Who Am I? The Influence of Teacher Beliefs on Instructional Technology Incorporation

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Abstract

Research shows that the primary causes of resistance to technology adoption are various resource-type barriers, such as lack of institutional support, financial resources, time, and technical knowledge. Could it be that the primary barriers to adoption are much less tangible and are in reality the result of who an individual is as a teacher and the choices that individual makes? Since resource centers have had difficulty persuading faculty to adopt instructional technology, this study examines the assumption, and the research, that the primary barriers to adoption are based on resource type barriers. It does so by comparing teaching beliefs and styles to quantity, quality and kinds of technology use among higher education faculty.

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Introduction

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 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 & Grana, 1995; Skeele & Daly, 1997; Wetzel, 1993).

Faculty technology and development centers countrywide have developed training aimed at helping faculty break down the barriers to instructional technology incorporation. 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 be masking the real issue of resistance to incorporation, which could be a more intrinsic issue, meaning beliefs about teaching and learning. We need, therefore, to question the assumption, and the research, that these barriers to incorporation are primarily based on extrinsic resources. 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.

Purpose of the Study

The purpose of this study was to determine whether barriers to faculty technology adoption are primarily intrinsic and based on teacher beliefs, rather than extrinsic and based on the availability of resources.

Background for the Study

Extrinsic Barriers to Instructional Technology Incorporation

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 & 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 mandates.

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.

Faculty technology and development centers countrywide have developed training to try to address these issues. Even after adjusting and changing the shape and the 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 physical resources. Could it be that these barriers are much less tangible?

Intrinsic Barriers to Instructional Technology Incorporation

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 techno 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 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.

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.

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 Faculty Resource Center

The Faculty Resource Center (FRC) at the University of Alabama is a support unit whose mission is to support faculty in the incorporation of technology into teaching, research and service. The unit has a professional staff of 10 and provides technical and pedagogic support to

faculty in the design and development of instructional materials utilizing current and emerging educational technologies. The staff also consults with faculty on integrating electronic information resources into courses, including creating guides, tutorials, and reference lists. The FRC encourages and supports the development of faculty projects that use multimedia and information technology to support instruction. To help achieve these goals, the FRC has, for the past seven years, conducted diverse workshops and seminars geared at training and supporting faculty. These workshops have altered as demand has changed. Originally, the workshops consisted of three-hour long weekly sessions during the academic semester and weeklong sessions during the summer months. During the academic semester, the sessions progressed from simple to more difficult. Typically, the semester workshops began with topics that covered basic concepts such as making, copying, and moving files and subdirectories. Workshops then moved to more complex issues like file transfer protocol (ftp), file zipping, and basic web theory. More complicated topics and programs were introduced after the faculty member was, ideally, more confident and comfortable with the basics. In summer workshops, over a one-week period, faculty participants were taught all the technology they could possibly need to put a web site or web course online. They were introduced to programs that are the mainstay of web technology professionals. The emphasis of these workshops was on learning applications.

In effect, these workshops were addressing the extrinsic barriers of lack of knowledge, but did little else to assist faculty in their technology incorporation and instructional implementation. The workshops did not deal with the other identified extrinsic barriers of deficiencies in institutional support, financial support, or time. Additionally, not only did other barriers beyond basic lack of technology expertise need to be addressed, but also the emphasis had to shift more intrinsically, toward pedagogy and educational goals, and away from

technology. As Donovan and Macklin (1998) found, faculty were, at this point, actually not interested in acquiring a technology skill; they wanted to know how to perform specific tasks that were applicable to their disciplines or fields, and they wanted to be able to retain the knowledge and be equipped to repeat these tasks once they returned to their offices.

In an effort to address these barriers, the Faculty Resource Center redesigned its workshop structure. The regular academic year sessions were cancelled, and the summer workshop instead of being a single week, now became two weeks long; the faculty were paid for their time, and the main objective was that each participant would create, via the course management system WebCT, an entire course that realized concrete pedagogic principles. The workshop was organized with the idea that the technical, or extrinsic, and the pedagogic, or intrinsic, would interact with and build upon each other. Emphasis was placed on the concept that pedagogy and, most especially, the final goal of creating a complete WebCT course would be paramount. Only enough technology would be taught to realize the pedagogic goal; in the past, sessions on a particular technology would cover as many possible aspects of the program that could be packed into a 3-hour session. During this workshop, participants were taught only the parts of that technology they needed to know in order to achieve the task at hand, whether that be creating the obligatory syllabus or working with lecture materials.

After three separate implementations, informal interviews, questionnaires and personal communications have shown even though this workshop addressed all the remaining barriers—lack of time, lack of money, lack of institutional support, the faculty were not necessarily retaining more technological information, nor were they using more instructional technology methods in their teaching than did faculty from previous workshops. According to the literature on conducting faculty workshops (Cagle & Hornik, 2001; Littlejohn & Sclater, 1999; Millis,

1994; Padgett & Conceicao-Runlee, 2000; Shapiro & Cartwright, 1998; White & Myers, 2001), the FRC was in line with the research, but the faculty were still resisting. What this seemed to mean is that the faculty were not convinced that using technology was beneficial in terms of educational gains, nor in terms of time and effort saved. Indeed, the Faculty Resource Center was not alone in its inability to facilitate faculty in incorporating technology into their instruction. All of this pointed to the supposition that lack of faculty incorporation must be due not to issues of resources, but to something more fundamental.

Teacher Beliefs

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, we can say that generally 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 children have an equal ability to learn, this belief may be reflected in methodology and teaching style. The methods teachers

choose for these educational situations may reflect their own beliefs. 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."

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 asserted 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.

Brown, Cervero, & 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 hierarchal society, with the primary identifiers being race, gender, class, physical ability and sexual orientation. Teaching style and methodology choice are products of socially constructed categories.

At least one study 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 philosophy (Becker, 2000). If technology is important and there is an educational value on 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. To adopt 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 that teachers who do not (Becker, 2000; Dexter, Anderson, & Becker, 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.

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).

This binary definition of teaching style is, for some, incomplete. Hoyt and Lee consider teaching style to be a combination of teaching approaches, where a teaching approach is a combination of teaching methods (2002). In contrast to being a summation of methodology, Darkenwald (1989) sees teaching style as based on characteristic behaviors that are engaged in for promoting student learning. Conti (1989) defines teaching style as a range of behaviors that allow the teacher to operate comfortably and adds that these behaviors or qualities are persistent from context to context and are not linked to the content. Kaplan and Kies (1995) define teaching style more narrowly, and include the specific method in the definition. For them, teaching style is personal behaviors, but also the media that is used to transmit and receive data for information from the learners. For Zinn, it is a more specific behavior in that teaching style is the operational behavior of the teacher's educational philosophy (1990). According to Zinn, teaching style is

more than just behavior or method; teaching style (behaviors) must be based on the particular value system a teacher holds. This value system is the teaching philosophy. Dunn and Dunn (1979) try to find the root of teaching style and posit that teaching style is developed based on a model system. Many believe that teachers teach the way they were taught, meaning that one's philosophy of teaching would be a direct result of the philosophy of teaching employed by the teacher's teachers; instead, Dunn and Dunn believe that a teacher's teaching style is a direct result of the way a teacher learned. Essentially, one does not teach the way one was taught; one teaches the way one learned. This model begins to explain how one's teaching beliefs developed—one's ideas about teaching may be partly a result of how one learned.

Grasha assumed that teaching styles represented not only a belief system, but also behaviors and needs that a teacher exhibited in a class (1994). To this end, he outlined five teaching styles that represent faculty orientations or beliefs about teaching (1996). Grasha's five styles include the Expert, Formal Authority, Personal Model, Facilitator and Delegator. The Expert and Formal Authority are considered to be instructionist teaching styles, while the Facilitator and Delegator are constructionist styles. The Personal Model is a combination of instructionist and constructionist.

The Expert teacher possesses knowledge and expertise that the students need. This teacher is concerned that students receive the correct information and are well prepared in the discipline. An Expert gains respect from the students by being very knowledgeable in the field at hand. The disadvantage of the Expert model is that the display of knowledge the faculty member exhibits can be intimidating to many students. Additionally, this model is based on outcomes and may not always include the thought processes involved in reaching conclusions. The second style, The Formal Authority, although also concerned with expertise, gains his/her status and

respect because of his/her position as a faculty member. The Formal Authority is concerned with the correct way of doing things according to relevant standards. The disadvantage to this style, according to Grasha, is that it can lead to rigid, standardized, somewhat inflexible teaching. A faculty member who exhibits The Personal Model, the third style, is concerned that he/she establishes a prototype on how to behave and think. This faculty member will show students how to do things rather than simply tell them. A disadvantage to this style would be that students may feel inadequate if they cannot emulate and live up to the standards set by the faculty member.

The last two styles, The Facilitator and the Delegator, focus more on the instructor as guide rather than sage. The Facilitator guides and directs students by using various methodologies. The goal here is to develop in the student the ability for independent thought and action. The disadvantage is that this model is time consuming. The Delegator concerns him/herself in the students' ability to function in an autonomous manner. The instructor gives students various tasks to complete and functions as a resource person rather than a knowledge source. The disadvantage with this style is that many students, particularly at the lower undergraduate level, are uncomfortable with this autonomy and may feel lost and without direction.

Methodology

Purpose of the Study

The purpose of this study was to determine whether barriers to faculty technology adoption are primarily intrinsic and based on teacher beliefs, rather than extrinsic and based on the availability of resources.

The study took place at the University of Alabama, a Carnegie-classified Doctoral/Research University—Extensive, and a member of the National Association of State Universities & Land Grant Colleges (NASULGC). The Southern Association of Colleges and Schools (SACS) accredits the University. The University has approximately 20,000 students and 900 full-time instructional faculty and is divided into 11 instructional schools, which are Arts and Sciences, Commerce and Business Administration, Communication and Information Sciences, Community Health Sciences, Continuing Studies, Education, Engineering, Human Environmental Sciences, Nursing, Law, and Social Work. There are 84 undergraduate degree programs, 75 master programs, 7 educational specialist programs, 57 doctoral programs, and 1 law program.

Two instruments were chosen for the study. These instruments were selected to determine whether there was a correlation between teaching style, which represents teaching beliefs, and attitudes about instructional technology. The first instrument, chosen to determine beliefs about and toward technology, was Hogarty's Perceptions of Computers and Technology, which has been tested and validated through common factor analysis (Hogarty, Lang, & Kromrey, 2003). The second instrument, chosen to assess teaching style, was the Grasha-Reichmann Teaching Style Inventory.

Hogarty's Perceptions of Computers and Technology, a paper-based instrument, was slightly modified for this study to make it applicable to higher education. The wording of particular titles, sections, and questions were changed. For example, "General School Support" was changed to "General Institutional Support, " and "on-site computer specialist" was changed to "Technical support staff." Three sections of Hogarty's instrument are related to integration of computers and technology in the schools. These three sections are teacher software use, student

software use and integration of computers in the classroom. In the modified version, the sections on student software use and integration of computers in the classroom were omitted due to the appropriateness of these questions for higher education. Another two sections of the instrument were devoted to measure support of computer use. In the modified version, these sections were slightly modified to reflect the administrative structures of higher education. One section of the instrument measured teacher confidence and comfort using computers, while the final section of the instrument focused on teacher attitudes toward computers.

The work of Anthony Grasha in terms of teaching styles is prominent and respected. The Grasha-Riechmann Teaching Style Inventory is a web-based assessment, available at various web sites, that asks for a Likert-type response to a serious of questions designed to objectively categorize teaching style. A teacher is asked a question such as, "I set high standards for students in this class," and 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 data were collected from 11 higher education faculty members taking part in a two-week technology and teaching workshop. The subjects were 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 data from Hogarty's instrument were collected on the first day, and the data from Grasha's Teaching Style inventory were collected on the second day of the workshop.

Results

The results of the Grasha-Reichmann Teaching Style Inventory were that all participants tested either high or moderate on all styles—no subject was low in any category. Therefore, the results reflect that the high in each particular category was compared to the moderate in each category. Essentially, this means that if one person scored high on the Formal Authority scale, they were compared to someone who scored moderate on the same scale in terms of their answer to Hogarty's questionnaire. A paired samples t-test was run and the results were significant at the .05 level. The following registered as statistically significant.

Formal Authority:

- High Formal Authority were less inclined to use a
- pplication software (.014)
- High Formal Authority were less inclined to use technology as a research tool (.082)
- High Formal Authority were less inclined to use technology as a productivity tool (.048).

Expert:

- High Experts were less inclined to use application software (.033).
- High Experts were less inclined to use instructional software (.017)
- High Experts were less inclined to use technology as a research tool (.082).
- High Experts were less inclined to use technology as a productivity tool (.008).
- High Experts were less inclined to use technology in cooperative group settings (.029).

Delegator:

- High Delegators had a positive affinity toward computer use (.043).

Personal Model:

- High Personal Models had a higher frequency of using technology to promote student centered learning (.045).
- High Personal Models had a higher frequency of using technology to aid in decision-making and problem solving (.013).
- High Personal Models had a lower frequency of using technology for fun and entertainment (.026).

Discussion

The results of this study indicate that faculty who were "formal authority" in teaching style were less inclined to use technology in applications, research, and productivity, whereas those who were classified as "delegator" in their teaching style had a positive affinity toward computer use. Further, those with teaching styles identified in the "personal model" category had a higher frequency of using technology to promote student centered learning and a higher frequency in using technology to aid in decision making, a common attribute of constructivist style teaching. These results certainly support Honey and Moeller's (1990) findings from a K-12 setting in which those teachers who identify themselves as more student-centered may be more inclined to use technology; and further, those who identify themselves as teacher-centered may not be willing to "deal" with technology. The results of this study clearly point to a possible correlation between teaching style and attitudes toward and use of technology. Those who are more instructionist-type teachers seem to be less inclined to use technology, and not only in terms of instructional technology. These faculty are less inclined than constructionist teachers to use technology for research and to improve productivity. On the other side, those who are more constructionist have a more positive affinity toward computer use, and are more willing to use technology as a classroom teaching methodology.

Traditional barriers to faculty technology adoption have been identified as those that are extrinsic in nature such as lack of institutional support, time, and technical knowledge (Betts, 1999; Butler & Sellborn, 2002; Chizmar & Williams, 2001; Groves & Zemel, 2000). However, other studies have begun to investigate the potential of intrinsic barriers playing a high factor in technology adoption. For example, Rutherford and Graves (1995) indicated fear as the greatest impediment to faculty using technology. Honey and Moeller (1990) noted a strong correlation

between teaching philosophy and technology incorporation and found that student centered teachers were stronger proponents of technology.

This study should be viewed as a beginning point in the investigation of the correlation between teaching style and instructional technology incorporation, and is a prelude to other studies at this institution. Further studies, with a larger sample, are needed in order to identify characteristics of *teacher centered* versus *student centered* teachers and if those characteristics play roles in whether the teacher incorporates technology in the classroom. Many questions could also be raised from this study, including whether demographics (e.g. gender, college affiliation, tenure status, and years at university) play a role in identifying whether teaching styles effect technology incorporation. Further investigation is planned, and the results of these investigations hopefully will aid resource centers in planning, developing and implementing faculty technology training programs.

References

Becker, H. J. (2000). Findings from the Teaching, Learning, and Computing Survey: Is Larry Cuban Right? *Education Policy Analysis Archives, 8*(51).

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

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., & Sellbom, M. (2002). Barriers to adopting technology for teaching and learning. *Educause Quartely, 25*(2), 22-28.

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.

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*, from http://ts.mivu.org/default.asp?show=article&id=612

Ernest, P. (1989). The knowledge, beliefs and attitudes of the mathematics teacher: A model. *Journal of Education for Teaching, 15*, 13-34.

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.

Giroux, H. A. (1994). Doing cultural studies: Youth and the challenge of pedagogy. *Harvard Educational Review, 64*(3), 278.

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.

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.

Kagan, D. M. (1992). Implication of Research on Teacher Belief. *Educational Psychologist, 27*(1), 65.

Lumpe, A. T., & Chambers, E. (2001). Assessing teachers' context beliefs about technology use. *Journal of Research on Technology in Education, 34*(1), 93-107.

Pajares, M. F. (1992). Teachers' Beliefs and Educational Research: Cleaning up a Messy Construct. *Review of Educational Research, 62*(3), 307-332.

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).

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

Skeele, R., & Daly, J. (1997). Technology, pedagogy, and academic freedom: a democratic paradigm for the 21st century. *Technology and Teacher Education Annual*, 49-52.

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.

Wetzel, K. (1993). Teacher educators' uses of computers in teaching. *Journal of Technology and Teacher Education, 1*(4), 335-352.

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