Mckee, 1988).

However, mentoring is not an easy term to define because mentoring in and of itself is an ever-changing and ever-evolving process. There is no consensus as to the precise definition of mentoring or the functions associated with it either (Anderson, 1987). As Parkay (1998) stated, mentoring is "a complex interpersonal relationship that unfolds and changes over time, mentoring is probably not amenable to a precise, static definition" (p86).

It is worth noting the definition given by Anderson and Shannon (1987). They started from a historical examination of the term mentoring and suggested that mentoring can be best described as:

> A nurturing process in which a more skilled or more experienced person, serving as a role model, teaches, sponsors, encourages, counsels, and befriends a less skilled or less experienced person for the purpose of promoting the latter's professional and/or personal development. Mentoring functions are carried out within the context of an ongoing, caring relationship between the mentor and protege. (p.25)

In their definition, Anderson and Shannon present the following five essential attributes of mentoring: 1) the process of nurturing in which a nurturer is able to recognize the ability, experience and psychological maturity of the person being nurtured and can provide appropriate growth-producing activities; 2) the act of serving as a role model, providing the proteges with a sense of what they are becoming; 3) the five mentoring functions (teaching, sponsoring, encouraging, counseling and befriending; 4) the focus on professional and/or personal development; and 5) the ongoing caring relationship (Anderson, 1987).

Several definitions of mentoring in the literature appear to focus specifically on functions of mentors. Some researchers define mentoring is a process in which mentors are influential people significantly help mentees reach their life goals (Phillips-Jones, 1982; Alleman, 1986; Zey 1984). These researchers state that mentoring is a process in which a mentor is a person of greater rank or expertise who teaches, counsels, guides and develops a novice in an organization or profession. The mentor has the "power-through who or what they know-to promote...welfare, training, or career." (Phillips-Jones, 1982). Mentors oversee the career and development of another person usually a junior, through teaching, counseling, providing psychological support, protecting, and at times promoting and sponsoring. In contrast, Fagan and Walter (1983) define mentoring simply as a process in which "an experienced adult who befriends and guides a less experienced adult (p. 51)". Similarly, Klopf and Harrison (1981) conceptualize mentoring as an enabling process, in which mentors are "competent people who serve as teachers, advisors, counselors, and sponsors for an associate, who may be younger and of the same or different sex. " (p. 42).

Although there are several definitions that describe mentoring (Anderson, 1987), key factors of effective mentoring relationships have been identified and reported in the literature.

The key factors of effective mentoring relationships

The mentoring process links an experienced person (the mentor) with a less experienced person (the mentee) to help foster career development and professional growth of the mentee. The process allows a mentor to share ideas, information, resources, and expertise. A effective mentoring relationship relies on both the mentor and the mentee. Prior to participation, mentors and mentees must know each other's expectations for the experience. Once the mentor and mentee both have a clear understanding of those expectations and how those expectations can be met, then both can build a framework for the relationship (Gehrke, 1988).

The success of any mentoring relationship is dependent upon several key factors. The more these factors are present in a mentoring relationship, the more beneficial the relationship will be to the participants (Clemson, 1987; MacArthur, et. al, 1995). The following present key factors to effective mentoring relationships that emerged from the literature.

- Developmental, multidimensional relationship (Clemson, 1987) - Mentors may play many roles while working with a mentee. The numerous roles indicate the potential complexity of the mentoring relationship. Thus, mentoring program must not be limiting and narrow but rather allow dimensions of different relationship grow.

- "Personal fit" of the mentoring relationship (Clemson, 1987, p. 86) - The mentors and mentees were not "assigned" to one another. They were paired up according to their own personalities, interests, background, and needs.

- Mutual benefit (Clemson, 1987) - Both the mentor and mentee should benefit from the relationship. Mentees gain knowledge, skills, insight, and experience. Mentors sharpen skills and knowledge, learn new things, and are rewarded from the collaboration with the mentee.

- Mutual respect and trust (MacArthur, et. al, 1995; Clemson, 1987) - Mentors and mentees respect each other's background, knowledge, skills, expertise, personal interest, and individual needs. They trust each other like friends. The mentee feels comfortable confiding in and making mistakes in front of the mentor and the mentor is the supporter and encourager for the mentee (Clemson, 1987).

- Mutual participation - The mentor is not the only member of the mentoring relationship taking action (Kay, 1990). While receiving assistance from the mentor, the mentee is also expected to make the best effort to contribute to the mentoring experience. The mentee is an active learner and participant in the mentoring. Moreover, the mentee may take on mentoring as they share their skills and knowledge with his mentor.

- Open lines of communication - Open dialogue between mentor and mentee allowing each participant to express their feelings, talents, knowledge and expectations (Gehrke, 1988). Through two-way communication, the mentor and mentee are able to understand each other's needs, interests, and desired outcomes of the mentoring relationship.

- Time - Both mentors and mentees must set aside time for the mentoring to occur. Mentors are willing to allocate time to assist mentees and mentees are willing to spend time to learn from mentors. Without sufficient time from both mentors and mentees, it is difficult for a mentoring relationship to grow (Kay, 1990).

Roles of mentors and mentee

Since mentoring is a ever-changing, ever-evolving process, both the mentor and mentee have many roles in the mentoring relationship. In order to have a good mentoring relationship, both mentors and mentors must have a good and right understanding in the roles one is undertaking.

The Roles of Mentor

There are many roles that a mentor can assume. The roles assumed totally depend on the needs of the mentee and on the relationship one builds with the mentee. As Mac Arthur et. al (1995) reported, mentors change "roles frequently to effectively meet the needs of their proteges (mentees)" (p.53). Naturally, there is not a consensus on the roles of a mentor during the mentoring experience (Odell, 1990).

Based on Anderson's (1987) definition of mentoring, Anderson and Shannon (1987) do elaborate on the roles of a mentor. These roles include: teacher, sponsor, encourager, counselor, and befriender. Being a teacher means basic behaviors like modeling, informing, confirming/disconfirming, prescribing and questioning. The role of sponsor involves being a kind of guarantor, protecting, supporting, and promoting. Being an encouraging is means behaviors of affirming, inspiring and challenging. The mentor can affirm their mentees for who they are and what they can do, inspire them by examples and words, and offer

challenges by inviting mentees to become involved in a variety of growth-producing experiences. Being a counselor means that the mentor listens, probes, clarifies, and advises mentees. Lastly, mentors are friends of mentees. As a friend, mentors will convey to their mentees that they understand and support them.

Several other researchers have suggested roles for mentors (Schein, 1978, Schmidt & Wolfe, 1980, & Anderson, 1987). Schein (1978) suggested eight mentor roles: teacher, confident, sponsor, opener of doors, role model, developer of talent, protector, and effective leader. Schmidt and Wolfe (1980) identified mentor roles as role model, consultant-advisor, and sponsor. Later, Zelditch (1996) summarized a mentor's multiple roles as follows:

> Mentors are advisors, people with career experience willing to share their knowledge; supporters, people who give emotional and moral encouragement; tutors, people who give specific feedback on one's performance; masters, in the sense of employers to whom one is apprenticed; sponsors, sources of information about and aid in obtaining opportunities; models, of identity, of the kind of person one should be to be an academic. (p.8)

Finally, it is worth noting the work of Daloz (1983) about the roles of a mentor. According to Daloz (1983), mentors assume such roles as guide, supporter, and challenger along the way of the mentees' growth. Daloz used a travel metaphor when characterizing a mentor as a guide on a journey. Thus, the mentor offers both emotional and mental assistance, while also challenging the mentee by "prodding, cajoling, urging and offering alternative viewpoints" (Daloz, 1983, p, 24).

The Role of mentee

The mentee plays an extremely important role in the mentoring process. However, the role of mentee has not been discussed widely in the literature. According to Giebelhaus (1999), the ideal mentee has a strong desire to learn new skills and abilities, or a desire to

develop existing skills and abilities. The mentee strives to elevate his level of technical skills and professional expertise to gain a greater mastery of the job. He has ability to work as a team player to contribute to the mentoring relationship. He should initiate and participate in the discussion, seek for information and opinions, try to ease tension between parties, and be fair with praise and criticism. He must be patient and be willing to put time and effort into the mentoring relationship. A mentee must persevere through difficulties that arise during the learning process and also have a positive attitude.

In summary, mentors and mentees undertake different roles in the mentoring relationship. The mentors are guides, teachers, supporters, sponsors, counselors, role models, door openers, and friends. The mentees are active learners and participants in the mentoring. Mentors and mentees work together toward their mentoring goals and objectives. Without a common understanding in each role, conflict and misconception may exist and a good mentoring relationship is difficult to grow. Therefore, when designing a mentoring program, it is very important to clarify mentor's roles and mentees' roles.

Established mentoring efforts in teacher education

As stated earlier, one-on-one mentoring has become an emerging theme in teacher education. It has been reported as a valuable means to assist teacher education faculty to integrate technology in their courses (Thompson, 1995). Some teacher education institutions have already established mentoring programs to support teacher education faculty to learn and use technology. Findings indicate that mentoring is an effective way to encourage their faculty to integrate technology (Gonzales & Thompson, 1998). The following section

describes examples a few mentoring programs established in those teacher education institutions.

Iowa State University

It is worth noting the student mentoring program established in the Department of Curriculum and Instruction at Iowa State University. The ultimate goal of this mentoring program is for faculty members to become confident, independent computer users who model effective uses of technology in their courses. Beginning in 1991, graduate students and teacher education faculty members voluntarily paired up to work together on specific technology projects that faculty members had identified. Since 1993, the department connected the mentoring program with a graduate course entitled "Technology in Teacher Education" (C I 610). As part of the course, students who had technology expertise were matched up with faculty members desiring assistance according to their personality, interest, background, and technology experience (Thompson et al, 1996). Student mentors then help faculty members at their level of technology experience and cater to their individual needs and interest (Zachariadess & Roberts, 1995). Usually, student mentors and faculty mentees meet once a week to work on technology projects identified by the faculty mentees. In addition, student mentors meet for class each week to share their mentoring experiences, to get help and suggestions, and discuss contemporary technology issues in teacher education. Since establishing of the mentoring program, an increasing number of faculty members and graduate students have joined the mentoring program. It has gradually become a systematic approach in the department to assist teacher education faculty in using and integrating technology. Results of the mentoring program indicate that using students to mentor teacher

education faculty has shown promise as an effective approach to integrate technology into course design and development (Thompson & Schmidt, 1996).

New Mexico State University

In 1996, New Mexico State University launched a mentoring program called "Learning Technologies Program" to assist teacher education faculty to integrate technology into their courses (Gonzales & Thompson, 1998). Like the mentoring program at ISU, New Mexico State University used masters and doctoral students who were experienced users of technology to mentor faculty members one-to-one. The participating faculty from Curriculum and Instruction volunteered for the program and were matched up with graduate students by area of interest and technology expertise. Graduate students received internship credit by joining the mentoring program. Over the semester, each faculty member and graduate student met each week for approximately 2 hours for face-to-face to work on their technology goals, which were identified by faculty members and their student mentors. In addition, graduate student mentors met with the director of the mentoring program every other week to investigate some questions that emerged from their mentoring experiences.

At the end of the semester, student mentors and the director wrote an article entitled, "Faculty from Mars, technology from Venus: mentoring is the link." The mentoring program was reported to be effective. Faculty members felt it increased their comfort level and their understanding of how to integrate technology into their courses (Gonzales & Thompson, 1998).

Ohio Universities

Besides using college students as mentors, using classroom master teachers to mentor teacher education faculty has also been reported as being effective. In 1999, five Ohio universities (Cleveland State University, John Carroll University, Baldwin Wallace College, Ursuline College, and Nortre Dame College of Ohio) initiated a mentoring program entitled "Modeling Instruction with Modern Information and Communications Technology" to support teacher education faculty who want to integrate technology into their courses. Teacher education faculty members responsible for teaching Arts and Sciences courses in five universities participated in this one-year mentoring program. In this mentoring program, classroom professionals who were regarded as outstanding classroom teachers with technology expertise in the local school districts were used as mentors for higher education faculty (Abate, 2001). These master classroom teachers were paired with education faculty. Each pair set up their own working schedule and mentoring plan for the year. During the mentoring experiences, teacher education faculty addressed specific needs with the classroom master teachers the classroom master teachers brought authenticity to the experience by introducing real world technology problems and solutions in K-12 classroom. The one-year long mentoring program was reported as both effective and promising to help teacher education faculty integrate technology into preservice courses (Abate, 2001).

University of New England

Another type of mentoring program matches technology-using teacher education faculty with faculty who has less experience using technology (Kortecamp & Croninger, 1996). At the University of New England, a pilot mentoring program was established to

assist teacher education faculty use and integrate technology. In 1995, novice users of technology were paired with more experienced faculty who served as mentors. Mentors voluntarily assisted mentees to understand technology concepts, brainstormed technology ideas, and tutored the use the hardware and software. The mentoring program was reported to be effective in assisting novice faculty in gaining confidence and increasing comfort level as they began to integrate technology in their teaching (Kortecamp & Croninger, 1996).

In summary, mentoring programs have been established in teacher education institutions to assist teacher education faculty to use and integrate technology into their teaching. From the findings of these mentoring programs, one-on-one mentoring has emerged as a promising staff development model to help teacher education faculty learn and use technology. However, little is about how and why these mentoring programs work to assist faculty members to integrate technology. Additional research is needed to fully understand how and why mentoring programs work and to explore mentoring relationships and roles of mentors and mentees who participate in the mentoring programs.

Summary

This chapter presents a literature review about the following topics: need for integration technology in teacher education, barriers to confront when attempting to integrate technology in teacher education, and efforts to integrate technology integration into teacher education. In the section of efforts to integrate technology integration into teacher education, common approaches used to integrate technology in teacher education were explored and efforts to assist teacher education faculty to use and integrate technology were discussed.

All in all, literature pointed out the importance of and barriers associated with integrating technology into teacher education. It also indicated several viable approaches to facilitate technology integration into teacher education preparation programs and identified efforts made to assist teacher educators who attempt it. From the literature, mentoring emerged as an effective and promising approach to assist teacher education faculty to integrate technology in teacher preparation programs. It appears to be one alternative model for assisting teacher education faculty to learn and use technology. Thus, an examination on how and why mentoring programs work is necessary. As more is known about how and why mentoring programs are effective, teacher educators will be better equipped to integrate technology throughout the teacher preparation program.

CHAPTER 3: METHODOLOGY

The purpose of this chapter is to describe the methodology used to conduct this research study. First, background information about the Iowa State University student/faculty mentoring model will be presented. Then, the methodology used for this research study is outlined. This chapter includes the following sections: 1) ISU student/faculty mentoring program; 2) research participants; 3) the researcher; 4) research design; 5) research procedures; and 6) data analysis.

ISU Student/Faculty Mentoring Program

The establishment of the student/faculty mentoring program in the Department of Curriculum and Instruction at Iowa State University can be traced back to 1991. The purpose of the ISU student/faculty mentoring program is to assist faculty members as they learn about and use technology. It provides teacher education faculty with an opportunity to learn about technology in a non-threatening learning environment. The ultimate goal of the mentoring program is for faculty members to become confident, independent computer users who model effective uses of technology in their courses.

Initially, the department began providing office computers to all faculty members who were interested in using technology in their classes. With grant funding, the department continues to upgrade faculty computers and to provide software for faculty to use in their courses. As access to computers increased for faculty, the need to support their efforts to learn about using the technology grew. Hence, graduate students and faculty members voluntarily paired up and worked together on specific technology projects that faculty

mentees had identified. Thus, faculty members who were interested in using and learning about technology had access to a computer and support from their student mentor.

Beginning in 1993, the mentoring program began to acquire more structure. It gradually became a systematic approach to assist teacher education faculty in the department to use and integrate technology. To help establish this systematic approach, the department began to connect the existing mentoring program with a course entitled *Technology in Teacher Education* (C I 610). This is an advanced seminar and practicum course focused on technology use in teacher education. The practicum part of the course matches graduate students who have technology expertise with faculty desiring assistance (Thompson et al., 1996). The student/faculty mentoring program also receives of a lot of hardware/software and personnel support from the Center of Technology in Teaching and Learning (CTLT) and administrative support from the department. The following two sections describe C I 610 and the CTLT in more detail.

Technology in teacher education (C I 610)

Technology in Teacher Education (C I 610) is a course offered every fall semester by the Department of Curriculum and Instruction in the College of Education at Iowa State University. The purpose of the course is to provide graduate students with advanced seminar and practicum opportunities to use technology in teacher education. Graduate students can enroll for two credits to mentor one faculty, or three credits to mentor two faculty members. Faculty members voluntarily participate in the mentoring program each semester. As a part of the course, each graduate student majoring in Curriculum and Instructional Technology is paired up with a faculty member who is interested in learning about technology. The student

mentors and faculty mentees are required to work together on specific technology projects for at least one hour each week.

Student mentors in C I 610 begin to help faculty members at their level of technology experience and cater to their individual needs and interests. It is the responsibility of the teacher education faculty members to define their own working agenda, choose the mentoring meeting place, and set up mentoring meeting times. During the first meeting, both the student mentor and faculty mentee set up goals for the semester and schedule their meeting times. The remaining mentoring sessions throughout the semester are focused on the faculty members' needs and interests. After each mentoring session, student mentors are required to write and reflected about session's accomplishments. The purpose of the student journals is to record the interaction and happenings of each mentoring session. Each journal entry is usually structured into the following sections: mentoring activity, achievements/failures, roles/relationship, and benefit/impact (See Appendix B).

Besides meeting with their faculty mentees each week, graduate students also meet as a group for seminar once a week. These seminars provide opportunities for the graduate students to share their thoughts about their mentoring experience, to get help and suggestions from the course instructor and other students, and to participate and discuss articles about contemporary technology issues in teacher education. By the end of the course, the student mentors write up a case report that describes their mentoring experience and their perspectives on the mentoring process.

Support from the department and the CTLT

Currently, ISU student/faculty mentoring program receives administrative support from the Department of Curriculum and Instruction and the Center for Technology in Learning and Teaching. The chair of the Department of Curriculum & Instruction has been highly supportive of the mentoring program. Every fall, the opportunity to participate in mentoring program is announced during a departmental faculty meeting. Faculty are then encouraged to sign up for the program to receive assistance from graduate student mentors.

It is also worth noting the support that the Center of Technology in Teaching and Learning (CTLT) in the College of Education provides for the mentoring program. The CTLT is a nurturing environment and is comprised of a group of faculty, graduate students, undergraduate students, and staff who are interested in using technology in education. The CTLT is a technology-rich learning environment that includes three computer labs, technology production facilities, and a model student-centered classroom with distance education capabilities. Whenever faculty members have a need for using technology in their teaching, they can reserve equipment and/or a computer lab. Faculty and students can also check out hardware, software and books from the CTLT. Naturally, CTLT provides the space and support that faculty may need to incorporate technology integration ideas into their courses. In addition, both student mentors and their faculty mentees receive assistance from CTLT staff when encountering hardware/software problems or generating technology integration ideas for their classes.

In summary, the ISU student/faculty mentoring model is a systematic approach used to assist teacher education faculty in the Department of Curriculum & Instruction in their attempts to use and integrate technology. Each fall, faculty members and graduate students

are asked to participate in the mentoring program. However, the mentoring model has not been thoroughly investigated. More research is needed to fully understand how and why this mentoring model might assist the teacher education faculty learn about technology. Issues such as characteristics of effective mentoring relationships and roles of student mentors and faculty mentee need to be examined (Reinhart, 1997). The more we understand about the components of this mentoring model, the better we can assist teacher education faculty with technology use and integration. Therefore, it is critical to further investigate this student/faculty mentoring model.

Research Participants

As stated earlier, C I 610 is a course offered by the Department of Curriculum and Instruction and it provides research discussions and practical experiences to understand the use and integration of technology in teacher education. As a part of the course, graduate students are paired up with faculty members or classroom teachers to work on a technology projects identified by the faculty and teachers. During fall semester 2000, there were eight graduate students enrolled in C I 610. There were seven teacher education faculty members from Department of Curriculum and Instruction, and four classroom teachers participating as metees in the program. Three graduate students, who were K-12 inservice teachers, were paired up with their colleagues in local schools. The remaining five graduate students were teamed up with seven teacher education faculty mentees in the department according to their technology experience and interest.

Three graduate student mentors and their faculty mentees were selected for this research study. Participant selection was based on the following criteria: 1) Only the student

mentors and their teacher education faculty mentees working in the Department of Curriculum & Instruction were selected. Because the purpose of this research study was to investigate how and why the student/faculty mentoring model works to assist teacher education faculty in higher education to use and integrate technology, the mentoring cases that included K-12 classroom teachers were not included. 2) Only mentoring cases in which student mentors and their faculty mentees had kept regular mentoring meeting sessions on a weekly basis over the entire semester were selected. Occasional mentoring scheduled with student mentor to solve specific technical problems was not included, because the research study intended to investigate fully developed mentoring relationship and roles of mentors and mentees in the program. 3) The mentoring cases in which faculty mentees and student mentors worked on technology integration projects identified by faculty members were selected, because the research study attempted to investigate how and why the mentoring program might assist faculty mentees to use and integrate technology. Mentoring cases that involved in purely technical support were not selected. Based on the above selection criteria, three student mentors (Mary, Jane, and Crystal) and their faculty mentees (Dr. Johnson, Dr. Taylor, Dr. Erickson, Dr. Davison, and Dr. Clark) were selected for this research study.

All research participants were assigned with names for the sake of confidentiality. A brief profile for each student mentor and faculty mentee is provided in Table 1. A more detailed description for each participant is included in Chapter 4.

Table 1. Description of faculty mentees and student mentors.

Faculty mentees	Student Mentor
John: assistant professor, teaches courses in multiculturalism	Mary: 2nd year doctoral student, research assistant in the Department of Curriculum & Instruction, worked in a publishing business before coming to graduate school.
Tom: assistant professor, teaches courses in educational foundations	
Edward: professor, teaches courses in special education.	Jane: a first semester masters student in the Department of Curriculum and Instruction, taught at elementary level for 3 years before coming to graduate school.
Diana: temporary instructor, teaches courses in educational foundations and children's literature.	Crystal: 1st year doctoral student, teaching assistant for the Department of Curriculum and Instruction, taught high school English before coming to graduate school.
Cindy: associate professor, teaches courses in literacy and reading education	

The Researcher

As it is well known, qualitative research is influenced by the researcher's perspectives (Yin, 1994). It is helpful to share background and experience of the researcher with readers for a deep and clear understanding of this research. This section is a brief description about the background and experience of the researcher.

The researcher had been a course instructor of English at the University of Science and Technology in Beijing. During my teaching, the researcher developed a strong interest in using and integrating technology into language learning. In 1999, the researcher enrolled in a graduate program of instructional technology in United States.

During the program study, the researcher received some technology experience ranging from desktop publishing to web authoring tools. The researcher also worked as a teaching assistant for the Department of Curriculum and Instruction to teach one undergraduate course C I 201 (Introduction to Instructional Technology). As a TA for the course, she taught computer applications to preservice teachers that included database, multimedia production, spreadsheet, and web page design, etc.

Besides the teaching, the researcher had an assistantship opportunity to work as a technology mentor for the faculty members in the Department of Curriculum and Instruction in the College of Education at ISU since the summer session of 2000. The mentoring enabled the researcher to work closely with teacher education faculty to assist them in integrating technology into their course teaching. During the mentoring experience, the researcher noticed that the comfort level and competence level of faculty members to use computers started to increase. As a student mentor, the researcher found that she refined her technical skills and gained professional knowledge as a result of the mentoring experience as well. The researcher was motivated to explore the phenomenon of the ISU faculty/student mentoring model: the characteristics of effective mentoring relationship; roles of student mentors and faculty mentees; and the perspectives of both faculty members and student mentors on the mentoring approach.

In fall of 2000, the researcher took the course CI 610 entitled Technology and Teacher Education to gain a good understanding of the ISU student/faculty mentoring program. As a part of the course, the researcher was paired up with one faculty member in the department to work on technology projects identified by the faculty. The researcher attended the class, participated in the class discussion about technology integration in

education, and joined the discussions about the mentoring experiences of student mentors. Therefore, the researcher was able to gain first-hand materials about ISU student/faculty mentoring program. By being a student mentor, the researcher obtained an insider view about how and why the mentoring program worked, the perspectives of student mentors on mentoring, and their mentoring experience.

Research Design

Case study is a preferred research methodology used when "how" and "why" questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context (Yin, 1994). This methodology captures a full picture and illustrates every detail in the context being studied. According to Merriam (1998), "There is no manipulation of treatments on subjects; the research takes things as they are (p. 7)." Yin (1994) states a case study is an inquiry that:

> Investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident." [It] copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to converge in triangulating fashion, and as another result benefits from the prior development of theoretical propositions to guide data collection and analysis (p. 13).

The decision about which research design to use depends upon the nature of the research questions, amount of control, and the desired end product (Merriam, 1988). Because this research study explores "how" and "why" the mentoring model works to support and facilitate faculty use of computer technology, the case study approach was selected so the dynamic process of mentoring can be described and understood. As a case study unfolded, the research can provide data to help understand the meaning of the phenomenon rather than

verifying predetermined hypotheses (Merriam, 1988). Using a case study approach enables the researcher to, within the natural setting, collect words rather than numbers, and analyze the data inductively (Bogdan & Biklen, 1992).

Applying the case study approach to this research study will allow the researcher to gather data that provide "an in-depth understanding of the situation and its meaning for those involved" (Merriam, 1998). Due to the nature of the mentoring process, words rather than numbers will better illustrate and capture the phenomena of the entire mentoring process (Bogdan & Biklen, 1992; Merriam, 1988).

Research Procedures

Gaining access in a case study involves the process of acquiring permission to work with the participants and collect data (Glesne & Peshkin, 1992). At the beginning of the fall semester, the researcher submitted a research proposal to the Human Subjects Committee at Iowa State University (See Appendix). The research procedures and instruments were reviewed and then approved by the committee. Three graduate student mentors in the C I 610 and five faculty mentees gave their consent by signing a participation form agreeing to participate in the research study (see Appendix).

In order to have an insider view of the mentoring program, the researcher signed up as a student mentor in the mentoring program by enrolling in the course C I 610 in the fall, 2000. The researcher attended the C I 610 class each week and participated in class discussion about mentoring experiences, issues, and the uses of technology in teacher education. As a student mentor, the researcher was also paired up with one teacher education faculty in the Department of Curriculum and Instruction to work on technology projects

identified by the faculty mentee. She met with the faculty mentee an hour every week to work together. By joining the mentoring program herself, the researcher gained an insight about the mentoring experience and obtained a good understanding of the mentoring program.

As stated earlier, three graduate student mentors and five faculty mentees were selected to participate in the study. The student mentors and their faculty mentees met one hour per week for the entire semester. These meetings were scheduled by each mentoring pair. After each mentoring session, student mentors were required to record in a journal the progress of their mentoring session. These entries included such details like achievements and challenges that were faced by the mentoring pairs. Each week, graduate student mentors also met for two hours with classmates and the course instructor to share information about their mentoring experiences and to explore the contemporary issues about technology in teacher education. At the end of the semester, student mentors were required to write a case study report about their own mentoring experiences and perspectives on mentoring. In each case report, student mentors provided a mentor/mentee profile, a reflection of their mentoring experience, and a summary of what they gained from the mentoring experience.

At the end of the semester, the three student mentors and their faculty mentees were interviewed by the researcher. Each interview lasted about 40 minutes. The purpose of the interview was to gather additional information about their mentoring experiences. Interview questions were e-mailed to interviewees prior to the interview. Interview questions were structured so additional data about mentoring characteristic, roles and perspectives would be gathered. A list of interview questions used with faculty mentees and student mentors is found in the Appendix.

Finally, the researcher interviewed both the associate director of the CTLT and the chair of the Department of Curriculum and Instruction. These interviews were conducted to gather data about the program's background and history and how administration has supported this program. These interviews also lasted 40 minutes. Interview questions for these two interviews are included in Appendix.

Data collection

Evidence for case studies may come from several sources: documents, archival records, interviews, observations, and physical artifacts (Yin, 1994). Therefore, the data collection methods utilized in this descriptive case study included interviews, documents, and observations. The following three sections describe how the data were collected for this study using these three methods.

Interview

Among all data, the most important source of case study information is the interview (Yin, 1994). Interviewing is a tool of qualitative case study research used to acquire unique information (Merriam, 1988) and to identify what is in and on people's mind (Patton, 1980). Patton (1980) reported that "We interview people to find out from them those things we cannot directly observe. The purpose of interviewing, then, is to allow us enter into the other person's perspective (p. 196)."

Though there is no common list of criteria for an investigator's research skills, Yin (1988) suggests the following criteria:

- A person should be able to ask good questions-and to interpret the answers.
- A person should be a good "listener" and not be trapped by his or her own ideologies or preconceptions.

- A person should be adaptive and flexible, so that newly encountered situation can be seen as opportunities, not threats. (Yin, 1988, p.56)

Three student mentors and their five faculty mentees were interviewed at the end of the semester by the researcher. Each interview lasted for about 40 minutes. Specific interview questions were written by the researcher and sent to all participants to preview prior to their interview. During each interview, questions were added, removed, and altered for additional information (Merriam, 1988). Specifically, the interviews with faculty members were used to examine: 1) characteristics of a effective mentoring relationship, 2) roles of faculty mentees and student mentors in the mentoring relationship, and 3) the perspective on the mentoring from faculty mentees about how and why mentoring program assists them to learn and integrate technology. The interviews conducted with student mentors were used to determine the same aspects presented above, but from the perspective of the student mentors.

Again, the researcher conducted separate interviews with the associate director of the CTLT and the department chair. Each interview lasted about 40 minutes. These interviews were conducted to gather additional data about the administrative support that is present for mentoring and the background and history of mentoring program.

All interviews with participants followed a semi-structured interview format. Prior to the interview, interview questions were emailed to faculty mentees and student mentors for preview. The researcher started with a basic set of questions but was not bound by the order and added questions as needed (Merriam, 1988). Each interview lasted about 40 minutes, assumed a conversational manner, and followed a certain set of questions (Yin, 1994). All interviews were audio taped. The researcher also took notes during the interviews to

highlight key information. After each interview, the researcher listened to the recording, selecting what part to be transcribed.

Documents

Journals and case reports are other major sources of data collection (Yin, 1994). All student mentors submitted student journals at the end of the semester. These journal entries reflected upon the events of each mentoring session and provided information that revealed their feelings and views about the mentoring process. According to Merriam (1998), journals are a dependable source for collecting data on the participants' views, beliefs, and feelings (Merriam, 1988). The researcher provided student mentors with guidelines to assist them in documenting their mentoring experiences. The journals were structured into the following sections: mentoring activities, mentoring achievements/failures, mentoring relationships, and roles of mentors and mentees. An outline of the journal format appears in the Appendix B.

At the end of the semester, each student mentor wrote up a case report as a part of an assignment of C I 610. In the case report, student mentors recorded their thoughts about their mentoring experience which included sharing their perspectives on mentoring.

The student journals and case reports were the main sources of information used to supplement data from interviews. Some student mentors were more comfortable sharing their thoughts and/or feelings about the mentoring program in the journal rather than in an interview.

Class observations

Observation as a tool for data collection provides the researcher with firsthand experiences in the participants' natural setting (Merriam, 1988). Observations also provide an

alternative to second-hand accounts for experiences that are described in interviews and journals (Merriam, 1988). Because the researcher was also a student mentor enrolled in C I 610, she participated in the discussion about their mentoring experience of student mentors. She observed their remarks about their concerns, perspectives, and beliefs on mentoring process and mentoring programs. As a participant in the mentoring program, the researcher got a good opportunity to know student mentors, to understand their mentoring process, and to gain an insight about their perspectives on mentoring.

Analysis of Data

The purpose of this study was to describe and to analyze how and why mentoring is an effective approach to assist teacher education faculty in improving computer skills and to use technology in their teaching. The study aimed at presenting a full perspective of the mentoring program from both faculty mentees and graduate student mentors.

In this descriptive case study, data such as student mentors' journals, case reports, interviews and observations were collected and analyzed to answer the following research questions. 1) What are the characteristics of an effective mentoring relationship of a student/faculty mentoring program? 2) What are the roles of student mentors and faculty mentees in the student/faculty mentoring program? 3) What are the perspectives from teacher education faculty members about how and why the student/faculty mentoring program assists them to use and integrate technology? 4) What are the perspectives from student mentors about how and why the student/faculty mentoring program assists teacher education faculty to use and integrate technology?

Data analysis in this research study used is constant comparative method of data analysis. According to Lincoln & Cuba (1985), the method is a "continuous and simultaneous collection and processing of data". It has four main phases: unitizing, categorizing, filling in patterns, and member checking.

Unitizing is the process of extracting the small pieces of meaningful information from the data. In this research study, data were collected from interviews, student journals, student mentors' case reports, and class observations. During unitizing process, the researcher reviewed data for meaningful evidences to answer the research questions. The researcher identified meaningful pieces of information from interviews, student journals, case reports, and class observations. These units of information were extracted from the data in the forms of sentences and phrases.

Categorizing places the units of information in provisional categories. Based on the research questions, initial organizing categories for the data were developed: characteristics of effective mentoring relationship, mentor roles, mentee roles, the perspective of student mentors about mentoring, and the perspective of faculty mentees about mentoring. In addition, categories for the data of each question were identified after a review of the literature along with categories identified by the researcher as the analysis progressed. For example, the initial categories on roles of mentors emerged from the literature. Mentors are tutors, facilitators, door openers, guides, and friends (Clemson, 1987; MacArthur, 1995; Gehrke, 1988; Schein, 1978, Odell, 1990; Anderson 1987). Therefore, the researcher categorized the identified units of information into the developed categories such as tutor and facilitator found in the literature. Additional categories such as learner's role of student

mentors were identified and developed by the researcher. Additional categories contribute to the existing knowledge about the student/faculty mentoring phenomenon.

The third phase is to fill in the patterns. After categorizing data, categories were reviewed for possible overlaps and relations. Then the researcher carefully examined data in each category and then themes emerged to reveal specific patterns present during the mentoring process (Merriam, 1985). The researcher categorized the concrete data into conceptual themes and ideas to reveal specific patterns present. With each emerging theme, pieces of evidence from the data were used to support each theme.

The final phase is member checking. This phase involves taking the data and interpretations back to the participants who provided the data to check with them to see if the results are reported accurately and realistically (Merriam, 1988). After the data analysis, the researcher shared the data and findings with the research participants and asked for their opinions. Then, the researcher reviewed the responses from the research participants and made revisions accordingly.

Summary

The purpose of this chapter was to describe the methodology used in investigating how and why the student/faculty mentoring model works as an effective approach to assist teacher education faculty to use and integrate technology in teaching in the Department of Curriculum and Instruction at Iowa State University.

Three graduate student mentors and their faculty mentees were selected to participate in the study. As research participants, these student mentors and their faculty mentees met once each week of a semester to learn about technology and to work on technology

integration projects. After each mentoring session, student mentors documented their experiences in the student journal. Student mentors wrote case reports that summarized their thoughts about the entire mentoring experience. Student mentors and faculty mentees were interviewed by the researcher about their mentoring experiences and their perspectives on the mentoring. In addition, the department chair and associate director of the Center of Technology in Teaching and Learning were also interviewed about the background and administrative support of the ISU student/faculty mentoring program.

A descriptive case study approach was used in this research study. Data were gathered from multiple sources: interviews, documents, and observations. These data were then analyzed to answer research questions. The results and findings will be reported in the next chapter.

CHAPTER 4: RESULTS AND FINDINGS

In this chapter, data are analyzed and presented. First, descriptions of the graduate student mentors and faculty mentees are given to provide a context for the results. The chapter includes the following sections: 1) Faculty mentees' profile; 2) Graduate student mentors profile; 3) Summaries of mentoring experiences; 4) Research questions results; and 5) Summary.

Faculty Mentees' Profile

Dr. Johnson (Mary's mentee)

Dr. Johnson is a temporary assistant professor in the Department of Curriculum and Instruction. He teaches courses in multiculturalism. He had reached a certain level of comfort with technology and was ready to "put his knowledge to creative use". The main technology project dr. Johnson wanted to work on in the mentoring program is to learn WebCT 3.1 so he can use it in his course next semester.

Dr. Taylor (Mary's mentee)

Dr. Taylor is an assistant professor in the Department of Curriculum and Instruction. His area of interest lies in the historical and comparative analyses of education policy and politics: school choice, religion and public education. Prior to the mentoring experience, he had used the Internet for running searches and downloading articles for his class. He was now ready to create his homepage and use it as a central point for distribution of his course-related information. The technology projects Dr. Taylor wanted to work on during the

mentoring program were: 1) learn how to build web pages; and 2) explore new technology like iMovie.

Dr. Erickson (Jane's mentee)

Dr. Erickson is a professor in the Department of Curriculum and Instruction. He teaches courses in special education. He began to use computers first as "decoration for his office", but then learned to use them for word processing and e-mail. He had attended a few computer workshops provided by the technical support community at the university. Dr. Erickson didn't find the workshops helpful at all because he felt they were geared toward people who had more experience with computers than he had and that they were either "over his head" or didn't have anything to do with what he needed to know. Dr. Erickson decided that he wanted to learn PowerPoint because he had seen other colleagues around him used it and he felt it presents information more clearly and effectively. He also felt that it is what students expect these days. For his technology project, Dr. Erickson wanted to work on was to learn how to create and deliver PowerPoint presentation in his class.

Ms. Davison (Crystal's mentee)

Ms. Davison is a temporary instructor in the Department of Curriculum and Instruction. She teaches courses in educational foundations and children literature. Like most of faculty members in the department, Ms. Davison used the computer for e-mail, word processing and searching for Internet resource. She was interested in exploring instructional uses of technology in her teaching. The technology projects Ms. Davison identified were: 1) learn to use computer accessories such as scanners and digital cameras; 2) improve

knowledge of PowerPoint; and 3) explore desktop publishing software program to use for computer projects in her class.

Dr. Clark (Crystal mentee)

Dr. Clark is an associate professor of literacy education in the Department of Curriculum and Instruction. Her technology experience was mainly the use of email and word processing. In conversations with Dr. Clark, she mentioned that she could never learn from sheets of instruction. Thus the mentoring program's concentration on "personalizing the package" was very appealing to her. Dr. Clark reasons for pursuing technology training were due to her interest and strong need to integrate computer technology into her personal life, teaching, and administrative career. The technology projects she wanted to work on during the mentoring program are: 1) gain more knowledge of computer as a tool for class management like a grading book; and 2) increase knowledge of software packages like PowerPoint and Claris Homepage.

Graduate Student Mentors' Profile

Mary (Dr. Johnson's and Dr. Taylor's mentor)

Mary is a doctoral student in the Department of Curriculum and Instruction. She once worked for a publishing business before she joined the doctoral program. She was a teaching assistant for C I 201 (Introduction to Instructional Technology) for one semester and now is a research assistant for the department. Her interest lied in developing online courses that promote democratic learning. She was paired with both Dr. Johnson and Dr. Taylor for the mentoring experience. She felt working with Dr. Johnson on WebCT to design online course

activities is exciting and challenging because she had not worked with WebCT. Working with Dr. Taylor was also an exiting opportunity for Mary because she was very interested in Dr. Taylor's area of teaching and research.

Jane (Dr. Erickson's student mentor)

Jane entered the mentoring program as a first semester master student in the Department of Curriculum and Instruction. Before entering the graduate program, Jane had been a sixth grade teacher for three years. Her use of computers had been limited to basic word processing and e-mail, but she was in the process of exploring other computer software programs like PowerPoint. She was a teaching assistant for C I 201 (Introduction to Instructional Technology). In the mentoring program, she was paired with Dr. Erickson because they both are interested in exploring PowerPoint.

Crystal (Ms. Davison's and Dr. Clark's student mentor)

Crystal is a first semester doctoral student in the Department of Curriculum and Instruction. In 1994, she earned her master degree in Curriculum and Instructional Technology with specialization in computer-based instruction applied to second/foreign language teaching. She was an EFL (English as Foreign Language) teacher in a high school. She had technology experience using the PC platform and was familiar with using several software programs. She was also a teaching assistant for C I 201. Crytal was paired with Dr. Clark and Ms. Davison in the mentoring program. Crytal felt that this was a good working group because they all were language teachers.

Summaries of Mentoring Experiences

The mentoring experiences described were all effective in achieving goals. All faculty mentees evaluated their mentoring experience positively. They said that they achieved their mentoring objectives and their comfort level for using computers increased. The following summaries briefly describe the documented achievements for each mentoring pair.

Dr. Johnson-Mary

Dr. Johnson and Mary worked on WebCT 3.1 to design a web site for Dr. Johnson to use in one of his courses the next semester. Mary helped Dr. Johnson to conceptualize the project and to develop several online activities for students to participate in during multicultural education course. Overall, Dr. Johnson felt that his mentoring experience was highly effective and productive. He said, "we have met the goal I set up at the beginning. We have gone beyond. We moved around the WebCT features and designed good activities for my students." (Dr. Johnson, interview,12/18/00)

Dr. Taylor-Mary

Dr. Taylor was satisfied with his mentoring experience with Mary. He was glad that he met his mentoring goals and that the experience was effective. With the assistance from Mary, Dr. Taylor created a couple of web sites on Netscape Composer. In addition, they worked with iMovie and Dr. Taylor became familiar with the software program's capabilities. He thought the mentoring process helped him become comfortable with computers. He said, "definitely my comfort level has been increased." (Dr. Taylor, interview, 12/17/00)

Dr. Erickson - Jane

Dr. Erickson and Jane worked together on PowerPoint. Dr. Erickson intended to replace old overheads with PowerPoint presentations for his class the next semester. Dr. Erickson was glad that he had a very good start on his project of creating PowerPoint presentations. He reported that he got a feel of the program and became more comfortable as the semester progressed. Dr. Erickson thought his mentoring experience was very effective. He would like to continue with Jane as his mentor the next semester. (Dr. Erickson, interview, 12/05/00)

Ms. Davison - Crystal

According to Ms. Davison, she had met all of her mentoring goals and even went beyond her initial plan. She said, "we worked on Easybook and PowerPoint. I also learned how to use a digital camera, Fetch to transfer files, and a scanner. Even more, I learned how to use Fetch and how to use Excel to create a grade book for my class." Ms. Davison felt Crystal effectively opened a "technology window" for her to see the potential of software and hardware in classroom. (Ms. Davison, interview, 12/15/00)

Dr. Clark - Crystal

Dr. Clark became more comfortable with using technology because of the mentoring program. She indicated that best outcome for her was becoming more comfortable with computers. Dr. Clark felt her mentoring experience was effective and very helpful. She learned to create web quest pages with Claris Homepage and to create a grade book using Microsoft Excel. At the end of the semester, Dr. Clark found that she was more comfortable

with those programs and a step further in using technology in her teaching. (Dr. Clark, interview, 12/15/00)

Research Question Results

The purpose of this research study was to investigate how and why the student/faculty mentoring model works as an effective approach to assist teacher education faculty in using and integrating technology in their teaching. Three graduate student mentors and their faculty mentees were selected for this research study. Participants were selected for this study based on the following criteria: 1) Only the student mentors and faculty mentees in the Department of Curriculum & Instruction were selected. Because the purpose of this research study was to investigate how and why the student/faculty mentoring model works to assist teacher education faculty in higher education to use and integrate technology, the mentoring cases with K-12 school teachers and graduate students were not included; 2) Only student mentors and their faculty mentees who kept regular mentoring meeting sessions over the entire semester and worked on some type of technology project were included. Based on these two criteria, three student mentors (Mary, Jane, and Crystal) and their faculty mentees (Dr. Johnson, Dr. Taylor, Dr. Erickson, Ms. Davison, and Dr. Clark) were selected for this research study.

The following sections will report the findings for each research question. These findings were generated from interviews with faculty mentees and student mentors, student mentors' journals and case reports, and class observations.

Research question one:

Research question one was stated as follow: What are the characteristics of effective mentoring relationships in ISU student/faculty mentoring program?

This is the exact wording of a question that was posed to both the faculty mentees and graduate student mentors during their individual interviews. Faculty mentees and graduate student mentors responded to this question in terms of their own unique mentoring experience. They identified characteristics that they consider are crucial for establishing and maintaining effective mentoring relationships. After coding the data, the following themes emerged from participants' comments: 1) time; 2) mutual trust and respect; 3) personal fit; 4) communication; 5) mutual benefit; and 6) positive attitude.

Time

Time is identified as an essential characteristic for the success of a mentoring relationship. In this study, both the student mentors and faculty mentees were willing to work together and spend time each week learning about and exploring technology. Without allocating sufficient time, effective mentoring won't occur. In other words, making time available for the mentoring experience is a key for the continuation of a success of mentoring relationship. The following quotes from Dr. Johnson, Dr. Taylor, and Ms. Davison indicate they made a deliberate attempt to keep their mentoring meeting sessions with their student mentor each week.

> *We set aside the time to work on it [mentoring]. We were both willing to come here every two weeks and give 100% for two hours. We didn't answer the phone and didn't answer the door. Nothing else mattered and the priority was to learn something new with technology. (Ms. Davison, interview, 12/17/00)*

In order to make the mentoring effective, first of all, we had to make a deliberate attempt to work on the project. If we can set aside time, it will be effective. It will be both a positive experience for me and the mentor. (Dr. Taylor, interview, 12/17/00)

We had to make a deliberate attempt to work on mentoring at first. We have to set aside time if you want the mentoring to be effective and pleasant. (Dr. Johnson, interview, 12/18/00)

Mutual trust and respect

Mutual trust and respect seems essential for a effective mentoring relationship. In the mentoring program, student mentors are respected by their faculty mentees because of their expertise in instructional technology. Faculty mentees are mutually respected by student mentors because of their professional knowledge and scholarly expertise. The following quotes reveal how the mutual trust and respect was fostered between Mary and Dr. Taylor.

The trust and respect is pretty essential. It is some sort of like a marriage. I am glad that my mentor never expects me to have a legitimate needs and interest. She is never condencending or impatient with my level and skills. (Dr. Taylor, Interview, 12/17/00)

Dr. Taylor and his wife wanted to purchase a computer for their home. They asked me for some advice. I share with them my experience with cross-platform, memory and computer chip, etc. I feel I am like a consultant. I am pleasantly surprised and touched at their trust in my authority. (Mary, student mentor, interview, 12/18/00)

Mary and Dr. Johnson also mentioned the importance of building professional relationship based on trust and respect. Both indicated their mutual respect for each other in their interviews with the potential of their working together in the future.

I admire her expertise in technology and wish to learn from her. She showed great interest in my course and respects my expertise in my subject matter. I guess, we trust and respect each other and that helps. We have a good mentoring relationship. I know she is someone who is looking forward to working with me, who is patient, and who became knowledgeable in my area. Now I want to use technology and I want to brainstorm with her. I am more excited [about mentoring] because I know she knows what I am doing, she is interested, and she is caring. (Dr. Johnson, Interview, 12/18/00)

Dr. Johnson suggested we could work on some papers together with regard to our course design using WebCT. It is awesome! (Mary, student mentor, student journals, 12/15/00)

Personal fit

This is another important theme among the characteristics of effective mentoring relationships. Good matches between student mentors and faculty mentees set a good tone for the relationship. In the student/faculty mentoring program, three graduate student mentors were paired up with faculty members according to their background, technology interest and experience, needs, and personality. This personal fit enables student mentors and faculty mentees to build a compatible for the foundation to build up a good mentoring relationship. For example, Crystal, Dr. Clark and Ms. Davison who all are language teachers were paired up. They all shared common interest in using technology in language teaching and learning. Mary was matched with Dr. Johnson and Dr. Taylor and they all interested in designing web pages and online courses. Jane and Dr. Erickson both were interested in exploring PowerPoint. These quotes from the student mentors illustrated that personal fit was important and appreciated.

I have a very good mentee to work with. We have a lot in common. Both of my mentees (Dr. Clark and Ms. Davison) are language teachers, which is a real good match with my own background. Especially, with Ms. Davison. We talked a lot about language learning. We don't have kids but we like to share how our nephews and nieces learn a foreign language. It is fun. (Crystal, student journal, 9/28/00)

I am looking forward to meeting with Dr. Taylor because his area [public school system, voucher system] interests me. With Dr. Johnson, we were more like friends. I think it is due to Dr. Johnson's personality. He is open to new ideas, plus he is a very good teacher. I was absolutely awed at the strategies he employs to teach the kids about issues relating to discrimination. (Mary, student journal, 9/1/00)

I was paired with a faculty member [Dr. Erickson] who wanted to learn how to create and give PowerPoint presentations in his lecture. He was in luck because I had created and given my own PowerPoint presentation just a week earlier. (Jane, case report)

Communication

Student mentors and faculty mentees mentioned the need for open and frequent communication between the participants. Effective mentoring relationships occur when mentors and mentees clarify their roles and expectations for each other in the mentoring. In addition, it was important for them to maintain good communication throughout the mentoring process. Crystal and Dr. Johnson commented on the importance of having good communication to help build the mentoring relationship.

I feel it is important to make both of us understand our roles in the mentoring program, I expect that she [Dr. Clark] knows my role as a mentor is to help her to gain computer skills as much as possible. Without a common understanding in the roles and the same expectations for the mentoring, I don't think my mentoring will be so satisfactory. (Crystal, Student mentor, interview, 10/05/00)

Definitely communication skills is import for a effective mentoring. I should communicate clearly what I need and what I am interested with her [Mary]. She [Mary] helps me to develop some comfort and expertise in technology. I am glad that we communicated clearly right at the beginning of the semester about goals, objectives, and everyone's role. (Dr. Johnson, interview, 12/17/00)

In contrast, without good communication, student mentors and faculty mentees may have misconceptions about mentoring. Although Mary and Dr. Taylor may have thought they communicated their expectations about the experience with each other, it appeared that there was some miscommunication between them.

I could not go beyond the skill-development phase with Dr. Taylor. Perhaps we need more time to graduate to a higher level. He was not able to see technology's potential beyond his own personal use. I soon realized our expectations did not match up exactly. He (Dr. Taylor) also realized that we had come into the mentoring program with a little different expectations. Nonetheless, he was receptive to my ideas and

promised to explore them further. I see his enthusiasm with iMovie software as the first step in this direction. (Mary, student mentor, case report)

Mutual benefit

Mutual benefit is identified as an essential characteristic for the success of mentoring relationships. It seems that both student mentors and faculty mentees must feel they are benefited from and are rewarded for participating in the mentoring activities. Results indicated that most faculty mentees increased their comfort level with computers and improved their computer competency when they are involved in the mentoring program. Faculty mentees frequently expressed the benefits they gained by participating in the program.

After the mentoring program, my confidence level is starting to go up. I am at the point now, where I can start to confidently move things and try to troubleshoot more. I am getting a little closer. I am much better than a year ago. I am a step further. (Ms. Davison, interview, 12/10/00)

I feel more comfortable learning to do Powerpoint. (Dr. Erickson, interview, 12/08/00)

I feel a little more comfortable with technology so that I can use it in my classes. (Dr. Clark, interview, 12/08/00)

At the same time, student mentors benefited from the mentoring program by sharpening technical skills and gaining professional knowledge. Student mentors indicated that mentoring is a mutual beneficial process.

I learned a lot from the glitches of the technology and my ability to troubleshoot computer problems has increased a lot. The only thing I knew about Powerpoint is to make a basic slide when I began my mentoring. Now I know how to put in animation, insert graphics, how to put slides together effectively as learning and teaching tools. (Jane, student mentor, interview, 12/05/00)

I learned more about our instructional technology program. What is it about? What are we doing in this field? I learned from people in our center by asking them questions in the hallway. (Jane, student mentor, interview, 12/05/00)

I became better informed on the course content taught by my mentees. I learned a lot from him. His vast knowledge in the historical and political aspect of schooling enlightened me. (Mary, case report)

Positive attitude

A positive attitude is a critical element for effective mentoring relationships. In the mentoring program, all faculty mentees and student mentors possessed a positive attitude toward using technology. A positive attitude helped mentors and mentees troubleshoot and deal with technical problems and motivated them to keep learning about technology. The following quotes demonstrate that the importance of a positive attitude.

A positive attitude is definitely important. Sometimes, computers won't do the right thing for us. That's ok. We will figure out what is going wrong. If we can't, people in the CTLT can help. (Dr. Clark, interview, 12/17/00)

I am very luck to have mentees who are positive about technology. They show great interest in learning and always remain positive about technology. They will not tell me that they don't like the computer or it is too hard for them to learn. That positive attitude helps. (Crystal, student mentor, interview, 12/08/00)

Summary

In summary, faculty mentees and student mentors in the ISU mentoring program believe the following characteristics are essential to ensure their effective mentoring relationships. Time is an essential characteristic for a effective mentoring relationship. Making time for the mentoring sessions is vital for the effective mentoring relationships. Mutual trust and respect is needed for faculty mentees and student mentors to build a effective mentoring relationship with each other. Creating a personal fit between faculty mentees and their student mentors when assigning partners helps them to establish a

meaningful professional relationship with each other. Both faculty mentees and student mentors must clearly communicate their roles and expectations to each other throughout the mentoring. Both faculty mentees and student mentors must feel they are benefited from participating in the mentoring experience. Finally, a positive attitude is critical for an effective mentoring relationship.

Research question two:

Research question two was stated as follows: In the student/faculty mentoring model, what are the roles of faculty mentees and what are the roles of student mentors?

Faculty reported that they felt comfortable in having a student mentor help them learn and use technology. During the mentoring program, they didn't assign tasks for student mentors to do for them and they didn't request for student mentors take care of their technology related problems. Rather, faculty mentees realize the student mentors' expertise in instructional technology has made them someone from whom they can learn. One theme did emerge from the interviews conducted with faculty mentees about their role during the mentoring process.

Faculty mentees are motivated learners and active participants in the mentoring.

One major goal for faculty mentees is to become comfortable, competent, and independent computer users. It was evident that the faculty mentees were motivated and active learners. They presented their learning needs and their strong desire to learn by setting learning goals and objectives, identifying technology projects to work on, and completing their technology homework resulted from the mentoring sessions. The faculty mentees really took on the role of the learner in the mentoring experience.

I have to see myself as a person who really needs support with technology. To move away from the idea that I don't have all the answers and going to find answers by myself would be very time-consuming. I now know that there's a mentor who is willing to work with me and I can learn from her [Mary] in many ways. (Dr. Johnson, interview, 12/18/00)

My expectation in the mentoring program is to learn the skills of a Webquest and to get comfortable with it so I can use it in my classroom and to be able to help my students a little bit if they don't understand it. In order to do it, I have to view myself as a learner, taking time, sitting with my computer, learning from my mentor, then just doing my homework, and practicing to make it work. (Dr. Clark, interview, 12/15/00)

I am definitely a learner. Sometimes, my mentor knows every question and tutors me in every aspect. Sometimes, she doesn't have answers, so we learn together. (Ms. Davison, interview, 12/17/00)

In the mentoring relationship, student mentors play very important roles. From the data, the roles of the student mentors were categorized into four major categories: tutor, facilitator, consultant, and learner. Faculty mentees and student mentors described the roles of student mentors as a tutor, a buddy expert, a consultant, a advisor, a guide, a learning partner, a companion, a friend, a resource person, a coach, a facilitator, a collaborator, a supporter, a helper and a good listener. The following is a brief discussion about the roles of student mentors in each category.

The student mentors are tutors.

Effective mentors are people who realize the needs and interests of their mentees. It is important that the mentors respond to the needs of mentees by providing instructions and feedback for faculty mentees. Hence, student mentors become coaches who provide encouragement and direction for the faculty mentees.

My mentor is someone who knows what is new to me, what I still don't get it, and knows what part needs repetition. She is willing to help, saying "Let me show you how to do it one more time."(Dr. Clark, interview, 12/15/00)

She [my mentor] is not here to lecture me and get my things done. She is very much responding to my interests. I rely on her and get help from her to solve my problems. She is helping me how to do that. (Dr. Taylor, interview, 12/17/00, 12/17/00)

I am kind of teaching them [Dr. Clark, Ms. Davison] something I know. Sometimes, I hold their hands to learn technology. I would demonstrate skills first and then let them [Ms. Davison, Dr. Clark] follow my steps. (Crystal, student mentor, interview, 12/10/00)

The student mentors are facilitators.

Another role of the student mentors was to act as a facilitator. It is the responsibility of the student mentors to make it easier for the faculty mentees to learn about technology. The mentors work as resource people for faculty mentees, supporting and assisting them to locate hardware/software and to acquire desirable computer skills. The mentors facilitate the learning process with technology and assists faculty mentees to accomplish their technology projects. For example, Crystal facilitated Ms. Davison to locate appropriate software for her class. The following quotes illustrate the facilitating role of the student mentors.

[She] is to help and support me. One time when I wanted to find software to use for my class project, Crytal spent more time down there [CTLT] and found the program and brought it up [to me]. It was absolutely what I wanted, easy to use. So at that time she was taking the facilitator role and I was definitely the learner. (Ms. Davison, interview, 12/17/00)

My role is a facilitator. I facilitate to achieve what they want to do. (Crystal, student mentor, student journal, 12/10/00)

The following data report how Mary helped Dr. Johnson to learn WebCT. Mary offered suggestion to help Dr. Johnson visualize his technology project.

I like that Mary is willing to answer some questions even when she got frustrated. But if she doesn't know, she will take to the next step and she is going to find out. (Dr. Johnson, interview, 12/18/00)

I feel like a facilitator. The mentor role is to help the faculty to visualize what they can do and understand that. I am going to look for information to facilitate the faculty's learning process. (Mary, student mentor, student Journal, 11/9/00)

The student mentors are consultants.

The student mentors often becomes consultants who listen and provide suggestions and advice to better help faculty with their work. The student mentors must be good listeners and advisors. The student mentors provided guidance as they consulted with faculty on things they wanted to learn about and complete. These suggestions included uses of technology. The following data indicated that the student mentors do have a role as consultant for faculty mentees.

She is a kind of consultant. Like "I have done that all. So can you help me to make it better?"(Dr. Clark, Interview, 12/15/00)

She is willing to be a good listener, siting back and listening what I am struggling with. She takes time to do that and responds to me in a positive and favorable way. (Dr. Johnson, Interview, 12/18/00)

Dr. Taylor and his wife wanted to purchase a computer for their home. They asked me for some advice. I basically gave them my experience with cross-platform, memory and computer chip, etc. I feel I am like a consultant. I am pleasantly surprised and touched at their trust in my authority. (Mary, student mentor, interview, 12/18/00)

Maybe someone who is not involved in the class can have an outsider's view to help the mentee visualize if the things will work or not. I can be an outsider to see if it's doable or not. (Jane, student mentor, interview, 12/19/00)

The student mentors are learners.

Data clearly indicated that the student mentors learn technology together with their faculty mentees. Student mentors can not answer all questions they received from their faculty mentees. So they seek help from the CTLT and department staff. Then they share their knowledge and skills with their faculty mentees. Student mentors often learn new computer

software or new skills together with their faculty mentees. For example, Mary and Dr. Johnson learn WebCT 3.1 together. Crystal learned Easybooks with Ms. Davison together, and Jane became a PowerPoint expert when mentoring Dr. Erickson.

> *When I see that she doesn't know how to use the program, well, it's good. We got the program and we loaded it. We worked with it together. I can work off it from my background and she can work from hers. We worked together to figure out the new uses of this technology. I think you would probably end up with a richer project if you have two people who draw from different sources to create the use of technology. Learning and exploring the program just makes the mentoring a good experience for two people. (Dr. Johnson, interview, 12/18/00)*
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> *I view myself as someone who knows a little more than them [faculty mentees], I am learning as much as my mentee. (Crystal, student mentor, interview, 12/10/00)*
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> *Both of us are learners. We knew nothing about the Easybook program. When we started, we went downstairs and spent two hours going through software. Crystal and I are more of a learning team. (Ms. Davison, interview, 12/17/00)*
>
> *I learned a lot from the glitches in the technology and my ability to troubleshoot computer problems has increased a lot. The only thing I knew about Powerpoint was to make a basic slide when I began my mentoring. Now I know how to put in animation, insert graphics, and how to put slides together. (Jane, student mentor, interview, 12/05/00)*

Summary

Key to an effective mentoring relationship between faculty mentees and student mentors is both having a good understanding of each other's role in the experience. In the ISU student/faculty mentoring program, faculty mentees were motivated learners and active participants. They presented their needs and desire to learn and actively participated in the mentoring activities. The student mentors became coaches, facilitators, consultants, and learners.

Research question three:

Research question three was stated as follows: What is the perspective of faculty on mentoring regarding how and why mentoring works to for them to learn and use technology?

All faculty responded positively towards mentoring in terms of how it assists them to learn and use technology. Faculty indicated that one-on-one mentoring is an ideal situation for them to learn about technology. They reported that their comfort level of using technology in their teaching and research has increased. Ms. Davison praised mentoring by saying, " I don't know what else could help me to learn technology." Dr. Clark also expressed her favor for mentoring:

> *I think it [mentoring] is a blessing. I think the mentoring program is wonderful. I'm a lot further in technology today because of the mentoring program. I probably wouldn't do it otherwise. (Dr. Clark, interview, 12/15/00)*

There are some specific themes that emerged from the faculty interviews. Faculty mentees were asked to share their perspectives on mentoring regarding assisting them to learn and use technology. These themes were: 1) Creates one-on-one personalized learning context; 2) Cultivates a comfortable and non-threatening technology learning environment; 3) Provides immediate access to just-in-time technical assistance; 4) Helps faculty to continuously improve computer skills with multiple mentoring meeting sessions; 5) Helps nurture a technology learning community for faculty; and 6) administrators encourage and support for faculty use of technology. Data to support each theme follows.

Creates one-on-one personal learning context.

This mentoring program creates one-to-one relationship. It produced a learning situation for faculty, where individualized instruction was designed to meet faculty's unique

interest, technology experience, and needs. In this environment, the faculty mentees could work at their paces. The student mentor can focus specifically on the faculty mentee's needs and interest since the mentoring is just between them. Data indicated participants were appreciative of being able to work with someone one-on-one.

> *I can set up one hour with my mentor and just work on what I am interested in. (Dr. Erickson, interview, 12/10/00)*

> *Compared with a workshop, I think I have pretty unique interests and needs in this area, so one-on-one mode will be really helpful. She [Mary] spends some time with me before we get going and tries to assess what I want to do. That is not what I can do with a group of people who have different interests and needs. (Dr. Taylor, interview, 12/17/00, 12/17/00)*

Cultivates a comfortable and nonthreatening technology learning environment.

Faculty mentees appreciated the comfortable and friendly learning environment created by the mentoring experience. Sometimes faculty may be intimidated working with a group of people in a workshop. Wit h student mentors sitting right next to them in their office, it cultivates a comfortable and non-threatening learning environment. Clearly, the faculty mentees were comfortable learning in this type of environment.

> *It is more comfortable in my office than in a classroom. The comfort level is important. There is comfort level when we talk back and forth about weather or family or books or common interests. That creates a better learning environment than in a classroom with strangers. No peer pressure, and no stupid questions. (Ms. Davison, interview, 12/15/00)*

> *I am not in a group that is better than me. It intimidates me a little bit. When I am just in my office and someone is sitting right next to me, it's just more comfortable. No peer pressure."(Dr. Erickson, interview, 12/10/00)*

> *In my age group, many of us are relatively older. Technology came to us during our mid life, so we didn't grow up with technology. We have to work on it and become comfortable with it. In that situation, we don't permit ourselves to explore freely with technology for fear that we will break it. It is really helpful to have someone to sit beside you to support you. Just the fact that she [Crystal] is there, and the freedom to explore more, and to gain the comfort level which is pretty hard to develop on your*

own. I think that comfort level is pretty hard to be developed during the class too. I have been taking classes. They can move you ahead and you feel you are exposing yourself to a fearing environment when your peers are much more proficient than you. (Dr. Clark, interview, 12/15/00)

Provides immediate access to just-in-time technical assistance

The one-on-one mentoring program provides an avenue for faculty mentees to ask questions in a convenient and comfortable way. They don't need to wait for an instructor who might be helping others during a workshop. Faculty mentees can get immediate feedback and just-in-time assistance from mentors who sit right next to them during their mentoring sessions. Moreover, faculty mentees enjoy the availability of their student mentors who are willing to help at any time. Faculty mentees were very appreciative of the access to just-in-time support.

I like the idea that I can call someone to get answers to my questions. I have extra questions from time to time. I would call Jane and she is willing to help. (Dr. Erickson, interview, 12/10/00)

During the one-on-one mentoring, I can get my questions answered immediately. I don't have to wait. I get all the attention in the mentoring. If I need help, immediately there's feedback. (Dr. Erickson, interview)

In my mind, in a workshop, someone in front of the room teaches us how to do it and we set at a computer and try to do it. If we make mistake, then we have to wait for the instructor to get out of his way to help. When I have a mentor sitting right next to me, if I need help, immediately there's some feedback. She would say, "this is a better way to do it or you know when it happens you need to do this." So, the feedback is more immediate, I learn better this way. (Dr. Clark, interview, 12/15/00)

For me, the mentoring really reproduces or provides the best situation because it is one-on-one, it repeats weekly and you could ask someone the question you encountered if it came up outside of the mentoring meeting. So you have a good support system that is one-on-one. That allows you to explore in-depth and to ask all the questions you have. (Dr. Johnson, interview, 12/18/00)

Help faculty to continuously improve computer skills with multiple mentoring sessions.

Faculty repeatedly commented that by meeting with their mentors every week helped them continually to learn about technology. Since the mentor was scheduled to meet with their mentee an hour every week, faculty felt they were "pushed" to set aside the time to learn technology. Without meeting regularly, the faculty mentees admitted that they tended to push technology down on their working list. The multiple and repeated mentoring meeting sessions helped faculty to continuously increase comfort level and competence in using computers. For example, the regular mentoring meeting sessions helped Dr. Johnson, Dr. Erickson, and Ms. Davison improve their technical skills.

> *I find the fact that she [Mary] comes here every week valuable because she [Mary] holds you accountable. She helps me by coming here and checking my progress. I have the opportunity to speak with her and it kind of keeps me moving forward. I know that she comes to meet with me every week and forces me to continue my work. (Dr. Johnson, interview, 12/18/00)*

> *She [Jane] helps me by coming here and checking my progress. Simply being here helps me do my homework. (Dr. Erickson, interview, 12/10/00)*

> *If we wouldn't have set aside this two hours, technology would be more laid back and I find the technology gets pushed down on the list because I am not very comfortable with it. It's easier to answer the phone, it's easier to have a student's' appointment because I am more comfortable with it. This forces me to go beyond my comfort level because I know every two weeks I will have these two hours and I will do nothing else but this in the two hours. (Ms. Davison, interview, 12/17/00)*

Helps nurture a technology learning community for faculty.

According to faculty mentees, the effectiveness of mentoring lies in nurturing a friendly technology learning community. All faculty mentees indicated that they have used the CTLT more often during and after the mentoring program than before. They and their student mentors checked out equipment like digital video cameras, still digital cameras, and

computer laptops. In addition, they reserved software to review and computer stations to work on their technology projects. They asked the CTLT staff to help with hardware/ software problems. The faculty came to recognize "friendly faces" down in the CTLT and felt they were better connected with departmental technology initiatives. Through mentoring program, faculty mentees became more familiar with what the CTLT had to offer and gradually began to see themselves becoming pa part of learning community where everyone learns together.

> *Some of the mentoring is just like building a community. My going down stairs [to the CTLT] has been increased a lot. Before the mentoring program, I didn't want people to know how much I didn't know about technology for fear that people down there would think me stupid. But through the mentoring, I am not scared to ask people because now I understand how big and vast technology is. I will just go down to find my mentor. We would try first, then we go to another mentor, then we will use our department technical support if we can't solve the problem. So, it is the question of having that learning community, building that community and feeling more like we are a team of friends learning together. (Ms. Davison, interview, 12/17/00)*

> *I am more willing to go downstairs. We all need to recognize the friendly faces in the hall or know if we run down stairs or we got a quick question, there is a friendly face I know I can go ask rather than I don't know to whom to ask a question. There are a lot of people down there, who I should talk to. (Dr. Clark, interview, 12/15/00)*

> *I used the CTLT more frequently than before. I would check out software, ask questions to my mentors or other technical support in the CTLT, and reserve computer stations to work on my project. I used iMovie last week to edit some clips I can use for my class. I find the CTLT is quite useful for me now. (Dr. Taylor, interview, 12/18/00)*

Administrators encourage and support for faculty use of technology

Administrators provide extensive support and encouragement for faculty who participate in the mentoring program. The chair of the Department of Curriculum & Instruction has been highly supportive of the mentoring program. Each semester, the mentoring program is announced in a faculty meeting to inform faculty members of the

mentoring opportunity. All faculty members are encouraged to sign up to obtain assistance from student mentors.

> *When I heard that there is a mentoring program available this semester in the faculty meeting, I quickly signed up for the program. It is a great idea that the department can help faculty like me learn technology. (Dr. Clark, interview, 12/15/00)*

> *I feel I am well-supported using technology in my class. I know the department encourages the use of technology in courses and will support me when I need it. (Dr. Johnson, interview, 12/18/00)*

In addition, the CTLT provides hardware and software and personnel support for the mentoring program. Faculty mentees and student mentors can reserve equipment, software, or computer labs in the CTLT. Both student mentors and their faculty mentees receive assistance from CTLT staff when encountering hardware or software problems.

> *CTLT has been very helpful. We reserve computer stations and check out software for my technology projects. The people in the center are very willing to help and answer our technical questions (Ms. Davison, interview, 12/17/00)*

> *I am glad that we have support from CTLT. Sometimes, we [Dr. Erickson and Jane] have problems with my computer in my office and we don't know what to do. Sometimes we can't figure out how to use one feature in PowerPoint. CTLT is always the right place to go and find the help.* (Dr. Erickson, interview, 12/18/00)

> *If there is anything we don't know or even the mentor doesn't know, we can always ask somebody in the CTLT or the department about it and get some help. I think that is really helpful. (Ms. Davison, interview, 12/19/00)*

Summary

Faculty mentees indicated that the mentoring program was a very effective approach to assist them as they began to learn and use technology. Through mentoring program, faculty mentees increased the comfort and competence level of using computers in their teaching and research. They remarked that they were a lot further in using and understanding technology because of the mentoring program. Faculty mentees expressed that the mentoring

program is effective because: 1) It creates one-on-one personalized learning context; 2) it cultivates a comfortable and non-threatening learning environment; 3) it provides immediate access to just-in-time assistance; 4) it helps faculty improve computer skills with multiple meeting sessions; 5) it helps nurture a friendly technology learning; and 6) administrators encourage and support faculty involved in the program.

Research question four:

Research question four was stated as follows: What is the perspective of student mentors on mentoring regarding assisting faculty learn and use technology?

Graduate student mentors reported that mentoring was an excellent way to help faculty learn to use technology. They agreed that this mentoring technique was very helpful and effective to assist technology integration into their courses. Four themes emerged from the data from the student mentors' perspectives on mentoring. These four themes included: 1) Individualized instruction; 2) Private and comfortable learning environment; 3) Expanded activities beyond general computer skills; and 4) Supports from the CTLT and C I 610 peers empower mentoring.

Individualized instruction

The student mentors agreed that offering individualized instruction to faculty mentees was critical to the success of the mentoring program. One-on-one mentoring provided student mentors with the opportunity to meet the needs of each faculty mentee. The student mentor can devise his instruction to fit the learning style, skills level and personal interest of the faculty mentee. The following quotes from Jane, Crystal, and Mary show how individualized instruction meet the needs of their faculty mentees.

Mentoring is effective because it is more towards his [Dr. Erickson] needs and his understanding of technology. He [Dr. Erickson] is my focus point, where to go and what to learn. So it is very individualized. It's not like a workshop, where you get very general information and have to accommodate other people's needs and perspectives. The mentoring is all about him and me. (Jane, student mentor, interview, 12/05/00).

The one-on-one mentoring can cater to the individual's needs. I couldn't think about any other better way. I can really go according to their [Dr. Clark, Ms. Davison] needs. For example, I work with Ms. Davison on scanners and Easybook, but work with Dr. Clark on Claris Homepage. In terms of learning computer skills, one-on-one mentoring can cater to individual needs. (Crystal, student mentor, interview, 12/10/00)

Because it [mentoring] really focuses on their [Dr. Johnson, Dr. Taylor] needs at that moment and with that they end up learning more. (Mary, student mentor, interview, 12/18/00)

Private and comfortable learning environment

Providing a private and comfortable learning environment enables faculty to learn technology in a non-threatening way. According to the graduate student mentors, this is an advantage of mentoring over traditional workshop models. This mentoring model provided a private and secure environment for faculty mentees to learn technology and try out their technology ideas. They didn't need to worry about asking "stupid" questions in front of peers. Student mentors frequently mentioned the importance of learning in a private and comfortable environment.

Mentoring is more private. Dr. Clark might sign up for some workshops to get some basic computer skills. She will feel intimidated if other people in the workshop are head and shoulder over her in technology. With mentoring, we do individually provide a private space so that they will feel secure. If I were a faculty, I would choose mentoring instead of going to a workshop. (Crystal, student mentor, interview, 12/10/00)

Working in their office for faculty is more comfortable. It helps Dr. Erickson learn better in a more secure environment. He doesn't need to worry about exposing his awkwardness with computers in a group of people (Jane, student mentor, interview, 12/05/00)

Expanded activities beyond general computer skills

Mentoring was appealing and effective because it focused on assisting faculty mentees to learn and use technology in their "specific" courses. It gave them the opportunity to explore other uses of technology in their courses. Instead of displaying technology superficially, student mentors were active consultants. They offered suggestions about how the technology could be best used in the faculty mentee's courses. Student mentors brainstormed technology ideas, discussed course design and development issues and shared their perspectives about technology integration with their faculty mentees.

> *Dr. Erickson came a long way. At the beginning, he just wanted to transfer what he has on the overheads to the slides. But it [PowerPoint] doesn't really work that way. Then I showed him that it won't work for his course if he just wanted transfer what he has on the overheads without any graphics or special effects. I convinced him that the visual presentation is what he wants PowerPoint presentations and how to uses Powerpoint to make a good design for his course. (Jane, student mentor, case report)*

> *He [Dr. Johnson] gave me the examples of activities and asked how he could extend these into WebCT. What if you could prolong the discrimination experience in WebCT by creating difference: some private and other public—in other words, give access to some students but not to all?? This would create an environment of discrimination, which students would experience for themselves. I think it would work for his course. Dr. Johnson seemed like the idea. (Mary, student mentor, student journal, 10/21/00)*

Support from CTLT and C I 610 empower mentoring.

Receiving support from others is essential to the effective use and integration of technology. Faculty mentees and student mentors were grateful of the support they received from the CTLT and peers in the C I 610 course. Student mentors and faculty members received help from the lab directors, lab managers, the lab assistants and technical support personnel in the CTLT. In addition, the CI 610 course provided student mentors with a

secure place to share, discuss, and get advice about their individual mentoring experiences. Student mentors feel that C I 610 gives support in the mentoring.

> *I can't imagine what my mentoring experience would be like if nobody in the center to help me. During my mentoring, I can't give immediate answers to my mentees because I don't know the answer either. Luckily, I can always get a hold of people (technical experts, like the lab manager and the associate director of CTLT), they are willing to help me and show me. Then, I can show my mentee later. (Jane, student mentor, interview, 12/05/00)*

> *Enrolling in C I 610 helps. It makes me feel that I can always talk to the class and get help from others or from the course instructor. During the class, we can always talk and share. That makes me feel secure and I like that. (Crystal, student mentor, interview, 12/10/00)*

Summary

Student mentors indicated that the mentoring program was a useful approach to use with faculty to help them learn about technology. Student mentors expressed it created positive learning situation for faculty mentees. In their opinion, the mentoring is effective because: 1) it provided individualized instruction; 2) it provided a secure and private learning environment; 3) it offered opportunities for faculty to expand their skills; and 4) support from CTLT and peers of C I 610 empowered technology learning.

Summary

Data from this research study indicate that a effective student/faculty mentoring program is characterized by the following traits: 1) time; 2) mutual trust and respect; 3) personal fit; 4) communication; 5) mutual benefit; and 6) positive attitude. If these characteristics of a mentoring relationship are present, it seemed more likely that the mentoring relationship will be effective.

To have an effective mentoring relationship, both faculty mentees and student mentors must have a good understanding of their roles. Roles of faculty mentees can be summarized as active learners and participants throughout the mentoring experience. The major roles of student mentors were as tutors, facilitators, counselors, and learners.

From the perspective of the faculty mentees, the mentoring program was an effective approach to assist them to learn and use technology. They indicated that the effectiveness of the mentoring existed because of the following factors: 1) one-on-one personalized learning context; 2) comfortable and non-threatening technology learning environment; 3) immediate access to just-in-time technical; 4) periodic meetings for continuous faculty improvement; 5) nurture a technology learning community; and 6) administrative support for faculty use of technology.

Finally, the student mentors reported that mentoring program was an effective way to help faculty members learn how to use and integrate technology. They felt the one-on-one mentoring provided individualized instruction to coincide with the learning styles, needs, and interests of their faculty mentees in a more private and secure technology learning environment. Moreover, the support from various sources empowered the participants involved in the mentoring program.

CHAPTER 5: SUMMARY, DISCUSSION, AND RECOMMENDATIONS

In the first four chapters of the thesis, the background, related literature, research methodology, and research findings were presented. The purpose of this chapter is to briefly summarize the research study, to discuss the study's findings, and to provide recommendations for further research about the mentoring. This chapter includes the following sections: 1) Summary of the research study; 2) Discussion of research results; 3) Recommendations for future mentoring projects; and 4) Recommendations for future research.

Summary of the Research Study

The purpose of this research study was to investigate how and why the ISU student/faculty mentoring program assisted teacher education faculty in the Department of Curriculum and Instruction at Iowa State University to use and integrate technology in their courses. The research questions were: 1) What are the characteristics of effective mentoring relationships of the ISU student/faculty mentoring program? 2) What are the roles of the student mentors and faculty mentees in the mentoring program? 3) What are the perspectives of the faculty mentees about how and why the ISU student/faculty mentoring program assists them to use and integrate technology? 4) What are the perspectives of the student mentors about how and why ISU student/faculty mentoring program assists faculty mentees to use and integrate technology? This research study provides information on designing an effective mentoring program for teacher education faculty.

A qualitative case study approach was used to capture a full picture of the ISU student/faculty mentoring program. This case study approach enabled the researcher to, within the natural setting, collect words rather than numbers, and analyze the data inductively (Bogdan & Biklen, 1992). Because this research study explored "how" and "why" the mentoring model worked, using case study approach allowed the researcher to gather data that provided "an in-depth understanding of the situation and its meaning for those involved" (Merriam, 1998, p.86).

Three graduate student mentors and five faculty mentees who were enrolled in the ISU student/faculty mentoring program in fall, 2000 were selected to participate in the study. Participants were selected based on the following criteria: 1) student mentors and their teacher education faculty mentees worked in the Department of Curriculum & Instruction; 2) they held weekly mentoring sessions with each other; 3) they worked collaboratively on technology integration projects identified by faculty mentees.

As research participants in the research study, the graduate student mentors and their faculty mentees met at least one hour per week to work on technology projects identified by the faculty mentees. After each mentoring session, student mentors recorded the progress of their mentoring session in a journal. In addition, graduate student mentors met each week for two hours with classmates and the course instructor and shared their perceptions about their mentoring experiences and explored the contemporary issues about technology in teacher education. At the end of the semester, student mentors wrote a case study report about their own mentoring experiences and their perspectives on mentoring. The student mentors and their faculty mentees were also interviewed by the researcher to gather additional information about the mentoring experience. In addition, the researcher interviewed the associate director

of the CTLT and the department chair about the history and background of the ISU student/faculty mentoring program.

It is worth noting that the researcher was a participant in the mentoring program and enrolled in the C I 610 course. As a student mentor, the researcher was paired up with one faculty member and worked with her for an hour every week. She also participated in the class discussions about the mentoring experience and the uses of technology in teacher education. By participating in the mentoring program, the researcher gained additional insights about the mentoring experience and obtained a deep understanding about the mentoring program.

Data such as student journals, case reports, class observations, and interviews were collected and categorized into themes that pertained to each research question. Then the data were analyzed by using the constant comparative method (Merriam, 1985). The data were unitized, categorized, filled in the pattern, and checked. The emerging themes for each research question were identified. Research finding and results were reported in the Chapter 4. The following section is a discussion about the research results and findings.

Discussion of the Results

In this section, a discussion of the results is presented. The discussion focuses on the findings for each research question and is organized around the emerging themes. The discussion reviews the following results: 1) characteristics of effective mentoring relationships; 2) roles of student mentors and faculty mentees in the ISU student/faculty mentoring program; and 3) how and why the ISU student/faculty mentoring program assists faculty to use and integrate technology into teaching.

The characteristics of effective mentoring relationships

This research study identified several the characteristics of effective mentoring relationships of this student/faculty mentoring program. The characteristics were: 1) Time; 2) Mutual trust and respect; 3) Personal fit; 4) Communication; 5) Mutual benefit; and 6) positive attitude. The first five characteristics were cited in the research about mentoring relationships. The last characteristic of positive attitude towards technology was emerged from the research data. The following is a discussion about each characteristic.

As Kay (1990) stated, time is a key factor for having a effective mentoring relationship. Without investing a sufficient amount of time, a good and healthy relationship can't be nurtured during the mentoring program. Participants in this research study mentioned that setting aside time to work together was very important. In the ISU student/faculty mentoring program, student mentors and faculty mentees were required to set aside one hour each week to work on their technology project. All participants made a deliberate effort to keep their commitment and scheduled regular mentoring sessions every week. As Ms. Davison stated, "we set aside the time to work on it [mentoring]. We were both willing to come here every week to work on technology." (Ms. Davison, interview, 12/17/00). With time reserved for the mentoring, faculty mentees and student mentors were able to work with each other to establish the mentoring relationship. As Hall (1995) stated, a mentoring relationship needs time to grow. It takes time to build the rapport, credibility, and trust between the mentor and mentee in the mentoring relationship (Cobb, Hensman, Jones, & Richards, 1995).

The second characteristic to effective mentoring relationships identified in this study was to build mutual trust and respect between the mentor and mentee. MacArthur (1995) and

Clemson (1987) asserted that mutual respect and trust is a critical factor for effective mentoring relationships. The mentoring relationship between Mary and Dr. Johnson and Dr. Taylor illustrated the importance of the mutual trust and respect. Mary respected Dr. Taylor's professional expertise in educational foundations and was never condescending or impatient with Dr. Taylor's computer level and skills (Dr. Taylor, interview, 12/17/00). Dr. Taylor respected Mary's expertise in instructional technology and trusted her ability to make recommendations for a home computer (Mary, student journal, 12/18/00). The mentoring relationship flourished between Dr. Johnson and Mary. Dr. Johnson described Mary as someone who looked forward to working with him, who was patient and caring, and who was knowledgeable and interested in what he was doing (Dr. Johnson, interview, 12/18/00). Mary admired Dr. Johnson's expertise and said that she was "absolutely awed" by Dr. Johnson's innovative teaching strategy (Mary, student journal, 12/15/00). The fact that they wrote and presented a paper about their mentoring experience demonstrated their mutual trust and respect for each other. Because mentoring involves an ongoing, caring relationship, a good mentoring relationship can only be fostered with mutual respect and trust (Janas, 1996). The mutual trust and respect in the mentoring relationship allows ideas, cooperation, communication, and personal relationships to flourish (MacArthur, 1995).

Another characteristic of effective mentoring relationships is effective communication between mentors and mentees (Gehrke, 1988). Open dialogue between the mentor and mentee allowing each participant to express their feelings, talents, knowledge and expectations is essential for a effective mentoring relationship. According to Dr. Johnson, faculty mentees and student mentors should clearly communicate with each other about their expectations, needs and interests, goals and objectives, and roles in the mentoring (Dr.

Johnson, interview, 12/17/00). This open line of communication helped to ensure that the relationship was "less susceptible to the vagaries of interpretation, fundamental disagreement, and dissatisfaction" (Hall & Kinchington, 1995). In contrast, the lack of communication may cause misconceptions about the mentoring relationship. For example, Mary viewed mentoring as an effort to integrate technology into Dr. Taylor's course. However, Dr. Taylor thought Mary was supposed to teach him only computer skills in the mentoring program. Unfortunately, they didn't clearly communicate their expectations with each other. As a result, Mary felt a little frustrated that she "could not go beyond the skill-development phase" with Dr. Taylor (Mary, case report). Without a shared understanding and common expectation, both mentors and mentees can be caught in a negative and frustrating association (Hall & Kinchington, 1995). Thus, effective communication between the mentor and mentee is essential so that they can understand each other to avoid misconception and misunderstanding (Clemson, 1987).

Personal fit was identified as another characteristic of effective mentoring relationships (Clemson, 1987). Mentors and mentees who have similar backgrounds, common interests, and compatible personalities tend to have effective mentoring relationships. In this research study, the three student mentors were matched with the faculty mentees according to their technology experience, personal background, personal interest and personality. For example, Crystal, who was a high school English teacher was matched with Dr. Clark and Ms. Davison who were language teachers too (Crystal, student journal, 9/30/00). Jane had limited technology experience, but was interested in learning and using PowerPoint. So she was paired with Dr. Erickson. He was a beginning computer users, but wanted to use PowerPoint in teaching (Jane, student journal, 9/29/00). Mary indicated she had a similar personality to

Dr. Johnson and a common interest (public school system) with Dr. Taylor (Mary, student journal, 9/30/00). Thus the nice personal fit creates common language and good match with each other's experience and interest between student mentors and faculty mentees. It increased the probability that the relationship between the mentor and mentee was effective.

Clemson (1987) conculded that mutual benefit is a critical element for effective mentoring relationships. Both the mentor and mentee should benefit from the relationship. Mentees gain knowledge, skills, insights, and experience. Mentors sharpen skills and knowledge, learn new things, and reward from the collaboration with the mentee (Clemson, 1987). In the ISU student/faculty mentoring program, faculty mentees improved their level of computer competency and confidence in using and integrating technology. As Ms. Davison and Dr. Clark stated that they were "a step further in technology" and that their "comfort level is going up" respectively (Ms. Davison, interview, 12/10/00; Dr. Clark, interview, 12/08/00). Student mentors indicated they refined their computer skills, became familiar with the department's context, gained professional knowledge, and established a professional relationship with faculty in the department (Jane, interview, 12/05/00; Mary, case report; Crystal, interview, 12/10/00). The mentoring relationship is a reciprocal relationship (MacArthur, 1995).

In addition to these characteristics that were cited in the literature, a positive attitude was also identified as a critical characteristic for effective mentoring relationships. A positive attitude can help faculty mentees and student mentors overcome technical problems and keep them motivated to learn more about technology. In the student/faculty mentoring program, faculty mentees were interested in using technology and they had a strong desire to learn about the uses of technology in their teaching. Therefore, they were prepared to spend time

and effort to learn about technology endure difficulties they might encounter during the mentoring experience (Dr. Clark, interview, 12/17/00). Positive attitudes help the faculty mentees persevere through difficulties that arise during the learning process (Giebelhaus, 1999).

Summary of characteristics of effective mentoring relationships

An ideal mentoring relationship would support the professional development of faculty mentees (Hall & Kinchington, 1995). There are many factors that contribute to the dynamics of personal relationships throughout the mentoring process. Time is the precondition for mentoring to occur (Kay, 1990). Mentors and mentees need time to establish trust, credibility and rapport in the mentoring relationship. Mutual trust, respect, understanding and empathy is another characteristic that is needed for effective mentoring relationships (MacArthur, 1995). In addition, good communication between mentors and mentees is critical for effective mentoring relationships. Without a shared understanding of the roles and the expectations of the mentoring relationship, mentors and mentees may develop misconceptions (Clemson, 1987). Another key characteristic for effective mentoring relationships is personal fit. Mentors and mentees who have similar interests, compatible personalities, and similar personal backgrounds tend to have a effective mentoring relationship. Mutual benefit ensures that both mentees and mentors are rewarded from participating in the mentoring relationship. Finally, a positive attitude helps the faculty mentees persevere through difficulties that arise during the learning process.

Roles of graduate student mentors and roles of faculty mentees

In the student/faculty mentoring program, both student mentors and faculty mentees have important roles in the relationship. The following is a brief discussion about the roles of student mentors and faculty mentees in the student/faculty mentoring relationships.

The roles of graduate student mentors

The mentor is the core of the mentoring relationships (Hall & Kingchington, 1995). Mentors' perceptions of the nature of their roles and purposes are crucial to the outcome of the mentoring relationship. Only when the nature of the mentor's roles has been explored and openly accepted can an honest relationship exist between the mentor and mentee. Understanding the role the mentor plays and its implications helps mentors gain mastery over that role (Cobb, Hensman, Jones, & Richards, 1995).

Because mentoring is a dynamic process, the mentors changed "roles frequently to effectively meet the needs of their proteges". (McArthur, 1995, p.53). The roles of student mentors gradually evolve and change. The graduate student mentors in the ISU student/faculty mentoring program changed their roles constantly to satisfy the needs of their faculty mentees. The student mentors become supporters, guides, sponsors, facilitators, collaborators, encouragers, counselors, and friends in the student/faculty mentoring model (Daloz, 1978; Huffman and Leak, 1986; Schein, 1978).

Frequently, the student mentors are tutors and coaches. As Anderson (1987) indicated, the roles of the mentor are to be a teacher, tutor, and role model. Student mentors responded to unique interests and needs of their faculty mentees, demonstrated computer skills, provided feedback and assisted faculty to gain desired skills. For example, Crystal taught Dr. Clark

Microsoft Excel and Web page design and helped Ms. Davison with Easy book (Crystal, interview, 12/10/00); Mary helped Dr. Johnson learn WebCT and helped Dr. Taylor with Web page development and iMovie digital editing (Dr. Taylor, interview, 12/17/00); and Jane taught Dr. Erickson how to use PowerPoint (Jane, student journal, 9/12/00). Student mentors assessed how they could assist faculty mentees, what they had mastered, and which skills needed reinforcement (Dr. Clark, interview, 12/15/00). All of the student mentors demonstrated their computer skills and suggested possible uses of technology in the mentee's courses. As Janas (1996) expressed mentors are the door openers for faculty mentees .

Student mentors are facilitators, sponsors, and supporters (Anderson & Shannon, 1987; Schein, 1978). They are the resource people for their faculty mentees, supporting faculty mentees as they learn technology. They are the "sources of information about and aid in obtaining resources." (Clemson, 1987). Clearly, student mentors in this study provided faculty mentees with desirable and necessary support by showing them how to repair and troubleshoot computers, load software, and locate needed hardware and software. When Ms. Davison wanted to use new software for her class project, Crystal became a facilitator as she located an appropriate piece of software and provided desired assistance to support her project (Ms. Davison, 12/19/00). Mary took "the next step" and sought help from the CTLT staff to answers Dr. Johnson's questions. She located information to facilitate Dr. Johnson's learning process (Dr. Johnson, interview, 12/18/00). Hence, mentors are there to empower their mentees, share their knowledge and resources, and help them to develop appropriate skills and independence (Hall & Kingchington, 1995).

Student mentors are counselors, advisors, good listeners, and guides for their mentees (Daloz, 1983; Anderson, 1988; Schein, 1978). Mentors are expected to draw from

accumulated experience, knowledge, and personal perspective and to offer guidance (Cobb, Hensman, Jones & Richards, 1995). They are good listeners, responding to their faculty mentees in a positive and favorable way. They are able to employ counseling skills and they are capable of empathy and emotional strength. In the ISU student/faculty mentoring program, student mentors listened to, probed, and provided suggestions to their faculty mentees. They were good listeners and responded to their faculty mentees in a positive and favorable way. Jane offered advice and helped Dr. Erickson to visualize his technology ideas for his class (Jane, interview, 12/19/00). Crystal acted like a consultant and suggested how Dr. Clark could use her technology project for her class (Dr. Clark, Interview, 12/15/00). Likewise, Mary helped Dr. Johnson visualize his course activity using WebCT (Mary, interview, 12/18/00). Student mentors became counselors who advised faculty mentees on how technology works and how it can be managed.

Beside the more traditional roles of mentors, the student mentors are learners as well. Unlike a traditional mentoring model where mentors usually have "absolute authority" in the mentoring relationships (Philips-Jones, 1982), the ISU student/faculty mentoring program was a collaborative model, in which faculty mentees and their student mentors shared knowledge, skills, and expertise with each other. Because technology field is constantly changing and evolving, no one knows or is expected to know everything (Brzycki, Yost & Dudt, 2001). Dr. Johnson remarked, " student mentors are buddy expert in technology, but not necessarily to know the usage of a specific software or have certain computer skills" (Dr. Johnson, interview, 12/18/00). As a result, student mentors and faculty mentees learned together, shared expertise and completed technology projects together. Dr. Johnson said, " We worked with it [WebCT] together. I can work from my background and she can work

from hers. We worked together to figure out the new uses of this technology." (Dr. Johnson, Interview, 12/18/00). Consequently, Mary felt that she "learned as much from them [Dr. Johnson & Dr. Taylor] as they were [learning] from me." Jane and Crystal also learned new computer programs and technical skills from their mentoring experience. Crystal praised herself to be "an expert in setting printing area" and now "learning Easybook" (Crystal, interview, 12/10/00). Jane was glad that she learned a lot with Dr. Erickson about PowerPoint. She said, " The only thing I knew about Powerpoint is to make a basic slide when I began my mentoring. Now I know how to put an animation, insert graphics, how to put slides together effective as learning and teaching tools" (Jane, interview, 12/05/00). This learners' role of student mentors makes the student/faculty mentoring model dynamically and mutually beneficial. Faculty mentees improved computer competency and student mentors were rewarded by sharpening and upgrading their own technical skills. Therefore, mentors and mentees are sharing, contributing, learning, and improving skills and expertise together in this kind of mentoring model (Beisser, 1997).

The roles of faculty mentees

In the ISU student/faculty mentoring program, faculty mentees were motivated learners and active participants. The faculty mentees had a strong desire to learn new skills and abilities and a desire to elevate existing skills and abilities (Giebelhaus, 1999). Usually, mentees strive to elevate their level of technical skills and professional expertise to gain a greater mastery of the job (Giebelhaus, 1999).

In the ISU student/faculty mentoring model, faculty mentees were responsible for taking the initiative to learn about technology. In this mentoring program, faculty were

required to identify learning goals and objectives. After identifying goals and objectives, faculty focused on learning about technology to enhance course activities. As Dr. Clark reflected, "My expectation in the mentoring program is to learn the skills of Webquest and to get comfortable with it so I can use it in my classroom and to be able to help my students a little bit if they don't understand it. In order to do it, I have to view myself as a learner, taking time, sitting with my computer, learning from my mentor, doing my homework, and practicing to make it work. "(Dr. Clark, interview, 12/15/00). Thus the mentees play roles of students in the mentoring (Clemson, 1987).

Summary of roles of mentors and mentees

Due to the dynamic nature of the mentoring process, the roles of mentors are evolving and changing (McArthur, 1995). Student mentors in the ISU student/faculty mentoring program became tutors, coaches, facilitators, and counselors. Moreover, student mentors were learners too. Since it was impossible for the student mentors to know everything, they learned with faculty mentees together about technology.

In addition, faculty mentees were active participants and learners throughout the mentoring experience. They entered the mentoring program with a strong desire to learn and ended with the ability to critically reflect and evaluate possible uses of technology in their courses.

How and why the mentoring assists faculty to use and integrate technology

The one-on-one mentoring approach appears to be a promising means to obtain professional development for technology infusion in teacher education program. It has emerged as a promising staff development approach to assist teacher education faculty who

are learning to use technology (Thompson & Reinhart, 1995). All faculty who participated in this research study responded positively about how mentoring assists them in using and integrating technology. They reported that mentoring was an ideal approach for them as they worked to increase their personal comfort level and computer competency. They indicated it was an excellent way for them use and integrate technology into their teaching.

The effectiveness of the ISU student/faculty mentoring program lies in the essential characteristics of the mentoring and the good support network of the mentoring program. In summary, faculty mentees and student mentors perceived that the ISU student/faculty mentoring model was effective because of: 1) the one-on-one individualized instruction; 2) the non-threatening technology learning environment; 3) the immediate access to just-in-time technical assistance; 4) continuously improve computer skills with multiple mentoring meeting sessions; 5) a nurturing technology learning community; 6) expanded mentoring activities beyond general computer skills; and 7) administrators encourage and support for faculty use of technology.

The ISU student/faculty mentoring produces one of the best learning situations. It is characterized by its individualized nature of instruction focused on the specific needs of the faculty mentees (Zachariades & Roberts, 1995). Faculty mentees learned at different rates and brought a myriad of experiences, needs, interests, backgrounds, and beliefs with them to the learning and using technology (Bahannon, 2001), this one-on-one model was helpful to adjust personal learning style and preferences and to cater to each faculty member's unique interests and needs. In the student/faculty mentoring program, student mentors helped faculty mentees work on authentic technology projects identified by faculty mentees, responding to the real need of the faculty mentees in their teaching and professional skills. They focus on

the needs of their faculty mentees and devise instruction to best fit the faculty mentees' computer skills, experiences, and styles. As Dr. Taylor stated, "I have pretty unique interests and needs in this area, so one-on-one mode will be really helpful. She spent some time with me, tried to assess what I want to do and how I wanted to do." (Dr. Taylor, interview, 12/17/00). The one-on-one interaction between student mentors and faculty mentees increases faculty technology use, which is similar to their needs and interest (Gonzales & Thompson, 1998)

Moreover, the student/faculty mentoring model created a non-threatening and friendly technology learning environment for the faculty mentees. First of all, mentoring relationship is an interpersonal and caring relationship (Gehrke, 1998). The relationship entails mutual personal involvement in which mentors and mentees feel trust, admiration, respect, appreciation, and even love for each other. A part of roles as mentors is to behave as tutor, facilitator, counselor, and friend of faculty mentees. Student mentors respect faculty mentees' professional knowledge and would never look down upon their computer skills and experience. Thus the caring and personal nature of mentoring relationship can foster a friendly atmosphere for faculty to learn about technology.

In addition, the one-on-one mentoring produced a comfortable and secure environment for the teacher education faculty, where they were not exposed to an intimidating and fearing situation with peer pressure. This non-threatening environment helped increase the comfort level of the faculty and they could concentrate on their leaning goals and objectives. Since faculty who feel comfortable with technology are more likely to integrate technology into their teaching, a non-threatening technology learning environment

is critical to increase the opportunities of faculty mentees to learn and integrate technology (Amburgey, 2001).

The one-on-one mentoring model provided immediate access to just-in-time technical support for faculty mentees. In other words, the availability of mentors in the mentoring program ensures faculty mentees to get desirable technical support. According to Kemp (2000), it must meet an immediate need of the trainee for training to be most effective. Faculty mentees in the mentoring got immediate feedback about their questions from the student mentor to their questions who is sitting right next to them. In addition, the mentoring meeting sessions are held every week, so faculty mentees realized their questions would be addressed in a timely manner. They could also call or email their student mentors at any time to get assistance (Dr. Erickson, interview, 12/10/00). Consequently, this immediate access to just-in-time support satisfies the needs among faculty mentees who want the support readily available. (Zbar, 1999). It is more helpful and desirable than one-time workshop in facilitating meaningful technology integration (Abate, 2000).

Multiple and regular mentoring meeting sessions helped faculty mentees improve computer skills. With the weekly mentoring, faculty mentees "forced" to set aside time to work on their technology projects. This helped faculty continually improve their computer skills and moved on with their technology agenda instead of keeping "*pushing technology back on their list.*" (Ms. Davison, interview, 12/17/00). Faculty mentees expressed that simply coming to their offices and checking their progress by student mentors helped them learn technology (Dr. Johnson, interveiw, 12/18/00; Dr. Erickson, interview, 12/10/00). This finding corresponds with the literature that faculty members need time to be set aside to learn and practice computer skills before they gain comfort level and computer competency

(Quick, 1999). One-shot workshop event is not enough for faculty members to gain mastery over computer skills and also think reflectively about how they can integrate technology into their teaching (Atkins & Vasu, 1998).

The ISU student/faculty mentoring model nurtured a friendly technology learning community. It built connections between faculty mentees, student mentors and the CTLT staff. Faculty mentees commented that they were left to learn technology on their own, there was a whole team of supporters and "friends" to help and support them (Ms. Davison, interview, 12/17/00). This type of environment is critical to keep faculty's interest and morale high as they continue to learn about technology and use technology. As Edward and Crawford (2000) indicated, an environment in which a nurturing, supportive atmosphere will aid teacher educators in developing a level of comfort with technology and slowly moving towards the appropriate and effective integration of technology within their classroom.

The student/faculty mentoring program provided the faculty mentees and their student mentors with opportunities to explore how the technology can be used in the faculty mentees' courses. Thus the mentoring experience not only covered basic skills training, but it involved dealing with educational conceptions and concrete designs of instructional activities for the faculty mentees. This maybe extremely helpful for teacher education faculty to use technology, who will be the role models for presenting the appropriate uses of technology in classrooms. Teacher education faculty need to learn how to use the technology, but more important, they need to understand how technology can improve their teaching and student learning (Smith & O'Bannon, 1999). The expanded mentoring activities helped teacher education faculty improve their understanding in the technology integration in their own

teaching, provide opportunities for them to try out their technology ideas, and to accumulate their experiences in incorporating technology into their teaching.

The administrative support at an organizational level is a critical factor for the success of a mentoring program (Cobb, Hensman, Jones & Richards, 1995). Administrative support must be present for faculty to use and integrate technology in teaching. In the ISU student/faculty mentoring program, faculty mentees were encouraged to join the mentoring program and supported by the department administrators with access to computers and assistance from student mentors (Ms. Davison, interview, 12/17/00). Without the recognition and support from administrative level, faculty may not be encouraged to put time and effort to try to integrate technology into their teaching (Cobb, Hensman, Jones & Richards, 1995)

In addition, the CTLT provides additional support for the mentoring program. It provides faculty mentees a good technology learning environment where they can use equipment and software and reserve computer labs. As a result, the CTLT ensures faculty a good resources and accessibility of hardware and software. Because inadequate or obsolete equipment and limited availability of equipment would block faculty from their usage of technology (Cuban, 1993), the CTLT acts an important in the student/faculty mentoring program to ensure the accessibility of hardware and software by faculty mentees. Along with the good accessibility of technology resources, the CTLT provides good personnel support to the student/faculty mentoring program. Student mentors and faculty mentees directed their questions to the technical experts in the center and department and received help to solve their technical problems. Jane commented, "I can't imagine what my mentoring experience would be if there's nobody in the center [CTLT] that can help me." (Jane,interview, 12/05/00).

The support from the department and CTLT created a supportive environment for learning technology. As Willis (1993) previously stated, major issues for faculty development are related to how to provide continuous administrative support (Willis, 1993).

Summary of how and why the mentoring assists faculty in using technology

The one-on-one mentoring shows promise to be an effective approach to assist faculty in technology integration. The effectiveness of the mentoring lies in the nature of the one-on-one mentoring and its supportive environment. The one-on-one mentoring provides individualized instruction, non-threatening environment, and immediate technical support for faculty mentees. It also facilitates the process of technology integration into faculty mentees' unique course design and development. On the other hand, a good administrative support from the department and the CTLT nurtures a friendly technology learning community to assist faculty mentees to improve their computer skills.

Recommendations for Future Mentoring Program

The purpose of this research study was to investigate how and why the ISU student/faculty mentoring program worked to assist teacher education faculty to use and integrate technology into their teaching. It investigated the characteristics of effective mentoring relationships, the roles of student mentors and faculty mentees, and the perspectives of student mentors and faculty mentees on the mentoring program. An analysis of the data provided information that will help inform future efforts in this area.

The first recommendation is to provide student mentors with an on-going mechanism to discuss and share the needs and concerns of their mentoring experience with each other.

Student mentors assumed many roles in the mentoring relationship. They need continual support and guidance so they can meet the needs of their mentees. For example, an experienced student mentor could be invited to lead a discussion with novice student mentors. These experienced mentors could share the "tips" and "pitfalls" they encountered in the mentoring relationship. In addition, an online discussion forum could be allocated for student mentors to exchange ideas about their experiences. By providing a mechanism for discussion and support, student mentors could be better equipped to provide effective mentoring experience for their faculty mentees.

A second recommendation is to improve the communication channel between faculty mentees and student mentors. Faculty mentees requested to see more appropriate uses and concrete examples of how technology can be used in teaching and learning. Since student mentors are there to assist faculty mentees while they use and integrate technology. Providing opportunities for faculty mentees to share what they are doing with each other in most cases will be very helpful to the department.

The final recommendation is to extend the time period of mentoring program longer and make it available for faculty each semester. Officially, the mentoring program is available to students and faculty every fall semester. However, faculty mentees may need a longer period of time to accomplish their goals and objectives. After the creation of the technology project, faculty mentees may need the technical support from student mentors when they try out in their classroom teaching. By extending the time of the mentoring program, faculty mentees could continue getting support. Potentially, the use and integration of technology by faculty might increase. These recommendations lead to ideas for further research in this area.

Recommendations for Future Research

The ISU student/faculty mentoring model lends itself to future research initiatives. One recommendation is to examine the impact of the mentoring program had on the teacher education program at ISU. What impact has the mentoring program had on the use of technology in ISU courses? Do faculty and preservice teachers use more technology in their courses as a result of participating the mentoring program? With more technology elements incorporated in courses, how will the entire teacher education program be influenced? Future research could examine those questions.

Another recommendation is to examine the effect of the mentoring over a longer period of time than just one semester. Because it is a long process for faculty members to learn about technology and to integration technology in their teaching (Spott & Bowman, 1993), it is appropriate to know about how and why the mentoring assists faculty over a longer time of period than a semester. Would findings from a mentoring program of a longer time be similar to those of this semester-long program? What new themes will emerge from a longer time period?

The third recommendation is to examine what impact the mentoring program had on the student mentors. Although the mentoring program is aimed at assisting faculty who want to use technology, student mentors must also be affected in some manner. Clearly, documentation from the interviews, student journals, and case reports indicated that mentoring program does impact student mentors. In addition to the short-term impact, what long-term impact does the mentoring program have on the student mentors? Future research could identify what student mentors gain from the mentoring program and how that impacts their work in the graduate program and their professional career.

Next, it is recommended that future research address perspectives and attitudes of faculty members who have had negative mentoring experiences or who haven't participated in the mentoring program. Because this research study included faculty had a relative positive mentoring experience, future research that provides information from a different perspective might reveal a more complete synopsis of the student/faculty mentoring program. These additional perspectives and insights could help meet the needs of more faculty and improve existing student/faculty mentoring programs.

Finally, it is recommended that the student/faculty mentoring model be extended to involve others in the program. Since not every teacher education college has a graduate program, using undergraduates as student mentors for faculty might be a practical approach to utilize technology expertise of the college. In addition, using K-12 inservice teachers as technology mentors for their colleagues maybe further researched as well.

In conclusion, this research investigated how and why the student/faculty mentoring program in the Department of Curriculum and Instruction at Iowa State University assists teacher education faculty with technology integration. The research explored characteristics of effective mentoring relationships, the roles of student mentors and faculty mentees in the student/faculty mentoring program, and the perspectives from the faculty mentees and student mentors about mentoring. Research results indicated that characteristics of effective mentoring relationships include: time, mutual trust and respect, mutual benefit, personal fit, communication, and positive attitude. In mentoring relationships, faculty mentees were active learners and student mentors were tutors, facilitators, counselors, and learners. From the perspectives of the faculty mentees and student mentors, the student/faculty mentoring program was effective because: individualized instruction met specific needs of faculty

mentees; the learning environment was non-threatening; the technical support was immediate and just-in-time; and administrative support was present, etc.

This research study deepened the understanding of how and why using student mentors is a promising strategy to assist teacher education faculty with technology use and integration. The results provided valuable information and experience about how to design an effective student/faculty mentoring program to assist teacher education faculty with technology integration. Teacher education programs interested in using such an approach should work toward making sure these characteristics are present and should clarify the roles of student mentors and faculty mentees to design an effective student/faculty mentoring model.

APPENDIX

Ethics and Consent Protocol for Faculty Members

Technology Mentoring Research Project: Consent Form

The purpose of this research is to investigate how and why the ISU graduate student-faculty members mentoring model help faculty learn about and integrate technology into their courses.

As a participant in the case study, you will be asked to meet with your mentor once a week for about one hour. At the end of the semester, an interview will be conducted with you to gather information about your mentoring experience and your perspectives on mentoring. The interview will last no longer than one hour. Real names will not be used during data collection, nor in the written research.

Please note that participation in this research is voluntary. Participants have the right to withdraw from the study at any time. Data will be returned to the participants upon request.

Please feel free to contact the following people if you have any questions about participating in this research:

Qian Li, Researcher 294-3486 (w) 572-4201(h)
Dr. Ann Thompson, Co-major professor, 294-5287
Dr. Denise Schmidt, Co-major professor, 294-9141

I **agree** to participate in the research. _____

I **disagree** to participate in the research_____

Signature of Participant_____ Date_____

Signature of Researcher_____Date_____

Ethics and Consent Protocol for Graduate Students

Technology Mentoring Research Project: Consent Form

The purpose of this research is to investigate how and why the ISU graduate student - faculty members mentoring model help faculty learn about and integrate technology into their courses.

As a participant in the case study, you will be asked to record thoughts and reflections in journals and final report, and to be interviewed. The information obtained from observation, student journals, and interviews will be used in the research.

You will get together with your mentee once a week for about one hour. At the end of the semester, interviews will be conducted with you to gather information about your mentoring experience and your perspectives on mentoring. Interviews will last no longer than one hour. Graduate student journals and a final report will also be collected at the end of the semester. Real names will not be used during data collection, nor in the written research.

Please note that participation in this the research is voluntary. Participants have the right to withdraw from the study at any time. Data will be returned to the participants upon request.

Please feel free to contact the following people if you have any questions about participating in this research:

Qian (Kathy) Li, Researcher 294-3486 (w) 572-4201(h)
Dr. Ann Thompson, Co-major professor, 294-5287
Dr. Denise Schmidt, Co-major professor, 294-9141

I **agree** to participate in the research. _____

I **disagree** to participate in the research_____

Signature of Participant_____ Date_____
Signature of Researcher _____Date_____

Interview Questions for Faculty Mentees

1. What have you achieved in the mentoring?

2. What was the most valuable part of the mentoring experience for you?

3. In your opinion, what characteristics are required for a successful mentoring relationship?

4. In your opinion, what is your expectation for your mentors and what is your own role in the mentoring?

5. Can you describe your mentor with some nouns?

6. How will you describe your relationship with your mentor?

7. Were you using computers in your teaching before the mentoring program? Did you require your students to use computers to complete assignments?

8. What suggestions do you have for improving the mentoring program?

Interview Questions for Graduate Student Mentors

1. What have your mentee(s) achieved in the mentoring?

2. How have you been benefited from the mentoring program?

3. Do you think mentoring is a good approach to help faculty in learning technology? why?

4. In your opinion, what characteristics are required for a successful mentoring relationship?

5. In your opinion, what are your roles and what are (is) your faculty mentee's roles?

6. How will you describe your relationship with your mentee?

7. What suggestions do you have for improving the program?

8. What didn't work?

Interview Questions for Department Chair and CTLT Associate Director

1. How did you come up with the idea of using graduate mentors to help faculty use of computers in their courses?

2. Why is the mentoring successful in helping faculty in integrating technology in their teaching?

3. How does the mentoring program impact the dept regarding faculty use of computer?

4. What characteristics are required for a successful mentoring program?

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