

# **The Influence of Teacher Beliefs On The Incorporation of Instructional Technology By Higher Education Faculty**

(Abridged)

By: Susan Lucas Ph.D.



## INTRODUCTION

"I touch the future, I teach."

-- Christa McAuliffe

Christa McAuliffe, the schoolteacher who died aboard the Space Shuttle *Challenger* when it exploded in 1986, touched the future by being the first teacher to fly in space. McAuliffe saw teaching, through technology, as a way to influence and shape the future, for herself and for her students. For years after the explosion, I had a bumper sticker on my car with McAuliffe's quote. I was proud to be a teacher, and proud to know that so much of what I taught had the potential to touch the future. What I did not realize then was that so much of my teaching touched—or connected to—the past, rather than the future. My teaching was a product of who I was/am as a person, and who I was/am as a person was a result of my race, class, gender, sexuality, and ability. I was the teacher I was because I had experienced life in a certain manner. The teacher I was could not be separated from the person I was. Additionally, what I believed about education and teaching could not be separated from who I was. My perspective as a teacher, my beliefs about teaching, the methodologies and styles I chose, had been built on my prior knowledge, experience, and environment. I was not touching the future as much as I was sustaining the past. I was a combination of a middle-class, white, mid-Western American, gay, female teacher. What I knew and how I taught could not be separated from the basis of where I had come from in society. I was, and am, a socially-constructed person and teacher. Conti (1990) when speaking of teaching styles states this eloquently:

As a teacher, you do not randomly select your teaching style, and you do not constantly change your style. Instead, your style is linked to your educational philosophy, which in turn is a subset of your overall life philosophy. Therefore, your ethical, spiritual, and political beliefs will provide clues to possible elements of your educational philosophy. (p. 89)

As he explains, teaching styles are not created in a vacuum—they are formed and shaped by life experience and linked to who one is. Who you are and what you believe outside the classroom will be reflected in who you are and what you believe inside the classroom.

This notion that who I am outside the classroom reflects who I am inside the classroom has been made even clearer to me in my current position. I now work and occasionally teach at an American institution of higher education, and I see the past and the future connecting again, and, like McAuliffe, I believe that the agent of that connection is technology.

For a variety of reasons, since the 1990s, the use of technology in education has created both controversy and excitement. Many believe that technology can change the face of formal education; many others believe that technology is the latest educational fad. To reach the potential that technology offers, one cannot have a naive view of it. Technology has not been the "magic bullet" that has revamped modern tertiary education. It will not be in the future either, unless the focus on technology changes. The view in higher education about technology has primarily been that it will reduce cost, and make education more

accessible and more effective (Van Dusen, 1998). *Effective*, until recently, meant more efficient in administrative terms. However, the focus is shifting back to the teaching and learning process and away from being used for purely administrative procedures, and the word *effective* is becoming tied to student learning outcomes (Center for Academic Transformation, 2004). Educators and administrators are beginning to realize that technology should not be used as a tool for efficiency, but as a tool for learning. Additionally, the ability and potential that technology has to address issues of educational inequity in terms of among other things, learning styles, are becoming more and more apparent.

In the United States, higher education is struggling to meet the future because of the instructional needs of the new technologically savvy and demanding student (Oblinger, 2004). This student believes in technology, and higher education has been challenged to change in sync with this student. However, the haste with which higher education has attempted to accommodate this student has created a myriad of obstacles, not the least of which is the need to teach faculty. These faculty, unlike their students, may not have a belief about the use of technology. Additionally, they may not know how to use and incorporate various new technologies into their instruction (Watkins, 1990). This incorporation of technology on the part of the faculty has proven difficult. Much research has been done to determine why faculty choose not to readily incorporate technology into their teaching (Chizmar & Williams, 2001; Donovan, 1999). Among the issues preventing incorporation are barriers such as a lack of institutional and financial support, a lack of time, a lack of technical knowledge, and a lack of technology support (Betts, 1999; Butler & Sellbom, 2002; Chizmar & Williams, 2001; Groves & Zemel, 2000; Parker, 1997; Rutherford & Gana, 1995; Skeeel & Daly, 1997; Wetzel, 1993).

Faculty technology and development centers nationwide have developed training to try to address these barriers. Even after adjusting and changing the shape and scope of the training to address these barriers, it seems as if little more concrete learning and instructional implementation is taking place. We need, therefore, to question the assumption, and the research, that these barriers are primarily based on extrinsic resources. Could it be that these barriers are much less tangible? Perhaps the barriers to technology incorporation are the result of who an individual is as a teacher and the choices that individual makes; the barriers are a result of a teacher's intrinsic identity and beliefs, which are ultimately manifest through teaching style.

In summary, using technology in education may necessitate a rethinking and (re) examination of not just teaching methodology, but beliefs about teaching. Since knowledge is socially constructed, and since beliefs about teaching are socially constructed, it makes sense that the level and ease of faculty technology incorporation in education is directly related to teaching beliefs.

## The Problem

Faculty technology and development centers countrywide have developed training aimed at helping faculty incorporate instructional technology. Charged with supporting and training faculty in the use of instructional technology, many resource centers are finding the traditional workshop model of one-time offerings unsuccessful; even when faculty physically do attend, they leave the workshops to find that they quickly forget the technology learned (Donovan & Macklin, 1998). Additionally, faculty members at The University of Alabama, where this study took place, have reported through evaluations conducted after various forms of workshops, that they are getting too much information too quickly, have no time for practice during the workshop, have little or no time to practice the newly learned technology skill once they leave the workshop, have no institutional support, and are prevented by their other duties from being able to devote the necessary time to reinforcing what they have learned. However, these issues themselves may not be the heart of the problem. Focusing on these external barriers may mask the real issue of resistance to incorporation, which could be a more intrinsic issue, meaning beliefs about teaching and learning. To better

serve the faculty, and teaching and learning, teacher beliefs toward instructional technology must be more fully explored.

## Importance of the Study

Unless and until faculty technology resource centers at institutions of higher education connect technology very closely with pedagogic concerns, efforts toward bringing about technological implementation will remain incomplete. Such centers have attempted to improve instruction, have compensated faculty for course development, have given time, and have given support. Unfortunately, these external resources may merely be masking the real issue. If technology incorporation is indeed dependent on teaching beliefs, then perhaps faculty trainers and other administrators can devote resources to address these beliefs. There is no concrete evidence, contrary to what the literature implies, that simply providing resources to a faculty member for the development of instructional technological advances, improves, or encourages faculty technology development. If evidence exists that points to teaching beliefs being at the heart of the instructional technology incorporation, then not only may valuable resources such as time, money, and technology be saved, but the entire process of understanding instructional technology and its role in education may be clarified.

## REVIEW OF THE LITERATURE

### Introduction

Faculty support centers on college campuses nationwide have been designing and conducting technology workshops with the goal of increasing virtual and face-to-face incorporation of instructional technology. These centers have focused their design and resources on eradicating the extrinsic barriers that faculty face in the quest to incorporate technology. This extrinsic focus may be the reason that incorporation has generally been slow and sporadic. A focus on more intrinsic barriers may be the key to increasing and improving incorporation. The purpose of this study was to explore how intrinsic fundamental beliefs about teaching, the notion of who a person is as a teacher, not extrinsic resource-based barriers, may cause faculty to resist or to support instructional technology incorporation.

Much research has been done to determine why faculty choose not to readily incorporate technology into their teaching (Chizmar & Williams, 2001; Donovan, 1999). Extrinsic barriers that prevent incorporation, such as a lack of institutional and financial support, lack of time, lack of technical knowledge, and reliability of the technology (Betts, 1999; Butler & Sellbom, 2002; Chizmar & Williams, 2001; Groves & Zemel, 2000; Meltzer & Sherman, 1997; Padgett & Conceicao-Runlee, 2000; Parker, 1997; Rutherford & Grana, 1995; Skeeel & Daly, 1997; Wetzel, 1993; Wilson, 2001) have been heavily researched. Additionally, some studies have focused on intrinsic barriers as well (Ertmer, 1999; Groves & Zemel, 2000; Hagner, 2000; Hirschbuhl & Faseyitan, 1994; Honey & Moeller, 1990; Rutherford & Grana, 1995). Even though there has been a wealth of research into both extrinsic and intrinsic barriers, the focus in terms of faculty development courses has been on overcoming the extrinsic barriers.

Before we can begin examining and addressing the specific intrinsic barriers faced by faculty, we must first examine how these barriers are fashioned. Intrinsic barriers can be based on a person's beliefs, which themselves are a product of the social construction of the person. Not surprisingly, every teacher has beliefs about teaching, whether those beliefs are stated or not, which have been shaped and formed from personal identity and beliefs. As Giroux (1994) noted when discussing cultural studies, "Teaching is a

social practice that can only be understood through considerations of history, politics, power and culture" (p. 280). We each build our beliefs about teaching, our styles and methodologies based on our socially-defined knowledge, our own experiences, past and present, and our prior learning. Giroux notes that teaching is a social practice in that the teacher cannot be separated from the person; the one influences the other. Additionally, as Giroux says, the teacher and the person are both a product of history, politics, power, and culture—the social, the economic, and the political. As the person cannot be separated from the teacher, the teacher cannot be separated from society, politics, or economics.

The starting point for this examination of the impact of society, politics, and economics on a teacher needs to point back to the question, Who am I as a teacher? Or, even more broadly, Who am I? The answer to this question depends on how one looks at identity and the construction of identity. The modernist idea of identity as stable, objective, rational, and formed by natural law implies that identity is permanent and there is an essential quality to being human that can be identified. The postmodern penchant for avoiding meta-narratives and rejecting human essentialism (Flax, 1990) means that there is more fluidity in the construction of identity. We view and interact with the world and our environment in a manner that is shaped by society, politics, and economics. Within these systems, constructs of race, class, gender, sexuality, and ability form and shape identity (Butler, 1993; Fanon, 1952; Hill Collins, 1990; Weedon, 1987). Contrary to the modernist notion of the stable self, there is no one essential human experience, no one essential truth, or meta-narrative, about individuals, about life, or about the way we live.

As we are a product of society, politics, and economics, so schooling is a product of these same forces. There are many theories as to the fundamental role(s) of schooling in our society. These theories can be defined through established categories of society, politics, and economics. In terms of society, schooling and schools carry out or transmit the values, beliefs, attitudes, and norms of the dominant culture. In other words, schooling socializes. Schools and schooling are one form of Althusser's (1971) state apparatus. Politically, schools create informed and patriotic citizens, and economically schools and schooling reinforce class distinctions, thereby guaranteeing a trained and available labor force (deMarrais & LeCompte, 1999). What this ultimately means is that schooling serves to reinforce the existing ideals, ethics, and standards of the dominant culture, namely that of the middle-class, white patriarchy. Schooling also exists to retain and reinforce class structure created by that dominant culture (Bowles & Gintis, 1976). As schooling becomes an agent of dominant culture ideology and hegemony, teaching, then, is an agent of schooling. This raises several questions. Are teachers transmitting values of the dominant group in the way they teach and manage the classroom? Are teachers inadvertently reinforcing a class structure that perpetuates inequity? Are teachers educating students or are they simply one part in the creation of citizens whose place and role in the world is already predetermined?

Most teachers would profess that what they do is educate students. Teachers prepare students for lives as productive adult members of society. However, regardless of what a teacher may consciously believe, he or she is a part of the social construction of the schooling system, and may be propagating the hegemony of the dominant culture. This propagation can be seen clearly through the actions of the teachers themselves. Sadker and Sadker (1985) found that teachers allow male students to dominate the classroom verbally, thus reinforcing gender norms and the patriarchal structure of society; Rist (1970) found that teachers also tend to treat students differently based on perceived class association, reinforcing hegemonic class distinctions. Studies about disproportional discipline toward minority, particularly African-American students, by administrators and teachers (Skiba, Michael, Nardo, & Peterson, 2000) document the reinforcement of the cultural capital of being white.

If we accept the claim that identity is socially constructed, and we accept that teaching is socially constructed, we should accept that identity as a teacher is socially constructed. Brown, Cervero, and Johnson-Bailey (2000) discuss how the social location of the teacher affects the teaching and learning process. They

claim that little research has been done on the positionality of the teacher and how it affects the classroom environment; the research has focused mainly on the positionality of the learner, with positionality defined as the way that people are categorized in Western hierarchical society, with the primary identifiers being race, gender, class, physical ability, and sexual orientation. What this means is that teaching style and methodology choice tend to be a product of socially-constructed categories, the purpose of these categories being to represent, replicate, and reinforce the dominant culture. An example of this would be to look at one of the most popular means of teaching. In higher education, the lecture is used as the primary teaching method by an estimated 70 to 90 percent of professors (Gardiner, 1998). Some argue that this method of instruction is best suited for males (Lyons, Kysilka, & Pawlas, 1999) in that it addresses masculine learning styles, which are themselves social constructions. What this means is that if I, as a teacher, choose this method, I am in fact perpetuating the inequities of the dominant class social structure, in this case in terms of gender.

This notion of perpetuation gives a sense of bleakness; if I am, as a teacher, merely a product of the construction of society, and the way I teach is predicated on this product, my methodologies and my style may just support and maintain the dominant ideology. If I, as a teacher, want to break out of this dominant ideology and ensure that all students are equally served, especially those with learning styles that traditional classroom methodologies have not addressed, I must find an alternate to these established and traditional methodologies.

One possible remedy to this problem is, simply, technology. Technology, like identity and like teaching, is also a social construct, and is gendered (Lucas & Smith, 2004) and classed. Even with these markers, technology has the *potential*, if used correctly and fully, to address issues of learning style inequity, particularly on the higher education level. For example, most traditional teaching methods, again the lecture as an example, cater to essentially a singular student learning style, meaning those who learn best through oral stimuli since a lecture is a verbal methodology (Felder, 1993). Therefore, during a lecture, a student who may possess a different learning style can essentially lose out on the possibilities for learning. Through the use of varied teaching methods, technology has, however, the potential to include diverse student learning styles, and this may help to address and reform this issue.

It is important, however, to remember that technology is only a tool, and one which can carry with it particular cultural and social significance, value judgment, and identity. Technology itself is not necessarily a neutral instrument. It is a construct of society and carries with it societal values and norms. An example of this is manifest in the concept that technology is gendered. For example, technology has been historically and culturally viewed as masculine (Henwood, 2000), and as a male domain (Fredman, 1992; Lage, 1991). Additionally, computers and technology are perceived as belonging to the world of science, which has traditionally been viewed as a male domain (Inkpen et al., 1994). People who participate more readily in technology, at least initially as "early adopters" (Rogers, 1962) are usually male (Young, 2000), as evidenced by the commonly held perception that "hackers" and "computer geeks" are typically male (Morahan-Martin, 1998). Fewer computer instructors in secondary and higher education institutes are female (Young, 2000), and there are fewer women students enrolled in computer science programs across the country. Given all of this, it is not surprising that research has shown that females hold more negative views about technology than do males (Schumacher & Morahan-Martin, 2001). Additionally, the portrayal of computer professionals in the mass media (Knupfer, 1998) contributes to negative attitudes held by females. And, the imbalance starts early. Computer games and software, are primarily made for and marketed to males (Butler, 2000; Henwood, 2000; Knupfer, 1998). Through this avenue, boys get more opportunities to use technology as part of their play activities than girls; the technology itself becomes more obviously identified with boys, adding to the perception that women belong outside the arena of technology.

In addition to being gendered, technology is also classed. The issues of availability and cost make the use of technology feasible to only a small global population. In fact, the typical worldwide Internet user is an elite minority that is male, under 35 years old, university educated, English speaking and urban (*Women's Learning Partnership for Rights, Development, and Peace*, 2003). Additionally, the average cost of a computer, for example, is affordable only to those economically situated in, at a minimum, the middle class in North America, and prohibitive to some middle classes globally.

If we conclude that identity is socially constructed, and we conclude that beliefs about teaching are socially constructed, it makes sense that the level and ease of faculty technology incorporation in education is directly related to teaching beliefs. However, faculty resource centers have tended to devote time and resources to extrinsic barriers.

## Extrinsic Barriers

Wilson (2001) reported that respondents of her study ranked time as the primary barrier toward faculty incorporation of instructional technology. The lack of time was manifest in various ways, including lack of time to prepare course materials and lack of time to participate in technology training. Additional barriers identified by the respondents were lack of support and lack of equipment. In order to address these barriers, Wilson recommended that more institutional support was needed for faculty to successfully use distance education.

To find out what motivates and what inhibits faculty to participate in distance education, Betts (1999) surveyed a total of 532 subjects, which included faculty and deans. Betts formulated lists of the top 10 motivators for faculty already participating in distance education, the top 10 motivators for faculty who do not participate, and the top 10 motivators identified by deans. She also gathered a list of the top ten inhibiting factors. The primary inhibitor was the concern over faculty workload. Second was lack of technical support, third was lack of release time, and fourth was the concern about the quality of courses.

Butler and Sellbom (2002) surveyed 410 faculty in a mid-western university to assess what they saw as the primary barriers to faculty technology incorporation. The results indicated that even faculty with a high level of technology proficiency identified the same barriers as those with a lower level of proficiency. Their findings indicated that the biggest issue or barrier for all faculty was the reliability of the technology. The second biggest concern for the respondents was the time it takes to learn new technology, and the third item was a concern about the quality of a course that is technology-based. Butler and Sellbom then offer solutions to the above barriers. The solutions, such as increasing information about the equipment, having a technical support person available at the beginning of class, and checking equipment regularly, all point to external barriers as the critical roadblock in faculty technology incorporation. The logic of these recommendations is clear--make more resources available and the problem will be solved.

Although Chizmar and Williams (2001) did not rank their specific findings about what barriers were the biggest impediments, they did find that the number one problem seemed to be a general lack of time. A secondary problem was lack of release time, while, to the researchers surprise, faculty did not seem as interested as hypothesized in "tangible rewards and incentives for spending time developing classroom technology" (p. 23) as they had thought. This seems to contradict some research, for example, that of Betts (1999) who found that faculty were interested that work with technology become a part of tenure review, or that they receive some kind of supplemental compensation for their work with technology.

Padgett and Conceicao-Runlee (2000) suggest resources to help aid in the incorporation of technology, based on the faculty learner's style in terms of Rogers' (1962) diffusion of innovations. According to Padgett and Conceicao-Runlee, differing resources will help various faculty. The assumption

here is that a faculty member faces barriers that are different depending on what level of innovator the faculty member is. For example, to increase incorporation among the early adopters, the researchers suggest increasing time and software resources. To increase incorporation among the late majority, the researchers suggest rewards, resources, incentives, and manates.

Meltzer and Sherman (1997) list ten "commandments" for successful technology implementation. Although four of their ten commandments involve extrinsic barriers-- provide administrative support, provide time, provide a technology coordinator, provide equipment and access--they also make it clear that learning transfer must be promoted. They explain that technology must be used as a tool to better teaching and learning. The focus must be on the pedagogy, and not on turning on the machines. They stress that technology must be integrated with effective pedagogy.

In a review of literature regarding cognitive factors and faculty technology incorporation, Dusick (1998) concluded, based on the literature, that there were five "environmental" factors that influence a faculty member to use instructional technology, and seven social cognitive factors. The environmental factors were supportive administration, availability of equipment, support and sharing of resources, support staff, and training. Her social cognitive factors were attitude, self-efficacy, competence, time commitment, the risk of using technology, beliefs and perceived relevance, and lack of knowledge. She concluded that the more comfortable faculty are with technology, the more likely they are to integrate it into curricula. To gain this comfort, personal, environmental, and behavioral changes must occur.

## Intrinsic Barriers

Ertmer (1999) defines incorporation barriers in terms of first and second order. She outlines first-order barriers as extrinsic to teachers, namely lack of access, insufficient time, lack of support, and so on. The assumption about these beliefs is that if enough resources are acquired, technology incorporation would occur at a greater rate and extent. Second-order barriers, on the other hand, are intrinsic and include teacher beliefs about teaching, about technology, about classroom practice, and willingness to change. These barriers impede fundamental organizational change because fundamental beliefs must first be changed.

For Rutherford and Grana (1995), the biggest barriers to faculty technology incorporation are intrinsic; external resource issues are not the great inhibitor to incorporation; rather, they believe that the single greatest impediment to faculty incorporating technology is fear. This fear takes on several different forms, including, for example, fear of change, fear of time commitment, fear of appearing incompetent, fear of technology lingo, and fear of rejection.

Honey and Moeller (1990) describe the results of their qualitative study of K-12 teachers in two districts in New York state. They did not look at faculty technology development in terms of workshops, but they did address the barriers to incorporation. They found that the teachers they interviewed could be divided into four groups based on their teaching philosophy and attitudes toward and use of technology. The first group was characterized by their student-centered philosophy, and their extensive and creative use of technology. The second group had a student-centered teaching philosophy, but members were hesitant to use technology because of personal fears and inhibitions. The third group had a more teacher-centered philosophy, and members were reluctant to use technology because they feared technology might somehow detract their authority and control, and they felt overwhelmed by educational mandates and did not have spare time to deal with technology. The last group was also student centered, and they would have liked to use technology as a teaching method, but lacked the resources in their schools to do so. Their results point to a strong correlation between teaching philosophy and technology incorporation. They found that those who are more student-centered in teaching philosophy were stronger proponents and users of technology as a teaching method.

Two other early researchers, Hirschbuhl and Faseyitan (1994), began to look at the issue of teaching philosophy as a barrier to incorporation. In their research, they felt that the important question to ask was not Why aren't faculty adopting technology? but, rather, What kind of instructors use computers for instruction? They found that computer self-efficacy, beliefs, and attitude toward computers are the significant factors in incorporation. The solution they suggested, however, was to give faculty more technology training. This solution seemed to contradict their original idea of why faculty were not adopting technology and did not focus on the beliefs a teacher held, nor address attitudes toward computers.

Hagner (2000) reported that the primary reason, almost to a person, that faculty gave for implementing technology innovations was because they thought it was the right thing to do in that students deserved to have the quality of their education improved. He also stated that about 65 percent of respondents listed student benefit and personal satisfaction of a job well done as the primary reward for implementing innovative technology.

In addition to reporting that faculty wanted more institutional support, Wilson (2001) found, although not statistically significant, that faculty were intrinsically motivated to participate in technology, specifically distance learning, because they saw it as a way to facilitate student learning. Her results reported that financial incentives for faculty received the lowest rankings as a motivator for technology development.

The research of Groves and Zemel (2000) did not address the barriers to incorporation, but rather looked at factors influencing the use of instructional technologies in teaching. They found that the most influential factor affecting use was the reliability of equipment. The second most influential factor was improved student learning; the third was increased student interest, and the fourth was advantage over traditional methods of teaching. This study seemed to reveal that it was the value of the learning that was most important to technology use. However, the demographics of this study reveal some important considerations. The subjects of this study were faculty and graduate teaching assistants, and of the total respondents, 85% reported having a computer at home. Assumingly, the results of the survey are influenced by the fact that the respondents were already using technology in some facet, either in their private or professional lives.

## Teaching Style

At the most essential, teaching style can be structurally defined in terms of the binary of teacher-centered and student-centered. Because these two terms have in recent times taken on particular value judgments, the terms *instructionist* and *constructionist* (Dexter, Anderson, & Becker, 1999) will be used to differentiate between the two binaries. On one side of the binary, instructionist teaching beliefs direct that the teacher is the center of the learning process, that the teacher chooses, based on expertise and training, the methods, activities, and techniques that will assist the students in receiving and assimilating knowledge. These methods, activities, and techniques usually involve the transmission of knowledge from the teacher to the student. Instructionist classrooms allow for a large volume of information shared in a short amount of time while the teacher has more control of the organization of the class, the pace of the class, and the content of the class. The instructor is the expert and there usually is a system of one-way communication. On the other side of the binary, constructionist teachers believe that the student is the center of the learning process and is the most critical element. Constructionist classrooms focus on innovative, interactive, student-driven methods that respond to a variety of learning styles. These student-centered approaches require active participation from teachers and students (*Teaching Philosophies: Teacher and Student Centered Approaches*, 2004).

## How Teaching Styles Develop: Beliefs about Teaching

Beliefs are often mistaken for attitudes, values, judgments, opinions, ideologies, and so on (Pajares, 1992), and currently there is not a standard definition for what the term *belief* means (Pedersen & Liu, 2003). However, for the purposes of this study, beliefs are subjective ideas about what we think is true about our world and about ourselves and are formed through our interactions with the world.

Since teaching beliefs are a product of personal beliefs and values about knowledge, society, education, and politics (Kagan, 1992), as well as a process of enculturation and social construction (Pajares, 1992), it may be impossible to separate teaching beliefs from life beliefs. Woods (1993) points out that the personal dispositions and experiences accumulated over the years help shape the professional role of teacher as it is subjectively experienced, meaning we are a product of our experiences and environment, and that is reflected in our profession. As Pajares reminds us, all teachers hold beliefs about their work, students, subject and roles, and responsibilities (1992). For example, if a teacher believes that all students have an equal ability to learn, this belief will be reflected in methodology and teaching style. If a teacher believes that males are particularly suited for science and math, and females for language and reading, this becomes a part of teaching beliefs in that a teacher may teach males differently in subjects like language, and teach females differently in the sciences. The methods a teacher chooses for these educational situations will reflect his/her own beliefs (see Cuban, 1984, p. 245). Two teachers may have similar knowledge, but teach in very different ways. This would indicate that beliefs are more powerful than knowledge in understanding how teachers make decisions (Ernest, 1989). Consequently, Pajares has called teacher beliefs a "messy construct" (1992, p. 307).

Kagan (1992) says that teacher beliefs are stable and resistant to change, even in the face of contradictory evidence such as reason, time, or experience (Pajares, 1992). Pajares goes further,

Belief change during adulthood is a relatively rare phenomenon, the most common cause being a conversion from one authority to another or a gestalt shift. Individuals tend to hold on to beliefs based on incorrect or incomplete knowledge, even after scientifically correct explanations are presented to them. (1992, p. 325)

Pajares believes that beliefs about teaching are well established by the time a student goes to college. What this essentially means is that teacher beliefs or beliefs about teaching are formed early, are difficult to change, and may not be based on rationality nor on the latest educational research.

## Teaching Style and Instructional Technology

At least one study has found that teachers who were committed to using technology in the classroom were also committed to using technology in their daily lives (Galloway, 1997). This commitment to using instructional technology reflects a personal value system or pedagogical belief (Becker, 2000). If technology is important and there is an educational value in its use, then its value is more likely to become a part of a teacher's beliefs about teaching, and its use possibly incorporated into teaching style. Applied to the classroom, these beliefs are played out through choice of methods, which would mean incorporation of instructional technology into the classroom. Zhao and Cziko (2001) point out that using technology requires pedagogic changes, and some teachers do not share the same philosophy fixed in these changes. Their example is that the use of technology involves a more student-centered approach to education that some teachers do not philosophically accept. To incorporate technology would mean to abandon a potentially life-long belief about teaching and learning. Becker (2000) found that there was a clear relationship between

teaching philosophy and whether a teacher used computers with students. For example, at least two studies suggest that teachers who use computers in the classroom are more constructivist than teachers who do not (Becker, 2000; Dexter et al., 1999) . Lumpe and Chambers (2001) posit that these beliefs toward technology use are "most likely formed during time spent in the classroom either as teachers or students. These experiences help form teacher beliefs that may or may not be consistent with the literature about best practice," (p. 94). Pedersen and Liu (2003) similarly believe that teacher implementation is tied to experiences the instructor had both as a student and as a teacher.

## Summary

A person's identity is a social construction. Beliefs are a part of identity, and therefore arguably also socially constructed. It follows then that beliefs about teaching are socially constructed as well. These beliefs are guides and determiners for the classroom decisions that we make as teachers. If a faculty member does not believe in instructional technology as an appropriate methodology, it may influence incorporation. Much research has been done to determine why faculty choose not to readily incorporate technology into their teaching. There are extrinsic barriers that prevent incorporation, such as a lack of institutional and financial support, lack of time, lack of technical knowledge, and reliability of the technology. There are also intrinsic barriers. Even though there has been a wealth of research into both types of barriers, the focus in terms of faculty development has been on overcoming the extrinsic barriers. Faculty support centers on college campuses nationwide have been designing and conducting technology workshops that have focused design and resources on eradicating the extrinsic barriers that faculty face in the quest to incorporate technology. This extrinsic barrier focus of the workshops may be the reason that incorporation has generally been slow and sporadic. To improve and increase faculty technology incorporation, resource centers must first understand the beliefs that faculty hold, and then address these beliefs in terms of teaching style and instructional technology.

## Purpose of the Study

The purpose of this study was to explore how intrinsic fundamental beliefs about teaching, the notion of who a person is as a teacher, not extrinsic resource-based barriers, may influence faculty instructional technology incorporation.

## Research Question

How does the way faculty members perceive themselves, meaning their beliefs about themselves as teachers, influence incorporation of instructional technology?

## Current Study

This research was a multi-method (Schutz, Chambless, & DeCuir, 2004) study, incorporating data gathered from two quantitative instruments with those gathered from a phenomenological-based qualitative instrument. A multi-method study can have many advantages over a strict single-method qualitative or quantitative study. As deMarrais & Lapan (2004) indicate, "Jick (1983) and Fielding & Fielding (1986) suggest that combining methods provides opportunity for completeness, depth, and breadth or elaboration (Rossman & Wilson, 1985) to the understanding of a phenomenon" (p. 277).

The focus of a phenomenological study is an understanding of a concept or phenomenon. Understanding underlying teacher beliefs and how these beliefs relate to technology use and incorporation is well suited to phenomenological methodology. To achieve this understanding, the lived experiences of the

subjects in terms of that phenomenon (Creswell, 1998) must be examined. Creswell goes on to explain that the important aspect of a phenomenological study is to describe meaning developed by a small number of individuals who have experienced the phenomenon. In the case of this study, 30 faculty members will be looking at the phenomena of their own teaching beliefs, teaching methods, and use of instructional technology.

## Subjects of Study

The subjects of this study were University of Alabama faculty members, of assistant professor, associate professor and full professor ranks, in or not in tenure-track positions, and tenured and non-tenured. These faculty were full-time permanent only. The faculty represented various colleges and departments across the University.

The faculty were grouped by the researcher into three groups with 10 members. Each group was given a name based on the level of instructional technology incorporation they already have. The first group is the campus leaders in instructional technology, so they were called the "Leaders." The second group wished to have a greater level of incorporation, so they were called the "Aspirers," as they aspired to a greater level. The final group actively resisted incorporation of instructional technology, so they were called the "Resisters."

Group A, the Leaders, consisted of 10 well-known and officially recognized instructional technology users. To be considered officially recognized in instructional technology use, the faculty member was honored or awarded by his/her college or department; was the recipient of technology grants; or was recognized by an extra-university entity. For example, one faculty member has been recognized and honored by Adobe Corporation for her use of Adobe Illustrator and Photoshop in her instructional methods. The faculty in this group were identified through official university publications, from my own personal knowledge having worked with them for the past five years, and from being personally known to University of Alabama Information Technology personnel or from recommendations by their Associate Deans. Therefore, the group was generated non-randomly.

Group B, the Aspirers, was made up of 10 faculty who had volunteered to be participants in a two-week pedagogy-based workshop and were therefore also selected non-randomly. This group had a strong interest in using technology, and indeed their degree of implementation was varied among the members, and in general, the members of this group wanted to incorporate instructional technology, but for assorted reasons had not done so to the extent desired.

The final group, Group C, the Resisters, was made up of 10 faculty who have actively resisted the incorporation of instructional technology. These faculty have been exposed to instructional technology, but have declined to use it in their teaching. In choosing Group C, the snowball method (Bogdan & Biklen, 1982; Meltzoff, 1999) was used by first consulting college-level associate deans, and then by recommendations from members of Group A and others in Group C.

## Data Sources/ Instrumentation

There were three sets of data sources for this study: a Teaching Style self-assessment instrument based on Grasha's work (Appendix D), the Grasha-Reichmann Teaching Style Inventory, a web-based assessment (Appendix B), and three separate versions of a qualitative interview instrument, one for each group, (Appendixes E, F, G). These instruments were chosen because they not only reflect the participants self-assessment of their own teaching style, but also ask for the reflection in three different ways, thereby developing construct validity (deMarrais & Lapan, 2004) and offering reliability through triangulation (Berg,

2004). Additionally, the Grasha instruments were chosen because they reflect the fluidity of teaching style and do not absolutely label a teacher with one style. Grasha's clusters seem to approach a much more realistic vision of true teaching styles and account for differences in student level, subject matter, and other variables. The Grasha-Reichmann instrument is available to the public to use and can be accessed on various web sites.

The Teaching Style self-assessment instrument was presented on paper in chart format, and listed Grasha's five categories of teaching styles with a brief description of each style below the category name. The study participant was asked to read the descriptions and to fill in the bubble next to the category that best fits the participants' self-assessment of their own teaching style. The participant was informed that the fit would not be exact, but to choose the closest match.

The Grasha-Reichmann Teaching Style Inventory is a web-based assessment, available at various web sites, that asks for a Likert-type response to a series of questions designed to objectively categorize teaching style. A teacher is asked to respond to a statement such as, "I set high standards for students in this class." He/she responds within a five-point range from *strongly disagree* to *strongly agree*. The teaching style is calculated via a numeric score and the results are presented in a table that presents whether the respondent is low, moderate or high, based on the numeric outcome, in a particular style.

The qualitative instrument was designed to elicit information from faculty in their own words toward attitudes and beliefs about technology, extent of technology use, and attitudes and beliefs about teaching. Since each group had varying degrees of technology incorporation, the instrument was slightly modified for each group to reflect these degrees. This qualitative instrument was a semi-structured interview designed to assess a broad overview of the subject's current teaching methodology, teaching beliefs, use of technology and attitudes toward technology in instruction. The questions were open-ended and intentionally vague in order to allow the subject control of the conversation. All versions of the instrument began by asking the participant to talk about likes and dislikes of their job, then of teaching. By focusing on their single favorite course, they would, later in the interview, describe their teaching methods. As the interview progresses, they were asked about their use of and beliefs about instructional technology.

## Research Design

The subjects were first given the Teaching Style self-assessment instrument. This instrument was designed to gauge how the faculty subjectively viewed their own teaching styles. To that end, the subjects were asked to find a best fit into one category and indicate that fit by filling in the appropriate bubble. They were given the instruction that they would not fit completely and neatly into one category. Groups A and C were then immediately given Grasha's Teaching Style Inventory. Group B was given the Inventory on the second day of the workshop, which was no later than two weeks after the self-assessment. Groups A and B were given the Inventory via the web, with Group C given the choice to take the web version or fill out a paper version. The paper version was scored by the researcher at a later date. This inventory objectively assessed the subject's teaching style based on Grasha's defined categories. Subjects in all groups then participated in the qualitative interview, which lasted no longer than one hour.

## RESULTS

### Teaching Style and Instructional Technology Use

The expectation of this study was that those faculty who are more instructionist would be less inclined to incorporate instructional technology into their teaching. Conversely, those faculty who were more constructionist would be more inclined to incorporate instructional technology. Instructionist and

constructionist styles were measured through the Grasha-Reichmann Teaching Style Inventory. Those faculty who scored highest as an Expert, Formal Authority, or Personal Model are classified as instructionist teachers, while those who scored the highest as a Facilitator or Delegator are classified as constructionist. Based on the above expectation, Group A should have contained the largest number of constructionist teachers, with Group B having a roughly equal number of constructionist and instructionist, and Group C having the smallest number of constructionists, but the largest number of instructionists. Although Group A had a slightly higher percentage of constructionists, this difference does not indicate a pattern, and essentially the same ratio of constructionists to instructionists is found across groups.

These data were then analyzed with the Kruskal-Wallis Test for Independent Samples. The results of this analysis clearly indicate there was no statistical significance and therefore the expectation of this study is not supported. The results do support Grasha's (1996) research that the Expert style is prevalent in higher education and is essentially found in every faculty member to some degree. The results of this study found the Expert style to be the least exclusive to grouping based on instructional technology use.

## Findings

The lack of support for the expectation of the study does not mean, however, that important discoveries were not made. What it means is simply there was not enough data to associate teaching style to instructional technology use. What is important in this study is the clear evidence that the use of instructional technologies is tied not to a particular teaching style, but to beliefs about teaching, which can be manifest through various teaching styles and methods, and those beliefs stem from who that faculty member is as a teacher, and how he or she views teaching. A faculty member will most likely not use an instructional technology, and therefore will not invest the time, effort, or energy in creating, mastering, and implementing that technology, unless the faculty member believes that the technology will be a tool that will benefit the teaching and learning process. Only then, after the faculty member has an established intrinsic belief in the value of instructional technology, will he or she begin to deal with the extrinsic barriers associated with instructional technology incorporation.

There were six major findings of this study that directly relate to how faculty members perceive themselves, meaning their beliefs about themselves as teachers, and how these beliefs influence incorporation of instructional technology. The following findings support the proposition that it is faculty members' beliefs about themselves as teachers that influence the incorporation of instructional technology.

1. There is an inconsistency between the way many faculty perceived themselves as teachers and how they scored on the Grasha-Reichmann Teaching Style Inventory.
2. There is a difference in teaching methodology among Groups A, B and C.
3. There are differences among groups in terms of changing teaching methodology.
4. There is a difference among groups in beliefs about the benefits of instructional technology incorporation.
5. There are more intrinsic barriers to faculty instructional technology incorporation than extrinsic.
6. The discussion of student learning styles is not uniform across groups.

For the sake of brevity, only the two most important findings, findings number 3 and 5, are going to be dealt with in this paper.

### **Finding #3: There is a difference among groups in terms of changing teaching methodology.**

The third major finding of this study was the difference across groups in terms of changing teaching methodology. Each participant was asked to choose his or her favorite course and answer a series of questions based on that course. At one point, the participant was asked to think back to the very first time that he or she had taught the course and talk about any changes in methodology, if any, and what had caused those changes. From Group A, 60% had changed their methodology in the class; in Group B, 80% of the participants had changed their methodology, while in Group C there was a 0% change; no one reported that he/she had changed their methodology from the first time he/she taught the course compared to the way he/she teaches it now. Many of those in Group C had changed content matter, had changed textbooks, or had changed in terms of self-confidence and comfort level, but none had changed their teaching methodology. The question then becomes, Why had Group C not changed, and why did Group B have the most change?

### **Discussion of Finding #3**

One possibility for this phenomenon is that Group B had more non-tenured faculty who are generally younger, less experienced teachers and who may be looking for an appropriate methodology, while Group A and C had more tenured faculty and were therefore perhaps more solidified about their teaching.

As a teacher's experience in classrooms grows, his or her professional knowledge grows richer and more coherent, forming a highly personalized pedagogy—a belief system that constrains the teachers' perception, judgment, and behavior. (Kagan, 1992)

The implication here is that through this process of personalizing pedagogy there would be experimentation and trial involved in terms of methodology, but it does not appear that this is the case for members of Group C. Their teaching methodologies do seem to be personalized, and solidified, but there is no evidence that there has been any kind of growth or change process to get them to their personalized pedagogy.

### **Finding #5: There are more intrinsic barriers to faculty instructional technology incorporation than extrinsic.**

The fifth major finding deals with faculty resistance to instructional technology incorporation. Only members of Group A and Group B were systematically asked why they believed that members of Group C and other faculty members actively resist the incorporation of instructional technology. Participants gave multiple responses to this question, and the responses were coded, categorized, and counted. Members of the two Groups listed more than double the number of intrinsic barriers to resistance than extrinsic barriers.

The barrier mentioned more times than any other, either intrinsic or extrinsic, was dislike of change. This barrier was mentioned by both members of Group A and of Group B. As Jeffrey, Group B, pointed out,

I think that one [reason for resistance] is that we all resist change. We are all products of our environment. I'm sure there is an older generation that didn't grow up with technology and we are asking them to change and people are inherently resistant to change.

Karen, also Group B, agrees with Jeffrey. "I think part of it has to do with the fact that people don't want to change. You know, change is hard. Sometimes too difficult."

## Discussion of Finding #5

This dislike of change can be argued to be limited to the personalities of individual faculty members, but most likely the resistance to change exists at a level larger than the individual. Although perceptions abound that higher educational institutes are places of progression, particularly social progression, there is, as Cuban points out, an ethos in education that resists change.

The occupational ethos of teaching that breeds conservatism and resistance to change in instructional practices. This conservatism, i.e. preference for stability and caution toward change, is rooted in the people recruited into the profession, how they are informally socialized, and the school culture of which teaching itself is a primary ingredient. (1984, p. 243)

Given a tendency to resistance in general, it is not surprising that there is a resistance to technology incorporation, and this resistance is not limited to the world of faculty who teach in a traditional classroom. Resistance to technology incorporation can be argued to be institutional. Despite higher education's fundamental role in the development of computer technology, including the internet and the world wide web, resistance to the incorporation of instructional technology is found on the institutional level, and this resistance affects technology in the classroom.

To date, the university stands apart, almost unique in its determination to moor itself to past traditions and practices, to insist on performing its core teaching activities much as it has done in the past. Our limited use of technology thus far has been at the margins, to provide modest additional resources to classroom pedagogy or to attempt to extend the physical reach of our current classroom-centered, seat-time-based teaching paradigm. It is ironic indeed that the very institutions that have played such a profound role in developing the digital technology now reshaping our world are the most resistant to reshaping their activities to enable its effective use. (Duderstadt, Atkins, & Van Houweling, 2002, p. 18)

Given the ethos of education and the reluctance of the institution to incorporate technology, it is hardly surprising that many faculty are also resistant. Commitment to using instructional technology reflects a personal value system or pedagogical belief (Becker, 2000) , and if this belief system is systematically discouraged administratively and institutionally, it is unlikely that it would develop on the individual level, and is somewhat surprising that it has to the current extent.

On the individual level, Zhao and Cziko (2001) point out that using technology requires pedagogic changes, and some teachers do not share the same philosophy fixed in these changes. Their example is that the use of technology involves the constructionist approach that some do not philosophically accept. Thus, to incorporate technology would mean to abandon a potentially life-long belief about teaching and learning.

Without institutional support and encouragement for this change in belief, it is doubtful that it can occur on a large scale.

Hand in hand with resistance to change is the second most common explanation for faculty resistance to instructional technology incorporation, fear. This finding is somewhat in line with Rutherford and Grana's (1995) finding of fear being the largest inhibitor to incorporation. Fear is, clearly, another intrinsic barrier to incorporation. Interestingly, fear was the most commonly mentioned factor from Group B. Four out of the ten members of Group B mentioned fear immediately as the primary factor preventing incorporation. Only two members of Group A mentioned fear.

It is because, it's the internal. I don't know how you call it. It's the fear of the unknown. It's the fear of the unknown. It is the same fear as traveling abroad--I don't know what to expect so I had better stay here. (Sarah, Group B)

Mark, another member of Group B, seems to be able to pinpoint this fear.

Fear. I think fear of not understanding how to use it. Fear of having to develop a new way of thinking. Fear that it is not, they are not, going to have the control that they have now in using their textbooks or their lectures or their way of seeing things. So I think it has a lot to do with that fear of losing control. Probably also, but see earlier when I talked about peeling away layers, I noticed in myself anyway that everything came down to fear. I mean that must seem like the base.

Joseph, again from Group B, also sees the resistance being primarily attributable to fear.

With some of them, I think it is fear. . . . That maybe they can't learn this stuff, or that maybe when they try to learn this stuff they are going to look so stupid someone is going to laugh at them. As you know by now, we are an insecure lot—we are an incredibly insecure lot.

Barbara combined fear and change into one and believed that fear of change was the factor that most prevented faculty from incorporating instructional technology. "Most of the people that I know are just afraid of it; they are afraid to use that [technology]. . . There is a fear of change."

Another important intrinsic barrier to incorporation, and one that has its basis in teacher beliefs, is the finding that instructional technology may not be perceived by resistant faculty as beneficial to the teaching and learning process. Robert, from Group A, believes that faculty will not invest resources if they don't believe the outcomes will be worth it. "I'm not sure they are convinced it is worth their investment, [in terms of] time, and student learning being any better." John, also from Group A, has a view similar to that of Robert.

They've [other faculty] managed to keep doing the way they've been doing for a lot of years and they are, in some cases, close to retirement age. They just don't see a need to change. You know, why fix it if it ain't broke? The technology people are just doing it because [of] technology and they really aren't paying attention to what really counts.

Louis, Group B, believes that faculty resist incorporation because "they don't have the skills and they are not interested in learning the skills because they are teaching according to them fine without it." Carol, also from Group B, attributes resistance to establish pedagogy and lack of vision in terms of the benefits of instructional technology.

I think there are probably people who approach teaching like an old guy who is a professor of German for undergraduates. He would come into the seminar room. He would open his briefcase. He would pull out his yellowed notes, set them down in front of him. He'd obviously been using them for thirty-five years.

Carol perceived that her German professor would be very resistant to instructional technology most likely because of his lack of methodological change over the years. We can assume that the German professor did not change his methodology because he did not perceive a need to do so.

Intrinsic barriers, although more numerous, were not the only mentioned reasons for resistance. In terms of extrinsic barriers, time, reward, lack of technical knowledge, and technical problems were the most commonly given reasons as to why faculty resist instructional technology incorporation. Group A believed that time and reward prevented incorporation the most, while Group B believed that technical problems and knowledge prevented incorporation. No one from Group A saw technology as being the major deterrent. These findings have a certain logic. Members of Group A have been using technology to a great extent and are therefore very aware of the time commitments and lack of reward. Group B, on the other hand, has not incorporated technology to the same degree and so therefore sees factors technological as the main extrinsic barriers to further incorporation. For example, Robert, Larry, Richard, and Rita, all from Group A, said that time was an important factor. Robert said, "Time. Time to learn it, to prepare it, to deal with problems that can occur." Larry said that in his mind the main reason faculty resist technology incorporation is because they are comfortable with the way they are teaching, but the second reason is one of time. "Second reason might be a matter of what's easily the professors most scarce resource, and that is time." Richard, agrees.

I know that some people think that the time you spend doing technology, you know it's a zero sum game. It's time that is taken away from something else, and that something else might be, their research time it might be the time they would spend collecting information they would give to their students, or stuff like that.

Rita believes time is a factor, but only because it is being used as an excuse by other faculty. "I'll be generous and use the argument that they use. And that is that they don't have time. . . I think that they don't want to make the time for a variety of reasons."

## Summary of Findings

Many of the findings of this study support or are consistent with other research into the effect of intrinsic barriers on faculty technology incorporation. Ertmer (1999) believed that barriers existed on two levels, what she called first-order and second-order, with first-order barriers being extrinsic and second-order barriers being intrinsic. This study supports that barriers to incorporation are complex and do occur both intrinsically and extrinsically. Additionally, Rutherford and Grana (1995) believed that the biggest barriers to incorporation are those intrinsic, with the main barrier being fear. Although this study did not support fear as the main intrinsic barrier, it was found to be a strong force in preventing incorporation or incorporation of instructional technology. Hagner (2000) found that teacher beliefs about students' needs was a motivating factor in instructional technology incorporation. Those findings are also supported by this study, although beliefs about student learning styles and student instructional needs are not uniform across groups, nor were they pervasive.

Taken together, the findings of this study point to a critical issue. Some faculty have never, and may never, change their teaching methodology. Their perceptions of themselves as teachers and the way their beliefs about teaching are manifest through their teaching styles and methodology allow them to be comfortable with their teaching as it is. These faculty do not perceive a need to change methodology, and this mostly likely includes incorporating instructional technology.

## References

- Althusser, L. (1971). *Lenin and philosophy, and other essays*: Monthly Review Press.
- Anderson, L. M., & Bird, T. (1995). How three prospective teachers construed three cases of teaching. *Teaching and Teacher Education, 11*(5), 479-499.
- Asmar, C. (2002). Strategies to enhance learning and teaching in a research-extensive university. *International Journal for Academic Development, 7*(1), 18-30.
- Becker, H. J. (2000). Findings from the teaching, learning, and computing survey: Is Larry Cuban right? *Education Policy Analysis Archives, 8*(51).
- Becker, H. J., & Ravitz, J. (1999). The influence of computer and Internet use on teachers' pedagogical practices and perceptions. *Journal of Research on Computing in Education, 31*(4), 356-384.
- Bellas, M. L. (1997). Disciplinary differences in faculty salaries: Does gender bias play a role? *Journal of Higher Education, 68*(3), 299-321.
- Benjamin, E. (1999). Disparities in the salaries and appointments of academic women and men. *ACADEME, 85*(1), 60-62.
- Berg, B. L. (2004). *Qualitative research methods for the social sciences* (Fifth ed.). Boston: Allyn and Bacon.
- Betts, K. (1999). *Perception vs. reality: top 10 motivators and inhibitors for participating in distance education as view by faculty and deans at a research II institution*. Retrieved December 15, 2002, from <http://www.geteducated.com/vug/archives/vug0499.htm#chalk>
- Bogdan, R. C., & Biklen, S. K. (1982). *Qualitative research for education: An introduction to theory and methods*. Newton, MA: Allyn & Bacon.
- Bowles, S., & Gintis, H. (1976). *Schooling in capitalist America : educational reform and the contradictions of economic life* (Paperback ed.). New York: Basic Books.
- Brown, A. H., Cervero, R. M., & Johnson-Bailey, J. (2000). Making the invisible visible: Race, gender, and teaching in adult education. *Adult Education Quarterly, 50*(4), 273.
- Butler, D. (2000). Gender, girls, and computer technology: What's the status now? *Clearing House, 73*(4), 225.
- Butler, D., & Sellbom, M. (2002). Barriers to adopting technology for teaching and learning. *Educause Quartely, 25*(2), 22-28.
- Butler, J. (1993). Imitation and gender insubordination. In H. Abelove, M. A. Barale & D. M. Halperin (Eds.), *The Lesbian and Gay Studies Reader*. New York: Routledge.
- Cagle, J., & Hornik, S. (2001). Faculty development and educational technology. *T.H.E. Journal, 29*(3), 92-97.
- Candiotti, A., & Clarke, N. (1998). Combining universal access with faculty development and academic facilities. *Communications of the ACM, 41*(1), 36-41.
- Castelnuovo, S., & Guthrie, S. R. (1998). *Feminism and the female body: Liberating the Amazon within*. Boulder: Lynne Rienner.
- Center for Academic Transformation. (2004). Retrieved July 1, 2004, from <http://www.center.rpi.edu/>

- Chizmar, J. F., & Williams, D. B., 2001, 18-24. (2001). What do faculty want? *Educause Quarterly*, 24(1), 18-24.
- Conti, G. J. (1989). Assessing teaching style in continuing education. In E. R. Hayes (Ed.), *New Directions for Adult and Continuing Education* (Vol. 43, pp. 3-16). San Francisco: Jossey-Bass.
- Conti, G. J. (1990). Identifying your teaching style. In M. Gailbraith (Ed.), *Adult Learning Methods*. Malabar, FL: Krieger.
- Creswell, J. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage.
- Cuban, L. (1984). *How Teachers Taught: Consistency and change in American classrooms, 1890-1980*. New York: Longman.
- Darkenwald, G. G. (1989). Enhancing the adult classroom environment. In deMarrais, K. B., & Lapan, S. D. (Eds.). (2004). *Foundations for research methods of inquiry in education and the social sciences*. Mahway, NJ: Lawrence Erlbaum Associates, Inc.
- deMarrais, K. B., & Lapan, S. D. (Eds.). (2004). *Foundations for Research Methods of Inquiry in Education and the Social Sciences*. Mahway, NJ: Lawrence Erlbaum Associates, Inc.
- deMarrais, K. B., & LeCompte, M. D. (1999). *The way schools work: A sociological analysis of education* (Third ed.). New York: Longman.
- Denzin, N. K. (1986). *Interpretive biography*. Newbury Park, CA: Sage.
- Dexter, S. L., Anderson, R. E., & Becker, H. J. (1999). Teachers' views of computers as catalysts for changes in their teaching practice. *Journal of Research on Computing in Education*, 31(3), 221.
- Donovan, M. (1999). *Rethinking faculty support*. Retrieved September 19, 2003, from <http://ts.mivu.org/default.asp?show=article&id=612>
- Donovan, M., & Macklin, S. (1998). *One size doesn't fit all: designing scaleable, client-centered support for technology in teaching*. Paper presented at the CAUSE98: The Networked Academy, Seattle, Washington.
- Duderstadt, J. J., Atkins, D. E., & Van Houweling, D. (2002). *Higher education in the digital age: Technology issues and strategies for American colleges and universities*. Westport, Conn: Greenwood Press.
- Dunn, R. S., & Dunn, K. J. (1979). Learning styles/teaching styles: Should they...can they...be matched? *Educational Leadership*, 36(4), 238.
- Dusick, D. M. (1998). What social cognitive factors influence faculty members' use of computers for teaching? A literature review. *Journal of Research on Computing in Education*, 31(2), 123.
- Ernest, P. (1989). The knowledge, beliefs and attitudes of the mathematics teacher: A model. *Journal of Education for Teaching*, 15, 13-34.
- Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology, Research and Development*, 47(4), 47-61.
- Fanon, F. (1952). The fact of blackness (C. L. Markmann, Trans.). In *Black skin, white masks*. London: MacGibbon & Kee.
- Felder, R. (1993). Reaching the second tier: Learning and teaching styles in college science education. *Journal of College Science Teaching*, 23(5), 289-290.
- Fielding, N., & Fielding, J. (1986). *Linking data*. Beverly Hills, CA: Sage.

- Flax, J. (1990). Transitional thinking 3: Postmodernist philosophies. In *Thinking fragments: Psychoanalysis, feminism, and postmodernism in the contemporary west* (pp. 28-43). Berkeley: University of California Press.
- Fredman, A. (1992). *Yes, I can. Action projects to resolve equity issues in educational computing*. Eugene, OR: International Society for Technology in Education.
- Galloway, J. P. (1997). How teachers use and learn to use computers. In *Technology and Teacher Education Annual Journal, 1997*. Charlottesville, VA: Association for the Advancement of Computing in Education.
- Gardiner, L. F. (1998). Why we must change: The research evidence. *Thought & Action*(Spring).
- Giroux, H. A. (1994). Doing cultural studies: Youth and the challenge of pedagogy. *Harvard Educational Review, 64*(3), 278.
- Grasha, A. F. (1994). A matter of style: The teacher as expert, formal authority, personal model, facilitator, and delegator. *College Teaching, 42*(4), 12.
- Grasha, A. F. (1996). *Teaching with style*. Pittsburg, PA: Alliance Publishers.
- Grasha, A. F., & Yangarber-Hicks, N. (2000). Integrating teaching styles and learning styles with instructional technology. *College Teaching, 48*(1), 2.
- Groves, M. M., & Zemel, P. C. (2000). Instructional technology adoption in higher education: An action research case study. *International Journal of Instructional Media, 27*(1), 57.
- Hagedorn, L. S. (1996). Wage equity and female job satisfaction: The role of wage differentials in a job satisfaction cause model. *Research on Higher Education, 37*(5), 569-598.
- Hagner, P. R. (2000). Faculty engagement and support in the new learning environment. *Educause Review, 35*(5), 27-37.
- Hallam, M. (2000). *WebCT tools and the good teaching principles they support*. Retrieved November 27, 2004, from [http://www.webct.com/WYW/ViewContent?contentID=2627458&pageName=WebCT3\\_tools.html](http://www.webct.com/WYW/ViewContent?contentID=2627458&pageName=WebCT3_tools.html)
- Harding, S. (1987). Is there a feminist method? In S. Harding (Ed.), *Feminism and Methodology*. Bloomington: Indiana University Press.
- Henwood, F. (2000). From the woman question in technology to the technology question in feminism: rethinking gender equality in IT education. *The European Journal of Women's Studies, 7*, 209-227.
- Hill Collins, P. (1990). *Black feminist thought*. London: Routledge.
- Hirschbuhl, J. J., & Faseyitan, S. O. (1994). Faculty uses of computers: Fears, facts and perceptions. *T H E Journal, 21*(9), 64.
- Hogarty, K. Y., Lang, T. R., & Kromrey, J. D. (2003). Another look at technology use in the classrooms: The development and validation of an instrument to measure teachers' perceptions. *Educational and Psychological Measurement, 63*(1), 139-162.
- Holloway, R. E. (1998). Diffusion and adoption of educational technology: A critique of research design. In D. J. Jonassen (Ed.), *Handbook of Research in Educational Technology* (pp. 1107-1133): Macmillian.
- Holt-Reynolds, D. (1992). Personal history-based beliefs as relevant prior knowledge in coursework. *American Educational Research Journal, 29*, 325-349.
- Honey, M., & Moeller, B. (1990). Teacher's beliefs and technology integration: Different values, different understandings. *CTE Technical Report Issue No. 6*.

- Hoyt, D. P., & Lee, E. J. (2002). Teaching "styles" and learning outcomes. *IDEA Research Report*.
- Inkpen, K., Upitis, R., Klawe, M., Lawry, J., Anderson, A., Ndunda, M., et al. (1994). We have never forgetful flowers in our garden: Girls' responses to electronic games. *Journal of Computers in Math and Science Teaching*, 13(4), 383-403.
- Jick, T. (1983). Mixing qualitative and quantitative methods: Triangulation in action. In J. Van Maanen (Ed.), *Qualitative Methodology* (pp. 135-148). Beverly Hills, CA: Sage.
- Kagan, D. M. (1992). Implication of research on teacher belief. *Educational Psychologist*, 27(1), 65.
- Kaminski, K. (2000). Infusing technology into the classroom. *TechTrend*, 44(3), 38-39.
- Kaplan, E. J., & Kies, D. A. (1995). Teaching styles and learning styles: Which came first? *Journal of Instructional Psychology*, 22(1), 29.
- Knupfer, N. N. (1998). Gender divisions across technology advertisements and the WWW: Implications for educational equity. *Theory Into Practice*, 37(1), 54.
- Lage, E. (1991). Boys, Girls, and microcomputing. *European Journal of Psychology in Education*, 6(1), 29-44.
- Littlejohn, A., & Sclater, N. (1999). The virtual university as a conceptual model for faculty change and innovation. *Interactive Learning Environments*, 7(2-3), 209-225.
- Lucas, S. (2002). The individualization of education: WebCT and learning styles in language instruction. *IALLT Journal of Language Learning Technologies*, 34(1), 77-81.
- Lucas, S., & Smith, G. (2004, April). *Exploration of instructional technology in higher education: The role of gender in IT teaching practices and beliefs among faculty*. Paper presented at the American Educational Research Association, San Diego, California.
- Lumpe, A. T., & Chambers, E. (2001). Assessing teachers' context beliefs about technology use. *Journal of Research on Technology in Education*, 34(1), 93-107.
- Lyons, R. E., Kysilka, M. L., & Pawlas, G. E. (1999). *The adjunct professor's guide to success: Surviving and thriving in the college classroom*. Needham Heights, MA: Allyn & Bacon.
- Mehra, B. (2002). *Bias in qualitative research: Voices from an online classroom*. Retrieved July 1, 2004, from <http://www.nova.edu/ssss/QR/QR7-1/mehra.html>
- Meltzer, J., & Sherman, T. M. (1997). Ten commandments for successful technology implementation and staff development. *NASSP Bulletin*, 81(585), 23-32.
- Meltzoff, J. (1999). *Critical thinking about research: Psychology and related fields*. Washington, D.C.: American Psychological Association.
- Millis, B. J. (1994). Faculty development in the 1990s: what it is and why we can't wait. *Journal of Counseling and Development*, 72(5), 454-465.
- Morahan-Martin, J. (1998). Males, females and the internet. In J. Gackenback (Ed.), *Psychology and the internet: intrapersonal, interpersonal and transpersonal applications* (pp. 169-197). San Diego: Academic Press.
- NCREL. (1995). *Glossary of education terms and acronyms*. Retrieved February, 29, 2004, from <http://www.ncrel.org/sdrs/areas/misc/glossary.htm>
- Neal, E. (1998). Using technology in teaching: We need to exercise healthy skepticism. *Chronicle of Higher Education*, pp. B4-5.

- O'Connor, T. (1997). *Using learning styles to adapt technology for higher education*. Retrieved November 27, 2004, from <http://www.indstate.edu/ctl/styles/learning.html>
- Oblinger, D. G. (2004). *Educating the net generation*. Paper presented at the Educause, Denver, CO.
- Overholtzer, J. (2001). A support crisis of our own making? Training versus equipping. *Educause Quarterly*, 24(4), 35-40.
- Padgett, D., & Conceicao-Runlee, S. (2000). Designing a faculty development program on technology: If you build it, they will come. *Journal of Social Work Education*, 36(2).
- Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62(3), 307-332.
- Park, S. M. (1996). Research, teaching, and service: Why shouldn't women's work count? *The Journal of Higher Education*, 67(1), 46-84.
- Parker, D. (1997). Increasing faculty use of technology in teaching and teacher education. *Journal of Technology and Teacher Education*, 5(2/3), 105-115.
- Pedersen, S., & Liu, M. (2003). Teachers' beliefs about issues in the implementation of a student-centered learning environment. *Educational Technology, Research and Development*, 51(2).
- Prawat, R. S. (1992). Teachers' beliefs about teaching and learning: A constructivist perspective. *American Journal of Education*, 36, 355-396.
- Rist, R. C. (1970). Student social class and teacher expectations: the self-fulfilling prophecy in ghetto education. *Harvard Educational Review*(40), 411-451.
- Rogers, E. M. (1962). *Diffusion of innovations*. New York: The Free Press.
- Rossman, G.B. & Wilson, B.C. (1985) Numbers and words: combining qualitative and quantitative methods in a single large-scale evaluation study. *Evaluation Review*, 9(5), 627-643.
- Rutherford, L. H., & Grana, S. J. (1995). *Retrofitting academe: Adapting faculty attitudes and practices to technology*. Retrieved September 11, 2002, from <http://www.thejournal.com/magazine/vault/articleprintversion.cfm?aid=1274>
- Sadker, M. P., & Sadker, D. M. (1985). Sexism in the schoolroom of the '80s. *Psychology Today*, 54-57.
- Schneider, A. (1998). Why don't women publish as much as men? *The Chronicle of Higher Education*, 45, A14.
- Schumacher, P., & Morahan-Martin, J. (2001). Gender, internet and computer attitudes and experiences. *Computers in Human Behavior*, 17(1), 95-110.
- Schutz, P. A., Chambless, C. B., & DeCuir, J. T. (2004). Multimethods research. In K. B. deMarrais & S. D. Lapan (Eds.), *Research methods in the social sciences: Frameworks for knowing and doing*. Hillsdale, NJ: Erlbaum.
- Shapiro, W. L., & Cartwright, G. P. (1998). New ways to link technology and faculty development. *Change*, 30(5), 50-52.
- Scheurich, J. J. (1994). Social relativism: A postmodernist epistemology for educational administration. In S. J. Maxcy (Ed.), *Postmodern school leadership: Meeting the crisis in educational administration* (pp. 17-46). Westport, CT: Praeger.
- Skeele, R., & Daly, J. (1997). Technology, pedagogy, and academic freedom: a democratic paradigm for the 21st century. *Technology and Teacher Education Annual*, 49-52.

- Skiba, R. J., Michael, R. S., Nardo, A. C., & Peterson, R. (2000). *The color of discipline: Sources of racial and gender disproportionality in School Punishment*. Indiana Education Policy Center.
- Sorg, S., Truman-Davis, B., Dziuban, C., Moskal, P., Hartman, J., & Juge, F. (1999). Faculty development, learner support and evaluation in web-based programs. *Interactive Learning Environments*, 7(2-3), 137-153.
- Spotts, T. H., Bowman, M. A., & Mertz, C. (1997). Gender and use of instructional technologies: A study of university faculty. *Higher Education*, 34(4), 421.
- Stecklein, J. E., & Lorenz, G. E. (1986). Academic women: Twenty-four years of progress? *Liberal Education*, 72(1), 63-71.
- Teaching Philosophies: Teacher and Student Centered Approaches*. (2004). Retrieved February 29, 2004, from <http://trc.ucdavis.edu/trc/ta/tatips/philosophies1.pdf>
- Thurston, C. O., Stuve, M. J., Pianfetti, E. S., & Thomas, R. (1998). Multiple means of support: the role of the office of educational technology in faculty development. In *Technology and Teacher Education Annual* (pp. 352-355).
- Van Dusen, G. C. (1998, Spring). Technology: Higher education's magic bullet. *Thought & Action*.
- Watkins, B. T. (1990). Growing number of older students stirs professors to alter teaching styles. *Chronicle of Higher Education*, 36(46), A1.
- Weedon, C. (1987). *Feminist practice and poststructuralist theory*. Cambridge, MA: Blackwell.
- Wetzel, K. (1993). Teacher educators' uses of computers in teaching. *Journal of Technology and Teacher Education*, 1(4), 335-352.
- White, J. T., & Myers, S. D. (2001). You can teach an old dog new tricks: The faculty's role in technology. *Business Communication Quarterly*, 64(3).
- Wilson, C. (2001). Faculty attitudes about distance education. *Educause Quartely*, 2.
- Women's Learning Partnership for Rights, Development, and Peace*. (2003). Retrieved March 17, 2004, from <http://www.learningpartnership.org/facts/tech.phtml>
- Woods, P. (1993). Managing marginality: Teacher development through grounded life history. *British Educational Research Journal*, 19(5), 447.
- Young, B. J. (2000). Gender differences in student attitudes toward computers. *Journal of Research on Computing in Education*, 33(2), 204.
- Zhao, Y., & Cziko, G. A. (2001). Teacher adoption of technology: A perceptual control theory perspective. *Journal of Technology and Teacher Education*, 9(1).
- Zinn, L. M. (1990). Identifying your philosophical orientation. In M. W. Galbraith (Ed.), *Adult learning methods* (pp. 39-78). Malabar, FL: Krieger Publishing.
- Zvacek, S. M. (2001). Confessions of a guerilla technologist. *Educause Quartely*, 24(2), 40-45.