FACULTY LEARNING TO USE TECHNOLOGY IN THEIR TEACHING:
CASE STUDIES OF TWO INSTITUTIONS IN HIGHER EDUCATION

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CHAPTER I. INTRODUCTION

During the past decade there has been pressure on faculty in institutions of higher education to use technology in their teaching. There are many reasons for faculty to use technology in their teaching: to increase student learning (Fullerton, 1998; Sims and Schulman, 1999), to save time over the long term (Kulik & Kulik, 1991; Sawyer, 1992; McArthur and Lewis, 1996), to use technology already purchased by institutions (Herther, 1997), and to better prepare students to enter the information workforce (Fullerton, 1998). The pressure is being placed on faculty largely due to two major factors: increased competition among institutions of higher education and the explosion in technological advances over the past decade (Lacost, Seagren, and Stick, 1998; Madjidi, Hughes, Johnson, Cary, 1999; Sims and Schulman, 1999).

Competition has been generated by an increasing pressure placed on higher education to deliver higher quality teaching (Reese, 1994 and Levine, 1997) and by resource constraints, both human and fiscal (Sims and Schulman, 1999). These pressures come from a variety of sources: Congress, special interest groups, parents, students and university administrators (Menges, 1987; McNeil, 1988; U.S. House of Representatives, 1992; Reese, 1994). They are due, in part, to institutions of higher education encountering changing demographics such as more non-traditional students who demand better quality teaching (Reese, 1994; Baker & Gloster, 1994; Levine, 1997). Parents and students are more consumer conscious and look for value in their education.
Parents and students, as well as society in general, are more conscious of the quality of the education students receive during their journey through the halls of higher education. This consciousness concerning the quality of higher education, along with dwindling resources, has generated a sense of competition among colleges and universities. Administrators are spending considerable time and energy searching for ways to help their institutions develop a response to this competition.

One major potential influence on the quality of education is faculty (Astin, 1997). Levine (1997) noted, "the state is demanding greater accountability from higher education, and that burden is resting increasingly on the shoulders of faculty." As Reese (1994, p. 2) points out, "Higher quality teaching is one way institutions can impact enrollments and attrition. The pressures of a global information society demand higher quality teaching thus compelling fundamental changes from the practices of the past. Many administrators see technology as one of the responses that can lead to higher quality teaching."

The explosion in the use of technology in virtually every facet of society has created pressure on higher education to incorporate the use of computers, communication technologies, and other cutting edge techniques. Privateer (1999, p. 60) points out, "micro-information technologies are proving to be powerful forces in shaping the destiny of higher education." A few institutions have even gone so far as having a port by every pillow, that is, ensuring that each dorm room has computer connectivity for each student, and making ownership of a
computer an entrance requirement for incoming students (Upcraft and Terenzini, 1999).

While administrators struggle to infuse technology throughout their institutions, it will be for naught if faculty do not keep abreast of the emerging technologies and find ways to incorporate them into their teaching.

This study attempts to answer three important questions regarding the use of technology by faculty. First, how do faculty members in two institutions of higher education learn to use technology in their teaching? The study examines how faculty define what constitutes technological tools and how they use these tools in their teaching. Interviews were conducted to examine how and where faculty learn to use technology in their teaching.

Secondly, how are opportunities for learning technology meeting the needs of faculty members based on their learning preferences? Participants were given the Myers-Briggs Type Indicator to determine their learning style. They were interviewed to validate their reported learning style. They were also interviewed to gather their stories about what worked and what did not work for them in their quest to learn to use technology in their teaching.

Finally, why do faculty choose to use technology in their teaching? What part does the socialization process play in the willingness of faculty to learn to use technology? The study gathered information that explores why faculty learn the use of technology in their teaching and in particular the effect the socialization process has on the participants use of technology.
Technology

Turoff (1998, p.1) asserts that, “Traditionally, institutions of higher education had some security in what amounted to geographical monopolies corresponding to the physical campus location. The educational consumer is now becoming free from that constraint. This will probably mean the emergence of virtual organizations and serious survival concerns for those institutions and associated faculty that cannot adapt or compete in the new environment.” Institutions such as the University of Phoenix, Strayer University, the Western Governors University, and others present a threat to the traditional campus bound institution.

College students today have grown up with technology: computers, satellite communications, and distance learning (Upcraft and Terenzini, 1999). This has helped to create a large technology gap between the experiences of faculty and students. Faculty who can use technology in the classroom can help their students learn in their own environment. While faculty can also gain an advantage by learning to use technology in their offices, this study concentrated only on their use of technology in teaching.

Cuban (in Fullerton 1998, p. 67) describes instructional technology as "any device available to teacher for use in instructing students in a more efficient and stimulating manner than the sole use of the teacher's voice." In a broader aspect, as it relates to education, instructional technology is also described as a systematic way of designing, developing, and evaluating the total process of learning and teaching in terms of specific goals and objectives, based on
research in human learning and communication, and employing a combination of human and non-human resources (http://it.coe.uga.edu/program.htm). Seels and Richey (1994, p. 1) note, "Technologies that are available for classroom use include traditional media such as audiotapes, bulletin boards, posters, photographs, radio, slides, speaker phones, television, laser discs, and videotapes. Technologies gaining greater acceptance include CD-ROMS; distance education systems; integrated learning systems; internet web pages; and computer-based tutorials, drills, and simulations."

Many policy makers see technology as a major solution to many of the problems facing higher education. This is evidenced by the establishment of virtual universities. Officials from several western states have developed a virtual university that opened its "doors" in January 1998, as the Western Governors University. Young (1999, A31) reported, "The virtual university has two distinct missions. One is to provide a central web site that highlights the distance-learning opportunities already offered at participating colleges and universities. The other mission of W.G.U. is both more unusual and less understood, especially within academe. Western Governors University wants to help people get college degrees based on what they already know, or what they teach themselves, or what they learn by any method they choose." Blumenstyk (1998, p. A21) notes, "They also still believe that the 'virtual university,' which will use technology to deliver courses, can help rein in the costs of educating ever larger numbers of students." This same sentiment is echoed by Sims and Schulman (1999, p. 54) who stated, "The Florida State University system expects online
programs to save about 40% of the cost of in-class programs." Although there are only a few completely virtual universities, Herther (1997, p. 63) reported, "over 150 accredited institutions offer entire bachelor's degree programs to students who rarely, if ever, visit campus." Floyd (1998, p. A25) states, "New technology can offer students significant learning opportunities, but only if their professors know how to use it effectively."

The support for the use of technology is also evidenced by the amount of funding available for those willing to implement the use of technology in their institutions. Olsen (1999, p. A23) reported, "The Pew Learning and Technology Program will award about 10 grants a year for three years to U.S. colleges and universities for using computer and network technologies to reshape their academic programs. The grants will be about $200,000 each," and Carr (2000, p. A56) reported, "Lehigh officials announced that the university had received a $670,000 grant from the Andrew W. Mellon Foundation to create a series of online courses for Lehigh students and high-school seniors who have been accepted for early admission." While some of these grants are not large amounts of money they can certainly help institutions build and maintain their information technology infrastructure. There are larger sums available that would greatly aid any institution willing to make the commitment to study high end computing and recruit students to enter the information technology field. Carnevale (16 Feb., 2000) noted, "The U.S. House of Representatives passed a bill Tuesday by voice vote that would authorize Congress to spend $6.9-billion over five years on basic
information-technology research. The bill would nearly double the federal government’s spending on information-technology research by 2004.”

Weimer (1990, p. 117) notes, “As faculty work with students to foster a commitment to learning and a recognition that formal education begins (not ends) the quest for knowledge, faculty members themselves must heed the lessons they are teaching. Most are by nature inquisitive, curious, independent, and lifelong learners when it comes to continuing their own education in their respective disciplines, but few ‘study’ teaching with the same fervor.” To learn how to best use technology in their classrooms and their professional lives faculty now have to become students.

This is no small feat as there are several factors that make it difficult for faculty to learn new techniques and technologies. They must first have the desire to want to make teaching a priority. However, the intensity of this desire can be limited, or enhanced, by the support or lack of support for teaching that they experience in their first months in an institution. The support they receive is dependent upon the mission of the institution. While most institutions will profess that they strive to excel in the three academic missions of teaching, research, and service there is usually a culture that supports one over the others. During a study on academic values and faculty rewards Fairweather (1993) discovered that faculty research was positively related to promotion and salary while the more time faculty spend on teaching and instruction the lower the pay. Thus, enculturation into an institution of higher learning, the process of socialization, can have a great impact on how strongly faculty members feel supported in their
teaching roles and how strong their desire is to learn new strategies such as using technology for teaching.

Turoff (1998, p. 11) states, "The key to the future is the incorporation of technology for group communications into regular classes and movement of all university student services on to the network." One of the keys to this incorporation of technology is faculty. In order to teach today's students in their own environment, faculty must learn to use technology in their classrooms as well as in other aspects of their work. While some faculty have begun this process there is a need to reform the way instruction of students is generally viewed, that is that teaching is synonymous with telling (Svinicki, 1990).

Socialization

A study of how faculty learn to use technology must also take into consideration why they learn to use technology. While there may be numerous incentives for either learning or not learning to use technology in one's teaching, a strong underlying factor that must be considered when studying how faculty in higher education learn to use technology in their teaching is the part played by the socialization process. Schein (1968, p. 43) states, "Socialization is cultural learning which takes place in a social context. From the perspective of individuals within an organization, organizational socialization is the process by which the newcomer learns what is important in the organization, including its norms and values, and the behaviors expected of members of the organization." Reynolds (1992, p. 637) describes socialization as, "the process by which an individual
acquires the norms, values, and behaviors of the group. In other words, socialization is the development of an initial world view." This process has a strong influence on how new faculty members view their various roles in their institution. Reynolds (1992, p. 638) also notes, new faculty "are passing through a critical period for learning the job and forming attitudes about it, most notably, commitment to the academic way of life; moving from liberal, idealistic perspectives to more conventional bureaucratic ones; and strongly influenced by significant others (peers, superiors) and highly regard their feedback and expectations."

There are three basic work roles that must be filled by faculty; Boyer (1990) defines them as research, service, and instruction. The time spent in each of these roles is driven by the focus of the institution, the academic department, and the interest of the individual faculty member. Of the three major roles of faculty, Corcoran and Clark (1984) found that teaching proved to be both the strongest attractor to the profession and gave the best sense of fit with an academic career; that is, individuals saw themselves making the transition to faculty based on the role as teacher. However, the support of the institution for teaching does not apply only to junior faculty. As LaCelle-Peterson and Finkelstein (1993, p. 287) point out, "senior faculty members' success as teachers depends on the support of their institution."

Each role plays an important part in the overall life of a faculty member. Research is conducted and published to further the knowledge in the field. Service allows faculty members to play key roles in the life of the university, as
well as in local, and professional communities. Instruction allows the faculty member to share the in-depth knowledge they possess in their field to students. Each of these areas is intertwined and while they can support each other, they often compete for the time and energy of faculty.

While each of these roles is important, the role that seems to be the most common denominator across all institutional types is instruction. While research is carried out by many faculty at major research universities and to a somewhat lesser extent in other types of institutions, and service to institutions and the community is provided by most faculty, virtually all faculty, at all institutions of higher learning provide instruction. Several leaders have called for more emphasis on teaching as noted by Boyer (1990, p. 1) when he reported that Donald Kennedy, President of Stanford University, called for faculty to attend more to teaching by suggesting more contact between faculty and students. "It is time for us to reaffirm that education – that is, teaching in all its forms – is the primary task of higher education."

However, no matter how much support and how much the desire of new faculty to attend to teaching, the intensity of the desire can be limited, or enhanced, by the support or lack of support for teaching that faculty experience in their first months in an institution. The support for teaching is related to the institutional type and a major determinant in the cases selected for this study. The socialization process can have a great impact on how strongly teachers feel supported in their teaching roles and how strong their desire is to learn new strategies for teaching.
Corcoran and Clark (1984) believe socialization evolves over a lifetime and they describe three stages of socialization: 1) anticipatory socialization - a pre-entry stage; 2) occupational entry and induction – which includes formal schooling and learning on the job; and 3) role continuance – roles are internalized with a degree of commitment.

The time of anticipatory socialization includes gaining a sense of how one would fit into the profession. The entry and induction stage is marked by graduate education, the transmitting of skills and knowledge, guiding by advisors, and an attempt to formulate a view of what is important. New faculty members discern what is important at all levels of the organization. The department chair plays one of the most important roles in this process. According to Whitt (1991), a department chair may incorrectly assume that a new faculty member already knows everything they need to be effective and unintentionally play a negative role in the adjustment of the new faculty member. The current cadre of faculty also make a deep impression on a new faculty member by their actions as much as their words. For example, if a new faculty member observes little or no use of technology in the instruction of peers, they may assume that use of technology is not supported or possibly even discouraged.

The role continuance stage is marked by the internalizing of roles, making a commitment to these roles, and a sense of satisfaction. However, for actions to become habits, others must support them. It is difficult for new faculty to be innovative in their use of technology if peers and administrators do not support its use.
Teaching techniques have not changed drastically for many decades. However, Batson and Bass (1996, p. 42) observe, "Many teachers have tried for a long time to reduce their role as the center of all activity and to become facilitators more than presenters. Thus, not coincidentally, teachers in many fields are experimenting with ways for information technology to accelerate these pedagogical trends." This observation was echoed by a group of leaders in technology in education (McNeil, 1988, p. 2), when they surmised, "The educational system is undergoing technological changes that challenge current assumptions about how people are taught, when they are taught, where they are taught, and the length of time they need to master particular subject matter." Thus the use of technology is changing the way faculty fulfill their teaching role, as well as their research and service roles.

Svinicki (1990, p. 1) noted, "It has been suggested (Cross, 1989) that the greatest educational reform will come not through the sweeping changes of large, institutionally mandated programs but through the small, day-to-day improvements that faculty members make in their own courses. The faculty member is the first line of revolution in teaching; without their cooperation, no change is possible, with it, no challenge is impossible." These small day-to-day improvements come in many forms; self-study, faculty development workshops, and new faculty mentoring, to name a few.

To help faculty members to learn to use technology in their teaching, institutions must provide a variety of learning opportunities to assist faculty in incorporating new technological tools into their teaching. They must also insure
that the outcome of these opportunities are positive and result in faculty using the technological tools available to improve the quality of their teaching. One way to provide insurance is to develop these opportunities with the faculty members’ learning habits and styles in mind.

Learning Theory and Learning Preferences

While the focus of higher education is on undergraduate and graduate education, the focus of this study is on faculty education, in particular, how faculty in higher education learn to use technology in their teaching. To begin to understand how faculty learn it is crucial that learning preferences be viewed as a key piece to the puzzle.

As Reese (1994, p. 3) points out, “University and college faculty on the whole, have received little formal education or training in any of the following areas important to teaching: (a) adult learning theories; (b) alternative strategies; (c) communication or presentation techniques such as using voice, body language, and visual aids; or (d) the modern technology as teaching tools.” Since learning is the key to virtually all activity in institutions of higher education, it is important to look at some of the theory about learning and how it affects the way faculty might learn to use technology.

“Learning can be thought of as a process by which behavior changes as a result of experiences” (Maples and Webster, 1980 as quoted in Merriam and Caffarella, 1999, p. 250). Merriam and Caffarella (1999) describe at least five different orientations to learning: behaviorist, cognitive, humanist, social learning,
and constructivism. They also note there are numerous learning theories described by several authors (Hilgard and Bower, 1966; Reese and Overton, 1970) that all break down to two major schools of thought about learning theory. One group believes learning processes do not change and, “learning is learning at any age” (Butler, 1989). The second group believes that adults learn very differently than children. Butler (1989) provides several common descriptors of adults as learners. First, age does not reduce a person’s ability to learn but may reduce the speed at which learning takes place. In addition, because of time elapsed since earlier learning experiences, adults may underestimate their own abilities to learn and/or may need additional time to adjust to new learning conditions. Second, the adult learner is a person with a sense of self, bringing all previous life experiences, both personal and professional, to bear on new learning. Past experiences affect what the learner learns and are the foundation for current learning. Learning takes place best when new learnings are demonstrably tied to or built upon past experiences. Third, adult learners exist in situations separate from the learning context. They are motivated to learn by changes in their situations and learn best when new learnings apply in practical ways and/or are relevant to the changes in their situations. Fourth, the adult learner controls what is learned, selecting new information and/or deciding how to use it, and this takes place at both the conscious and unconscious levels. Fifth, adults tend to be problem-centered rather than subject-centered learners and learn better through practical applications of what they have learned. Sixth, adult learners must be treated as adults and respected as self-directed persons.
They learn best in non-threatening environments of trust and mutual respect. Seventh, the optimum role of the adult learner in the learning situation is of a self-directed, self-motivated manager of personal learning who collaborates as an active participant in the learning process and takes responsibility for learning. Adults learn in a variety of ways and there is no one right method of learning. Finally, continued learning depends on achieving satisfaction, especially in the sense of making progress toward learning goals that reflect the learner's own goals.

By understanding the way adults learn, faculty can plan for activities that will aid learners' understanding and use of the information presented. This is only a beginning, as faculty also need to understand the background of their students. It is incumbent on instructors to understand the learning preferences of their students and even more important for them to understand their own learning preferences as they tend to teach in the same style as they learn.

Any attempt to study how faculty members learn to use technology must consider learning and learning preferences. Learning is an extremely important part of being a faculty member, whether it is learning for oneself or helping others to learn. Brookfield (1986, p.1) states, "When adults teach and learn in one another's company, they find themselves engaging in a challenging, passionate, and creative activity. The acts of teaching and learning – and the creation and alteration of our beliefs, values, actions, relationships, and social forms that result from this – are ways in which we realize our humanity."
There are a variety of models and instruments used to assess and describe learning preferences; Kolb's Learning preferences, the Myers-Briggs Type Indicator, Guglielmino and Guglielmino's Self-Directed Learning Readiness Scale, and Price, Dunn and Dunn's Productivity Environmental Preference Survey to name a few. For this study I chose to use the Myers-Briggs Type Indicator (MBTI) to determine and describe the learning preferences of participating faculty. This choice was driven by my knowledge and experience in using the instrument and the value of available descriptive data about the different preference afforded by the MBTI types. Schroeder (1993, p.22) notes, "The MBTI has been a very useful tool in contributing to our understanding of the role of individual differences in the learning process."

By identifying the various learning preferences of the faculty involved in this study others may be able to identify learning techniques that may work for them as they learn to use technology. This information may also be useful for faculty development units and other organizations in the academy that strive to assist faculty in providing the best possible instruction to students. New methods for teaching and learning to use technology need to be passed on to others. This study attempts to gather this information and make it available to those who wish to increase or improve their use of technology in their role as faculty.

Summary

There is intense pressure on institutions of higher education to deliver higher quality teaching. Leaders, both political and academic, view technology as
a means to achieve this end and have invested considerable funds in purchasing new technology. This is evidenced by the establishment of several virtual universities. However, the burden to find ways to implement the use of this technology in to the classroom falls on faculty.

This study attempts to answer three important questions that affect how faculty implement the use of technology in the classroom. First, how do faculty members in two institutions learn to use technology in their teaching? Second, how are opportunities for learning technology meeting the needs of faculty members based on their learning preferences? Finally, what part does the socialization process play in the willingness of faculty to learn and use technology in their teaching?

Implementing the use of technology in teaching will require faculty to concentrate on the teaching role more than the research or service roles. The time spent in each of these roles is driven by the focus of the institution and is supported by the socialization process. This process has a strong influence on how faculty view their various roles within their own institution. To help faculty members to learn to use technology in their teaching, institutions must provide a variety of learning opportunities to assist them in incorporating new technological tools into their teaching.

To maximize the ability of faculty to acquire the necessary knowledge, these opportunities must provide for the variety of learning preferences held by faculty participants. This study seeks to share the experiences and stories of
faculty members in two institutions as they sought to learn new technology and apply it in their teaching.
CHAPTER II. LITERATURE REVIEW

This chapter begins with a discussion of instructional technology, what constitutes technology in instruction, its role in higher education, and how faculty learn to use it. Second, the chapter talks about why faculty learn to use technology, the factors that promote or inhibit faculty learning to use technological tools and, in particular, the role of socialization in affecting the use of technology in teaching. The chapter ends with a discussion about learning theory and learning preferences and how they relate to how faculty in higher education learn to use technology in their teaching.

The number of research studies looking at the use of technology has grown steadily over the past few years as more and more schools and institutions look to technology to meet educational challenges. However, much of the research on technology has been in the K-12 arena.

Technology

Privateer (1999, p.62) notes, "Higher education is at a crossroads – one path continuing an essentially administrative approach to the management of learning, and a second, promising meaningful change by redesigning instructional technology in terms of being both a strategic and cognitive tool." Levine (1997) observed, "technology is available with the capacity to fundamentally change the nature of college instruction." To take full advantage of this technology, faculty must learn to use these tools in their instruction. Very little research has been conducted about the way faculty in higher education use
technology in their professional lives and specifically at the way faculty learn to use technology in their teaching. This is confirmed when noting that by 1988 there had been only one issue in the New Directions for Teaching and Learning series that had educational technology as a central theme (Knapper in Young and Eble, 1988). More research is being conducted on particular technologies as in Backer and Yabu's (1994) work on Hypermedia as an instructional resource. However, very little has been published about how faculty members actually learn to use these technologies in their professional lives, especially in their teaching.

Several scholars have made the point that faculty need to make more use of technology in the classroom (Marsick, 1988; Young and Eble, 1988; Halpern, 1994). Knowles (in Hayes, 1989, p.3) has asserted, "The behavior of the teacher probably influences the character of the learning climate more than any other single factor." This gives great impetus for faculty to learn to use the tools being used by their students, i.e., technology.

Much of the literature concerning use of technology in higher education is about the possibilities for use. Fiorini (1989, p. 41-43) describes several types of technology currently used in higher education, "The versatility of video and computer technologies makes them popular choices for use in adult education."

She also notes, "teachers can use a microcomputer in conjunction with compact disc or video laser disc technology to offer students new dimensions of interactive instruction." Fiorini (1989) goes on to describe several main types of technology available to teachers: Computer-Assisted Interactive Video (CAIV),
Computer Conferencing, and video. Cartwright (1993) notes, "The computer, especially one connected to an information network, is a dynamic multi-purpose device that takes on multiple-roles as needed; including communicating, calculating, displaying, searching, stimulating, and modeling.

Juliano (1997, pp. 2-4) describes the use of technology in the classroom as "power pedagogy." He goes on to give several examples of learning activities that are made possible with the application of technology: "private newsgroups for each class; electronic-mail collaboration between students, between students and faculty, and between faculty; electronic mail submission and critique of work; video- and/or teleconferencing; internet-based lab work and research projects."

Virtually all of the existing literature dealing with faculty use of technology is in the realm of staff development. This appears to be virtually the sole venue for faculty in higher education to learn the use of new technology. Nelsen and Siegel (1980, p. 3) sum up staff development efforts saying, "At their best, faculty development efforts have contributed to increasing the opportunities for faculty members to grow in their unique, even idiosyncratic ways. They have held out for faculty real challenges to utilize and apply their skills to campus needs. At their worst, faculty development programs have attempted to force faculty into specific new roles defined too narrowly by others." This is echoed by Marsick (1988, p. 17) who noted, "Trainers often judge themselves, and may be judged, by the number of courses they conduct, the number of trainees, or the number of satisfied users, as indicated by highly positive workshop evaluations. By contrast, employees benefit most from training when it meets a current need, not a training
schedule." She further states, "...discussions of effective staff training and development are confined to the best ways to deliver formal courses.
Unfortunately, the delivery mentality may make trainers more efficient at doing what they know best than at meeting learners' needs" (p. 4).

The use of technology in teaching is certainly not new as pointed out by Knapper (in Young and Eble, 1988, p. 32), "Classroom teaching has always made use of technological aids - sometimes developed especially for educational settings (such as black-board and overhead projector), but more commonly adapting technologies that were originally devised for other purposes." However, as technologies have become available at an ever increasing pace, faculty members have had a difficult time keeping pace.

Topp, Mortenson, and Grandgenett (1995, p. 1) identify three key elements necessary for increased use of technology. "First, the equipment must be available for both faculty and student use. The second element involved in faculty empowerment with technology involves faculty training. Because of the perceived stature of the higher education faculty member, it is often assumed that they need little training in the use of something new, in this case computers. Third, the expectation that faculty will actively include technology in their teaching and research is the third element related to increased technology use."

Byron (1995, p. 2) pointed out, "Faculty believe the use of technology can add value to the total educational experience and be significantly beneficial to learning. However...faculty expressed frustration at not being able to fully realize the potential of instructional technology due to a lack of support (both technical
and administrative).” During their socialization the effective use of technology is often not supported.

Socialization

There are numerous factors at play in determining how a faculty member spends their time and energy: the type of institution, which drives the focus on teaching, research, or service; interests of the faculty members; and the preferences of other faculty members. A driving force in determining how faculty spend their time is the socialization process.

In the early years of an academic appointment, new faculty members must learn what their colleagues and students expect of them, acquire facility in dealing with organizational structures and processes, and grasp the history and traditions of their new institutional setting (Whitt, 1991). This is quite a task for new faculty and it may seem a daunting one to many. According to Hamilton (1996, p. 1), “A common metaphor throughout much of this research is that new faculty are ‘thrown to the wolves’ with little consideration that the completion of a Ph.D. does not necessarily assure that they have the necessary confidence and skills in the classroom to be effective instructors.” This was echoed by Boice (1991, p. 150), “Unfortunately, the subjects in this study experienced no collegial support, especially regarding teaching. This inattention to teaching surprised new faculty since all expressed a desire for concrete help, such as using syllabi and tests from courses that preceded theirs.”
Although it is not the purpose of this study to debate the pros and cons regarding the relative importance of various faculty roles, one underlying factor, which must be discussed to put everything in context, is the tension between research, service, and teaching.

The age-old debate of what is the most important role of faculty in higher education has raged for decades. Although the battles vary depending upon the type of institution in which faculty work, the basic struggle is the same. Faculty members continue to have great demands placed upon their limited time. Should they be spending most of their time in research activities, service activities, or teaching activities? All of these demands present obstacles for each and every faculty member. Halpern (1994, p.45) notes, “Of the many obstacles to moving teaching ahead, the anti-teaching prejudice that pervades higher education is the most pernicious. This prejudice is particularly deleterious because it confers second-class citizenship on professors who work ‘too hard’ on their teaching. University professors are rewarded for visible and easily quantifiable activities such as publishing, making presentations at scholarly conferences and societies, receiving grants, consulting with private industry, or engaging in other activities that bring money into our cash-strapped campuses. "Gaff (in Teather, 1979, pp. 234-235) points out, “Teaching is much neglected by academic tradition. In most schools this neglect is not due to the lack of interest in teaching among individual faculty members. Rather, the neglect can be traced to factors pervading the general academic culture, such as the lack of preparation for teaching roles during graduate education, the relative absence of in-service education which is
found in other professions, and the paucity of academic policies (e.g., promotion, salary increases or tenure) which provide incentives and support for effective teaching."

Even if teaching is given a strong emphasis, the methods used by faculty in higher education are often ineffective. "Many respected authors such as Dewey, Piaget, and Vygotsky have noted that most of the collaborative learning vines are deeply rooted in experiential learning and student-centered instruction. They all struggled to understand how teachers can help learners deal with the tension between what students already know (their prior experience) and what is newly presented to them. They stressed how critical it is for the teacher not simply to transmit content but also to create a context where learners can discover on their own and successfully reconstruct their understanding of the world around them." (in Svinicki, 1990, p. 21). Collaboration is also applauded by Chickering and Ehrmann (1996, p. 617-618) as a strategy for implementing two of their seven principles, "Frequent student-faculty contact in and out of class is a most important factor in student motivation and involvement. Faculty concern helps students get through rough times and keep on working." They also state, "Learning is enhanced when it is more like a team effort than a solo race. Good learning like good work is collaborative and social, not competitive and isolated. Working with others often increases involvement in learning. Sharing one's ideas and responding to others' improves thinking and deepens understanding."

Chickering and Ehrmann (1996) also suggest technology can increase opportunities for these two activities.
However, it is common knowledge that teaching has always been equated with telling (Svinicki, 1990). One need only note the root from which professor is derived, profess. Faculty members in higher education have constantly searched for ways to improve methods of teaching. However Svinicki (1990, p. 7) points out, “When you release yourself from the responsibility of providing all the instruction in a class and accept that students can learn a lot on their own or from their peers in a well-designed course, you will be amazed at what a different face that gives to the classroom.”

A critical piece to the resurrection of the teaching role and to acceptance of the use of technology lies within each institution that is within the culture of the organization. Tierney and Bensimon (1996, p. 15) note, "The culture of an organization is a contested area in which individuals and groups struggle over the definition of knowledge and what it means to be a knowledgeable individual. As opposed to a static concept that equates culture with the taxonomic parts of an institution, the idea advanced here is that culture is the product of the social relations of the participants within an organization. Ideologies of colleges and universities, then, both reflect and reform the beliefs of the society in which these institutions exist. Culture is a series of contested areas, discourses, and relations of power pertaining to the nature of reality."

New faculty are particularly subject to the socialization process and the entry into an institution can permanently forge their concepts of instruction. Tierney and Bensimon (1996, p. 36) ask, "Is the structure in place socializing individuals to particular norms, or is it promoting options and alternatives for
transformative praxis?” The answer is extremely important when considering whether faculty ponder how important teaching is and whether they should look to the use of technology to make their teaching more effective.

Rosch and Reich (1995, p.2) developed an enculturation model of organizational entry, which had four stages. These stages include, “(1) the pre-arrival stage, dealing primarily with an individual’s predispositions prior to entering a new setting; (2) the encounter stage, dealing with an individual’s preconceptions formed during recruitment and selection; (3) the adaptation stage, dealing with the external socialization processes and the initiate’s identification with the organization; and (4) the commitment stage, dealing with the extent to which the norms and values of the local culture are assimilated by new organization members.” They found each of the new faculty members taking part in the study had the most difficult time during the adaptation stage due to the preconception formed before beginning their new faculty positions. The study showed, “the usefulness of the formal opportunities departments employed to socialize new members were suspect in addressing new faculty learning needs” (p. 20).

This four-stage model matches the three-stage model posited by Corcoran and Clark (1984, p. 134-135) which they define as (1) the anticipatory socialization stage, “the process by which persons choose occupations and are recruited to them, gradually taking on the values of the group to which they aspire;” (2) occupational entry and induction stage, "formal schooling, preparation, or training for the occupation, and/or mediated entry, and/or learning
while doing;" and (3) role continuance stage, "The new member has internalized role specifications, a sense of satisfaction with work, and a high degree of job involvement and commitment."

Faculty in search of ways to provide more variety in their teaching may find technology can offer today's undergraduates a medium with which they are familiar. Faculty may use technology as a bridge over which they can guide students. In order to learn how to use this bridge of technology, faculty must again become students, adult learners.

Learning Theory and Learning Preferences

Noted authors (Knowles, 1970, 1975, 1978; Kidd, 1973; Knox, 1977; Cross, 1981; Brookfield, 1986) agree that individual adults have different learning preferences; in all probability they pass through a number of developmental stages and some aspects of their performance may change with age. As Daines and Graham (1993, p. 1) note, "For many people 'learning through experience,' whereby they solve problems, acquire skills and develop understanding and knowledge in their own manner, is likely to be the preferred way of doing things. It follows that they are less likely to respond effectively to the formal teaching methods they endured at school."

The importance of four assumptions of adult learners noted by Knowles (1970) and Brookfield (1986) cannot be overstated when considering how to help faculty in higher education learn to use technology. They noted the change in self-concept from a child learner to an adult learner, the importance of
experience in the learning situation, the change of orientation to a life/work-centered orientation, and a change in the readiness to learn. It is imperative for those attempting to help faculty learn to use technology to make note of these assumptions when developing strategies.

Brookfield (1986, pp. 9-11) suggests six principles of effective practice for adult learning based on these assumptions. First, "Participation in learning is voluntary." Adults learn because they want to learn not because they are told to learn. Second, "effective practice is characterized by a respect among participants for each others' self-worth." Effective teachers of adults respect the experience of their students, each person has value to add to the learning experience. Third, "facilitation is collaborative." Adults need to feel they are part of the learning, not the object of the learning. Fourth, "praxis is placed at the heart of effective facilitation." Adults need the opportunities to practice the skills they have learned and discuss the knowledge obtained to make it fit for them. Fifth, "facilitation aims to foster in adults a spirit of critical reflection." True learning is more effective when adults can challenge their own ideas and beliefs, their ways of doing. Lastly, "the aim of facilitation is the nurturing of self-directed, empowered adults." Adults are naturally self-directed, effective facilitation will guide them to the realization that are capable of using the new knowledge or skill in ways that best suit themselves. This study will view these assumptions and principles in the context of how they are used in the various settings in which faculty in institutions of higher education learn to use technology.
While the Brookfield's principles can be broadly attributed to virtually all adults, there are a variety of ways each adult will relate to these principles based on their learning preferences.

Brownfield (1993, p. 6) states, "The study of learning preferences is a relatively new field." Kolbeek (In Cooper, 1991. p. 699) defines learning style as "a person's preferred approach to information processing, idea formation, and decision making: the attitudes and interests that influence what is attended to in a learning situation and a disposition to seek learning environments compatible with these personal profiles or types."

Part of the reluctance to study learning preferences may lie with problems noted by Rule and Grippin (1988, p. 3), "Instruments in current use by practitioners (researchers, teachers, counselors, and administrators) to provide guidance to adult learners and/or research phenomena of the adult learner pose problems. The problems include instrument development, reliability, and validity, therefore affecting the quality of both research results and guidance alike.

The author is familiar with Kolb's Learning Style Inventory and the Myers-Briggs Type Indicator and consideration was given to using one of these two instruments during the study.

In 1976 David Kolb, a cognitive theorist, initially developed what he called a Learning Style Inventory to describe the ways people learn and how they deal with ideas and situations (Tendy and Geiser, 1995, p. 6). The inventory is a twelve-item questionnaire on which the respondent ranks four words. Kolb's Learning Style Inventory delineates three stages of life: acquisition, specialization
and integration. Development of learning preferences is formed using four bipolar learning modes: concrete experience, a focus on being involved in experiences and dealing with immediate human situations in a personal way. These people are good at relating to others, are intuitive decision makers; reflective observer, like to look at things from different perspectives and appreciate different points of view; abstract conceptualization, uses logic, ideas, and concepts. Building general theories as opposed to intuitively understanding unique, specific areas; and active experimentation, actively influencing people and changing situations. Practical applications as opposed to reflective understanding. Styles are identified as Converger, Diverger, Assimilator, and Accommodator (Rule and Grippin, 1988, p. 3-4).

Beginning in 1942, the Myers-Briggs Type Inventory was developed over a period of years by Katherine Briggs and her daughter Isabel Briggs Myers with the aim of putting the theories of Carl Jung into practical use. Brownfield (1993, p. 5) states, "Some advantages of the MBTI are that it provides personal insight in a positive constructive way; it is almost completely self-administering; it has no time limits; it has several forms to accommodate various purposes; and the results are easy to interpret and understand."

While the MBTI has proven valuable in many uses, its use in education has been extensive. The instrument helps students understand their various learning preferences and through analysis and explanation of each type, a student can come to know how he or she understands material most effectively. The MBTI can also assist faculty by predicting what kinds of learning
environments, tools, and behaviors hinder or encourage learning for a particular student (Provost and Anchors, 1987). The MBTI can also help a faculty member understand their learning style, and since an instructor tends to teach toward their own learning style, it can help them understand their teaching style.

The MBTI was chosen for use based on several evaluations and comparisons (Rule and Grippin, 1988; Tendy and Geiser, 1995; Brownfield, 1993). Rule and Grippin (1988, pp. 4-5) note, "The internal reliability of the (Kolb) LSI is problematic" and, "The validity evidence offered...is not strong." The reliability of the MBTI was much stronger according to Rule and Grippin (1988, p. 9), "Reported internal consistency of the continuous scores using split-half with Spearman-Brown correction, for the preference indices range from the low to mid 80's." The validity faired similarly, "Other validity data is also, in general, supportive" (p. 10). Their assessment of the two instruments favored the MBTI as attested by their findings "...given the large amount of research data which finds support for the MBTI's reliability and validity, use of MBTI scores appears appropriate with awareness of conflicting research findings" (p. 11).

The MBTI helps individuals discover their preferences in four different areas; two functions called Perception and Judgment, and two attitudes referring to orientation of energy and orientation to the external world. Myers, et al (1998, p.4) note, "Personality types result from interactions among the four MBTI domains of mental functioning: opposite ways of perceiving, opposite ways of judging, opposite attitudes in which preferred perception and preferred judgment are typically used, and opposite ways of relating to the world."

Interactions among the four preference dichotomies produce 16 different types. Myers, et al (1998, 5) propose, "There are specific dynamic relationships among the four preferences...that lead to the descriptions and characteristics of the 16 personality types. Further, although the four dichotomies identified by the MBTI are psychometrically independent of each other, the dynamic characteristics of each type are not reflected in a simple summation of an individual's four preferences."

The dichotomies are reflected in the following description from Myers, et al (1998, p. 6):

Extraversion or Introversion (E-I): The E-I dichotomy is designed to reflect whether a person prefers Extraversion or Introversion in the sense intended by Jung (1921/1971). Extraverts are oriented primarily toward the outer world; thus they tend to focus their energy on people and objects. Introverts are oriented primarily toward the inner world; thus they tend to focus their energy on concepts, ideas, and internal experiences. Jung regarded Extraversion and Introversion as "mutually complementary" attitudes whose differences "generate the tension that both the individual and society need for the maintenance of life"
(p. 160). Jung thus saw both Extraversion and Introversion as necessary for psychological adaptation.

Sensing or Intuition (S-N): The S-N dichotomy is designed to reflect a person’s preference between two opposite ways of perceiving. A person may rely primarily upon the process of Sensing (S), which attends to observable facts or happenings through one or more of the five senses, or a person may rely more upon the less obvious process of Intuition (N), which attends to meanings, relationships, and/or possibilities that have been worked out beyond the reach of the conscious mind.

Thinking or Feeling (T-F): The T-F dichotomy is designed to reflect a person’s preference between two contrasting ways of making a judgment. A person may rely primarily on Thinking (T) to decide impersonally on the basis of logical consequences, or a person may rely primarily on Feeling (F) to decide primarily on the basis of personal or social values. In Jung’s and Myers’ approaches, the term Thinking does not imply intelligence or competence, and the term Feeling is not to be confused with emotional. Intelligence and emotional expression are independent of psychological typology.

Judging or Perceiving (J-P): The J-P dichotomy is designed to identify the process a person tends to use in dealing with the outer world, that is, with the extraverted part of life. A person who
prefers using a Judging (J) process typically uses either Thinking or Feeling (the Judging processes) when dealing with the outer world. A person who prefers a Perceiving (P) process reports a preference for using either Sensing or Intuition (the perceiving processes) when dealing with the outer world. It should be noted that Myers and Briggs believed this dichotomy was implicit in Jung's theory, but it was not explicitly described in Jung's writings.

Myers, et al. (1998, p.6) also note, "It is important to note that a preference for one alternative of each dichotomy does not mean that the opposite, less preferred alternative is never used. Both the theory and practical observations describe individuals as using each of the eight preference categories at least some of the time."

The MBTI dichotomies are also useful in describing learning and teaching styles of students and teachers.

**The Extraversion-Introversion Dichotomy**

According to Elliott and Sapp (1988) Extraverted students have been found to prefer approaches to learning that are collaborative and that they often depend on the external world for suggestions on how to proceed. Hinkle (1986) and Fourqurean, Meisgeier & Swant (1990) observed that introverts prefer observation and lecture formats. Myers et al. (1998, p. 261) propose, "The implications of these findings can be useful for educators. Extraverts work best in action and may be described as stimulus hungry...Introverts appear to do their best thinking in anticipation rather than on the spot; it now seems clear that this is
because their minds are so naturally abuzz with activity that they need to shut out external distractions in order to prepare their ideas."

The Sensing-Intuition Dichotomy

Beyler & Schmeck (in Myers, et. al. 1998, p. 263) stated, "Sensing types approach learning through fact retention and methodical study. Intuitive types are innovative (Jacobson, 1992) and value abstract conceptualization (Myers & McCaulley, 1985). Myers et al (1998, p. 263) expound on Jung's theory of opposites (1923) noting, "Type theory suggests that Sensing types can and will produce original ideas but usually after first consulting what they know for sure about a topic. They carefully (and more slowly than do Intuitive students) follow each step in sequence. Thus grounded in the real data, they can then produce the kind of big picture that does not lack in detail (as so many of the initial dreams of Intuitive types do). Conversely, Intuitive types can best learn to accumulate necessary facts if their imaginations are first allowed to roam free, without impediment of excessive rules.

The Thinking-Feeling Dichotomy

Thinking types have been found to reflect a systematic approach to learning (Gordan et al, 1986), to prefer a fact orientation (Beyler and Schmeck, 1992), and have concerns for self-justice (Liddell, Halpin & Halpin, 1992). On the other side Feeling types prefer holistic learning (Byler and Schmeck, 1992) have an abstract random learning style (Drummond & Stoddard, 1992), and have concerns with care and self-care (Liddell, Halpin & Halpin, 1992).
The Judging-Perceiving Dichotomy

Judging types prefer clear structure, drill and independent study (Fourqurean et al., 1990), sequencing (Drummond & Stoddard, 1992), and fact retention (Beyler & Schmeck, 1992). Perceiving types like tactile learning and loud noise (Fourquean et al., 1990), approaches to learning that are random (Drummond & Stoddard, 1992), and innovation and creativity (Jacobson, 1923).

Summary

There is a demand on the time and energy of faculty in higher education to fulfill three major roles: teaching, research, and service. Although rewards are generally given for quantifiable activities such as publishing, making presentation at scholarly conferences, and consulting with private industry, one of the main functions for faculty remains teaching. Students attend institutions of higher education to learn from experts. As Chickering and Ehrmann (1996, p. 618) noted, students learn best "when it is more like a team effort than a solo race." Faculty need to be engaged as facilitators of learning.

While the desires of faculty members play an important role in how their time is divided, the type of the institution drives the focus of organizational elements at all levels of the academic institution and plays a key role. The general academic culture in many institutions results in neglect for the teaching role of faculty members. A key factor in determining a faculty member’s attitude toward teaching is socialization. Whether it be as a newly conferred Ph.D. or as a seasoned faculty member who is new to an institution, socialization plays a key
role in how much time and effort are placed upon teaching. This process is especially key in deciding whether faculty will even consider using technology in their role as teacher.

In a search for ways to save time and become more effective in their teaching, some faculty members are turning to technology as a solution. If a faculty member decides to become a student again with regards to learning how to use technology, those who assist them in this venture must be cognizant of adult learning theory and varying learning preferences when developing learning delivery strategies.

While the use of technology is not the panacea for the woes of higher education, it is certainly a viable tool for overcoming some of the resource (funds, personnel, and time) and distance issues that afflict faculty in higher education today. Faculty must become continuous learners if they are to use technology effectively, as what is new today will very likely be obsolete within little more than a few months.
CHAPTER III. METHODOLOGY

The purpose of this study is to examine the ways that faculty in higher education learn to use technology in their teaching. In order to do this, qualitative methods were used, specifically a dual case study that explored the various ways participants learn to use technology in their teaching, the role of socialization in their quest to learn technology, and how the opportunities to learn to use technology in their teaching are meeting their needs based on their learning preferences.

Faculty participants were drawn from three colleges, schools, and departments in two institutions of higher education. One institution is a Masters I institution in the east, which emphasizes the teaching role of faculty while the second is a major Research I institution in the west, which is known for its leadership in regional programs.

These universities were selected for several reasons, including diversity of geographic location, availability of like types of administrative units, and ease of entry. Within each of these universities three colleges, schools, and departments have been identified: Education, English, and Nursing. The diversity of focus of these colleges gave a much broader perspective to the study. Data were gathered through a series of surveys and interviews and were analyzed using qualitative data analysis software.

This chapter describes the use of qualitative methodology, participants involved in the study, methods of data collection, data analysis, and the limitations of the study.
I conducted the research for this study from a qualitative theoretical perspective, using a constructivist interpretivist approach within a case study framework. One of the strong points for using a qualitative research design is the ability of this type of research to describe and understand experiences and perspectives (Denzin and Lincoln, 1994; Bogdan and Biklen, 1997; Creswell, 1997).

The fundamental purpose of this study was to reveal the ways in which faculty members in higher education learn to use technology in their professional lives. Both new and veteran faculty members need to know the ways in which other faculty learn to use technology. By providing an avenue for the participants in this study to share their experiences with the learning of technology, faculty members may discover methods that might assist them with their endeavors to bring new teaching techniques to their classroom and assist them in their daily professional lives.

Bogdan and Biklen (1997, pp. 4-7) describe five features of qualitative research as: naturalistic, using actual settings; having descriptive data; concerned with process; using inductive analysis; and seeking meaning. Since this study used the settings of two institutions of higher education, gathered descriptive data about the process of faculty learning to use technology, is not trying to prove an hypothesis, and seeks meaning in how each faculty participant learns to use technology, qualitative research methods are used to conduct this study. According to Creswell (1997, p. 17) there are several compelling reasons to pursue knowledge using a qualitative study. "In a qualitative study, the
research question often starts with a how or a what.” Since this study looked at how faculty learn to use technology and what strategies work for them, a qualitative study provides a useful view of what happens to these adult learners as they pursue knowledge about using technology to help them teach in the collegial community.

Creswell (1997, p. 17) identifies a second reason for conducting a qualitative study “...because the topic needs to be explored...variables cannot be easily identified, theories are not available to explain behavior of participants or their population of study.” Although there has been numerous studies on adult learning and about the use of technology in the classroom, little research has been conducted about how faculty learn to use technology in the broad scope of everything they do in their professional lives as faculty members, and especially in their teaching. As the field of technology advances exponentially, the need to know how faculty members both learn to use technology and stay current with new technological developments becomes even more imperative.

Lastly, Creswell (1997, p. 17) states, “choose a qualitative approach in order to study individuals in their natural setting.” Denzin and Lincoln (1994, p. 2) also note, “...qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.” While interviews do not necessarily have to occur in natural settings, interviews in this study will take place on the campuses of the two universities where the faculty participating in this study work and could arguably be considered to be in their natural settings. Observations must
certainly take place in a natural environment in order to obtain accurate data. These three reasons provide impetus for conducting a qualitative study.

This chapter discusses the methodological framework, the participants, the method of data collection, the data analysis involved in the study, and the limitations, which surround the study.

Methodological Framework

Knorr-Cetina (1994, p. 125) states, "The constructivist or interpretivist believes that to understand the world of meaning one must interpret it. The inquirer must elucidate the process of meaning construction and clarify what and how meanings are embodied in the language and actions of social actors." Thomas A. Schwandt (1994, p. 118) said, "Proponents of these persuasions share the goal of understanding the complex world of lived experiences from the point of view of those who live it." This study attempts to construct the realities of faculty in higher education learning to use technology.

Creswell (1997, p. 61) notes, "A case study is an exploration of a "bounded system" or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context. This bounded system is bound by time and place, and it is the case being studied." Merriam (1988, p. 9) agrees, stating, "The nature of the research questions, the amount of control, and the desired end product are issues to be considered when deciding whether case study is the most appropriate design for investigating the problem of interest. A fourth and probably deciding factor is
whether a bounded system can be identified as the focus of the investigation. That is, a case study is an examination of a specific phenomenon such as a program, an event, a person, a process, an institution, or a social group." Since this investigation was bound by location, three colleges, schools, and departments in two universities; time, beginning with the first time faculty participants learned to use technology to the present; and process, learning to use technology in their teaching, the case study method is a logical approach to choose.

Many researchers taking a snap shot of time in a particular location or multiple locations in an attempt to gain a better perspective of the phenomena being studied have used case studies. It is through a thorough study of the case that a true picture can be developed.

Overview of the Study

This study is designed as dual cases of faculty members within three colleges, schools, and departments of two universities. One case is a Master's I institution located in the east and has a student body of over 6,000. It is known for its leadership in training teachers at the K-12 level. The other case is a major Research I university located in the west and has a student body of over 18,000. It is known for its leadership in regional programs. The cases were bound by the locations of the universities and by the time period, approximately five to eight years, covered in the process of faculty learning to use technology. The choice of colleges, schools, and departments in one university is intended to match as
closely as possible the choice of colleges, schools, and departments in the other university to allow for comparison and contrast. The study was conducted over a ten-month period to allow analysis of the survey data, interviewing participants, and analyzing interview data.

Participants were selected to represent varying levels of expertise with the use of technology in teaching and varying length of service as a faculty member in an institution of higher education. Criteria for establishing levels of expertise were based upon responses received from an email survey that was sent to prospective participants in this study.

Data was collected through an email survey, by administration of the Myers-Briggs Type Indicator, and by interviews. The email survey was used to gain preliminary data on possible participants and allow for purposeful selection based mainly on the participants knowledge and use of instructional technology, and respondents' suggestions for participants in the study. Participants took the MBTI to ascertain their learning style. On-site interviews were conducted to gather in-depth data about how participants have learned to use technology in their teaching. Data gathered during the interviews was analyzed using qualitative software, NUDIST Vivo.

Sampling and Participant Selection

A purposeful sample was used in order to gain multiple perspectives. Bogdan and Biklen (1998, p. 65) describe a purposeful sampling as choosing "particular subjects to include because they are believed to facilitate the
expansion of the developing theory.” The study included at least three faculty members from three different colleges, schools, and departments from each case being studied, for a total of 12 participants in Case One and 13 participants in Case Two. The goal was to have maximum variation in sampling across the factors of gender, ethnicity, length of service as a faculty member, and experience in the use of technology in teaching. These perspectives were gained from faculty members in two institutions of higher education.

Within each of these colleges, participants had a variety of experiences with technology. Some participants had only limited experience with technology. Others had a moderate amount of experience or knowledge while the rest might be considered to be experts in the use of technology.

Participants were solicited by using a list of prospective faculty members garnered from students, faculty members, and department chairs as well as by peer nomination. Prospective faculty members were contacted via email and asked to identify other faculty members who might participate. The goal was to include a minimum of three faculty members from each college/department with a diverse range of abilities in the use of instructional technology.

Data Collection

Three methods of collecting data were used for this study. The data were collected using an email survey, the Myers-Briggs Type Indicator, and at least one semi-structured interview as instruments to reveal the variety of methods used by faculty members in two institutions as they learn to use technology.
A list was generated by seeking input from students, faculty members, and department chairs. Prospective participants were asked, via email and or personal contact, to participate in the study. An email survey was distributed to gather demographic data, background data, data about levels of experience with technology and general attitudes about the use of technology in higher education. Respondents to this survey were also asked to identify other faculty members from the defined colleges, schools, and departments whom they believe could provide valuable input to this study. Email surveys were then sent to those identified by their peers.

Demographic data and a brief description of the prospective participants' definition of technology were collected using an email survey. The data collected from this survey was analyzed manually to answer several fundamental questions such as:

- Is the respondent willing to participate in the study?
- What is the length of service as a faculty member in an institution of higher learning and in particular the two institutions under study?
- How many formal training opportunities has the respondent participated in to learn to use technology in their teaching?
- How do they define technology?

These levels were used in assuring there was a variety in the range of capabilities with regards to use of technology of those who participated in the study.
Once participants were identified, the MBTI was sent for the participant to complete and return. The results of the MBTI were used to help determine the learning preferences of each participant. A semi-structured interview was then conducted in the participant’s office to share the results of the indicator and to determine whether the reported type was their true type. Clarifying questions were asked to help participants determine their true type and learning style. While type and learning style were not the sole determining factor to select participants, I sought to include a wide variety of learning preferences among those who participated in the study.

After the participant’s learning preference was identified, they were asked questions to gather data about their view and use of technology in their instruction. These questions were based on their responses to the email survey. This portion of the interview was audiotaped. A major theme to this interview was to determine what works for each participant when learning to use technology in their teaching. Field notes were written after each interview and the recordings of each interview was later transcribed and analyzed for emerging themes and patterns before the next interview was conducted, consistent with Denzin's (1994) description of the interpretivist approach. Notes were written while reviewing the data, to expand understanding, question emerging patterns or categories, create other questions, etc., as is consistent with the interpretivist approach (Denzin, 1994). Computer software designed to provide constant comparative analysis of the data was used along with manual analysis. A list of questions is included in Appendix C. As themes emerged from the data,
additional data was collected via email from participants who had already been interviewed.

The time pressures on faculty in higher education are enormous. I did not want to add to those pressures by taking an inordinate amount of participants' time in interviews. By minimizing the number of interviews and focusing questions to achieve an understanding of how faculty learn to use technology in their teaching, time actually spent by the participants was kept to a minimum and none of the participants were dropped from the study.

Data Analysis

A constant comparative analysis of the data was used throughout the data collection process (Creswell, 1997). This process of continually reviewing the data and seeking patterns from the responses is integral to a constructivist interpretivist approach where the theory evolves during the actual research through the continuous interplay between analysis and data collection (Denzin, 1994; Creswell, 1997).

Phase one of the coding process began with listing attributes for each participant provided in the email survey. This assisted with getting a better "feel" for each participant's place in their faculty career and included number of years they had taught in higher education, number of institutions in which they had taught, number of years at their current institution, and their definition of technology.
Phase two of the coding process involved coding the interviews by establishing various nodes of information based on the participants' responses. Three root level, or parent, nodes were established; technology use, learning, and support. The technology use node consisted of five child nodes; audio-video, email, Powerpoint, videoconferencing, and web. The learning node contained three child nodes; workshop; one-on-one, and self. The support node consisted of three lower level, or child, nodes; institution, department, and colleague. A list of common responses contained in each node as well as the number of similar responses in each case can be found in Appendix D. The different themes that emerged were based on the responses.

I interviewed participants once and collected further data via email as needed based on analysis of themes emerging from the interviews. The interviews were transcribed and analyzed for emerging themes and patterns using Non numerical Unstructured Data by processes of Indexing Searching and Theory-building software package, commonly referred to as Nvivo (NUD*IST Vivo), to facilitate the coding of the data, ease of access to the data, and theory construction. Use of this tool facilitated the identification of ideas that were important to the respondents and recognition of common themes within each case as well as facilitating cross-case analysis. This software is designed to provide constant comparative analysis of data as well as manual analysis strategies (Wolcott, 1990).

It was believed some potential themes and patterns might include: differences in the readiness to use technology between faculty in colleges,
schools, and departments that have a very supportive culture for the use of technology; differences in faculty perceptions of the usefulness of technology in their teaching based on the socialization process they encountered when first entering the professoriate; differences in the perceived learning outcomes of training in how to use technology based on the match of learning style and teaching style used by the facilitators.

Limitations and Strengths

There are several limitations to this study. The study was limited to approximately 25 participants in six colleges, schools, and departments within two universities. The boundaries will somewhat limit generalizability of the issues concerning how faculty in higher education learn to use technology.

Although an attempt was made to include participants with a wide range of technological capabilities, due to the use of email it excluded most of those faculty members with virtually no experience with using technology.

This calls for further study of faculty in higher education who do not use technology and the factors, which prevent or inhibit them from using technology. Further study could also be done on how teaching is currently improved in higher education and the role of staff development in the process.

Physical access to participants was limited because of the geographical distance between the two cases and the home of the researcher. While the initial interviews were conducted face-to-face, and every attempt was made to conduct any subsequent interviews in that manner, technology was used to lessen the
effects of not being able to meet participants after the initial interview. However, it did not totally overcome this limitation, as face-to-face contact would have been preferable in order to use probing questions and guide the interview based on responses. Observance of body language and important voice inflections were eliminated when in-person questioning was not possible.

As evidenced in the review of the literature, faculty in institutions of higher education are extremely busy. They must respond to demands on their time from many different sources. Participation in these case studies will initiate even further demands on their time. While the use of technology will enable faculty members to choose the time of their response, the time must still be expended in answering the proposed questions whether it be via personal interviews or via emails or electronic surveys.

There are several factors that act as both limitations and strengths. As a certified user of the Myers-Briggs Type Indicator I have a bias toward the use of that instrument. This bias tends to exclude the use of other instruments that might be used to determine learning style. As a certified user I have extensive knowledge and training in using the MBTI. This experience will aid in assisting the participants to determine their true learning style.

I have attended both universities, one as an undergraduate and the other as a graduate student. I am not on the faculty of either university but I have knowledge of the cultures of both institutions.

I have a bias toward the use of technology in teaching. This bias could possibly affect the analysis and reporting of the data collected from the
participants. The bias is limited to a belief that technology is only one tool to be used in teaching and is not the sole answer to improving teaching in higher education. My knowledge of technology helped in data collection, analysis, and understanding and interpreting the stories of the participants.

Summary and Importance of this Study

This study is important because it focuses attention on several factors that can affect the success of faculty in higher education implementing technology in their teaching. Faculties in institutions of higher learning are constantly being called upon to help improve the quality of higher education. This call requires faculty to reassess how they teach and find new tools to help them teach more effectively. One of the tools with the most promise in helping them accomplish this task is technology. In order to incorporate technology in their teaching, faculty must become students again, learning to use technology for their benefit. There are many factors that come to play in a faculty members attempt to learn and use technology: socialization, support for the use of technology by their peers and the institution, learning and teaching styles, and availability of technology itself. By listening to the stories of faculty who have made the attempt to transform their teaching, their success and their failures, we can come to a better understanding of what worked for them in this venture.
CHAPTER IV. FINDINGS

Introduction

Over the past two decades intense pressure has been placed on institutions of higher education by increased competition among institutions and by the rapid technological advances of the society. College and university leaders have seen technology as a means to meet the demands of competition and have invested heavily in building up their information technology infrastructures. Many of these leaders have also recognized that simply increasing information technology capability is not the sole answer to their problems. They have also recognized the need to connect with a diverse student population through the use of innovative learning methodologies in the classroom. Faculty in higher education must play a key role in incorporating the use of these technologies if their potential is to be realized. Thus faculty play a key role in moving their institutions into the new century and its technological advances.

The focus of this study was to explore how educators learned to use and were supported in using, various technologies as tools for learning. Data for this study was collected from twenty-five faculty members within three colleges, schools, and departments of two universities. One case is a Master's I institution located in the east and has a student body of over 6,000. It is known for its leadership in training teachers at the K-12 level. The other case is a major Research I university located in the west with a student body of over 18,000. It is known for its leadership in regional programs. The cases are bound by the
locations of the universities and by the time period, the past five to ten years, covered in the process of faculty learning to use technology. These cases are also bound by the choice of colleges, schools, and departments in each university. The intent was to match as closely as possible the choice of colleges, schools, and departments in both cases to allow for comparison and contrast.

Data were collected from participants in the disciplines of Education, English, and Nursing at each institution. These data were collected from participants in the two case studies via email surveys and face-to-face semi-structured interviews. Each participant was also given a tool, or they provided results received previously, in order to determine their learning preferences. I also reviewed public documents such as speeches, mission statements, and strategic plans from each institution.

The data collected were targeted at answering the three main questions of this study. First, How do faculty members in two institutions of higher education learn to use technology in their teaching? The study examines how faculty define what constitutes technological tools and how they use these tools in their teaching. Interviews were conducted to examine how and where faculty learn to use technology in their teaching. During the interviews respondents were questioned about various opportunities to learn technology and which of these opportunities best suited their learning style and disposition. Participants freely discussed both those opportunities they had experienced and those they knew about but had not participated. Faculty members also talked about what worked for them in their quest to learn to use technology and what didn’t work.
Secondly, how are opportunities for learning technology meeting the needs of faculty members based on their learning preferences? Each faculty participant was given the Myers-Briggs Type Indicator (MBTI) to determine his or her learning preferences. They were all interviewed to validate their reported preferences and to gather their stories about what worked and what did not work for them in their quest to learn to use technology in their teaching. Learning is an extremely important part of being a faculty member, whether it is learning for oneself or helping others to learn. In order to determine how faculty members learn how to use technology in their teaching it is important to determine their learning preferences. The key to understanding learning preferences lies in understanding the two mental processes of gathering data, perception, and in making decisions on the data, judgment. Each learner has a dominant preference of either perception or judgment and a preference of one of the two dichotomies within these mental processes. Gordon Lawrence (1993, p. 12) describes these dominant preferences as follows:

**Sensing:** When sensing perception is dominant, the key to motivation is having experiences that are—above all—physically real, useful here and now, and practical.

**Intuition:** When intuitive perception is dominant, the key to motivation is having experiences that—above all else—hold fascinating possibilities and engage imagination.

**Thinking:** When thinking judgment is dominant, the key to motivation is having—above all else—logical orderliness in one’s
life, either in the inner life of the mind, or in the outer events of one's life. Things need to make sense.

**Feeling:** When feeling judgment is dominant, the key to motivation is having—above all else—harmonious relationships in one's life.

These basic descriptions held true for all twenty-five faculty participants in the study. Faculty participants represent nine of the sixteen MBTI types. It is interesting to note the group type of case one is ENTJ and the group type of case two is E/INFJ, the only difference in the two group types being the preferred method for making judgments, two ways of reasoning.

Finally, why do faculty choose to use technology in their teaching? What part does the socialization process play in the willingness of faculty to learn to use technology? The study gathered information that explores why faculty use technology in their teaching, what support they received at various levels of the institution, and in particular the effect the socialization process had on the participants use of technology. Participants were also asked about the support they received as they learned to use technology in their teaching. Specifically they were asked about support from the institution, their college, school, or department, and their colleagues.

The socialization process can have a great impact on how strongly teachers feel supported in their teaching roles and how strong their desire is to learn new strategies for teaching. Introduction of technology brings about new values and expected behaviors. As Schein (1968, p. 43) states, "Socialization is
cultural learning which takes place in a social context. From the perspective of individuals within an organization, organizational socialization is the process by which the newcomer learns what is important in the organization, including its norms and values, and the behaviors expected of members of the organization." However, this does not only apply to newcomers to the organization when there is a major shift in norms and values. When institutional leadership makes such a shift in what is valued, everyone becomes a "newcomer."

Each participant provided demographic data in a short email survey including number of years teaching in an institution of higher education, number of institutions of higher education in which they had taught, length of service at their current institution, size of their department, and how many of their colleagues in their department used technology.

On-site interviews were conducted to gather in-depth data about how participants have learned to use technology in their teaching. A purposeful sample was used in order to gain multiple perspectives. The study included at least three faculty members from each of three different colleges, schools, and departments from each case being studied with the goal of having maximum variation in sampling across the factors of gender, length of service as a faculty member, and experience in the use of technology in teaching. While the basic questions used in these interviews (see Appendix C) remained constant, other questions were asked based on responses to gain greater clarification of issues.

The final two chapters of this study will present the collected data and the analysis of the data. This chapter describes the research setting, analysis of
Each case, and a cross case analysis. Chapter V offers a discussion of the findings and implications as they relate to the theories that formed the foundation of the study, issues related to how faculty in higher education learn to use technology in their teaching. I will also discuss suggestions for future research that may give us further insight into the complex issue of helping faculty learn to use and implement technology in their teaching.

Each case will be considered by itself and then compared with the other case. Within case analysis of each college, school, and department will be discussed separately followed by a discussion of the institution as a whole.

Case One

Overview

The university studied is a Master’s I institution located in the east and has a student body of over 6,000. It was founded in the late 1800’s with the aim of training teachers. This institution was later designated a regional university and soon thereafter became a constituent institution of the state university system. The largest part of the student body comes from the surrounding area and states adjacent to the institution. It is known for its leadership in training teachers at the K-12 level. In the late 1990’s the university began requiring a computer for incoming freshman. In 2001 this institution was recognized as one of the top 100 “Most Wired” campuses according to Yahoo! Internet Life.
The College of Education

The College of Education has been one of the focal points of the institution since its founding and contributes to a great sense of pride within the institution due to its acknowledged expertise in producing fully competent and outstanding K-12 teachers. Its mission is to prepare educators, counselors, psychologists, speech-language pathologists, recreation personnel and other human service specialists at both entry and advanced levels. The college is focused on teaching, as opposed to research or service, as noted in the following excerpt from their mission statement: *Of these three scholarly activities, providing optimal learning environments for students is most important, followed by service and research.* The College of Education works closely with the Center for Teaching operated by the state system and located immediately adjacent to the university campus.

Faculty from the College of Education who participated in the study have been teaching in higher education a minimum of eight years, and have been teaching at this institution from three to twelve years (see Table 1). Three of the four participants have taught at other institutions of higher learning. All four of the participants in the College of Education use at least some technology in their teaching. Of the three colleges, schools, and departments studied at this institution, participants in the College of Education use technology the most in their teaching.
Table 1. Demographics for College of Education in Case One.

<table>
<thead>
<tr>
<th>FACULTY MEMBER</th>
<th>GENDER</th>
<th>YRS TAUGHT</th>
<th>YRS AT THIS SCHOOL</th>
<th>NO. OF SCHOOLS TAUGHT</th>
<th>DEFINITION OF TECHNOLOGY</th>
<th>USE OF TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>13+</td>
<td>4-7</td>
<td>3</td>
<td>Computers, email, Web, TV, PowerPoint</td>
<td>Web, email, multimedia</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>8-12</td>
<td>8-12</td>
<td>1</td>
<td>Tools to become as effective as possible</td>
<td>Web, email, Teleconference</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>8-12</td>
<td>1-3</td>
<td>2</td>
<td>Electronic or mechanical devices</td>
<td>Email, SPSS, Spreadsheet, Databases</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>13+</td>
<td>4-7</td>
<td>3</td>
<td>Productive tool</td>
<td>WebCT, Interactive TV</td>
</tr>
</tbody>
</table>

The English Department

The English Department prepares students in communications skills and offers concentrations in Journalism, Literature, Professional Writing, and Teaching with minors in Creative Writing, Film Studies, and Journalism. Faculty from this department who participated in the study have been teaching a minimum of one year, and have been teaching at this institution from one to more than thirteen years and have been teaching at this institution from between one to more than thirteen years (see Table 2). Three of the five participants from the English Department have taught in other institutions of higher education.

All of the five participants use at least some technology in their teaching. Of the three colleges, schools, and departments studied at this institution, faculty in the English Department had the greatest variation in use of technology in their teaching.
The Nursing Program

The Nursing Program was established at the institution in the late 1960's and prepares students to begin the practice of professional nursing through a Baccalaureate Nursing Program for non-RN licensed students. In the 1980's the department established a Baccalaureate Nursing Program for licensed RN students through a capstone track.

Faculty from this department who participated in the study have been teaching a minimum of four years, and have been teaching at this institution from one to more than thirteen years (see Table 3). All of the participants use at least some technology in their teaching. Of the three colleges, schools, and departments studied at this institution, faculty in this department had the lowest
overall use of technology in their teaching. One major factor in the low use is the majority of the department is housed at another university in the system due to its proximity to a major medical facility but are still supported by the information technology unit at the main campus, over an hour away. However, all faculty participants said they felt supported at all levels of the university.

Table 3. Demographics for Nursing Program in Case One.

<table>
<thead>
<tr>
<th>FACULTY MEMBER</th>
<th>GENDER</th>
<th>YRS AT SCHOOL</th>
<th>YRS AT THIS SCHOOL</th>
<th>NO. OF SCHOOLS TAUGHT</th>
<th>DEFINITION OF TECHNOLOGY</th>
<th>USE OF TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>13+</td>
<td>4-7</td>
<td>2</td>
<td>Web, email, video</td>
<td>Email, WebCT, CD-ROM, Spreadsheets, PowerPoint</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>4-7</td>
<td>1-3</td>
<td>2</td>
<td>Computers, email, web, TV, PowerPoint</td>
<td>CD-ROM, WebCT</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>13+</td>
<td>13+</td>
<td>2</td>
<td>Computer programs</td>
<td>WebCT, SPSS, Videoconferencing, Spreadsheets</td>
</tr>
</tbody>
</table>

Methods used to learn technology

Faculty in the College of Education participated in a robust series of opportunities to learn to use technology. Since one of the primary roles of the institution has always been teacher education it is not surprising that the College of Education was one of the early adopters of the use of technology in teaching. Like most of their colleagues, faculty participants in education felt very supported in their quest to learn to use technology. One faculty participant fairly well summed up the feelings of most of the participants in stating, "There are
constantly workshops, seminars, little learning opportunities that I always say, 'Man, I would love to go to that.' We have a tremendous amount of support out there in terms of well structured, well developed learning opportunities." Another faculty member noted, "As a matter of fact there are courses that are part of the curriculum that some faculty members have sat in on and that's pretty typical behavior." With very few exceptions most of the training opportunities provided in technology consisted of two parts; a presentation of the theory and overall operations, and a hands-on experience. These opportunities are well published on a weekly basis throughout the institution.

All faculty participants in the College of Education identified the Faculty Sandbox, an area where faculty can go to learn (play) ways to use computer graphics and technologies to enhance the learning experience of their courses, and the Collaborative Advanced Technology Area (CATA) labs, an area dedicated to promote collaboration among faculty, colleagues, and students in developing creative projects using advanced technologies that can enrich courses or curricula, were mentioned by everyone as supporting their efforts to learn to use technology.

The faculty participant with the most technology experience identified one-on-one experiences as the most effective. She noted, "I think it's one-on-one, OJT, as they need it, as it's important to them, that's when I think the learning takes place. I think we are all subject to that as adults. I know I am. Somebody can sit there and tell me all day long that I need to learn how to edit videotape on a computer but until I actually have to do it for a reason, it sat there
on my computer and I didn't touch it. All of a sudden I had the need to know and so I learned it. It meant something to me then. That need to know has to be there. I have taken workshops and courses that did not stick with me and it's because I never knew why I was in there. I don't think there is any immunity or any degree that keeps you from that." This was confirmed by another faculty member when he said, "I've stopped pursuing different applications and I just use whatever I need at the time. I don't bother trying to learn anything unless I need to use it." All participants in this group identified one-on-one help from both institutional structured resources as well as from colleagues as being particularly helpful and meaningful.

There were no indications from any of the faculty participants in the College of Education that they were inclined to learn to use technology in their teaching on their own with no assistance. All learning involved either participating in institution or college, school, or department sponsored learning opportunities or in working with other faculty members in sharing new discoveries.

Faculty in the English Department identified weekly workshops presented by institutional resources that were available as a valuable source of learning to use technology. Lists of these workshops are sent to a mass distribution through email. They also identified semi-structured workshops provided by colleagues to share tips and techniques in implementing the use of technology in the classroom as being a valuable resource. These sessions were supported and promoted by the department. All participants have taken advantage of at least some of the workshops. Virtually all workshops described by faculty participants
were presented in two parts, the first part being a presentation of application theory and a general overview of how it works, followed by a hands-on session. All faculty members noted that they especially valued hands-on opportunities and found these to be most valuable in their learning to use new technologies in their teaching.

Each participant in the Department of English has taken advantage of one-on-one assistance at one time or another. As one faculty member described her feelings, "In a field like ours, with writing, you definitely need the one-on-one time." Another participant explained the ease of gaining one-on-one help, "If you want to build a web page or something like that and you don't know how, you can make an appointment and they will come over and take you step by step."

Two of the five participants said they had learned at least some of their skills on their own. One new faculty member learned most of his skills as a freelance writer, before becoming a member of the faculty. The other participant said she learned word processing through a long trial and error process.

All five faculty members made reference to the several institution sponsored computer labs that promoted learning to use technology in teaching at their own pace. The Faculty Sandbox and the CATA lab were again identified by participants as being especially supportive in their learning to use technology in the classroom. These faculty noted that in concert with the workshops and seminars, these areas promoted testing the waters of technology use and provided a non-threatening environment for faculty members to practice what they had learned in workshops or to test new ideas for their teaching with
technology. One faculty member described the CATA lab as, “A one room Santa’s workshop. It has the most powerful computer and computer tools setups that anybody could want.” Each faculty participant made reference to the belief that the existence of these facilities exhibited the dedication of the leadership of the institution to promoting the use of technology in teaching.

Although the offices of the Nursing Department are located on the campus of another institution in the state system, all participants identified workshops that were available as a source of learning to use technology. One of the faculty also identified courses offered by the institution as another source of information and training for learning to use technology. However, as two of the participants noted, “We are over an hour away from the main campus and it is not just a case of let’s walk over to the computer lab and see what’s happening.” One faculty member had received a grant to learn to use WebCT in one of her classes. She noted that as time progressed the training sessions “went from seminar to more one-on-one. We had to bring our own syllabi on a disk and from there we actually created our own class so it became personalized at some point.” As with most of the faculty participants in this study, these three faculty members preferred some type of hands on training as opposed to simply presentations with no chance to practice what they had learned.

All three faculty members said much of their discoveries came as a result of collaboration with other faculty members in the Nursing Program. As one participant explained, “So the collegial thing is mostly cry on each others shoulders and help each other out when we discover things.”
Learning Preferences

The group type in this case was ENTJ with eight different types being represented by the participants (see Table 4). Three types, INFJ, ESTJ, and ENTJ, were represented by multiple faculty members. Participants were relatively equally split in the E/I and the T/F dichotomies (7-5). The S/N (3-9) and the J/P (10-2) dichotomies were more unbalanced.

Table 4. Type Table for Case One Faculty Participants.

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<thead>
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<tbody>
<tr>
<td>ISTJ</td>
<td>ISFJ</td>
<td>INFJ</td>
<td>INTJ</td>
</tr>
<tr>
<td>ISTP</td>
<td>ISFP</td>
<td>INFP</td>
<td>INTP</td>
</tr>
<tr>
<td>ESTP</td>
<td>ESFP</td>
<td>ENFP</td>
<td>ENTP</td>
</tr>
<tr>
<td>ESTJ</td>
<td>ESFJ</td>
<td>ENFJ</td>
<td>ENTJ</td>
</tr>
<tr>
<td>Ed</td>
<td>Ed</td>
<td>En</td>
<td>Ed</td>
</tr>
</tbody>
</table>

Ed = Education, En = English, N = Nursing

All participants noted the Faculty Sandbox as one of the most important venues in which they learned to use new technologies in their teaching. The concept of the sandbox meets the needs of both introverted and extraverted faculty. The facility can be used for workshops with multiple participants, which appeals to the extraverted learners. One faculty participant noted, “I always say to the faculty when they ask me about using web pages or using certain technologies, my first question is, is that the appropriate thing to do?” The Sandbox can also be used by faculty members wishing to experiment with technology or obtain aid from technology experts who work in the Sandbox. This
ability to work alone or with one other person appeals to the introverted faculty. An introverted faculty participant said, “I am working on a Powerpoint presentation for a conference and I’m going to set up an appointment to work on that.” Faculty members with a preference for introversion also liked working one-on-one with other faculty members or one-on-one with technology support personnel in learning to use new technologies.

Two faculty participants with a preference for extraversion described their interactions with others in technology as more of a giver than a receiver. This was due to their background, experience, and interests and was corroborated by others in the same departments. Both of these faculty members have a preference for extraversion and were motivated by a desire to make learning products or experiences that would benefit others.

There was one participant who was recognized as a leader in using technology by colleagues and had a preference for introversion. In keeping with a desire to work in private ways and have reflective time her main avenue was in creating activities on the web. She literally beamed as she talked about working on the web when she said, “I help put together the one for this anthology and we have another anthology that we use too and those are really great for looking up information on different authors.”

The ability to have hands-on experiences in their endeavors to learn to use technology in their teaching was a desire of all participants but it was extremely important to those faculty participants who had a preference for sensing perception. Those faculty who preferred an intuitive perception were
more interested in learning the possibilities for their teaching. Both groups felt their needs were met by both the Faculty Sandbox and the interaction with colleagues in their college, school, or department. As a faculty participant with a preference for sensing described, “That’s the technical area with the hands on.” A faculty member with a preference for intuition described his first experience with the Sandbox, “I had been invited by the technician who’s in charge there to come over and see what was going on and she had gotten me started doing web pages and all of a sudden I saw where this could be used for classes.” Faculty were using the same avenues to meet their needs but each from their own perspective.

The faculty participants with a preference for thinking were concerned that training they received be logical and well thought out. One faculty member shared her frustration with learning a new technology. “I was trying to use WebCT and the support person knew less that I did. He was reading the book (to get information) and then changed from 2.0 to 3.0 during the middle of the summer. I think the problem was when the college tried to demonstrate WebCT they focused on the bells and whistles rather than on the basics. So it was a struggle to learn the basics by myself with inadequate documentation. “

This desire for a well thought out plan was accentuated for this faculty member because she also had a preference for judgment making their preference for thinking the dominant preference. Faculty with a preference for judgment yearn for organization and structure while those whose preference is
perception desire a more open format that allows them to follow their curiosity and offers genuine choices in how they pursue lesson objectives.

**Support for the Use of Technology**

The vast majority of faculty participants in this institution believed that leadership from the University Chancellor down to individual department chairs, played key roles in the desire and ability of each faculty member in learning to use technology in their teaching. Comments such as, “We are very much encouraged to make the best use of the technology that is provided to us. You hear discussions about technology and that’s a biggie,” were prevalent among all faculty participants.

This feeling of support was verified in a speech given by the Chancellor in 1997 when he said, “I have placed a very high priority on developing the technological infrastructure of the University. I can now claim, with little fear of contradiction that (this institution) is the most technologically advanced campus (in the system) with regard to the applications of technology to teaching and learning.”

This claim is substantiated by a ranking as one of the 100 most wired campuses in the nation by *Yahoo! Internet Life* in 2000. The institution was one of the first dozen public universities in the nation to implement a requirement for incoming freshmen to come to campus with a personal computer.

All faculty who participated in this study noted not only support at each level; institutional leadership, college, school, and department leadership, and
fellow faculty, but even an expectation for the use of technology in teaching. In this institution use of technology is the norm, not the exception.

However, as authors have noted (Corcoran and Clark (1984), and Whitt (1991)), it is the actions of other faculty members that can be just as important in the socialization process. Faculty participants in this institution were excited about learning new ways to produce better learning opportunities for their students. Many of these opportunities came from colleagues. A typical remark from faculty was, “Once in awhile we will sit around and help each other with a program or a problem that we might have. It is nothing that is planned or anything. We have the Faculty Center for Teaching and Learning that has a sandbox area, a place where faculty can go and play with different things. There’s a fairly good expectation that we are there to help each other.”

Several faculty members also noted there was little use of technology just for the sake of using technology. One participant, identified by other faculty as one of the “go to” technology experts noted, “My first question is ‘Is that the appropriate thing to do?’ I mean if you are studying leaves and it’s fall in (the mountains), you don’t go to the Internet to look at pretty pictures. You go outside the building and you look at the pretty leaves.”

One faculty member summed it up, “There is more support available than I have time to take advantage of. There are constantly workshops, seminars, little learning opportunities. We have a tremendous amount of support out there in terms of well structured, well developed learning opportunities.” All identified workshops and seminars offered by various organizations across the institution
as being useful. Each participant also specifically identified institutional leadership support for faculty learning to use technology as positive and critical for success.

Another faculty member identified an institutional decision that incoming freshmen be required to have computers as a driving force behind gaining faculty support for integrating technology into their teaching. She stated, “Once our students were required to have computers there was a big aha from the faculty, ‘Oh, we better make sure that we’re up to speed.’ We were able to go to the faculty and say this is what we are going to teach your students as soon as they come on campus. They’re going to know how to do email, they’re going to know how to use the library on line, they’re going to know how to use the network and all the servers that are available to them on campus. We are going to have these workshops for you. So I think there has been that kind of support in terms of encouraging from an institutional standpoint.”

Faculty felt most of the necessary support for technology is provided at the institutional level. However, when referring to specific technical issues one participant noted, “In my experience there is more of a tendency for faculty to go to local help as opposed to something like the Faculty Center. They’ll go to the department first.” Another participant identified at least two technology support personnel who were hired by the college.

All four faculty members believed colleagues were a strong source of support in their quest to learn to use technology in their teaching. One noted, “There’s more formal opportunities than you can take advantage of which makes
us rely upon a lot of informal opportunities." Another faculty member said, "There’s a fairly good expectation that we are there to help each other." Based on comments from all four participants there is a real sense that the use of technology is valued by everyone, from the chancellor of the institution down to the administrative help in each college, school, and department. This is supported by another participant who noted, "It is very common for us just to poke our head out the window and say, ‘Hey, does anybody know how to use this table or change font size?’ or something like that. We do that amongst ourselves very well. We feel comfortable enough with each other that we can just pop back and forth and say ‘I don’t know how to do something, can you show me?’ We either see that they have done something that we want to do or I know in my case after I learn how to do something I always shout, ‘O boy, look what I can do now!’ We just share it back and forth."

A new faculty member with extensive technology support experience and adult learning theory said, “I don’t feel pressured from my colleagues, I look at it as their willingness to share ideas with me. I always say to the faculty when they ask me about using web pages or using certain technologies, my first question is, ‘Is that the appropriate thing to do?’"

Like their peers, all participants in the English department identified numerous avenues of support provided by the institution. When asked how much support they receive from the institution one faculty member stated, “100 percent. (The institution) is absolutely dedicated to incorporating technology into our teaching and research and they are extremely supportive. They are constantly
offering workshops that will bring us in to refine our skills or introduce new skills. They are always available to come to our classrooms and work with our classes in developing new skills. They will do one-on-one work with us in setting up home pages, that type of thing.”

The institution provides computer classrooms for each major department and allocates time for freshman classes. One faculty participant noted, “When we teach freshman classes we are given our own personal librarian to work with that particular class and a lot of what she or he will do involves technology. But we've got wonderful support throughout the university but the library is just quite remarkable with some of the things they are doing now. This year they will actually come over...they always introduce the library to our freshman...they set up the day and we all take our class over there. But this year they come over here and they work with us in the computer lab which is where our students will be working.” These types of experiences were echoed by all five faculty participants in this study.

Faculty participants in the English Department noted support from the leadership of the department expressed by their stated high priority for more computer classrooms constructed or allocated to the department. They all identified department administrative personnel as being effective resources in particular software and programs.

Faculty participants in the Department of English used terms like, “enormous,” “all that you want,” and “supportive” when talking about support from their colleagues. They especially noted the willingness of other faculty members
in the department who one participant described as, "cutting edge" to share information and techniques for using the technology in a meaningful way. The department has instituted a formal system of providing forums to encourage faculty volunteers to present technological techniques to the rest of the faculty. The department provides pizza as an added incentive. As one faculty member stated, "Nobody really has an excuse for saying, "I can't get this information from people within the department.'” Another participant noted, “I think everybody is real optimistic about it and we have some people in the department that are more interested in it than others. But I think everybody comes through each other's offices and share new ideas. Part of the current workshops we do is us getting together to sharing those ideas.”

As in several of the organizations studied, there are a few faculty who are considered experts. One participant said, "We have a few colleagues in each department. You always have people who are kind of like cutting edge. I always feel comfortable and they are pretty gracious about that. Anybody you ask will be helpful. We have two people who are both really good and they continue to be so people just use them." Based on comments by faculty participants there is a culture of sharing capabilities and new learning in technology.

Much like their colleagues in Education and English, faculty participants from the Nursing Program believe there is extensive support for technology from the institution. They identified The Faculty Sandbox as particularly helpful in their learning technology. All participants believed they receive outstanding support from the institution.
The program is primarily housed on the campus of another institution in the state system to allow for better access to a major medical facility. The support agreement between these two institutions does not cover technology support. Thus faculty members must travel approximately one hour to attend workshops or have technology support personnel travel one hour to reach their location.

Participants from the Nursing Program identified the department head as being extremely supportive in their desire to use more technology in their teaching. One faculty member stated, “We receive much support and encouragement from our department head to use technology in our teaching where appropriate. Through our departmental equipment budget (videos, CD-ROMS and other CAIs, etc.,) and the library support budget, we have opportunities to purchase new, innovative materials & equipment. We continue to receive support to attend these workshops or in arranging for them to be brought here to us.”

The department chair is one of the most frequent users of technology and said, “On the nursing faculty, I think we are all in this together.” Other participants in this department felt especially supported by the department chair. As one faculty member stated when asked what type of support she received from her colleagues she replied, “Encouragement, support, consultation and collaboration!” There seemed to be a genuine desire to learn to use the technology and to use it for the benefit of their students. Another faculty member characterized the faculty as follows, “We are pretty technology illiterate in
Nursing except we all know how to do PowerPoint, we all use email. One of the other faculty is a little more advanced on the computer and will, if we have questions, help us. She knows how to do scanner and how to...we just bought a digital camera but none of us knows how to use it yet...and she’s in the process of learning how to get that going. She would be willing to work with us. But other than that we’re pretty ‘no-tech’.”

As noted earlier, the nursing faculty is self-described as, “technology illiterate.” All participants noted the strong support of the program head to integrate technology into their teaching where appropriate. The program head described it as follows, “I think we are all in this together. We do a lot of email messages to each other. We still have some who are somewhat computer resistant. But not very many.” She described much of the activity as, “Mostly consultation. Probably I’m more expert at it than they are. But there are some things that I can always learn and some of the secretaries are very good at it and they can tell me.”

The Chancellor has provided strategic direction for the university resulting in the prevalent use of technology in teaching. Beginning with the decision to require incoming freshman to have computers when they enter the university and continuing with a strong emphasis for faculty to use technology in their teaching, the institution is among the most wired campuses in the nation. However, there are very few faculty members who use technology just for the sake of using technology. There is a strong sense of ensuring the use of technology is pedagogically sound.
Case Two

Overview

The university is a major Research I university located in the west and has a student body of over 18,000. It was founded as a land-grant college in the early 1900's and is the flagship university in the state system consisting of both four-year institutions and several community colleges. The student body is diverse and includes students from other states as well as international students. It is known for its leadership in regional programs. In 2000 this institution was ranked in the top ten for utilizing digital technologies.

The College of Education

The College of Education was established approximately two decades after the founding of the institution. However, considering its antecedents, it is older than the institution itself. Its mission is to prepare and provide ongoing professional development of teachers, administrators, counselors and related professionals at the undergraduate and graduate levels.

The four faculty from this college who participated in this study have been teaching between four and over thirteen years, and have been teaching at this institution from four to more than thirteen years (see Table 5). Two of the participants have taught at other institutions of higher learning. All of the participants use at least some technology in their teaching. Of the three colleges, schools, and departments studied, faculty in the College of Education are average in their use of technology in their teaching.
The English Department

The English Department prepares students in communications skills and offers concentrations in Children’s Literature, Composition and Rhetoric, Cultural Studies, Life Writing, Literary Studies, Creative Writing, and Asian American Literature.

Table 5. Demographics for College of Education in Case Two.

<table>
<thead>
<tr>
<th>FACULTY MEMBER</th>
<th>GENDER</th>
<th>YRS TAUGHT</th>
<th>YRS AT THIS SCHOOL</th>
<th>NO. OF SCHOOLS TAUGHT</th>
<th>DEFINITION OF TECHNOLOGY</th>
<th>USE OF TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>8-12</td>
<td>8-12</td>
<td>1</td>
<td>Computers, Video, Interactive TV</td>
<td>WebCT, PowerPoint</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>13+</td>
<td>13+</td>
<td>1</td>
<td>Low tech, High tech</td>
<td>Web, PowerPoint, email</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>13+</td>
<td>8-12</td>
<td>4</td>
<td>Web, email, Video</td>
<td>WebCT, PowerPoint</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>4-7</td>
<td>1-3</td>
<td>2</td>
<td>Hardware, Software</td>
<td>Web, Video-conferencing</td>
</tr>
</tbody>
</table>

The four faculty from this department who participated in this study have been teaching from four to more than thirteen years, and have been teaching at this institution from one to more than thirteen years (see Table 6). All four participants from this department have taught at other institutions of higher learning. All of the participants use at least some technology in their teaching. Of the three colleges, schools, and departments studied faculty in the English Department use technology the least in their teaching.
The School of Nursing

The School of Nursing was established at the institution in the early 1930's and educates qualified people in the discipline of nursing through a Baccalaureate Nursing Program. The School of Nursing also offers an RN to BSN program as well as Masters and Ph.D. programs in Nursing.

Table 6. Demographics for English Department in Case Two.

<table>
<thead>
<tr>
<th>FACULTY MEMBER</th>
<th>GENDER</th>
<th>YRS TAUGHT</th>
<th>YRS AT THIS SCHOOL</th>
<th>NO. OF SCHOOLS TAUGHT</th>
<th>DEFINITION OF TECHNOLOGY</th>
<th>USE OF TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>13+</td>
<td>13+</td>
<td>5+</td>
<td>Word, email, Internet</td>
<td>Videos, email</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>13+</td>
<td>13+</td>
<td>4</td>
<td>Computers, email, Internet</td>
<td>Videos, email</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>13+</td>
<td>13+</td>
<td>3</td>
<td>Computers, email, Internet</td>
<td>Videotapes, email</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>8-12</td>
<td>4-7</td>
<td>3</td>
<td>Internet, Web, Authoring systems, Digital video/audio</td>
<td>WebCT, email, Internet</td>
</tr>
</tbody>
</table>

The four faculty from this college who participated in the study have been teaching a minimum of thirteen years, and have been teaching at this institution from one to more than thirteen years (see Table 7). All four participants have taught at other institutions of higher learning. All of the participants use at least some technology in their teaching. Of the three colleges, schools, and departments studied faculty in the School of Nursing use technology the most in their teaching.
Methods used to learn technology

All faculty participants in the College of Education acknowledged awareness of the availability of workshops offered by various units in the institution. All participants noted the deciding factors toward attendance were availability of time and convenience of location. The most common method of advertising these workshops is through mass distribution email.

Table 7. Demographics for Nursing Program in Case Two.

<table>
<thead>
<tr>
<th>FACULTY MEMBER</th>
<th>GENDER</th>
<th>YRS TAUGHT</th>
<th>YRS AT THIS SCHOOL</th>
<th>NO. OF SCHOOLS TAUGHT</th>
<th>DEFINITION OF TECHNOLOGY</th>
<th>USE OF TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>13+</td>
<td>1-3</td>
<td>4</td>
<td>Computer, LCD</td>
<td>Computer, Teleconference</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>13+</td>
<td>1-3</td>
<td>4</td>
<td>Computer, LCD</td>
<td>PowerPoint, Internet</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>13+</td>
<td>13+</td>
<td>5+</td>
<td>Computers, email, Web, TV, PowerPoint</td>
<td>WebCT, PowerPoint</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>13+</td>
<td>13+</td>
<td>4</td>
<td>Web</td>
<td>WebCT</td>
</tr>
</tbody>
</table>

Several faculty members noted that shorter sessions sustained over a longer period of time provided more meaningful learning opportunities for them. One participant noted, "I have attended a number of conference presentations. Because being a very linear thinker I'm not...creativity doesn't come all that easy to me and I don't see great advantages in using it exactly like I deliver course instruction now. If I'm going to spend time with it (technology) I want to do some
new and creative things. I want to make it worth the effort. So some conference presentations I’ve found to be very motivating because they showed me some of the real advantages.” None of the faculty participants preferred stand alone presentations as a method to learn to use technology in their teaching. Each one believed there must be a hands-on component for learning to be effective and retained.

Three of the participants were provided with one-on-one tutoring in the use of technology for their teaching. This tutoring is provided through a federal grant obtained by the Educational Technology department. One faculty member noted the difference between the workshops and their tutoring experience, “Because it (tutoring) is a sustained experience and because those (workshops) were like a shot and then you’re out. Whether you have a person there helping you for a little period really didn’t make much difference for me. What really makes a difference is having the tutor come in once a week and help me.”

Another faculty member receiving tutoring said, “I’ve asked for a little tutoring. That’s good because it is pacing me...keeping me moving forward and doing something every week because my technology person’s coming.” This was echoed by the third faculty member when she stated, “That has been my biggest support. Being able to call them and say, ‘I need a graduate student to come help me figure this out.’ That’s been the biggest support. One-on-one, being able to have a number to call. I feel comfortable with that I could email. One-on-one, in person, or one-on-one in email, either way they give me directions.”
With the exception of one participant who has an advanced degree in information systems, all other faculty participants described their technology capabilities as basic. Only one of these “basic” users acknowledged attempting to learn to use the technology by themselves by, “fiddling around with it and just taking hours on end in figuring out things.”

Of the four faculty participants in the Department of English, one uses mainly videos and very little other technology. He tried to set up email lists but his students balked at this due to a lack of convenient connectivity. Another participant is at the other end of the technological spectrum as his background is in computer graphics. The other two faculty participants use some technology in their classes but that use is not extensive.

All of these participants were aware of workshops offered by various faculty development and information technology units. Only one faculty member noted taking advantage of any of workshops provided by the department several years ago. She noted, “For me it would have to be, not just a one-shot workshop. That’s the one I had on Windows. It was just a one-shot and it wasn’t worth it. I think I’d be much further along on both Windows and Word if I could have had more training.” She also commented on “systematic” technology training available at a university where she had previously taught.

Three of the four faculty participants identified trial and error as their main strategy for learning to use technology. They also identified lack of time to “play” with the technology as their biggest impediment to learning to use technology in their teaching.
All faculty participants in the School of Nursing acknowledged awareness of the availability of workshops offered by various units in the institution. Two of the four participants took part in two-week workshops sponsored by the School of Nursing as part of an effort to incorporate web-based methods into parts of the curriculum in an effort to be more responsive to the non-traditional student. This move was also driven by a growing strain on resources devoted to the institution's interactive TV system. Both of these participants noted that an important ingredient in the success of these workshops was the ability to have hands-on time after the theory was presented.

The remaining two faculty members identified most of their learning to use technology was through self-efforts with some one-on-one assistance. These efforts involved reading manuals provided and using the help function provided with software. One of these participants attended one workshop and there weren't enough computers for everyone. She noted her frustration with the process, "...there weren't enough computers and so I didn't have hands on. There were three of us at this computer so I ended up feeling that I didn't know how I would remember just watching somebody do it."

Learning Preferences

The group type in this case was E/INFJ (participants were equally distributed between the preferences for extraversion and introversion) with six different types being represented by the participants (see Table 8). Four types, INFJ, ENFP, ESTJ, and ENFJ, were represented by multiple faculty members.
Participants were equally split in the E/I dichotomy (6-6) while the other dichotomies were relatively unbalanced S/N (3-9), T/F (4-8), and J/P (10-2). The majority of the faculty participants in the study identified access to workshops on the use of technology as an important avenue for learning to use technology in their teaching. However, different aspects of these workshops were important to different faculty participants based on their learning preferences. Those who preferred extraversion identified the value of learning with others and sharing ideas while those with a preference for introversion liked the one-on-one assistance they were afforded during the same workshops. Faculty in the College of Education were ecstatic with the personal attention they received from graduate students under a grant through the Educational Technology Department. Those who preferred extraversion liked the ability to bounce ideas off of these technology experts while those with a preference for introversion liked the intimacy afforded them in the one-on-one setting. When asked about the difference between workshops on technology they had taken and their

<table>
<thead>
<tr>
<th>ISTJ</th>
<th>ISFJ</th>
<th>INFJ</th>
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<tbody>
<tr>
<td>En</td>
<td>En</td>
<td>En</td>
<td>En</td>
</tr>
<tr>
<td>ISTP</td>
<td>ISFP</td>
<td>INFJ</td>
<td>INTJ</td>
</tr>
<tr>
<td>ESTP</td>
<td>ESFP</td>
<td>ENFP</td>
<td>ENTP</td>
</tr>
<tr>
<td>ESTJ</td>
<td>ESFJ</td>
<td>ENFJ</td>
<td>ENTJ</td>
</tr>
<tr>
<td>Ed</td>
<td>N</td>
<td>Ed</td>
<td>Ed</td>
</tr>
</tbody>
</table>

Ed = Education, En = English, N = Nursing
experience with the assistant they explained, "Because it is a sustained experience and because those were like a shot and then you’re out. Whether you have a person there helping you for a little period really didn’t make much difference for me. What really makes a difference is having (him) come in once a week and help me."

Faculty with a preference for intuition liked the ability to see how others were using the technologies in their teaching, to see the possibilities. The ability to have hands-on experiences in their endeavors to learn to use technology in their teaching was important to all faculty regardless of their preference and it was extremely important to those faculty participants who had a preference for sensing perception.

A participant with a preference for thinking described how attending conference presentations on technology assisted her as she learned to use new technology in her teaching. "Because being a very linear thinker I’m not... creativity doesn’t come all that easy to me and I don’t see great advantages in using it exactly like I deliver course instruction now. If I’m going to spend time with it I want to do some new and creative things. I want to make it worth the effort. So some conference presentations I’ve found to be very motivating because they showed me some of the real advantages." Another faculty participant with a preference for feeling noted her motivation for learning to use technology in her teaching. "I got a lot of emails from students saying ‘Thank you for putting your lecture notes up on WebCT.’ They said we really appreciate the time and effort you took to do this." As with most faculty who have a feeling
preference she was interested in developing a harmonious classroom and providing avenues for her students to learn.

Faculty with a preference for judgment are interested in having a clear plan that provides organization. One participant in this case discussed her motivation for moving her classes toward use of the web. "For me, this course I do, the efficiency is just unreal. I think it is an atypical kind of course. But I just think it's a very efficient use of my time."

Another faculty participant with a preference for perception was also moving toward more web-based instruction for a totally different reason. "I have assignments that require the students to use the Internet. I even have an Internet assignment for them to go online and look up web sites related to multicultural education for example. I want to give them options."

This is an example of two faculty who are using the same type of technology in their teaching but for totally different reasons.

Support for the Use of Technology

Although faculty did not find institutional leadership unsupportive, they believed the support was strictly financial and lacked a comprehensive strategy for assisting faculty to learn to use technology.

Faculty noted varying levels of support and planning by their various colleges, schools, and departments from the department chair having a strategic plan for integrating web-based methods and hands on development of lessons to
a school dean who seeks to hire faculty for their expertise in technology but does not use any technology in his teaching.

Faculty participants found the most support for their efforts to learn to use technology in their teaching from colleagues. Almost every participant recalled specific incidents when other faculty members had assisted with a problem or showed them a new way to successfully use technology to produce better learning for their students.

The institution ranked in the top five institutions in the nation of being wired for using digital technologies (The Digital State, 1998). This supports the faculty perception that, “There is a lot of talk and everyone knows it is important but if the university were more committed to it they would really have a central computing center,” and “overall I don’t think there is much support. I don’t think there has been the kind of commitment to build in technology in all areas of the university as there should be.”

All four participants from the College of Education felt there was at least a moderate level of support from the institution. All identified workshops and seminars offered by a faculty development unit or assistance provided by the Information Technology services organization as the most notable support from the institution.

While they believed the faculty support unit offered a “more than adequate” number of workshops and seminars, two participants identified lack of time as a prohibiting factor for learning to use technology. One faculty member noted that in a workshop she attended there were faculty from community
colleges and she gained from their participation because they "are doing a lot more with integrating technology because they're so student centered and their primary focus is on students."

All four faculty participants in the College of Education identified the greatest source of help in their endeavors to learn to use technology in their teaching as the Educational Technology Department within the college. Participants from various departments in the College acknowledged attitudes to the effect, "the department really acknowledges it's usefulness and would give us whatever support they could." Another participant identified colleagues who were, "willing to share and are very supportive." Education faculty felt support was better at the college, school, and department level than the institution level. All participants identified assistance they had received from graduate students who were supported by a grant in the Educational Technology department as being key to their ability to learn to use technology in their teaching.

One faculty member considered a one-class release to learn technology as being very meaningful support. Another participant related her perception that as older faculty retire and younger faculty members are hired support for integration of more technology into the classroom gets stronger.

Three of the four participants in the College of Education identified colleagues as being supportive in their quest to learn to use technology in their teaching. The support provided by these colleagues ranged from assistance with specific issues and techniques to moral support.
The sense of support was somewhat proportional to the technological ability of the participant. The greater the ability in technology, the less likely they were to receive help. The faculty members with advanced skills were more likely to provide assistance rather than receive it. As one faculty proficient in the use of technology noted, “I’m further along, in part because of my background and that’s fine.”

All participants in the English department expressed a lack of support from the institution. The perception of this group of faculty is that the institution does not have a commitment to build in technology in all areas. One participant’s comments fairly summed up the feelings expressed by everyone. “I think there is a real desire for it but I haven’t seen real products.”

The majority of support at this level appears to come in the form of reactive, rather than proactive, support and much of it in the form of purchasing equipment. With the exception of one faculty member who used very little technology, all faculty participants identified strong departmental support.

In the words of one faculty participant in reference to support from the college, school, or department, “Here I feel much more satisfied.” The college that supports the English department has made technology a priority by converting traditional classrooms and labs into computer labs and computer classrooms. Much of the funding for this initiative has come from federal grants developed by faculty.

Once hardware and software are acquired, the college provides instruction on using the new tools. According to a chief administrator of the
college, "We have hired people specifically for their technology skills. They are some of the most exciting kind of people. They are young and fresh and have new ideas and people find that attractive so they might win converts that way."

The process for determining what technology projects receive funding appears to be open as one faculty member stated, "When I do ask for things I generally get them or I know why I can't get them.

However, by far the strongest feelings of support and acceptance of the use of technology were attributed to colleagues as noted by comments such as, "(colleagues) that's where I've learned from the most," and "I get a lot of moral support. I get a lot of people who are glad that this is going on." Faculty members in this department also noted varying degrees of support from colleagues based on their technological skills. However, all of these participants acknowledged support for the use of technology in the classroom by their colleagues. One faculty member noted that "junior people who are using it (technology) as a kind of a way to distinguish themselves. It's a skill that they realize can make them indispensable and they learn it fast."

Another participant noted the downside of being indispensable, "...you wind up becoming just vapor in a box, whenever someone has a downloading problem or whatever, and you don't know how to say you're sorry, call someone else." He also noted this was in part a result of lack of technical support that should be provided by the larger institution. A third faculty member said, "That's where I've learned from the most. He (a colleague) was good because he would come in and say "turn on the switch" he was at our level."
Similar to the College of Education and the English Department, participants in the School of Nursing indicated university support for technology came from faculty development and information technology support units.

Two participants noted positive experiences in workshops taken at the development and support units. One faculty member noted "...has wonderful people who are very responsive. No question is too stupid even if I have to repeat this to you a zillion times."

As with the other colleges, schools, and departments in this institution, leadership in the School of Nursing has made the use of technology a priority. This was evidenced by allocating time, either in class release time or paid faulty overload hours, for faculty to receive training in new teaching methods using technology. This training has occurred mainly when new equipment or software has been delivered.

All faculty in this school noted the numbers of information technology support personnel that were provided by the school were more than adequate. However, all participants felt these personnel could be more helpful to faculty as they learned to use technology. Software is selected by support personnel and not by the faculty that want and need to use it. Faculty felt their access to software, such as Microsoft Word and Excel, is prohibited due to the control of the support staff. As one faculty member noted, "The system is difficult. I don't think it is very conducive to learning in my opinion to help making it a user-friendly environment...there is a lot of controversy about which programs should go on it and who has control of it."
When relating her feelings about departmental support said, "We have computer specialists who are there. They could be tremendously more helpful but they're not. On paper it looks really terrific. So we manage ourselves pretty much." Another faculty member corroborated this when she noted, "Now within our own department, it has been very difficult to get assistance with our computers even though we have several specifically hired only to do that. It doesn't seem like it's enough because it took me a year and a half to get an upgrade on a program that I asked for. If I have a problem with my computer it might take weeks for someone to come look at it." However, all members noted there was strong support for the use of technology by the department chair.

Much like the other colleges, schools, and departments, participants in the School of Nursing perceive a great amount of moral support from their colleagues in their quest to learn to use technology.

When discussing the backing they received from colleagues all participants agreed they felt most supported and as one faculty member said, "There is a lot of moral support. The cadre of us that went to those things (workshops) are very helpful. And I think because we all learned together we all supported each other." Another participant noted, "We are working on this strategic plan for distance education. That is something the faculty decided we should do and we are working on it right now. There's discussion and talking. So we have that kind of thing, generally the notion when we actually get down to what we are going to do, we certainly try to get buy in from everyone." One faculty member felt she gave more technology support than she received but was
very willing to give that support and identified a few software programs that she had received help with from colleagues.

An administrator in this school noted “Our school supports distance education because they provide me, 20% time to be the distance ed person. We are working on this strategic plan for distance education. That is something the faculty decided we should do. We have a show and tell at the end of the period. You learn from other people and can give feedback.”

CROSS CASE ANALYSIS

There were several similarities between the institutions represented in these two case studies such as the use of workshops for basic introduction to technology applications and a frequent use of one-on-one help to actually implement the use of technology in teaching. The single greatest difference in the two cases was the perception of faculty involving the leadership support for the use of technology in teaching provided at each institution.

The use of workshops at both institutions was similar. Workshops were announced on a regular basis through multiple media. Although every faculty participant in each case had attended at least one workshop to learn about using technology, the overall rate of attendance differed greatly between the two cases. Average attendance at institutionally sponsored workshops for Case One was over three workshops annually while faculty participants in Case Two attended less than one workshop annually.
Seminars were also offered in both institutions but were used sparingly and with similar results. Faculty who participated in seminars believed the absence of hands-on practice after presentations hindered their learning of the technology being presented. However, faculty participants in Case Two valued the diversity of experience and of organizational participation afforded to them in seminars. Geographical constraints prohibited such a wide diversity of participation in Case One.

Faculty participants in both institutions were afforded the ability to use one-on-one help. In Case One the one-on-one help was unstructured with the exception of the English Department, which used a semi-structured approach by scheduling monthly sessions to include lunch. In Case Two the one-on-one assistance was also unstructured with the exception of the College of Education which used a grant to offer the assistance of technologically capable graduate students in the Educational Technology Department who were paired up with faculty in the college. As one faculty member noted, "What really makes a difference is having (him) come in once and week and help me. We have it scheduled every Thursday morning." While all faculty members believed these one-on-one sessions were valuable, in both cases faculty who participated in the structured one-on-one sessions appreciated the dedicated time that they may not otherwise set aside to learn to use technology.

One-on-one assistance from other faculty members was a rich source of help in Case One. As one faculty participant noted, "There's a fairly good expectation that we are here to help each other." This philosophy was echoed by
faculty participants in each college/school/department in Case One. In contrast, participants in Case Two were more reluctant to seek assistance from peers. Although at least one participant in each college/school/department noted reluctance, three of the four faculty participants in the English Department, said, "People are so busy, I don't like to intrude on their time."

The ability to find learning opportunities that matched learning preferences did not appear to be an issue in either case. Workshops were sufficiently small to allow trainers to provide activities that met a variety of learning preferences. The key to success for the workshops was the ability for participants to have hands on practice to solidify their new knowledge of a particular technology.

The extensive use of one-on-one learning opportunities facilitated trainers' abilities to provide meaningful learning activities for faculty participants. Faculty members who participated in these activities were almost always extremely satisfied with the outcomes and would often schedule one-on-one sessions even after participating in workshops or seminars.

Faculty participants in both cases gravitated toward the opportunities that best met their learning preferences. Those faculty with a preference for extraversion would gravitate toward workshops or sessions with multiple participants whereas those with a preference for introversion were more likely to chose one-on-one opportunities or learning via the web.

The major difference noted in these cases was in faculty perceptions of leadership at the institutional level. Faculty members in Case One believed they
had overwhelming support by the highest leadership of the institution. At least nine of the twelve participants could identify speeches or times when they had talked to the Chancellor about the use of technology in their teaching. Comments such as, “There is tremendous support provided,” “There is more support available than I have time to take advantage of,” and “Incredible support,” were common among all faculty members. There was not a single faculty participant who made anything less than glowing remarks about the support received at the institution level.

Faculty members in Case Two were less enthusiastic about the amount of support they received from institutional leadership. Comments ranged from, “I think over the years there has been a fair amount available through the Office of Faculty Development,” to “The answer is really none.” One senior faculty participant noted, “There is a lot of talk and everyone knows it is important but if the university were more committed to it they would really have a central computing center.” Even in cases where there were cases of valued learning opportunities at the institutional level, faculty did not tie these opportunities to support at the highest levels of the institution.

The faculty perception of support for the use of technology at the college, school, or department level was also similar, and positive in both cases. While Faculty participants in Case One saw the support at this level as a continuation of the support from the top level, those faculty in Case Two saw a much greater level of support at this level. In each case respondents identified specific
activities and policies that promoted their learning and use of technology in their
teaching.

Virtually all faculty participants in both cases believed their colleagues provided invaluable support. There was a genuine sense of collegiality and a desire to share knowledge of new technology and pedagogical concerns as well as what had worked in the classroom.

SUMMARY

This study looked at three major areas as faculty learned to use technology in their teaching: the importance of a variety of methods available for learning to use technology in teaching, the ability of these methods to meet the learning preferences of the participants, and the role of support, not only in helping faculty members to learn to use the technology, but also in their desire to use it in the classroom. In both cases studied the methods used in teaching new technology generally met the needs of a variety of learning preferences held by the faculty participants. In many cases a well thought out workshop attended to the needs of those with different learning preferences. When workshops were not an option due to time constraints or a desire for more individual assistance, one-on-one help was available from several sources.

The effect of the perceived support provided by leadership at each institution was evident and had a great bearing on the socialization process for faculty learning to use technology in their teaching and in their actually using it in their instruction.
CHAPTER V. SUMMARY AND CONCLUSIONS

This dual case study focused on how faculty in higher education learned to use technology, the role of the socialization process in the willingness of faculty members to use technology in the classroom, and how opportunities for learning technologies matched the learning preferences of faculty. This chapter summarizes the study, discusses the findings of the study in terms of each of the research questions, and discusses implications for further research, theory and practice.

Summary of the Study

Competition is growing between institutions of higher education with more and more pressure being generated by a variety of sources (Menges, 1987; McNeil, 1988; and Reese, 1994). Much of this pressure is being put on faculty to deliver quality teaching (Reese, 1994 and Levine, 1997) by students who are more discerning consumers and demand better quality teaching (Reese, 1994; Baker and Gloster, 1994; and Levine, 1997). Reese (1994) and Astin (1997) point out faculty are a major influence on the quality of education and higher quality teaching can significantly impact enrollments and attrition.

Technological tools can provide faculty opportunities to develop new strategies for learning. Frayer (1999, p. 10) notes, "Technology can enhance learning by fostering the active processing and application of new ideas and by providing opportunities for students to engage in dialogue about ideas with their
peers outside of class time.” However, Saltrick (1996, p.59) observed, “College faculty make up one of the most plugged in professions in their use of technology for research and one of the most retrograde in their use of technology for teaching.”

This study sought to explore the ways faculty in two institutions of higher education learned to use technology in their teaching, how these avenues of learning match preferred learning styles, and how the socialization process affected faculty in their quest to learn and to use technology in the classroom. An understanding of these issues may help administrators and those involved with faculty development in creating and implementing avenues for learning technology and supporting its use in the classroom.

Discussion

Methods for Learning

The study sought first to identify the experiences of faculty in two institutions of higher learning as they learned to use technology in their teaching. Meltzer and Sherman (1997) identified professional development opportunities as generating the constructive implementation of technology if these opportunities are well developed and focused. However, Bruenjes (2001, pp. 4-5) noted, “Historically, the most underrated support area related to the integration of technology into the learning process is that of pedagogical support.” This is consistent with the findings of this study for Case Two but not for Case One. In this study, workshops, seminars, one-on-one experiences with technology
experts, programmed sharing sessions, and serendipitous sharing among colleagues all assisted faculty members in their quest to learn new technologies and supported their efforts to use these technologies in the classroom and in a variety of ways to aid student learning.

Faculty participants identified workshops as the most common method for learning to use technology in their teaching. This supports the findings of Newson (1999) and Frayer (1999) as they noted workshops are the most common medium for imparting knowledge on the use of technologies for learning. The majority of these workshops were offered by faculty development units, information technology units, or by organizations that were tasked with faculty development as part of their charter. In the two cases studied, workshops were differentiated from seminars by a time for hands-on practice built in.

The perceived value of the workshop, in most cases, was directly tied to specific skills learned and practiced during the workshop. Promoting, even marketing, of workshops is an important factor in gaining faculty attention to these venues for new learning. All twenty-five faculty participants in the study noted the variety of demands on their time and energies. Many were not aware of all the opportunities afforded them and only noticed those brought to their attention, usually through email.

Fifteen of the faculty participants in this study pointed to timing and location of workshops as an important factor in their decision to participate. Short notices and workshops held in a far corner of the campus did very little to promote attendance among faculty. Faculty have many demands on their time.
not only from teaching duties but also in the areas of research and community service. Workshops of one-half day or less or multi-session workshops, with sessions held over a period of days seem to overcome these time constraints better than workshops lasting several days.

Seminars differ from workshops in that the main objective is strictly to demonstrate capabilities of technology or to give an overview of technology tools but no hands on time is provided. While several faculty found attendance at seminars to be somewhat helpful it was from the standpoint of providing ideas for implementing technologies and not on the hard skills required to actually use the technology for teaching. Seminars satisfy an important goal for success as identified by Frayer (1999, p. 11) who noted, “Creating opportunities for faculty to learn about successful uses of educational technology on their own campus facilitates communication with adopters (a social variable identified by Marcus as important in promoting adoption of technology). Faculty can discuss the impact of technology on student learning and motivation, the amount of work required to develop and implement applications, and the perceived value.”

Several faculty participants in this study confirmed this idea when they declared the value of participation by a wide variety of faculty, from different schools, colleges, or departments and even from different institutions. This provided maximum input on the possibilities for using the technologies being demonstrated or under discussion. Eleven faculty in this study appreciated the innovative ideas shared by both presenters and fellow participant at seminars. Some faculty members appreciated the overview aspect of seminars and further
explored the capabilities and intricacies of use on their own after the completion of the seminar. However, care must be exercised to avoid overloading participants by demonstrating too many bells and whistles as experienced by at least two faculty members in this study.

Any time faculty members can receive one-on-one assistance in learning a new technology they will usually learn more than if they are sharing time for attention with others. This concentrated attention allows faculty and technology experts to focus on developing technology tools to enhance instruction targeted specifically for courses taught by the individual faculty member.

Matching methods of training to the learning preferences of faculty members can greatly enhance the transfer of knowledge and skills. This was confirmed by Bruenjes (2001), p. 28) when she said,

"A number of prominent professional development researchers (Bruce & Rubin, 1993; Cranton, 1996; Joyce & Showers, 1995; Fullan & Stiegelbauer, 1991; Sparks & Hirsch, 1997) have studied the individual developmental learning process of educators involved in faculty development. Cranton reports that while all people have the capacity to transform, ‘the way they go through this (the transformative learning process) is likely to be dependent on their character and their preferences’ (p.139). Sparks and Hirsh (1997) went even further when they suggested that educators who are offered the opportunity to learn through the
process of thinking, creating, and constructing their own knowledge are more likely to adopt new teaching practices."

Faculty learners who are able to learn using methods they prefer are more likely to become actively engaged in learning to use technology to improve learning for their students. One-on-one training limits the need for trainers and technology experts to be concerned with meeting a wide variety of learning preferences and allows the trainer to match training techniques to the preferences of the individual faculty learner.

Twenty-one of the twenty four participants in this study identified one-on-one training as an important venue in their quest to learn to use technology in their teaching. These faculty spoke to the value of the time spent in these one-on-one sessions. In many instances the trainers came to the faculty. This has several advantages for faculty members. Travel time to and from training was eliminated, allowing faculty to use their time more efficiently. Faculty were also able to learn in their own environment, using their own equipment. This negated confusion that often occurs when faculty use equipment that is not like their own and allows trainers to identify anomalies in information technology systems. Faculty are afforded a distinct sense of accomplishment and security with the knowledge they are performing with their own system. This is especially important for faculty who are new to using technology in their teaching. They are much more likely to use technology if they experience success with technological tools soon after they begin to use technology in their teaching.
Another method for learning technology that is somewhat of a cross between workshops and one-on-one is programmed sharing sessions. These sessions are normally led by faculty members who share information with small groups of colleagues or even one-on-one with other faculty members. Programmed sessions can vary in length but are normally no longer than several hours and can be as short as a lunchtime. The sessions can be held to demonstrate uses of technology or they can include hands-on interaction to allow participants to practice what they learn. There are several benefits to this strategy. Faculty members usually understand what other faculty are experiencing as they learn to use technology in their teaching. This knowledge enables the presenters to zero in on the key issues, knowledge, and skills necessary for a successful session. There is usually greater acceptance from faculty members because one of their own is presenting the information. Since many of these sessions draw faculty from the same department the presenters are able to focus on what works for a particular curriculum and participants are able to visualize and experience how the use of technology can work in their classroom. Faculty presenters can also address the pedagogy related to the use of technology. This is an important issue sometimes not covered by technology experts but is extremely important to faculty.

One department in this study used this venue very effectively and held sessions monthly with the department providing lunch for participants. This was considered extremely valuable by several of the participants because they could count on gaining insights to problems they had encountered and could also
conduct a dialogue with their colleagues concerning related challenges with use of the technology under discussion. Participants noted the inclusion of technological considerations, effective pedagogy, and real-world applications as being especially effective as they learned to use technology in their teaching.

The final venue to discuss is unplanned sessions. These are normally between colleagues but can also include a small group of faculty members. They often occur when faculty discover a technological tool or pedagogical technique using technology that is effective in their teaching. If there is a culture of sharing in the department and faculty have experienced a willingness to share among their colleagues they, in turn, are usually willing to share their findings with others. The sessions can also occur when faculty are seeking ways to successfully use technology in their teaching and ask colleagues for help or learn of a colleague who has used technology effectively and wishes to learn from them.

Unplanned learning sessions occurred in each and every school, college, or department in this study. In many cases faculty found these sessions to be the most valuable in learning technological tools and techniques that could enhance the learning of their students. Faculty in this study noted this method of learning as the easiest for problems that were limited in scope. However, Thirteen faculty participants said they would avoid asking others too frequently as they felt this was an invasion of their time.

Many of the advantages of programmed sessions also apply to unplanned sessions; an understanding of what other faculty are experiencing as they learn
to use technology in their teaching; ability to key in on the important issues, knowledge, and skills; acceptance from faculty members; focus on a particular curriculum; and addressing the pedagogy related to the use of technology. Since many of these sessions also tend to be one-on-one, many of the advantages associated with that model also apply; individual attention; opportunity for hands-on practice; and use of their own equipment.

The least used method for learning to use technology in teaching is learning on one's own by reading manuals, using on-line help, and using self-help texts. While several participants in the study noted using this method occasionally, it was usually as a last resort when no other medium for learning existed. Those faculty who had tried this method of learning noted it was very time consuming and they were not totally successful in meeting their needs. Most eventually sought out help from technology professionals or from colleagues who had experience in the technology they were trying to learn.

No matter how well planned and effective any of the methods for learning new technologies and pedagogies for using these technologies are, there is little chance for actually incorporating them into the classroom unless there is support from leadership and from colleagues.

**Effects of Socialization**

The second aim of this study was to explore the support for technology provided by leadership from various levels of the institution. In their study of technology used by faculty in higher education Gilbert (1996) and Graves (1998)
agree that support is a significant ingredient for success. Byrom (1998) reports, "leadership is the single most important factor affecting the successful integration of technology" (p. 16). It was clear that participants in this study were influenced in their desire to use technology in their teaching by the level of support they received from all institutional levels. This included support for the various methods for learning to use technology discussed earlier as well as support provided through other means such as class release, funding for new equipment as well as planned upgrading of equipment every few years, special extended training sessions, and stated support through speeches, strategic plans, and other media available to faculty throughout the institution.

Frayer (1999) noted that one of the important factors that influence faculty use of technology is support from higher administration, chairpersons, and deans. Participants in this study mirrored this factor. Faculty made a distinct differentiation between institutional leadership at the highest levels, such as the president or chancellor and those at the school or college level, and those at the department level.

Leaders at the highest levels of the institutions set priorities for the institution and must allocate funding based on these priorities. Funding at this level normally includes information technology infrastructure systems or institution wide systems such as wide area network (WAN) or local area network (LAN) cabling, servers, and associated software and computer labs available to all faculty and students as well as the expertise to maintain these systems. Faculty expect these systems to work most of the time and do not necessarily
think about them unless they are broken. Information technology units and faculty
development units are often funded at the institution level. It is interesting to note
that most faculty in one case of this study did not perceive strong support at the
institution level but identified very good support in the form of workshops offered
by the faculty development unit. In both cases workshops for using new
technology were offered by both faculty development units as well as information
technology units, although the latter was better known for addressing hardware
and software problems encountered by faculty.

Faculty perceptions of leadership support for critical areas of importance
are often driven by the amount of attention given by the president or chancellor
not only through funding but also in speeches and planning documents. The
overall faculty perception concerning support for the use of technology for the
cases in this study spanned both ends of the spectrum. In one case technology
was almost always noted in speeches by the chancellor of the institution. A key
theme in these quarterly speeches involved the pedagogical issues related to the
use of technology in teaching, a key concern of faculty as noted earlier. Many
faculty noted conversations with the Chancellor on this issue. Every faculty
participant perceived a great amount of support by institutional leadership and
provided specific actions as evidence of this support. In the other case
technology was noted in the most recent strategic plan and there is a strategic
plan for information technology. However, the stated aim was to increase access.
While no speeches from the president were available, faculty participants could
not recall the issue addressed in any forum with the president.
Butler and Sellbom (2002) identified three factors that are barriers to adoption of technology. The top leadership of an institution mostly controls the first factor, lack of institutional support. The second factor, lack of financial support, can be somewhat controlled by top leadership as well as leadership at the college, school, and department level. The third factor, lack of time to learn new technologies, is mostly under the control of leaders at the college, school, and department level. Deans and department heads have the ability to grant class release to allow faculty members to work on the implementation of technology in their teaching.

Leaders at the college, school, and department level may be responsible for information technology support and support of faculty implementing technology in their organizations. The level of responsibility for these organizations varies from institution to institution. Most faculty participants in this study perceived support for the implementation of technology in their teaching from this level of leadership. Their perceptions were based on support for training through workshops, seminars, one-on-one training, and programmed sessions as well as information technology support services budgeted at this level of the institution. Levels of support at the school, college, and department levels varied not only between institutions but also within institutions. In both cases some schools, colleges, or departments had budgeted for dedicated information technology specialists assigned to the organizations.

Leaders at this level have the opportunity for greater influence on how faculty in their organizations learn to use technology and, in the end, actually use
technology in their teaching. Deans and department heads are better able to keep their fingers on the pulse of learning activities from both the perspective of faculty and from the perspective of students.

Stated support for the use of technology by leaders at the college, school and department level can be just as important as it is for the top leaders of the institution. This support may be stated through addresses to faculty, organization wide papers or notes, and strategic plans. All faculty participants in this study perceived at least a moderate, if not strong level, of support from college, school, and department leadership. However, it should be noted that stated support without actions to implement this support can be very noticeable at this level of the institution.

It may be possible for leadership at the college, school, or department level to make a significant impact on faculty's use of technology even without full support at the institution level. To achieve success under these conditions deans and department chairs must be willing to allocate necessary resources to assist faculty as they learn to use technology and implement its use in their teaching.

While leadership at the highest levels of an institution as well as leadership at the college, school, and department levels are key players in the socialization process and its effect on the desire and ability of faculty to implement technology in their teaching, a key piece to the puzzle is the informal leadership exhibited by peers. Every faculty participant in this study identified colleagues as playing important roles in their desire and ability to both learn and especially implement technology in their teaching.
Faculty view the actions of colleagues and the success or failure of these actions on a daily basis. They hear colleagues discuss workshops that were particularly helpful in their learning to use specific technologies, they discuss implementation strategies, and they may even observe or participate in the actual use of technologies in the classroom. With very few exceptions, participants in this study mentioned colleagues who had helped them with particular problems as they used technology in the classroom and those faculty who were innovators in using technology told of their efforts to share their knowledge and experiences with others.

Several participants said they would ask peers for help more often but felt guilty about imposing on their time. Baldwin (1998) notes, "it is critical that mainstream faculty have access to training, time to learn and work with the technology, and adequate support (technical, pedagogical, and scholarly) when it is needed" (p. 16).

As previously noted time is a critical resource that must be considered in supporting faculty as they learn to use technology in their teaching. Implementation of technology means educators “typically face a complex challenge of meshing new ideas with well-established beliefs and practices” (Bruce, 1993, p. 9). Several participants in this study identified time as a major reason for the lack of pursuit for learning and implementing technology in their teaching. Institutional leaders can promote the use of technology by providing faculty with dedicated time for learning new technologies and time to develop and implement strategies to use these technologies in their teaching.
Implications for Theory and Practice

Findings from this study highlighted the importance in providing a variety of methods and support for faculty learning to use technology in their teaching. While it was clear participants in both cases had access to a variety of means for learning technology, several chose either not to take part in these opportunities or to participate in a limited number of learning events. The main reasons given were lack of time or a belief that use of technology would drastically change the way they taught and they could not see how technology would greatly improve learning for their students.

Faculty who took part in the various forms of learning opportunities all expressed the importance of opportunities for hands on practice of new techniques using technology applications. Faculty development and information technology units responsible for providing learning opportunities for faculty in the technology arena can provide more meaningful sessions if they ensure objectives are clearly stated, each participant is provided with tools for adequate practice, and opportunities for discussion of pedagogical issues are part of these opportunities. While the objective of seminars is to impart information on the capabilities of technology they would be more effective if participants are allowed to question the presenters and other participants on the applications of the technologies in teaching and when offered in conjunction with follow on workshops or other opportunities for participants to practice and gather more detailed information about the technology being demonstrated. Even participants
in one-on-one learning opportunities, both learners and trainers, would be well advised to keep these suggestions in mind.

Many faculty members take part in various opportunities to learn technology. However, they do not always transfer their new knowledge to learning opportunities in the classrooms. While faculty may learn new skills in using technology they are not always provided with pedagogical knowledge needed to apply the technologies to produce better learning opportunities for students. However, receiving the pedagogical knowledge does not ensure transfer to the classroom either. Lack of leadership support can also inhibit the transfer of technology into the classroom.

Leadership support is an extremely important factor in effecting the transfer of technology to actual use by faculty. Support can be provided by developing plans for acquisition and maintenance of information technology equipment, training of faculty in the use of these technologies, and establishing policies that support faculty in their learning and use of technology such as dedicated time and inclusion of technology efforts in tenure reviews. As evidenced by the difference in the perception of leadership support for use of technology in the two cases in this study, leadership at the highest levels of the institution would be well served to publicly express their support for the use of technology and promote the availability of learning opportunities.
Implications for Further Research

As stated in the literature review, technology offers the opportunity to provide greater access to higher education and fundamentally change the nature of college teaching. While there have been numerous studies conducted in the use of technology in the K-12 arena, more current research is needed on the availability of technology learning opportunities for faculty in higher education, the effectiveness of these opportunities, and the role of institutional leadership in providing an environment conducive to learning and implementing the use of technology in faculty teaching.

The methodology for this study focused on looking at the participants in the two cases as both separate faculties in two institutions and together as faculty in higher education to identify their shared experiences and common themes. As this was done, awareness of the importance of the role of institutional leadership in providing support for learning opportunities and especially for implementation of technology in teaching was highlighted. Researchers (Bruenjes, 2001; Butler and Sellbom, 2002; and Maddux, Cummings, and Torres-Rivera, 1999) have indicated leadership support is a critical factor in implementing the use of technology into the classroom and other venues such as online learning. It would be interesting to study a larger group of institutions to understand what actions their leaders have taken that has led to positive perceptions of their faculty and fostered implementation of the use of technology into their teaching.
Although this study looked at faculty participants in their roles of learners of new technologies, there were at least two faculty members who also functioned as providers of technology learning opportunities. Frayer (1999) identified faculty who have successfully used technology in their teaching as learning facilitators for fellow faculty members. Further research into this role of faculty would provide valuable insight into successful adoption of the use of technology in teaching. More research including a larger study group would also help to determine how well different methods for learning to use technology; workshops, seminars, one-on-one, and self-study, meet the needs of faculty with regards to their differing learning preferences.

Faculty participants in both cases who were self-described low users of technology noted the absence of dedicated equipment in classrooms or difficulty in acquiring necessary hardware as reasons for not using technology in their teaching. Both institutions studied are now in the early stages of implementing wireless technology into classrooms. Further study may indicate the importance of this technology in promoting the use of technology in teaching.

Conclusion

There is growing pressure on faculty in higher education to use technology to deliver quality teaching. There are several ways, such as workshops, seminars, one-on-one experiences, and peer sharing, for faculty to learn to use new technologies. All of these methods of learning can be effective if they take into account faculty participants' learning preferences and provide opportunities
for hands on practice of newly learned applications and techniques. Meltzer and Sherman (1997) identify pedagogical support, how to use technology to foster learning, as another key area that is usually lacking.

The socialization process can have a profound effect on how faculty in higher education implement technology into their teaching. A pivotal ingredient in the socialization process is leadership and Bruenjes (2001, p. 3) identifies this as, the single most important factor affecting the successful integration of technology as a teaching and learning tool," while Butler and Sellbom (2002) and Frayer (1999) describe leadership as one of the most important factors in faculty successfully adopting technology. Leadership support can come in many forms to include, publicly stated support for the use of technology, budgetary support through equipment and infrastructure, dedicated time to learn to use new technology, and inclusion of technology use in processes such as tenure review.

This exploratory study sought to better understand a group of twenty-five faculty members teaching in two institutions of higher education as they learned and implemented technology in their teaching. These faculty members were passionate about their commitment to offer the best possible learning opportunities for their students and actively sought to improve their instruction.

My role as a researcher was to give voice to their concerns and their successes as they learned to use new tools for their teaching. As I listened to their stories, I gained a sense for their passion for teaching and their search to foster learning in their students. I have a greater appreciation for both their struggles and their joys in learning to use an ever-increasing number of new
technologies that provide great promise in expanding the tools available for use by master craftsmen of minds, faculty.
APPENDIX A: Questions for Email Survey

1. How many years have you been teaching at an institution of higher education?

2. In how many institutions of higher education have you taught?

3. How many full time faculty members are in your department?

4. How would you define technology as it refers to your professional life?

5. In what aspects of your professional life do you use technology?

6. Are you willing to take part in a study?
APPENDIX B: Questions for MBTI Learning Style Interviews

1. Based on what you have read about the learning style that you scored on the indicator, does it reasonably describe the way you learn?

2. In what ways do you learn differently than described by the indicator?

3. (Based on response to question number two, a series of questions can be asked to help the participant determine the "best fit" learning style.)
APPENDIX C: Questions for Learning Technology Interviews

1. How much support do you feel you receive from the institution in your efforts to learn to use technology in your teaching?
2. What types of support do you receive from the institution?
3. How much support do you feel you receive from your department in your efforts to learn to use technology in your teaching?
4. What types of support do you receive from the department?
5. How much support do you receive from your colleagues in your efforts to learn to use technology in your teaching?
6. What types of support do you receive from your colleagues?
7. Have you found that certain colleagues become experts in certain things?
8. How do you use technology in your teaching?
9. How did you learn to use the technology for teaching?
10. What would you say was your greatest frustration when you were trying to learn technology?
11. What would you say was your greatest satisfaction when you were trying to learn technology?
12. Do you feel you could have learned to use that technology better if you had learned it in a different way?
13. Do you use technology in some courses more than others?
14. What are the circumstances that cause you to use technology in some courses more than others?
15. Do you feel your teaching would be more effective if you used technology more?

16. Are there any circumstances that would cause you to want to use technology more in your classes?

17. What technology would you like to use in your teaching that you don't currently use?

18. Are you aware of, or have you found, that there are faculty who use technology just for the sake of using it?

19. Is there any technology that you would like to use that you don't currently use?
APPENDIX D: Data Analysis Nodes With Common Data by Case

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<tr>
<th>NODE</th>
<th>DATA</th>
<th>CASE 1</th>
<th>CASE 2</th>
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<tr>
<td></td>
<td></td>
<td>Education</td>
<td>English</td>
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<tr>
<td>TECHNOLOGY USE</td>
<td></td>
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<tr>
<td>audio-video</td>
<td>I use videos regularly to stimulate discussion</td>
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<td></td>
<td>We really start relying on the computer for the email, trying to</td>
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<td></td>
<td>make the technology work for the benefit of both the student and the</td>
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<td></td>
<td>email institution</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Powerpoint</td>
<td>I like a lot about Powerpoint, being able to give students the notes</td>
<td>2</td>
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<td></td>
<td>on whatever is on the visuals.</td>
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<tr>
<td>Video Conferencing</td>
<td>We are broadcasting out to other sites. We usually have students</td>
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<tr>
<td></td>
<td>right in front of us but also there is three to four sites we are</td>
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<td></td>
<td>reaching out to.</td>
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<tr>
<td>Web</td>
<td>We need this if we are to develop off-campus or asynchronous</td>
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<td>programs.</td>
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<td></td>
<td>I use a web-based course component so that students would both get</td>
<td>4</td>
<td>3</td>
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<td></td>
<td>materials from me and also send materials to me.</td>
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<tr>
<td>LEARNING</td>
<td></td>
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<tr>
<td>Workshop</td>
<td>They have two components. They usually start with some sort of</td>
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<td></td>
<td>lecture and then do a hands on.</td>
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<td></td>
<td>I'm very much a hands on, I gotta do it or I can't learn it.</td>
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<td>3</td>
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<tr>
<td>One-on-one</td>
<td>As they need it, as it's important to them, that when I think the</td>
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<td></td>
<td>learning takes place.</td>
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<td></td>
<td>Because it was a sustained experience. What really makes a</td>
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<td></td>
<td>difference is having the help come in once a week and help me.</td>
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<td>Self I had to teach myself</td>
<td>1</td>
<td>2</td>
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<tr>
<td>SUPPORT</td>
<td>Institution</td>
<td>Encouragement wise, we are very much encouraged to make the best use of the technology that is provided to us. When I say encouraged, you hear discussions about technology and that's a biggie.</td>
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<tr>
<td>Institution</td>
<td>A technology unit of the university offered a two week seminar in the summer. (The two weeks) is a more engaging way of doing it.</td>
<td>3 3 3</td>
<td></td>
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<tr>
<td>Institution</td>
<td>It's not that they wouldn't provide the support if I asked for it but, it's always easier to ask people that are close by.</td>
<td>2 2</td>
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<tr>
<td>Institution</td>
<td>We didn't want to run in-house courses for faculty because it was duplicating a lot of stuff but we found out that faculty wanted it anyway because it was close by and it took less time.</td>
<td>2</td>
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<tr>
<td>Institution</td>
<td>I think there is a lot of talk and everyone knows it is important but if they were more committed to it they would really have a central computing center.</td>
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<tr>
<td>Institution</td>
<td>My sense is that people really haven't grasped the magnitude of the investment that technology demands.</td>
<td>2 3 2</td>
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<tr>
<td>Department</td>
<td>The college hires a support person or two.</td>
<td>1 1 2 3</td>
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<tr>
<td>Department</td>
<td>I'm getting a one-class release this semester and that's been good.</td>
<td>1 1</td>
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<tr>
<td>Department</td>
<td>We have a couple of students here that are here on a mini-grant that we have for our department.</td>
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<tr>
<td>Experience</td>
<td>Rating</td>
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<td>----------------------------------------------------------------------------</td>
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<tr>
<td>It has been very difficult to get assistance with our computers even though we have several specifically hired to do that.</td>
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<td>In my experience there is more of a tendency for faculty to go to local help as opposed to something like Colleagues the Faculty Center.</td>
<td>4 2 3 3 1</td>
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<tr>
<td>I get a lot of moral support. I get a lot of people sort of glad that this is going on.</td>
<td>1 3 1</td>
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</table>
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Lawrence, Gordon. (1993). *People Types and Tiger Stripes*. Gainesville, FL. Center for Applications of Psychological Type.


