An Investigation of K-12 Teachers' Attitudes toward Computer Technology use in Schools

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Abstract

This paper addressed the lack of investigation of K-12 teachers' attitudes toward computer technology use in schools. The study looks at teacher variables that might affect the implementation of computer use in the learning environment. A sample of 179 teachers in a Northeast Mississippi school district participated in this study. The survey, the Computer Attitude Scale (CAS), consisted of two sections. In section one, teachers were asked to provide demographic information about themselves such as computer experience, access to a computer at home, age , gender, teaching level, teaching field, ethnicity , and education level. The second section was a 40-item questionnaire used to measure in-service teachers' attitudes toward computer technology. Analysis of variance (ANOVA) was used to analyze mean differences in attitudes based on computer experience, computer at home, teaching field, teaching level, and age. The result revealed that there were significant differences between teachers' attitudes as related to the teaching levels. No significant differences were found between computer anxiety, computer confidence, computer liking, and computer usefulness based on age, and teaching field. T-tests were used to analyze mean differences in attitudes based on gender and ethnicity. No significant differences were found between computer anxiety, computer confidence, computer liking, and computer usefulness based on ethnicity and gender. From these results, it was concluded that school districts could provide opportunities for inservice training and staff development for all teachers in educational technology with focus on integrating technology with curriculum. It was also concluded that teachers should be trained in the ways that technology can be used in their work environment.

Introduction

One of the prerequisites for acceptance and implementation of computers in an educational system is the positive attitude of both teachers and students toward their use. Having a positive attitude toward technology has been shown to be associated with increased classroom use of computers (Moursund & Bielefldt, 1999). Studies of educational technology have often addressed teacher attitude and possible reasons behind teacher resistance to incorporating computer use into their practice (Wentworth, 1996; Ertmer & Hruskocy, 1999). Many studies, indeed, have shown that the more positive teachers' attitude toward computer use in instruction becomes, the more they tend to use computers. This contributes to a more positive attitude, which in turn motivates teachers to try additional computer-related instructional activities (CEO Forum, 1999; Moallem & Micallef, 1997). Proponents of educational technology initiatives have long been aware of this cyclical relationship between attitude and computer use, and have often included sparking teachers' positive attitudes as professional development activity objectives.

Random House Unabridged Dictionary defines the word "attitude" as "1. Manner, disposition, feeling, and position with regard to a person or thing; tendency or orientation of the mind: a negative attitude; group attitudes. 2. Position or posture of the body appropriate to or expressive of an action, emotion, etc. a threaten attitude; a relaxed attitude" (p. 134). Gibson, Ivancevich, and Donnelly (1991) define attitude as the "positive or negative feeling or mental state of readiness learned and organized through experience that exerts specific influence on a person's response to people, objects, and situations" (p.70). In addition, psychologists such as Fishbein and Ajzen (1975) and Rosenberg and Hovland (1980) have defined attitude in terms of components or domains. The domains most often mentioned are the cognitive, or what a person believes about the attitude object; the affective, or what a person feels about the attitude object, how favorable or unfavorable it is evaluated; and the behavioral, or how a person actually responds to the attitude object based on cognitive and affective domains. Therefore, attitude consists of what individuals feel (affective), believe (cognitive), and plan to do (behavioral).

Several studies on computer attitude concluded that attitudes towards computers have many dimensions. Gressard and Loyd (1985) have identified four dimensions: computer anxiety, computer confidence, computer liking, and computer usefulness, while Chen (1985) has identified five dimensions: computer interest, gender, equality in computer use, computer confidence, and computer anxiety.

Extensive research (Glazewski, Brush, Ku, & Igoe, 2001) was done when computers were not easy to use. More recently, Shegog (1999) investigated the attitude of two hundred fifty-five teachers towards using computers. One hundred forty-five teachers were white, eighty teachers were African American, nineteen teachers were Hispanic, six teachers were Asian, and five were from other minorities. These secondary teachers were investigated to determine their attitudes toward computer technology use in classrooms.

Shegog (1999) concluded that the best predicator of teachers' attitude was computer experience. Ethnicity was the second best predictor of teachers' attitudes. African-American teachers had the highest positive attitudes toward computers. White teachers had the least positive attitude. Shegog concluded that while white teachers had a positive attitude toward computers, the minority teachers had an even more positive attitude. Age and teaching experience were not good predictors of teachers' attitudes toward computer and technology use in classrooms.

A study by Hardy (1998) indicated that most teachers had positive attitudes and teachers were concerned about lack of hardware and/or software programs, not having time to plan their lessons with computers, lack of knowledge, and lack of training about the effective use of computers. This research confirms an earlier study by Stenzel (1982).

Stenzel (1982) studied the attitudes of 464 elementary, middle, and secondary teachers in five randomly selected parishes in the state of Louisiana. One elementary, one junior-high middle school, and one high school were randomly selected from each parish. The main purpose of this study was to find reasons that teachers may use to avoid using computer technology in the State of Louisiana. The results of the study indicated that most teachers had positive attitudes toward computers. No significant correlations were found among the variables age and predisposition of teachers to learn about computers, teaching level and the predisposition of teacher to learn about computers, or teaching field and the predisposition of teachers to learn about computers. Most teachers reported that they were interested in learning about using equipment and materials that would be used in their classrooms. One of the recommendations indicated by the study is that computer training workshops should be a part of in-service programs.

According to McCarthy (1998), negative teacher attitudes promote a resistance to learning about computers and influence the acceptance and use of technology in the classroom. Research indicates that if teachers feel comfortable to use computers in their classroom, students are comfortable, and if teachers feel uncomfortable using computers, students are uncomfortable as well (Chiero, 1997: Jaber & Moore, 1999; McCoy & Haggard, 1989; Norton, McRobbie & Cooper, 2000).

Statement of the Problem

The availability of computer technology in K-12 classroom is increasing, yet the use of such resources continues to be minimal. One explanation may be teachers' attitudes toward the use of computer technology, and its use in the classroom.

The researcher has been working as a substitute teacher in a K-12 district in rural Mississippi for several years. The researcher worked with teachers who had limited experience using computers. In addition, there was a limited number of computers in the classroom. For some teachers, using computer technology represented a challenge.

While listening to some of the teachers complain about not having enough time to "teach the test," and witnessing them struggle to use the mouse, create a file, download a file, save a file to a floppy disk, ortake activities from a targeted web site or a related web site influenced the researcher's decision to investigate the attitude of K-12 teachers toward the use of computer technology in schools.

A review of the current literature found several (studies) Shegog (1997), McCarthy (1998), Stenzel (1999), Yildirim (2000), and Yang (1999) on teachers' attitudes toward the use of computer technology in the classroom. Nevertheless, none located by the researcher focused on small rural school districts. The problem that this study investigated is K-12 teachers' attitudes toward the use of computer technology in education and factors that influence those attitudes (lack of computer experience, access to a computer at home, age, gender, teaching level, teaching field, ethnicity, teaching experience, and education level).

Purpose of the Study

This study addressed the impact computer experience, access to computer at home, age, gender, teaching level, teaching field, ethnicity, and education level had on K-12 teachers' attitude towards the use of computer technology in education.

Research Questions

For this study, a survey instrument (Computer Attitude Scale) by Gressard and Loyd (1985) has been developed to investigate the attitude of K-12 teachers toward the use of computers in classrooms. The researcher sought answers to the following questions.

1. What differences exist in K-12 teachers' attitude toward computers based on teaching level (elementary school, middle school, and high school)?
2. What differences exist in K-12 teachers' attitude toward computers based on other demographic factors (computer at home, age, gender, and ethnicity)?
3. What differences exist in K-12 teachers' attitude toward computers based on computer experience?
4. What differences exist in K-12 teachers' attitude toward computers based on teaching field?

Significance of the Study

Schools invest a significant amount of money to acquire computer resources for teachers and students, thus promoting computer use and limiting resistance to learning about computers. As computer use becomes more important in the educational environment, teacher's attitudes toward their use may play an important role in achieving success in the computer-related aspect of the curriculum. Research indicates that positive attitudes increase the prospect for achievement in any academic endeavor, and negative attitudes make achievement of competency less likely (Yildirim, 2000).The teachers' frustration may also lead to a dislike for the computer and avoidance of the computer's use as a tool for learning. Empirical study of the relationship among these factors can help clarify the character and significance of computer attitudes among teachers (Loyd & Gressard, 1985).

The preponderance of the research about teachers' attitudes toward the use of computer technology has been studied in larger schools with large recruitment (Flowers, Rakes, & Glenda 2000). However, no study located has investigated the attitudes of K-12 teachers toward the use of computer technology in rural schools.

Additionally, according to research, the results of this study could provide educators with paradigms to improve the attitudes of teachers and performance of students. Also, the result of this study could provide educators with information about demographic factors that might influence the attitude of teachers toward the use of computer technology in education. The factors are computer experience, access to computers at home, age, gender, teaching level, teaching field, ethnicity, and education level toward the use of computer technology.

Delimitations

The delimitations of this study include the following:

1. Participants: The study was limited to K-12 teachers (elementary, middle, and high school) in a rural Mississippi School District in northeast Mississippi.
2. The study was limited to the 2005-2006 school terms.
3. Only teachers who voluntarily participated were included in this study.
4. The independent variables included in this study were: computers experience, access to computers at home, age, gender, teaching level, teaching field, ethnicity, teaching experience, and education level.

Limitations of the Study

The limitations of this study include the following:

1. This instrument is a self reporting measure that depends on the honesty of the participants.
2. The instrument used to measure attitudes was both valid and reliable.
3. The study can be generalized only to the school district under investigation. It cannot be generalized to all rural school districts in Mississippi.

Definitions of Terms

The following terms were used for clarity in this study:

1. Computer anxiety: For the purpose of this study, computer anxiety was defined as a common emotional response to computers characterized by fear or physical phenomenon such as: heart palpitations, sweaty palms, and in some situations elevated blood pressure (Orr, 2003).
2. Computer confidence (Subscore on Computer Attitude Scale): Confidence in the ability to learn about or use computers (Gressard & Loyd, 1986).
3. Computer experience: the accumulation of knowledge or skills that result from direct participation in events or activities; dealing with computers over an extended period of time.
4. Computer liking (Subscore on Computer Attitude Scale): Enjoyment in using computers (Gressard & Loyd, 1986).
5. Computer usefulness (Subscore on Computer Attitude Scale): The ability to perceive computers as a useful tool (Gressard & Loyd, 1986).
6. Education level: The highest level of schooling achieved.
7. Ethnicity: Group identified by race, nationality, culture, or religion.

Review Related Literature

In this paper, the analysis of the 63 studies that relate to the computer technology attitudes of K-12 teachers is divided into several sections. The sections are as follows: (a) teacher attitude toward computers, (b) computer anxiety and teacher attitude, (c) age and teacher attitude, (d) gender and teacher attitude, (e) ethnicity and teacher attitude, (f) education level and teacher attitude, (g) teaching field and teacher attitude, and (h) computer training and teacher attitude. On a whole, it was revealed that certain demographics, educational and teaching levels, and school level factors determined the types of attitudes that these groups of educators exhibited toward computer technology use. However, these studies failed to examine the affect of the above determinants as they relate to K-12 teachers in a predominantly rural state like Mississippi—a state that has some of the highest poverty levels, lowest teacher salaries, and the most rudimentary knowledge base as it relates to technology and its applications (Unites States Department of Education, 2001).

The literature reviewed in this chapter is divided into six sections: (1) Attitudes toward computers, (2) computer anxiety, (3) age, gender and ethnicity and teachers' attitude (4) educational level and teachers' attitude (5) teaching Field and teachers' attitude (6) computer training and teacher attitude. The following databases were searched: EBSCO host, Academic Search premier (EBSCO host), Teacher reference center, and Association for the Advancement of Computing in Education (AACE). A Boolean search using the terms " teachers' attitude" and "technology", "computer anxiety", "age", "gender", and "ethnicity" and "teachers' attitude", "education level" and "teachers' attitude", "teaching field" and "teachers' attitude," and "computer training" and "teachers' attitude" yielded 3,829 articles. Of these articles, only 63 dealt with K-12 educators and their computer technology related attitudes.

Teacher Attitude and Technology

Some researchers (Abbott & Faris, 2000; Kumar & Kumar, 2003) have suggested that teachers' attitudes toward technology could be improved by integrating technology into teacher education course work. Furthermore, teacher preparedness contributes to teacher attitude, and the research suggests that teachers' attitude toward computers are very important to the integration of technology in the classroom (Russell, O'Dwyer, Bebell,& O'Conner, 2003). If teachers have a good attitude toward computers, they will use technology (Gabriel & MacDonald, 1996; Marcinkiewicz, 1996; Milbrath, & Kinzie, 2000; Reed & Overbaugh, 1993).

However, the way teachers view using computers in their classes is an important issue as a positive approach can help them to be more effective while teaching in a computer lab. There might be teachers who have negative attitudes towards using computers in their classes. According to Brickner (1995) one of the obstacles to integrating computers into schools is related to teachers' beliefs about teaching, beliefs about computers, their established classroom practices and unwillingness to change. McMeniman (1998) and Rado and Foster (1992) also stated that language teachers do not change their beliefs by decree but by practicing and when they are presented with the evidence that technology has positive effects on learning. Another possible reason for this kind of attitude might be because they do not feel confident enough and feel a need to be trained about the use of computers in classes.

In trying to ensure that they get through a curriculum filled with basic skills and having to satisfy a media and the public to increase student reading, writing and math skills, the researchers believes that teachers and schools find it difficult to also add computer literacy to the already packed daily schedules. In a study conducted by Ertmer, Addison, Lane, Ross, and Woods, D (1999) teachers reported that in a number of "cases technology was considered to be additional or supplementary to the existing curriculum" (p.8). Becker (1999) concurred that "computers have played a relatively limited role in schools — primarily, they have been used as a supplementary activity after more necessary work is done or in computer lab setting where students perform a uniform task" (p.362).

Another cluster of studies (Hannaford, 1988; Mitra, 1998; Moroz & Nash, 1997), suggest teachers see technology as important only if their teacher-training institute has placed value on integrating technology. Yildirim (2000) points out that education majors who become teachers report that they hesitate to use technology and do not feel prepared to integrate technology into their instructions. Ropp (1999) further notes that even those preservice teachers who demonstrate proficiency integrating technology will not do so if they do not believe that technology has a use in their classroom (p. 403).

In addition, teachers' attitudes have also been referenced as an obstacle for implementation of technology into the curriculum (Owens, Magoun, & Anyan, 2000). According to Scheffler and Logan (1999), teaching in the classroom that has been reorganized due to the integration of computer technology has a "difference in the rhythm of activities" (p.305). They reported that the teaching "no longer centers around the transfer of knowledge from teacher to student; learning comes from student inquiry, critical thinking, and problem solving based on information accessed from a variety of sources" (p.305) This change in roles is sometimes reflected in literature as a fear of technology, the "tech threat." Hodas (1993) reported that implementation of new technologies may produce an analysis of current practice. This analysis may be perceived as a threat, especially to veteran teachers who have become comfortable with the current curriculum and instructional practices. Educators have traditionally held a position of "high ground" of knowledge. Technology threatens this power, and educators fear that electronic media will displace them from this "high ground" as holders of all answers (Bailey, Ross, & Griffin, 1995; Monahan, 2000; Saye, 1998), Kerr (1996) also concurs with this response. He states that some educators see technology as an "intimidating threat to individualism and humanism in education" (p. 118).

Additionally, Green (1995) believes that technology "might significantly de-skill teachers' work just at a time when there are strong pressures for an enhanced professional role for teachers in making significant decisions about school practice and policy as part of the broader school reform agenda" (p. 118). However, Davidson and Ritchie (1994) report that the teachers surveyed in their study appeared confident that computer technology would not eliminate the need for teachers nor lessen their role as teachers.

If technology is something that teachers regard as important they will be more likely to follow through with it (Owens, 2002, p.65). However, Kathleen King (2002) makes an important point that even teachers who recognized the value of technology may still feel uncomfortable using it. "Truly technology skills are highly valued in our global community, and this can be one source of the extra stress teachers experience as they approach the learning of technology" (King, 2002, p.21). Persichitte, Caffarella, Ferguson, Javeri, and Hunt, 2002, indicate if teachers are feeling stress toward technology they are less likely to use it and less likely to encourage pre-service teachers to use it as well. Nevertheless, few studies have been conducted to directly connect teacher educators' use of technology and teachers' attitudes toward technology.

Computer Anxiety and Teacher Attitude

After a meticulous search of numerous educational research journals, educational databases, educational magazines, technology journals, and psychological journals for studies on computer anxiety in educators, this researcher found only a few studies that addressed teachers' anxiety relative to implementing technology in the teaching/learning process. Most of the research on technology relating to anxiety has been conducted in the area of computer anxiety and using computers as program or instructional management tools (word processors, grade books, databases, and presentations) for teacher use.

In the area of computer anxiety, Fletcher and Deeds (1994) and Kotrilik and Smith (1999) found that no difference existed in the computer anxiety of agriculture teachers and the norm for other professionals reported by Oetting (1983). In addition, it was reported in both studies that level of computer skills was a significant explanatory variable of computer anxiety.

In addition, Kotrlik and Smith found that no differences existed in computer anxiety among teachers from various vocational fields, namely, agriculture, home economics (now called family and consumer sciences), business, and industrial arts. They also found that four variables explained a substantial proportion of the variance in computer anxiety, namely, principals' support of computer use, computer availability at school, perceived mathematical ability, and whether the teacher had received formal computer training.

In addition, Budin (1999) stated that the placement of technology into classrooms without teacher preparation and curriculum considerations has produced high levels of anxiety among teachers. Russell (1995) identified six stages that naive users go through when learning to use technology: awareness, learning the process, understanding an application of the process, familiarity and competence, adaptation to other contexts, and creative application to new contexts. Learning to use the technology empowers the learner through the knowledge that the feelings of tension and frustration will be overcome. According to Khan (1997), teachers' understanding of these stages will assist them to reduce their anxiety level and pass through the stages more rapidly. Technology and psychological support are important because early successful encounters with technology will create enthusiasm and build teachers' confidence. These observations were supported by Hardy (1998) in her study of teacher attitudes toward and knowledge of computer technology.

Hong and Koh (2002) found that there was a negative linear relationship between computer and teachers' attitudes towards computers—those teachers with positive attitudes towards computers had low computer anxiety and those with negative attitudes had high levels of computer anxiety. Moreover, the study revealed that computer ownership and computing experience affected computer anxiety---teachers that owned computers and had more computing experience were found to have lower levels of computer anxiety.

Yang (1999) studied computer anxiety of 202 vocational technical teachers in Dada County, Florida. The results indicated that computer experience and education level influenced computer anxiety. Also, the results revealed no significant relationship between computer anxiety and age, and teaching area. It was recommended that computer anxiety may be reduced by improving computer training programs that should be related to teachers' needs and interests, well planned, focused on hands experience.

Herrington, McElroy, and Morrow (1999) found that in-service training workshop increase teacher knowledge and reduce computer anxiety. Moreover, the result revealed that the level of computer anxiety can be affected by the type of training.

Age and Teacher Attitude

Conflicting reports regarding faculty attitudes toward and extent of utilization of instructional technology, and computer usage in general, exist when identifying age differences (Anderson, 1999; Lebedoker, 2001; Schifter, 2001). Results from Lebediker's (2001) study regarding computer usage and attitude indicated varying results regarding age differences among faculty. He reported that faculty had a tendency to indicate only a slight decrease in computer use with an increase in age. However, a significant decrease in utilization of technology within the classroom setting was noted among faculty as their age increased.

Schifter (2002) noted no significant differences in regard to faculty participation in distance education based on age. Additionally, Schifter reported significant age differences in factors that motivated faculty to utilize distance education. Results indicated younger faculty (under the age of 30) were more concerned than older faculty with motivating factors related to personal needs, such as credit and lack of credit towards promotion and tenure job security, and reduced teaching load.

Warburton, Chen, and Bradburn (2002) performed a nationwide survey to explore faculty use of telecommunications technology. In regard to differences among faculty based on age, they reported a negative correlation with age and some instructional technologies. As age of faculty increased, use of e-mail for instructional purposes and use of class-based websites decreased.

Gender and Teacher Attitude

Research spanning the last 20 years show females have traditionally lagged behind males in their willingness to learn about and use technology in schools (Bunderson & Christensen, 1995; Comber, Colley, Hargreavens, & Dorn, 1997; Fey, 2001; Green, 2000; Lockheed & Frakt, 1984; Nicholson, Gelpi, Young, and Suzby, 1998; Shubert, 2001; Valenza, 1997). Female students were thought to have more negative attitudes and perceptions about using computers than their male counterparts.

Females have also traditionally been less interested than males in pursuing careers in highly technical areas (DiSabatino, 2000; Harrison, Rainer, & Hochwater, 1997; Horiuchi, 2002; McClure, 1998). Research regarding gender differences in education, computer use, and attitudes towards computers is copious (Campbell &Varnhagen, 2002; Lebedicker, 1997; Lucas, 1999; Schifter, 2002; Spotts, Bownan, & Mertz, 1997). Generally, research has supported the idea that females have less experience with and a more negative attitude toward computers than their male counterparts (Campbell & Varhagen; Spotts et al.). However, more recent studies indicate the gender disparity that once existed may either no longer exist or it may have narrowed substantially (Rainer, Laosethakul, & Astone, 2003; Solvberg, 2003).

A review of literature showed that in studies conducted during the 1980's through the mid-1990's, male students showed a greater sense of self-efficacy about computers than female students (Comber, et al., 1997; Nicholson et al., 1998; Volman, 1997). They displayed less anxiety and more confidence in their ability to use computers than did females. The literature also showed that male students tended to exhibit greater interest in learning about and using computers than female students, largely due to a perception by female students that computers were "nerdy" (Lockheed and Frakt, 1984; Zehr, 1998). In addition, studies reviewed that took place after 2000 indicated the differences between male and female attitudes about and confidence in using computers had narrowed (Rainer, Laosethakul, & Astone, 2003, Solverb, 2003). However, the few recent studies related to the topic make it difficult to definitively state that there is no longer a gender disparity in computer use.

Ethnicity and Teacher Attitude

Few studies were conducted to investigate teachers' attitudes toward computer technology based on ethnicity. According to Pittman (1999), minority teachers have inadequate access and inadequate training in the use of computer technology. In addition, Pittman indicated that minority teachers such as Hispanics and African Americans have less involvement in technology planning. It was recommended that those minority teachers should have an adequate representation in technology planning, and equal chances in training and access to technology.

Venning-Twonsley (1995) investigated teachers' perceptions toward computer technology use in K-12 schools, where the majority of students were ethnic and linguistic minorities. Teachers indicated that they infrequently used computers to manage their classroom daily work and for drill and practice for students. Also, all the participants indicated that they had not integrated computers with curriculum, although, they indicated they would like to do so. Teachers revealed that they had not received adequate training or technical support about the use of technology in their classrooms.

Rosen and Weil (1999) studied computer attitudes of one hundred seventy-one elementary teachers. The sample consisted of eight percent Asians, five percent African Americans, five percent Hispanic, and eighty-one percent white and one percent other. The result indicates that African-American and Asians had negative attitudes toward computers, less computer experience, and less use of computer in their classrooms.

Education Level and Teacher Attitude

Level of education was found by some studies not to have affected teachers' attitudes toward computers (Bin Lbrahim, 1995; Foster, 1989; Kendrick, 1992; Kindel, 1995). Becker (1999) found that education background was associated with teachers' perception about the value of Internet use. Becker revealed that those findings were related to the concept that teachers with higher education degrees are more likely to obtain computer expertise.

Teaching Field and Teacher Attitude

Teaching field has received only minimal attention. A study by Northrup (1990) investigated the attitudes of Social Studies teachers toward computers. The results showed that the teachers had a very positive attitude toward computers and had wide access to computers. Most teachers reported the need for training on software and classroom techniques.

McCaslin and Torres (1999) conducted research on factors that affect secondary vocational teachers' attitude toward microcomputers. Findings showed that belief in the educational value of computers and confidence in their use explained 44 % of the variance in attitudes toward using computers in in-service workshops.

In a study on mathematics, teachers' knowledge and attitude toward the use of computer technology in the teaching of senior high school mathematic, Pope (2000) found that most mathematics teachers had a high level of computer experience.

However, teachers who were older than 45 years had a lower level of computer knowledge compared to those who were younger than 45 years. Nevertheless Becker (1999) found that mathematics teachers had lesser attitude toward the use of the Internet to locate resources for teaching than other teachers.

A study by LaMaster (1998) investigated the attitude of physical education teachers toward computer technology in 23 districts in a large southern California county. The results indicated that teachers were comfortable with using technology. Also, this study recommended that teachers should have the opportunity to learn more about the use of computer technology in their programs.

Computer Training and Teacher Attitude

Teachers see technology as important if their teacher-training institute has placed value on integrating technology. Yidirim (2000) points out that education majors who become teachers report that they hesitate to use technology and do not feel prepared to integrate technology into their instruction. Ropp (1999) further notes that even those teachers who demonstrate proficiency integrating technology will not do so if they do not believe that technology has a use in their classroom.

Electronic School (2001) reported findings of a Netday.org survey that expressed concerns that the majority of teachers say the World Wide Web has not changed the way they teach. Teachers still primarily see the Internet as a research tool. Seventy eight percent of teachers stated that a lack of time prevents them from logging on. Seventy three percent stated that there was no pressure from administration to use technology and 50 % reported that the lack of equipment and technical support hindered their use of technology (p. 10). Senator Bob Kerry stated, "The Internet is revolutionizing all parts of society, but its impact on education is just beginning to be understood." Abbot (2000) reported similar concerns that teachers were uncomfortable with using technology prior to completing literacy training in integrating technology. This study also reported that, following a semester-long literacy course, which required extensive use of technology; teachers' demonstrated a statistically significant shift toward a more positive attitude toward using technology.

A major stumbling block for teachers attempting to use technology in their classroom placements, and thereby gaining necessary hands-on-development of this expertise, is the willingness and ability of the cooperating teacher to use technology. Even cooperating teachers who personally embrace technology may not actually be using it in their classroom. As Scott and Hannafin (2000), point out:

Teachers face many outside pressures each day that may prohibit, or at least discourage, fully embracing new methods of instruction. For example, even with encouragement from administrators to consider alternative teaching methods, teachers, particularly those in higher grades, are still expected to prepare students to meet objectives of standardized achievement tests, to teach a certain amount of content to students to meet state or school curriculum guidelines, or both. The cumulative effect of these external pressures surely affects the degree to which teachers adopt nontraditional teaching styles. Further, these other ongoing pressures may limit the likelihood that teachers may integrate technology into their curriculum.

Some researchers (Abbott & Faris, 2000; Kumar & Kumar, 2003) have suggested that teachers' attitudes toward technology could be improved by integrating technology into teacher education course work. However, few studies have been conducted to directly connect teacher educators' uses of technology and teachers' attitudes toward technology. "Teachers teach as they have been taught, it is unlikely that computer skills will be transferred to students and encouraged by teachers unless the teachers have positive attitudes toward computer use" (Yildirim, 2000, p. 481).

If technology is something that teachers regard as important then they will be more likely to follow through with it (Owens, 2002). However, Kathleen King (2002) makes an important point that even teachers who recognize the value of technology may still feel uncomfortable using it. "Truly technology skills are highly valued in our global community, and this can be one source of the extra stress teachers experience as they approach the learning of technology" (King, 2002, p.21). If teachers are feeling stress toward technology they are less likely to use it and less likely to encourage preservice teachers to use it as well (Becker, 1999).

Teachers only consider technology important if it directly affects them, if there is pressure from administration to use it or if they themselves are already using it (Sheingold, 1990). Cooperating teachers need to feel that what they are doing is important and they need to feel comfortable with their own technology skills to be able to pass these skills onto preservice teachers (Harris, 2000).

One would be led to conclude, if cooperating teachers are facing such stress that limit their own use of technology, it will be even more discouraging for teachers working under the same conditions.

Methodology

The purpose of this study was to examine the attitudes of K-12 teachers in a Northeast Mississippi School District regarding the use of computer technology in their classrooms. This study was conducted to determine the impact such variables as computer experience, access to a computer at home, age, gender, teaching level; teaching field, ethnicity, and education level had on teacher attitude toward computers.

This chapter will discuss the methodology that was used to complete this study. It will be composed of the following sections: population characteristics, research questions, variables, instrument, collection of data, and analysis of data.

Participants

There were a total of two hundred thirty-five teachers that comprised the population under examination (Districts Superintendent, 2006). Two-hundred teachers were given the survey; however, only one-hundred seventy-nine (89%) were returned were usable. Seven teachers declined to participate. Some of the teachers also missed the sections, or failed to complete the entire computer attitude scale (CAS).

Population Characteristics

The population in this study included K-12 certified teachers employed in a Northeast Mississippi School District during 2005 – 2006 school terms. The district superintendent of education provided an accurate list of the number of teachers in the school district. The nine schools that were included in the study were Geneva-Shed Preschool, Annette-Watt Elementary, Bertha-McCarter Elementary, Brown-Eddins Elementary, Silas Elementary, Sandy Junior High, Ray Charles High North, Ethel Alice High South, Victoria-Vikie Alternative, and the First-Born Career Technical Center.

Demographics

The gender of the participants that completed the 179 usable questionnaires was 14% males and 86% females. The participants' ethnic background included 39.1% African-American, 57.5% white, and 0.6% were classified as others. Approximately, 10.1% percent of the teachers were between the ages of 21-25. Of the population 11.4% of the teachers sampled were 55 and over. Table 3.1 shows age by frequency and percentages.

Table 3.1 Frequency and Percentage of Teacher's Age

Group	Age	Percentage	Total in Group
1	21-35	10.1	18
2	26-30	18.0	31
3	31-35	11.0	19
4	36-40	12.3	22
5	41-45	10.0	18
6	46-50	20.1	35
7	51-54	9.1	16
8	55 and over	11.4	20
Total		100.0	179

Variables

The ANOVA was used to analyze the difference across several of the independent variables. They were: (a) computer experience, (b) access to computer at home, (c) age, (d) gender, (e) teaching level, (f) teaching field, (g) ethnicity, (h) teaching experience, and (i) education level. The dependent variables are (a) computer anxiety, (b) computer confidence, (c) computer liking, and (d) computer usefulness, as measured by the Computer Attitude Scale (CAS).

Collection of Data

The researcher received written approval from the Mississippi State University Review Board (IRB) (Appendix D), the Superintendent of Education in West Point School District, Mississippi (Appendix E), and permission to use the instrument (Appendix B) before beginning the study. The West Point School Superintendent of Education mailed a letter of cooperation (Appendix D to the researcher in support of this research endeavor.

A questionnaire package containing a participant letter (Appendix E), the computer attitude scale (CAS) instrument (Appendix A) with directions, and a demographic survey was hand-delivered and distributed to all of the 235 school teachers during their faculty meeting. Additionally, participants were informed that participation was voluntary and there were know foreseeable risks with this research. The participants' confidentiality and anonymity were explained. The Computer Attitude Scale (CAS) was provided with standard directions.

Response Rate

A follow – up schedule was established if there became a need. On February 6, 2006, a follow – up was conducted by personally visiting the schools that did not have a 100 % return rate. The researcher spoke with the assistant principals and left questionnaire packets at each school. The assistant principals were asked to make an announcement on the intercom to inform teachers who did not complete the questionnaires. Those teachers were asked to obtain a questionnaire packet from the assistant principals, complete it, and return it to the office. The assistant principals agreed to contact the researcher if they received additional completed surveys. However, there were no additional surveys completed.

Instrument (Computer Attitude Scale)

The Computer Attitude Scale (CAS) is a Likert-type, 40-item questionnaire which has been used to measure in-service teachers' attitude toward computer technology (Gressard & Lloyd, 1986). The instrument consists of four scores on four subscales: Computer Anxiety, Computer Confidence, Computer Liking, and Computer Usefulness. Each Subscale consists of ten items. This instrument requires K- 12 teachers to rate their attitudes toward computers from 1 to 4 for each item. Possible scores on each subscale could range from 10 to 40. According to Shegog (1997), "A score of 25 on any of the four subscales indicated a neutral attitude toward computer" (p.166).

Reliability and Validity of CAS

CAS has been found to be a reliable and valid instrument to measure teachers' attitudes towards computers. The coefficient alpha reliability was 0.95, 0.86, 0.91, 0.91, for the total, Computer Anxiety, Computer Liking, Computer Usefulness, and Computer Confidence, respectively (Lloyd & Gressard, 1984a). In another study, the coefficient alpha reliability was 0.95, 0.90, 0.89, and 0.82 for the total, Computer Anxiety, computer Confidence, Computer Liking, and Computer Usefulness respectively (Lloyd & Lloyd, 1985). Furthermore, CAS has been used by many researchers.

Shegog (1997) stated the reason for choosing CAS as the instrument to measure teachers' attitudes toward technology:

The Computer Attitude Scale (CAS) was used for this study because of the recognized content and construct validity proven by past researcher (Lloyd & Gressard, 1984a, 1984b, 1985; Loyd & Loyd, 1985; Gressard & Loyd, 1986; Kluever et al., 1994; Carlson & Wright, 1993; Gardner et al., 19933b; Dyck & Smither, 1994; Woodrow, 1992. (p. 161)

As cited by Bin Ibrahim (1995), Bandelos and Benson (1990) and Gardner, Discenza, and Dukes (1993a) recommend the use of CAS to measure teachers' attitude toward computers.

Scoring the CAS

According to Gressard and Loyd (1986), the survey is scored as follows: For questions 1, 3, 4, 6, 9, 11, 12, 14, 16, 17, 19, 22, 25, 27, 28, 30, 33, 35, 36, and 38. Strongly Agree = 4, Slightly Agree = 3, Slightly Disagree = 2, Strongly Disagree = 1. Also, questions 2, 5, 7, 8, 10, 13, 20, 21, 23, 24, 26, 29, 31, 32, 34, 37, 39, 40 are scored as Strongly Agree = 1, Slightly Agree =2, Slightly Disagree = 3, StronglyDisagree = 4. This is shown in Table 3.2.

According to Gressard and Loyd (1986), each question is coded so that the higher the score, the more positive the attitude. The survey contains four subscores as shown in Table 3.3.

Table 3.2: Scoring the Survey

Statement #	Strongly Agree	Slightly Disagree	Slightly Disagree	Strongly Disagree
1, 3, 4, 6, 9, 11, 12, 14, 16, 17, 19, 22, 25, 27, 28, 30, 33, 35, 36, 38	4	3	2	1
2, 5, 7, 8, 10, 13, 15, 18, 20, 21, 23, 24, 26, 29, 31, 32, 34, 37, 39, 40	1	2	3	4

Table 3.3Statement Number for Each Subscale

Subscore	Statement Number
Anxiety	1,5,9,13,17,21,25,29,33,37
Confidence	2,6,10,14,18,22,26,30,34,38
Liking	3,7,11,15,19,23,27,31,35,39
Usefulness	4,8,12,16,20,24,28,32,36,40

Analysis of Data

To analyze the data in this research endeavor three analysis were used: descriptive statistic, t-test, and an Analysis of Variance (ANOVA). Analysis of Variance was used to determine whether or not certain demographic variables statistically significantly affected attitudes of teachers toward computer use in classrooms. Analysis of Variances was used to uncover the main and interaction effects of categorical independent variables (called "factors") on an interval dependent variable.

The key statistic in ANOVA is the F–test for differences of group means. This test if the means of the groups formed by values of the independent variables (or combinations of values for multiple independent variables) are different enough to have occurred by chance. If the group means do not differ significantly then it is inferred that the independent variable (s) did not have an effect on the dependent variables (s).

Conclusions

The descriptive dataindicated that all of the teachers generally had positive attitudes toward computers. In addition, about 93.3 % (167) of the respondents had access to computers at home and 88.3% (158) of the teachers had one year or more experience with computers. These results are consistent with finding by Becker (1999) that 80 % of teachers he studied had access to computers at home. However, Becker studied a broad range of districts, not the rural Mississippi district that are the focus of this study. In this study, over 93% of participants had access to computers at home.

Data reported by U. S. Bureau of the Census and U. S. Department of Education (2000) indicated a large gap in access to computer at home between low-income and higher-income areas. The report indicated that the difference in access to computers at home between families earning $10,000 - $14,000 and those earning $50.000 - $74,000 was 47.7% in 1997.

It may be possible because the district is close to two universities, Mississippi State University and Mississippi University for Women. This has created a more highly educated population even in the low-income area. The universities have teacher education program that required K-12 teachers to learn with educational technology. This may influence the teachers to by their own computers. Another reason is that teachers may not be representative of the larger community. However, teachers, because of their exposure to teach in higher education or in their school may be more willing to purchase computers than families in which are not educators.

Age

Age was not a predictor of teachers' attitudes toward computers**.** Nevertheless, Becker (1999) found that young teachers had more positive attitudes toward the use of the Internet in their classroom. Becker related his findings to the fact that the younger teachers feel comfortable with technology because they have grown up with computers.

It may be concluded that age was not a predictor of teachers' attitudes toward computers because this study found a small percentage of older teachers and a large number of younger teachers (91.1% of the respondents were younger than 50 years).

Gender

Results indicated that gender was not a predictor of teachers' attitudes toward computers. These findings agree with Wiburg's review of the literature (1995) that no significant differences existed between computer anxiety and gender when both males and females have the same opportunity for training. It may be concluded that gender was associated with training and computer experience.

Teaching Level

Elementary school teachers were found to have more positive attitudes than high school teachers and middle school teachers. It was expected that high school teachers would have higher score of computer attitudes than middle or elementary school teachers. It could also be possible that the sample had a small percentage of high school and middle school teachers (33.5% high school teachers, and 17.3% middle school teachers). This disparity in grade levels might have also affected this finding.

Teaching Field

In relation to teaching field and teachers' attitude toward computers, it was found that there were significant differences. Nevertheless, Becker (1999) found that mathematics teachers were less likely to use the Internet and had less positive attitudes toward the use of Internet in their classrooms. In this study, it may be concluded that teaching field was not a predictor of teachers' attitudes toward computers due to the fact that teachers in this district have had similar opportunities for receiving computer training.

Ethnicity

Regarding Ethnicity, no significant differences were found among ethnicity and teachers attitudes toward computers. The results of this study conflict with finding by Shegog (1997). She found that minority teachers had more positive attitude toward computers than whites. In her study she investigated the attitudes of 255 teachers towards using computers. One hundred forty-five teachers were white, eighty teachers were black, nineteen teachers were Hispanic, six teachers were Asian, and five were from other minorities. In contrast, McInerney and Sinclair (1990) found that Anglo preservice teachers had less anxiety than other minorities' teachers. They investigated computer anxiety of one hundred-one preservice teachers. Twenty- five were of minorities' background while seventy-six were Anglo. Additionally, Rosen and Weil (1995) revealed that minority elementary teacher such as African-Americans and Asians had negative attitudes toward computers, less computer experience, and used computer less in their classrooms as compared to their Anglo peers. The sample in their study consisted of one hundred seventy-one elementary teachers (8% Asian, 5% African-Americans, 5% Hispanic, 81% White, and 1% other).

This study found that ethnicity was not related to teachers' attitudes toward computers. This may be because minority teachers' have an adequate representation in technology planning, and equal chances in training and access to technology in the district studied.

References

Abbott, J. A., & Faris, S. E. (2000). Integrating technology into pre-service literacy instruction: A survey of elementary education students' attitudes toward computers. Journal of Research on Technology in Education, 33(2), 149-161.

Anderson, R. E. (1999). The presence of computers in American schools. Retrieved January 5, 2006, From, http://www.crito.uci.edu/TCL/findings/Internet-Use/

Bailey, G., Ross, T., & Griffin, D. (1995). Barrier to curriculum-technology integration in education: Are you asking the right questions? Catalyst for Change 25(1), 16.

Bandelos, D., & Benson, J. (1990). Testing the factor structure of a computer attitude scale over two grouping conditions. Educational and Psychological Measurement, 50(1), 49-60.

Becker, H. J. (1999). Internet use by teachers. Retrieved on January 3, 2006 from, http://www.crito.uci.edu/TLC/findings/computers/

Becker, H. J., & Ravitz, J., Wong, T. (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.

Bin Ibrahim, M. (1995). Attitudes toward computers among teachers: relationship with field dependence/field independence and computer experience. (Doctoral dissertation, Ohio University, 1995). Dissertation Abstracts International, 56, 05A.

Bohlin, R. (2002). Avoidance Computer Avoidance, Retrieved on January 19, 2006 from, http://it.coe.uga.edu/itforum/paper35/paper35.html

Brickner, D. (1995). The effects of first and second order barriers to change on the degree and nature of computer usage of secondary mathematics teachers: A case study. Unpublished doctoral dissertation, Purdue University, West Lafayette, IN.

Bradley, G., & Russell, G. (1997). Computer experience, school support, and computer anxiety. Educational Psychology; 17(3), 267-84.

Budin, H. (1999). The computer enters the classroom. Teachers College Record, 100(3), 656-659.

Bunderson, E., & Christensen, M. (1995). An analysis of problems for female students in university computer science programs. Journal of Research on Computing in Education, 28(1), 1-18

Campbell, K., & Varnhagen, S. (2002). When faculty use instructional technologies: Using Clark's delivery model to understand gender differences. Canadian Journal of Higher Education, 32(1), 31-56.

Carlson, E. U., & Wright. D. G. (1993). Computer anxiety andcommunication apprehension: Relationship and introductory college course effects. Journal of Education Computing Research, 9, 329-338.

CEO Forum. (February, 1999). Professional development: A link to better learning. Retrieved January 5, 2006 from, http://www.ceoforun.org/reports.cfm/

Chen, M. (1985). Gender and computers: The beneficial effects of experience on attitudes. Journal of Educational Computing Research, 2, 265-282.

Chiero, R. T. (1997). Teachers' perspectives of factors that affect computer use. Journal of Research on Computing in Education, 30 (2).133-145.

Chou, Tzu-Chin, R. (1997). The relationship among computer usage, experience with the computer, computer anxiety, and attitudes toward computers for secondary agricultural education teachers in the United States (Doctoral dissertation, Mississippi State University, 1997). Dissertation Abstracts International, 58, 07A.

Comber, C., Colley, A., Hargreaves, D. J., Dorn, L. (1997). The effects f age, gender, and computer experience upon computer attitudes. Educational Research, 39 (2) 123-133.

Davidson, G. V., & Ritchie, S. D. (1994). How do attitudes of parents, teachers, and students affect the integration of technology into schools? A case study. Proceedings of Selected Research and Development Presentations at the 1994 National Convention of the Association for Educational Communications and Technology Sponsored by the Research and Theory Division 16th, Nashville, TN. (ERIC Document Reproduction Service No. ED373710).

DiSabatino, J. (2000). Glass ceiling for women in IT persists. Computerworld, 34(20), 12. Retrieved October 2, 2003, from Academic Search Premier database.

Dyck, J. L. & Smither, J. A. (1994). Age difference in computer anxiety: The role of computer experience, gender, and education. Journal of Educational Computer Research, 10, 239-248.

Edmonson, A. (2002). Survey of information and communication technology. Retrieved on April 13, 2006 from, http://www.becta.org.uk/page_documents/research/cpd_edmondson.pdf

Electronic School NetDay (2001). NetDay Survey 2001. The Internet, technology and teachers, Executive Summary, May, 2001. Retrieved April 10, 2006 from, http://.netday_org/anniversary_survey.htm.

Ertmer, P. A. & Addison, P. (1999). Examining teachers' beliefs about the Role of technology in the elementary classroom. Journal of Research on Computing Education, 32(1), 54-72.

Ertmer, Peggy A.; Addison, Paul; Lane, Molly; Ross, Eva & Woods,Denise (1999). Examining teachers' beliefs about the role of technology in the elementary classroom. Journal of Research on Computing in Education, 32(1), 54–73.

Ertmer, P.A., Hruskocy, C. (1999). Impacts of a university-elementary school partnership designed to support technology integration. Educational Technology Research and Development, 47(1), 81-96.

Fey, M. H. (2001). Gender and technology: A question of empowerment. Reading & Writing Quarterly, 17, 357-361. Retrieved October 1, 2003, from Academic Search Premier database.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention and behavior: An introduction of theory and research. London: Addison-Wesley.

Fletcher, W. E., & Deeds, J. P. (1994). Computer anxiety and other factors preventing computer use among United States secondary agricultural education. Journal of Agricultural Education, 35(2), 16-21.

Flowers, B. F. & Rakes, G. C. (2000). Analyses of Acceptable Use Policies Regarding the Internet in Selected K-12 Schools. Journal of Research on Computing in Education, 32(3), 351-366.

Foster, W. T. (1989). Factors influencing the degree of computer use by high school teachers in selected Illinois school district (Doctoral dissertation, University of Illinois at Urbana-Champaign, 1989). Dissertation Abstracts International, 50-3559A.

Gabriel, M., & MacDonald, C. (1996). Preservice teacher education students and computers: How does intervention affect attitudes? Journal of Technology and Teacher Education, 4(2). 91-116.

Gardner, D., Duke, R., & Discenza, R. (1993a). Computer use, self-confidence, and attitudes: A causal analysis. Computer in Human Behavior, 9, 427-440.

Gardner, D. G. Discenza, R. & Dukes, R. (1993b). The measurement of computer attitudes: An empirical comparison of available scales. Journal of Educational Computing Research, 9, 485-507.

Gardner, E., Render, B. Ruth, S., & Ross, J. (1984) Human-oriented implementation curves "cyber-phobia". Data Management, 11, 29-32.

Gibson, J.L, Ivancevich, J. M., & Donnelly, J.H. Jr. (1991). Organizations. Plano, Texas: Business Publication Inc.

Glazewski, K., Brush, T., Ku, H. Y., & Igoe, A. (2001). Integrating technology into preservice teacher education. Journal of Computing in Teacher Education, 17(4), 16-17.

Green, M.Y. (2000, November). Why aren't girls more tech savvy? NEA Today, 19(3), 31. Retrieved September 17, 2003, from   Academic Search Premier database.

Gressard, C., Loyd, B. H. (1986). Validation studies of a new Computer Attitude Scales. Association for Educational Data Systems Journal, 18(4), 295-301.

Gressard, C., & Loyd, B. (1985). Age and staff development experience with computers as factors affecting teacher attitudes toward computers. School Science and Mathematics, 85(3), 203-209.

Hannaford, M. E. (1988). Teacher attitudes toward computers use in the classroom. Paper presented at the Annual Conference of the Washington Educational Research Association, Seattle, WA. (ERIC Document Reproduction Service No. ED 296721)

Hardy, J. (1998). Teacher attitudes toward and knowledge of computer technology. Computers in the Schools, 14(3/4). 119-136.

Harrington, K. V., McElroy, J. C., & Morrow, P. C. (1990) Computer anxiety and computer-based training: A laboratory experiment. Journal of Educational Computing Research, 6, 343-358.

Harris, J. M. (2000). Utilization of computer technology by teachers and Carl Schurz High School, a Chicago public school. (Doctoral dissertation, Northern Illinois University, Dekalb, IL, 2000). Dissertation Abstracts International, 61, 2268.

Harrison, A.W., Rainer, R.K., Hochwarter, W.A. (1997). Gender differences in computing activities. Journal of Social Behavior & Personality, 12(4), 849-868. Retrieved September 17, 2003, from Academic Search Premier database.

Hodas, S. (1993). Technology refusal and the organizational culture of schools Seattle: Horse Horse Lion Lion. (ERIC DOCUMENT Reproduction Service No. ED 366 328)

Hong, K., & Koh, C (2002). Computer anxiety and attitudes toward computers among rural secondary school teachers: A malaysian perspective. Journal of Research on Technology in Education.35(1).

Horiuchi, V. (2002, March 18). Computer skills not an equalizer for women at work. The Salt Lake Tribune. Retrieved October 2, 2003, from Newspaper Source database.

Jaber, W. E., & Moore, D. M. (1999). A survey of factors which influence teachers' use of computer-based technology. International Journal of Instructional Media, 26(3), 253-266.

Kendrick, M. L. (1992). Actual uses of microcomputers and perceptions of microcomputer use by teachers of secondary school mathematics courses, grade nine to twelve, in Philadelphia public school (Doctoral dissertation, Temple University, 1992). Dissertation Abstracts Internationals, 53, 3181A

Kerr, S. T. (1996). Vision of sugarplums: The future of technology, education, and the schools. In S. T. Kerr (Ed.), Technology and the future of schooling (pp. 1-27). Chicago: The University of Chicago Press.

Khan, J. (1997). Technology-rich teacher education: Meeting the NCATE challenge. Journal of Computing in Teacher Education, 13 (2), 24-29.

Kindel, M. M. (1995). Computer attitudes and use of public secondary school teachers in Kentucky (Doctoral dissertation, University of Kentucky, 1995). Dissertation Abstracts International, 56, 03A.

King, Katheleen P. (2002). Keeping pace with technology: Educational technology that transforms. New Jersey: Hampton Press, Inc.

Kluever, R. C (1994). The computer attitude scale: assessing changes in the teachers' attitude toward computers. Journal of Educational Computing Research, 11(93), 251-261.

Kotrilik, J., & Smith, M. (1989). Computer anxiety levels of vocational agricultural teachers. Journal of Agricultural Education, 30, 41-48.

Kumar, P. & Kumar, A. (2003). Effect of a web-based project on preservice and inservice teachers' attitude toward computers and their technology skills. Journal of Computing in Teacher Education, 19, 87-92.

LaMaster, K. J. (1998). Technology: Attitudes, efficacy and use by practicing physical education teachers. Journal of Physical Education Recreation and Dance, 69(6), 21-24.

Lebediker, E. S. (1997) Computer attitudes and usage: An Exploratory survey of higher education faculty (Doctoral dissertation, State University of New York at Albany, 1997). Dissertation Abstracts International, 58, 04A, 149.

Lockheed, M. E. (1985). Women, girls, and computers: A First look at the evidence". Sex Roles13(3), 4.

Lockheed, M.E. & Frakt, S.B. (1984). Sex equity: Increasing girls' use of computers. The Computing, 11(8), 16-18.

Loyd, B. H., & Gressard, C. (1986). Gender and amount of computer experience of teachers in staff development programs: Effects on computer attitudes and perceptions of the usefulness of computers. Association for Educational Data Systems Journal, 18(4), 203-311.

Lloyd, B. H., & Lloyd, D. E. (1985). The reliability and validity of an instrument for the assessment of computer attitudes. Educational and Psychological Measurement, 45(4) 903-908.

Loyd, B. H., & Gressard, C. (1984a). The effects of sex, age and computer experience on computer attitudes. AEDS Journal, 40, 67-77.

Loyd, B., & Gressard, C. (1984b). Reliability and factorial validity of computer attitudes scales. Educational and Psychological Measurement, 44(2), 1-50.

Lucas, C. J. (1999).Teacher education in America: Reform agendas for the twenty-first century. New York: St. Martins Press.

Marcoulides, G. A., & Wang, X. (1990). A cross-cultural comparison of computer anxiety in college students. Journal of Educational Computing Research, 42, 151-158

Marcinkiewicz, H. R. (1996). Motivation and teachers' computer use. Proceedings, 18th National Convention of the Association for Educational Communication and Technology, 467-472. (ERIC Document Reproduction No. ED 397818).

McCarthy, P. J. (1998). Teacher attitudes toward computers and the relationship between attitudes toward computers and level of involvement with computers among New York special education teachers. (Doctoral dissertation, Columbia University, 1998). Dissertation Abstract International, 59, 01A.

McCaslin, N. L., & Torres, R. M. (1999). Factors underlying vocational teachers' attitudes toward and perceived ability to use microcomputers for supplementing in-service education. Journal of Vocational Education Research, 18(4), 23-42.

McClure, P.A. (1998). Technology and gender; Or is John Gehl a sexist? Or is… Educom Review, 33(3), 12-15. Retrieved October, 2, 2003, from Academic Search Premier database.

McCoy, L. P., & Haggard, C. S. (1989). Determinants of computer use by teachers. Paper presented at the Annual Meeting of the Eastern Educational Research Association, Savannah, GA. (ERIC Document Reproduction Service No. ED305377)

McInerney, V., & Sinclair, K. (1990). Computer attitude and student teachers: Interrelationships between computer anxiety, demographic variables and an intervention strategy. (ERIC Document Reproduction Service No. ED 2529400)

McMeniman, M. (1998). Motivation to learn. In P. Langford (Ed.), Educational psychology: An Australian perspective (pp. 215-237). Melbourne: Longman Cheshire.

Moallem, M., & Micallef, S.(1997). Instructional Technologists at Public Schools: A Study of the Role and Effectiveness of Technology Resource Teachers. 21pp. In: Proceedings of Selected Research and Development Presentations at the 1997 National Convention of the Association for Educational Communications and Technology (19th, Albuquerque, NM, February 14-18, 1997)

Monahan, T. (2000). Built pedagogies & pechnology Practices: Designing for participatory learning. In PDC 2000 Proceedings of the Participatory Design Conference, edited by J. G. T. Cherkasky, P. Mambrey, and J.K. Pors. Palo Alto, CA: CPSR. Retrieved March 1, 2006, from, http://www.rpi.edu/~monaht/papers/pdc2000.pdf

Milbrath, C. L., & Kinzie, C. (2000)   Computer Technology Training for Prospective Teachers: Computer Attitudes and Perceived Self-Efficacy. Journal of Technology and Teacher Education, 8 (4). 12-25.

Mitra, A. (1998). Categories of computer use and their relationships with attitudes toward computers. Journal of Research on Computing in Education, 30 (3), 281-95.

Moroz, P. A., & Nash, J. B. (1997). Bath county computer attitude scale: A reliability and validity scale. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL. (ERIC Document Reproduction No. 408- 319).

Moursund, D., & Bielefeldt, T. (1999). Will new teachers be prepared to teach in a digital age? A national survey on information technology in teacher education. Santa Monica, CA: Milken Exchange on Education Technology and the International Society for Technology in Education.

Nicholson, J., Gelpi, A., Young, S., & Suzby, E. (1998). Influences of gender and open-ended software on first graders' collaborative composing activities on computers. Journal of Computing in Childhood Education, 9, 3-42.

Northrup, T. (1990). Are social studies teachers using computers?(ERIC Document Reproduction Service No. ED 342719)

Norton, McRobbie & Cooper (2000). Exploring secondary mathematics teachers' reasons for not using computers in their teaching. Journal of Research on Computing in Education. 33(1), 87.

Oetting, E. R. (1983). Manual: Oetting's computer anxiety scale (COMPAS). Ft. Collins, CO: Rocky Mountain Behavioral Science Institute, Inc.

Orr, C. (2001). The effect of individual differences on computer attitudes: An Empirical Study. Journal of End User Computing, 13(2), 26-39.

Owens, C. H., Magoun, A. D., & Anay, J. (2000). The effects of technology on the attitudes of classroom teachers (E-TACT). In proceedings of the Society for Information Technology & Teacher Education International Conference, San Diego, CA. (ERIC Document Reproduation Service No. ED444531)

Persichitte, K., Caffarella, E., Ferguson, D., Javeri, M., Hunt, E. (2002). Attitudes about computer use among preservice teachers. Selected readings from the Research and Theory section of the Association for Educational Communications and Technology. Dallas, TX.

Pittman, J. (1999). Professional Development: Do we need new standards for training inservice teachers. A published dissertation, Iowa State University, Ames, Iowa.

Pope, C. (2000). Preparing tomorrow's English languagearts teachers today:Principles and practices for infusing technology. Contemporary Issues in Technology and Teacher Education, 1(1).

Rado, M. & Foster, L. (1992). Through the glass darkly? The National Policy on Languages as seen by tertiary language staff, Australian Review of Applied Linguistics, 13(2), 81-96.

Rainer, R.K., Laosethakul, K., & Astone, M.K. (2003). Are gender perceptions of computing changing over time? Journal of Computer Information Systems, 43(4), 108-114. Retrieved September 17, 2003, from Business Source Premier database.

Random House Unabridged Dictionary. (2005) Retrieved December 2, 2005 from,
http://www.factmonster.com/ipd/A0327780.html

Reed, W. M., & Overbaugh, R. C. (1993). The effects of prior experience and instructional format on teacher education students' computer anxiety and performance. Computers in Schools, 9(2/3), 75-89.

Ropp, M. M. (1999). Exploring Individual Characteristics Associated with Learning to Use Computers in Preservice Teacher Preparation. Journal of Research on Computing in Education, 31(4), 402-425.

Rosen, L. D., & Weil, M. M. (1995). Computer availability, Computer experience and technophobia among public school teachers. Computers in Human Behavior, 11, 9-31.

Rosenberg, M.J. and Hovland, C.I. (1980) Cognitive, affective and behavioral components of attitudes, in Hovland, C.I. and Rosenberg, M.J., Attitude organization and change (pp.1-14), New Haven, CT: Yale University Press, in Pratkanis, A.R., Breckler, S.J. and Greenwald, A.G. (Eds.), Attitude Structure and Function, Hillsdale New Jersey, Lawrence Erlbaum Associates Publishers.

Russell, A. (1995). Stages in learning new technology: Naïve adult email users. Computers and Technology, 25(4), 173-178.

Russell, M., O'Dwyer, L., Bebell, D., O'Conner, K. (2003). Useit Report: Teachers beliefs about and use of technology: Enhancing the use of technology for new and veteran teachers. Retrieved October 6, 2005 from, http://escholarship.bc.edu/cgi/viewcontent.cgi?article=101&context=intasc

Saye, J.W. (1998, Spring). Technology in the classroom: The role of dispositions in teacher gate keeping. Journal of Curriculum and Supervision, 13(3), 210-234.

Scheffler, F. L. & Logan, J. P. (1999). Computer technology in schools: what teachers should know and be able to do. Journal of Research on Computing in Education, 31, 305-326.

Schifter, C. (2001). Faculty motivators and inhibitors for participation in distance education. Educational Technology, 40 (2), 43-46.

Schubert, J. (2001). Gender equity in computer learning. Theory into Practice, 25(4), 267-275. Retrieved September 20, 2003, from Academic Search Premier database.

Scott, B. N., & Hannafin, R. D. (2000). How teachers and parents view classroom learning environments: an exploratory study. Journal of Research on Computing in Education, 31(3), 401-417.

Sheingold, K. (1990). Accomplished teachers: Integrating computers into classroom. New York: Bank Street College, Center for Technology in Education.

Sheogog, B. F. (1997). An investigation of the relationship between characteristics of teachers and their attitude toward technology integration in their courses. (Doctoral dissertation, Nova Southern University, 1997), Dissertation Abstracts International, 59.09A.

Smith, K. (1994). The relationship between the attitudes of secondary teachers toward educational technology and their actual use of educational technology and seven independent factors. (Doctoral dissertation, University of Southern Mississippi, 1994) Dissertation Abstract International, 57, 10A.

Solvberg, A. M. (2003). Computer-related control beliefs and motivation. A panel study. Journal of Research on Technology in Education, 35(4), 473-487.

Spotts, T. H., Bowman, M. A., & Mertz, K. (1997). Gender and use of instructional technologies: A study of university faculty. Higher Education. 34(1), 421-436.

Stenzel, L. G., Jr. (1982). Teacher attitudes toward computer literacy (Doctoral dissertation, Louisiana State University, 1982). Dissertation Abstract International, 44, 01A.

Valenza, J.K. (1997, February). Girls + technology=turnoff? Technology Connection,3(10), 20-22. Retrieved September 20, 2003, from Academic Search Premier database.

Venning-Townsley, F. (1995). K-8 teachers' beliefs and practices: Educational technology use with ethno linguistic minorities (Doctoral dissertation, University of San Francisco, 1995). Dissertation Abstracts International, 56-02A.

Volman, M. (1997). Gender-related effects of computer and information literacy education. Journal of Curriculum Studies, 29(3), 315-328. Retrieved October 1, 2003, from Academic Search Premier database.

U. S. Bureau ofthe and U. S. Department of Education (2000). Falling through the net ll: National Telecommunications and Information Administration. Retrieved April 17, 2006, from,
http://www.ntia.doc.gov/nationahome/net2falling.html

Wallace, A. R., & Sinclair, K. (1995). Effective responses and cognitive Models of the computing environment. (ERIC Document Reproduction Services No. ED 389 279)

Warburton, E. C, Chen, X. & Bradburn, E. M. (2002). Teaching with technology: Use of telecommunication technology by postsecondary instructional faculty and staff in fall 1998. Education Statistics Quarterly. Retrieved April 7, 2005, from http://nces.ed.gov/pubs2005/quarterly/fall4_4.asp

Weil, M., & Rosen, L. (1995). Computer anxiety: A cross-cultural comparison of university students in ten countries. Computers in Human Behavior, 11(1), 45-64.

Wentworth, N. (1996). Educational technology: From curriculum course to the classroom. Technology and Teacher Education Annual, 1996, 335-358.

Wiburg, K. (1995). Gender issues, personal characteristics, and computing. Computing Teacher, 22(4). 7-10.

Woodrow, J. (1992). The influence of programming training on the computer literacy and attitudes of preservice teachers. Journal of Research on Computing in Education 25, 201-219.

Yang, H. (1999). Study An Investigation of Computer Anxiety Among Vocational-Technical Teachers. Journal of Industrial Teacher Education, 37(1), 64-82.

Yildirim, S. (2000). Effect of an educational computing course on preservice and inservice teachers: a discussion and analysis of attitudes and use. Journal of Research on computing in Education, 37, 479-495.

Zehr, J. L. (1998). Sex differences in play and affiliation during social development in pigtail macaques. Master's thesis, Emory University.