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The attitudes and perceived self-efficacy of Mississippi career and technical educators toward information and communication technology

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THE ATTITUDES AND PERCEIVED SELF-EFFICACY OF MISSISSIPPI CAREER AND TECHNICAL EDUCATORS TOWARD INFORMATION AND COMMUNICATION TECHNOLOGY

By

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Research indicates that positive attitudes toward information and communication technology, coupled with a high perceived level of self-efficacy, greatly assist teachers as they strive to integrate technology into their curricula. Therefore, the purpose of the study was to investigate the attitudes and perceived levels of self-efficacy as they pertain to information and communication technology (ICT) of career and technical educators at high schools in Mississippi in an effort to better understand one part of the fabric that makes up the educational mosaic in Mississippi.

Participants for this study included career and technical educators teaching in one of three disciplines: 1) Agriculture, 2) Allied Health, or 3) Business and Technology. The instrument used for this study was the Information and Communication Technology Attitude and Self-Efficacy Survey (ICTASES). The researcher collected information pertaining to the educators' attitudes and self-efficacy toward information and communication technology, as well as participant demographics.

The results of the study indicated that the attitudes of Mississippi career and technical educators toward ICT were positive, while their perceived levels self-efficacy toward ICT was high. The educators in each of the three disciplines demonstrated positive attitudes and high perceived levels of self-efficacy toward ICT despite significant differences between the disciplines. Business and Technology educators demonstrated attitudes and perceived levels of self-efficacy toward ICT that were significantly more positive, and higher, respectively, than those educators teaching Agriculture or Allied Health.

Additionally, the study found that that the more advanced a degree the educator held, the greater the likelihood that he/she exhibited a more positive attitude and a greater level of perceived self-efficacy toward ICT. Those educators possessing a bachelor or master's degree possessed attitudes and perceived levels of self-efficacy toward ICT that were significantly more than those educators possessing an associate's degree.

Finally, the attitudes of the educators toward ICT were found to be positively correlated with the educators' perceived self-efficacy toward ICT. This result indicates that as the level of self-efficacy of the career and technical educators increases so does the likelihood that the positivity of their attitude will increase.

DEDICATION

This document, and all the work that went into its creation, is dedicated to my wife, Laura, and beautiful daughter, Abigail. This work's completion would not have been possible if not for your unwavering support and encouragement. Words alone cannot adequately express my love for each of you, nor can they properly illustrate my gratitude for all that you have done for me in my life.

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"None of us has gotten where we are solely by pulling ourselves up from our own bootstraps. We got here because somebody bent down and helped us."
Thurgood Marshall

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CHAPTER I

INTRODUCTION

In 1997, the "Report to the President on the Use of Technology to Strengthen K-12 Education" made the argument that the modest gains into the implementation of technology into our schools was not enough to assure that our children would attain high-skill jobs that contributed to economic stability of this country and to the global marketplace as a whole (President's Committee of Advisors on Science and Technology [PCAST]). The Panel of Educational Technology, charged with the creation of this report, made multiple recommendations relative to various aspects of the use of technology in K-12 schools. Among these recommendations, the Panel stated that it is "important that technology be integrated throughout the K-12 curriculum, and not simply used to impart technology-related knowledge and skills" (PCAST, p. 7). In other words, schools should focus on teaching with technology not just working to improve a student's computer literacy. According to this Report, the reasoning behind the recommendations was to suggest that technology may indeed have the potential to impact the transformation of elementary and secondary education in the United States.

Seven years later a new report was issued echoing the sentiments of its predecessor. In 2004, a report entitled "Toward a New Golden Age in American Education: How the Internet, the Law, and Today's Students are Revolutionizing Expectations" was submitted to Congress by Rod Paige, the Secretary of the Department

of Education for the United States, as required by the No Child Left Behind Act of 2001. The report outlined the Department's vision for a National Educational Technology Plan This new report outlined the strides that had been made in the implementation of technology in the classroom. However, as in 1997 the 2004 Report notes that our educational institutions were behind industry in the overall implementation of technology. In doing so, this Report noted that technology "ignites opportunities for learning, engages today's students as active learners and participants in decision-making on their own educational futures and prepares our nation for the demands of a global society in the 21st century" (United States Department of Education [USDOE], 2004, p. 46).

Although much had changed in the seven years between these reports, both reports agreed more had to be done to include technology in student learning. Of equal importance, both reports cited the need to make sure our teachers were adequately trained in technology. To that end, the 2004 report made four recommendations for teacher training: (1) to improve the preparation of new teachers in the use of technology, (2) to ensure that all teachers have the opportunity to take online learning courses, (3) to improve the quality of teacher education through measurement and accountability, and (4) to ensure that every teacher knows how to use data to personalize instruction (USDOE, 2004).

Lacking in these recommendations is a specific proposal that teachers should be educated or trained on the use of technology within their own curriculum and with technologies appropriate for that purpose. For technology to be properly instituted in a classroom environment, the overall attitude and perceived level of self-efficacy of the

teacher could play an important role. In order to cultivate positive attitudes and higher perceived levels of self-efficacy toward ICT, proper training is required. According to Milbrath and Kinzie (2000), teachers effective in using computer technologies in the classroom have positive computer attitudes, and feel self-efficacious in using them. Teacher training is a likely source for these positive outcomes. The lack of a positive attitude toward technology accompanied with a low belief in one's own capabilities serves as nothing more than a deterrent to a teacher seeking to use technology in the classroom.

In today's world, educators are obliged to prepare students to succeed in a global marketplace armed with the necessary skills to impact society in a positive and meaningful manner. To do so, technology must be integrated into the curriculum such that students are learning subject-matter that is enhanced through technology and not impeded by its presence. For this to occur, teachers must possess a positive attitude and high-level of self-efficacy toward information and communication technology (ICT). Knowledge of these characteristics is vital as ICT becomes more prevalent in today's classrooms and as more teachers are being asked to successfully integrate ICT into their curriculum.

Statement of the Problem

Since the Telecommunications Act of 1996, computers have become more readily available in the classroom due, in part, to the Act's effect on schools' abilities to purchase telecommunication services at reduced prices (FCC – E-Rate, 2004). This new era of availability has created an environment in which teachers are now faced with the task of

successfully integrating technology into the curricula. In order for teachers to be effective users of technology, they must possess a positive attitude toward technology and feel they can successfully utilize those technologies in the classroom. The vast majority of research indicates that utilizing technology in the classroom has a positive impact on the student. This impact can be seen in how information is accessed and organized, as well as technology's ability to facilitate student learning. For example, a study by Barbas (2006) has shown that introducing ICT into the curriculum can positively impact the students' cognitive ability in addition to their emotional and socio-cultural levels. The nation, however, is struggling to keep students in the classroom as dropout rates move higher.

National statistics indicate that almost one-third of all public high school students are failing to graduate (Civic Enterprises, 2006). A 2006 report entitled "The Silent Epidemic -- Perspectives of High School Dropouts" found that 69% of those dropouts surveyed attributed their dropping out to a lack of motivation and inspiration (Civic Enterprises). In an effort to respond to the growing number of students failing to complete high school, the Research and Curriculum Unit at Mississippi State University has instituted the *Redesigning Education for the 21st Century Workforce* (Mississippi Department of Education [MDE], 2007), or Redesign plan, which endeavors to "implement workforce education starting in kindergarten and coach students to select a career pathway in the 10th grade. This plan will make the overwhelming experience of choosing the best career path less intimidating and will better prepare" Mississippi high school students for a future workplace. (MDE, ¶ 1).

According to Education Week's 2008 report on education, Mississippi finished in the bottom six of all the states in the United States based on six areas of performance: (1) chance for success, (2) K-12 achievement, (3) standards, assessments, and accountability, (4) transitions and alignment, (5) the teaching profession, (6) and school finance. Mississippi received an overall letter grade of D+ and a letter grade of F in the K-12 Achievement category (Swanson, 2008).

In addition to the poor assessments received by Mississippi in K-12 achievement, there is a lack of existing literature examining the attitudes and self-efficaciousness of career and technical educators toward ICT. Existing literature is ripe with articles and research delving into the attitudes and perceived self-efficacy of K-12 educators toward ICT, but it is lacking considerably in those areas where career and technical educators are concerned.

The spotlight is squarely on our nation's teachers to excel in their endeavors to educate our youth. A greater understanding of how our educators regard technology, however, is necessary to determine if educators are prepared, in part, to implement technology into their curricula. Therefore, there is a clear need to discover the technological attitudes and self-efficacy of career and technical educators in Mississippi due to the positive impact ICT has on students (Barbas, 2006), evidence of Mississippi's K-12 poor educational performance, and a lack of research on the attitudes and self-efficaciousness of career and technical educators toward ICT.

Purpose of the Study

Research indicates that positive attitudes toward ICT, coupled with a high perceived level of self-efficacy (Milbrath & Kinzie, 2000), greatly assists teachers as they strive to integrate technology into the curricula. Therefore, the purpose of the study was to investigate attitudes and perceived levels of self-efficacy as they pertain to information and communication technology of career and technical educators at high schools in Mississippi in an effort to better understand one part of the fabric that makes up the educational mosaic in Mississippi

Research Questions

The following research questions were designed to guide this study as it sought to investigate attitudes and perceived levels of self-efficacy of career and technical educators at high schools in Mississippi as they pertain to information and communication technology:

1. What are the attitudes of career and technical educators in Mississippi toward information and communication technology?
2. Is there a significant difference in attitudes toward information and communication technology of career and technical educators in Mississippi based on selected characteristics of the educators?
3. What is the perceived level of self-efficacy of career and technical educators in Mississippi toward information and communication technology?

4. Is there a significant difference in the perceived level of self-efficacy toward information and communication technology of career and technical educators in Mississippi based on selected characteristics of the teachers?
5. What is the relationship, if any, between the attitudes of career and technical educators in Mississippi toward information and communication technology and their perceived levels of self-efficacy?

Rationale for the Study

Numerous studies have been conducted concerning teacher attitude and self-efficacy as they pertain to information and communication technology. However, the literature that focuses on educators from the State of Mississippi is unsubstantial. This is particularly noteworthy because the State of Mississippi has long suffered from poor assessments of the quality of its K-12 education ("From Cradle to Career", 2007; Swanson, 2008). With that in mind, there is a clear rationale for measuring teacher attitudes and perceived levels of self-efficacy in a state that succeeds in only graduating 62% of its high school students (Swanson) as compared to 87% on the national level (National Center for Educational Statistics, 2005).

A study such as this may have benefits in the future as well. For example, this study could serve as a model for future research whereby all teachers in Mississippi are asked to participate in order to gauge their attitudes and self-efficacy toward technology in the classroom. Furthermore, this study could provide information for educational administrators at the state level and in the schools for the purposes of making decisions

regarding ICT, the curriculum, and teacher training and all with the purpose of increasing the quality of education in the State of Mississippi.

Limitations

Generalizability refers to the applicability of findings to settings and contexts different from the one in which they were obtained (Gay, Mills, & Airasian, 2006). The limitations that may impact the generalizability of this study are:

1. The study was limited to high school career and technical educators during the Fall, 2008 semester in Mississippi. The findings may not be applicable to high school career and technical educators, or other educators teaching K-12, inside or outside the State of Mississippi.
2. The findings may not be applicable to high school career and technical educators not teaching in one of the following concentrations: (1) Agriculture, (2) Allied Health, and (3) and Business and Technology.
3. Numerous career and technical educators replied to the email invitation for this study lamenting their inability to respond to the survey due to a lack of access to the World Wide Web in their school. As a result, the overall response rate was unable to fulfill its potential.

Delimitations

The sample population for this study was limited to career and technical educators that teach taught through twelfth grade during the Fall, 2008 semester at high schools and career centers in the State of Mississippi. The sample population was further limited to

career and technical educators that teach in the following disciplines: (1) Agricultural and Environmental Science and Technology (AEST), (2) Allied Health, and (3) Business and Computer Technology.

Definition of Terms

In an effort to promote clarity, the following terms commonly found throughout this study are defined:

Attitude: Associations between a given object and a given summary evaluation of the object (Fazio, 2007).

Computer Anxiety: A feeling of fear and apprehension felt by individuals when using computers or even considering the use of a computer (Beckers, Wicherts, & Schmidt, 2007).

Efficacy Expectation: An individual's belief that he or she can successfully perform a behavior that is necessary to produce an outcome (Bandura, 1977).

Information and Communication Technology: Any technology which can transmit, store, create, share or exchange information. These technologies include, but are not limited to, radio, television, video, DVD, telephone, satellite systems, computers and the Internet (Fengchun, 2008).

Information and Communication Technology Attitude and Self-Efficacy Survey (ICTASES): Researcher-developed instrument designed to measure the attitudes and perceived self-efficacy of career and technical educators toward information and communication technology.

Teacher Self-Efficacy: Refers to a teacher's individual beliefs about their own abilities to successfully perform specific teaching and learning related tasks within the context of their own classroom (Dellinger, Bobbett, Olivier, & Ellett, 2008).

CHAPTER II

LITERATURE REVIEW

In an effort to better understand teacher's attitudes and perceived levels of self-efficacy toward information and communication technology an examination of the existing literature is required. In doing so, and with the purpose of this study in mind, the following review of the literature is categorized as such: (1) ICT and the classroom, (2) teacher attitude, specifically with regard to curriculum integration and computer anxiety, and (3) self-efficacy, specifically with regard to efficacy expectation and studies in self-efficacy and ICT. Knowledge of the existing literature is important as a means of defining and supporting the statement of the problem for this study.

ICT and the Classroom

Information and communication technology, or ICT, should be considered an umbrella term, which encompasses communication devices, applications, or application services. The United Nations Educational, Scientific and Cultural Organization (UNESCO) define ICT as any technology which can transmit, store, create, share or exchange information (Fengchun, 2008). These technologies include, but are not limited to, radio, television, video, DVD, telephone, satellite systems, computers and the Internet (Fengchun). For many years now, research has been conducted into the impact of ICT on the student, teacher, and curriculum. The general consensus has been that ICT have a

positive impact on student learning when the technology has been integrated into the classroom in such a way that enhances the curriculum and does not impede the process.

The Telecommunications Act of 1996 was the catalyst for the United States' government to actively seek to provide reasonably priced telecommunications services and Internet access for primary and secondary schools through the E-Rate program. This revolutionary Act has had a profound impact on the process under which administrators and teachers decide on how technology will be implemented in the schools. In 2005 alone, funding for the E-Rate program was $2 billion, and an average of 30,000 applications for discounts were being reviewed each year since its inception in 1996 (Trotter, 2007). This new source of funding has inspired school administrators and teachers to integrate technology into their school or classroom curricula, rejuvenating the question of how ICT can impact the classroom and its students.

To that end, the integration of ICT in the classroom has been the source of many research studies in the past and will be in the future. In 1990, Donald Ely identified eight conditions that are relevant to the implementation of ICT in the classroom. These conditions included dissatisfaction with the status quo, existence of knowledge and skills, availability of resources, availability of time, existence of rewards or incentives, participation, commitment, and leadership (Ely, 1990). Ely suggested that the goal during any implementation is to attain each of the conditions and doing so will ultimately increase the prospect of a successful implementation of technology into the classroom environment. Using Ely's conditions as a theoretical framework Mooij and Smeets conducted research that sought to determine which support actions best promote ICT

implementation processes as well as those characteristics that best describe ICT implementation processes in secondary schools.

Mooij and Smeets (2001) chose ten Dutch schools, which varied in size and geographical region for their study. The researchers utilized semi-structured interviews of teachers, students, and administrators, an examination of school documents with regard to ICT were studied, and an examination of each school's technical facilities were conducted in order to collect their data. Upon completion of their research, the researchers found that five successive phases of ICT implementation in secondary schools could be gleaned from the collected data:

(1) incidental and isolated use of ICT by one or more teachers, (2) increasing school awareness of ICT relevance for the school, (3) emphasis on ICT co-coordination and hardware within school, (4) emphasis on didactic innovation and ICT support, and (5) use of ICT-integrated teaching and learning, independent of time and place (Mooij & Smeets).

Mooij and Smeets (2001) noted that support for the ICT implementation process stems from rewards for the teachers, participation and commitment by all those involved in the schools, and consistent leadership as it pertains to a systemic evaluation of ICT in the school. Lawson and Comber (1999) conducted a similar study as they sought to identify those non-technical factors that lead to a successful integration of ICT into the curriculum.

Lawson and Comber (1999) utilized data collected through the United Kingdom Education Departments' Superhighways Initiative to identify four personnel factors which were important dimensions of the integrative school: (1) teachers' attitudes prior to

the innovation, (2) the role of the ICT coordinator, (3) the attitude of senior management, and (4) the existence of adequate support and training. The researchers found that attitudes toward ICT were wide-ranging amongst the schools but found that those teachers with a positive attitude typically taught at schools with policies on ICT and how they were to be delivered (Lawson & Comber). This denotes the importance of administrator acceptance of ICT in the classroom because without that acceptance policies such as the one just noted would not exist and teachers would be left to their own curiosity and willingness to implement ICT into their curriculum.

The role of the ICT coordinator is another important factor into the integration of ICT in the classroom. Lawson and Comber (1999) noted that in one successfully integrated school the ICT coordinator was established as the equivalent to a department head and was given a great deal of leeway when planning ICT activities. By giving the position such prominence in the school the teachers and staff found themselves with the necessary time and skills to implement the technology in the classroom. Other schools handed the role of ICT coordinator over to a curriculum expert rather than a technical expert. This resulted in a more learning-centric model in the school rather than a technical dimension but it was successful, nonetheless (Lawson & Comber).

Lawson and Comber (1999) further noted that senior management must commit to ICT and support its use in the classroom in order for its implementation to be a successful one. In addition, schools with senior management that conveyed a vision of where they wished ICT to go also had teachers with a positive response to ICT in the classroom. Furthermore, teachers provided adequate training in ICT and assistance to

explore learning opportunities were able to quickly use them in the classroom (Lawson & Comber).

The study by Lawson and Comber illustrated the importance of support from multiple sources, administration, ICT coordinators, and training, as a catalyst for a positive response by teachers as it pertains to their inclusion of technology in the classroom. However, this study does not address the actual level of integration ICT has made into the classroom and other factors related to non-integration. For that, a look at a study conducted in Scotland is required.

In 2000, a study was conducted by Williams, Coles, Wilson, Richardson, and Tuson in Scotland that sought to determine the overall use of ICT in the classroom, the impact of ICT on teaching strategies, the factors inhibiting the use of ICT, and the need for support of ICT in schools. Williams et al. (2000) surveyed teachers at 300 primary schools and 200 secondary schools followed by teacher interviews in order to collect their data. The authors found that the overall use of ICT in the classroom was positive. In fact, it was found that there was a great deal of interest and motivation to learn more about the potential of ICT and an acknowledgement that this is the direction teaching will be going in the future (Williams, et al.). For proponents of ICT in education this is good news. However, the authors do note that the use of ICT by primary teachers was much lower than that of the secondary teachers and that teacher attitude toward ICT was generally positive except with those teachers teaching math and science (Williams et al.).

As important as attitude and interest are, the purpose of ICT is to enhance a students' education, not impede its progress. Teachers in this study largely see a positive

impact of ICT on their teaching. Furthermore, 62% of primary and secondary teachers think that ICT has a positive effect on student learning. However, these same teachers outline many factors that inhibit their use of ICT in the classroom. Among them, overall access to technology is at the forefront while cost and the technical support received are not seen as inhibiting factors (Williams et al., 2000). Williams et al. note that teachers who were interviewed indicated that more access to technology was required and strategies for the management of ICT was needed in order to glean some benefit from ICT in the classroom.

In addition, these same teachers feel that ongoing support was an area of concern for them. Almost 80% of both primary and secondary teachers rely on colleagues for up-to-date technology information (Williams et al., 2000). This underscores the importance the role of an ICT coordinator can and should play in schools. Teachers do not have the time necessary to research all the new innovations in technology today. Support from colleagues is commonplace but, according to Williams et al., teachers wish to see support from an organizational standpoint with the administration taking the lead. However, in schools where the appropriate levels of support and policies are in place teachers may not be integrating ICT in their curriculum at a level consistent with that support.

A study in Belgium looked at that very issue. The study, conducted by Tondeur, van Braak, and Valcke (2007) was designed to determine the degree to which teachers were integrating ICT into their classroom in such a way that was consistent with how national authorities proposed it should be. Specifically, the researchers looked at whether or not actual classroom use of ICT mirrored the ICT competencies defined by the

Flemish Department of Education (Tondeur, van Braak, & Valcke). To do so, Tondeur et al. (2007) surveyed 60 school principals and 6 teachers at each school along with follow-up interviews with the principals. Almost 90% of the principals surveyed indicated they were aware of the existence of the new ICT competencies promoted by the Ministry of the Flemish Community. However, only a small number of principals (17.6%) planned on integrating the competency framework into their classroom curriculum.

These findings have far-reaching implications of which, and most importantly, it seems there is a gap, at least in Belgium, between ICT-related national curriculum initiatives and the current level of adoption of integrated ICT use (Tondeur, et al., 2007). Furthermore, the study indicates that teachers are not being involved by the school's administration with regard to the integration of the ICT competencies. This lack of communication between teachers and administrators is not uncommon as it may impact learning outcomes should the teacher not properly introduce technology into the classroom environment.

For ICT to truly take hold in the classroom as a viable curriculum enhancement teachers and administrators must see evidence that learning outcomes for students are improved upon by its presence. As part of a research study in the United Kingdom, Watts and Lloyd (2004) investigated the effectiveness of a multimedia broadband educational communications system on the country's newly instituted Literacy Hour, which requires schools to spend an hour a day on literacy to meet centrally established and monitored targets.

The researchers utilized a software package entitled Espresso for Schools to explore the use of the software on journalistic writing skills at 4 schools while another 4 schools utilized a lesson plan void of ICT (Watts & Lloyd, 2004). The results of a pretest-posttest instrument showed significant differences between the experimental and control groups' writing abilities after a two-week period of student interaction with the software. Those students who were part of the experimental group displayed higher scores on the posttest than those students in the control group (Watts & Lloyd). The comments by the teachers and students were equally as significant.

The overall response from the students and teachers was extremely positive. Espresso for Schools provided an adventure, of sorts, for the students as they worked with the software package. One student commented "There are lots of things to explore on the computer…where, like, if you are in class and you are in front of the teacher and she tells you things, it is not very interesting because you don't explore stuff" (Watts & Lloyd, 2004, p. 55). Teachers were just as delighted with the software:

> That's the joy of Espresso, you see. You stick them into it and you know that even if they're not particularly on task, doing the specific thing that you want them to do, the chances are that they've either just done it or they're busy exploring. And even if they are off exploring then they are learning anyway. (p. 57)

The teacher goes on to say that it "has been good to use it (Espresso) together as a class in the computer room and if anybody's found out something, I've been able to stop the class and actually share and say to them all: 'Try this part of it' and 'Have you found this?'" (Watts & Lloyd, 2004, p. 56). One concern, however, for the teachers was the lack of control the teacher actually had over the instruction since the software package took

control of that process. Overall, the teachers and students enjoyed a positive experience demonstrating the power of ICT if it is integrated into the curriculum in a proper fashion.

As shown, technology in the classroom can be successful should certain factors be integrated into the school's culture. First, there must be ardent support of ICT by the school administrator and this support must be of technical, economical, and operational in nature. Next, teachers feel that training and technological policies should be instituted so that teachers feel more comfortable using the technology. This training is most successful when an ICT coordinator is on staff at the school or school district. Finally, selection of an appropriate ICT for a lesson or subject type can greatly influence learning outcomes. Teachers have many tools with which to use if only they feel comfortable, as well as, obliged to use them. The reward comes in the form of positive attitudes toward technology by both students and teachers.

Attitude

The concept of attitude has long been studied in the psychological and sociological disciplines but has recently found its way into the technological discussion, as well. Fazio (2007) defined this concept of attitude as "associations between a given object and a given summary evaluation of the object" (p. 608). An individual's stance on a given object might be due to their appraisals of the attributes that define that object or may stem from an emotional reaction the object has spurned within the individual (Fazio, 2007). Furthermore, attitudes may be based on an individual's past experience or behavior with the object (Fazio). To that end, an individual's attitude toward technology will play an integral part in how that individual utilizes the technology and for what

purposes. Much research currently exists that indicates that a teacher's attitude plays a significant role in how, or if, that teacher uses technology in his or her classroom, which is one of the key elements calling for the exploration into the association between teachers and their attitudes toward ICTs.

Curriculum Integration

Generally speaking, Scott and Hannafin (2000) have identified three areas that may be factors in how a teacher views his or her classroom learning environment: (1) age, (2) teaching experience, and (3) grade level taught. Scott and Hannafin further note that school teachers are "in the best position to be change agents,"
(p. 414) so it is important to identify those teachers that are most likely to embrace change and "hold views that are consistent with school reform efforts" (p. 414). One area of reform taking place in today's schools is the integration of ICTs into the classroom and curricula. However, with external pressures pushing teachers to adopt non-traditional teaching styles, the integration of technology in to the curricula may be limited (Scott & Hannafin). To that end, the attitude of the teacher toward ICT is of critical importance and may play a large role in whether or not technology will be adopted into their curricula.

In 1992, a study conducted by McCaslin and Torres sought to determine the factors that may aid in determining vocational teachers' attitudes toward computers as they pertain to in-service education. For the study, 244 Ohio vocational teachers were surveyed with and equal distribution of those surveyed identifying themselves as either female (50%) or male (50%). Those studied categorized themselves as either teaching

home economics, trade, business, agriculture, marketing, health, or diversified occupations. Additionally, most of those surveyed, over 80%, identified themselves as having either a bachelor or master's degree.

Based on the results of the study, McCaslin and Torres (1992) concluded that there were two factors that accounted for approximately 44% of the variance in vocational teachers' attitudes toward computers. These two factors include the educational value of computers, and the confidence of the teachers in using computers. McCaslin and Torres recommended that, based on the results of their study, teacher educators should reinforce computer confidence into their vocational teachers by requiring their pupils to demonstrate their computer abilities after providing practical applications for computers in the classroom.

In 1997, Miller worked to identify the attitudes of agricultural vocational teachers (N=216) in Iowa as they pertained to a new interactive communications network that would allow the teachers to connect to distance students from around the state. The predominantly male (90.2%) vocational teachers would be able to conduct courses using real-time video, data, and voice instruction. Miller (1997) found that a negative correlation existed between those obstacles that the vocational teachers identified that may inhibit their use of the network and their attitudes of the network.

Miller (1997) further found that the vocational teachers were concerned with the costs of the network, a lack of training, and incentives for using the network. These teachers perceived their obstacles to using the network as slightly significant as they were concerned with scheduling problems and how certain programs could not be managed

over such a network. As a result, Miller suggested, as McCaslin and Torres did, that teacher educators provide their secondary agriculture students with information related to the network to increase awareness, as well as, provide access to the network to give the students experience in using the network. Some teachers, as the next study suggests, are now viewing technology as an inevitable part of the classroom environment.

Demetriadis, et al. (2003) found that teachers in their study had accepted the rationale for using ICT in school due to a realization that technology was working its way into the classroom. This is a revelation that most teachers are surely coming to realize. In addition, Demetriadis et al. noted that in order for teachers to introduce ICT into their classroom settings they must first feel that using ICT would maximize the effectiveness for achievement of higher level goals while not causing a disturbance to those goals and that they have the ability to control the technology.

Overall, Demetriadis et al. (2003) found that teachers are most interested in using ICT in order to attain a better professional profile and to take advantage of potential learning benefits to be had by using ICT. These learning benefits are an important aspect of any teacher's acceptance of ICTs in the classroom. Teacher's who perceive little or no learning benefit from using ICT in the classroom may not be so inclined to introduce them into the curricula.

The results of the study by Demetriadis et al. is further echoed in a study conducted in Egypt by Sadik. Sadik (2006) found that teachers in Egypt scored high on attitude scales, especially those measuring confidence and the likeability of computers. However, these same teachers scored lower on an importance scale, indicating the

teachers "might not appreciate the importance and usefulness of computer use in schools" (p. 107). This finding contradicts what Demetriadis et al. discovered as their results showed a potential learning benefit when using ICT. However, Sadik did show that teachers scoring higher on the importance and confidence subscales had a tendency to use computers at school more frequently and in a variety of ways. One such way teachers are using computers in the school is a WebQuest.

The WebQuest is an intriguing tool now used by many teachers to challenge students cognitively while introducing them to the World Wide Web. In a study conducted by Perkins and McKnight (2005) the authors sought to measure the relationship between a teachers' comfort level in using WebQuests and the degree to which WebQuests are being integrated into the curriculum. The authors utilized an instrument which measured the teachers varying stages of concern over the implementation of an innovation, which, in this case, was a WebQuest. The results were as one might suspect. Novice users of the WebQuests focused more on learning more about the tool and how that tool might affect them as teachers while experienced teachers were shown to be more curious about what else the tool could offer (Perkins & McKnight).

This study certainly reflects the largely positive views teachers potentially have with regard to new technological innovations introduced into their curriculum. Conversely, Albirini (2006) found teachers' perceptions "of the compatibility of ICT with their current teaching practices were not as positive" as their perceptions of computer attributes (p. 384) despite finding that the educators in his study demonstrated overall

positive attitudes toward ICT (M=4.05). Albirini noted, however, that this attitude toward curricula integration was due, in part, to a lack of computer access in the classroom. In some cases, however, an inability to integrate technology into the classroom may be a result of something more psychological.

Computer Anxiety

The American Psychiatric Association defines anxiety as a mood state in which an individual experiences fear, apprehension, nervousness, worry, and tension. Prolonged anxiety in an individual may assume a pathological form; produce counterproductive thought patterns; and poor coping strategies (Craig, Brown, & Baum, 2000). It comes as no surprise then that computer anxiety is now considered one of the many common anxiety disorders in society. According to Beckers, Wicherts, and Schmidt (2007) computer anxiety is a feeling of fear and apprehension felt by individuals when using computers or even considering the use of a computer.

To that end, Beckers and Schmidt (2001) suggested that there are six dimensions that are involved in the construct of computer anxiety: (1) computer illiteracy, (2) lack of self-efficacy, (3) heightened physical arousal, (4) feelings of dislike, (5) negative beliefs about the role of computers in society, (6) and positive beliefs about the role of computers in society. Furthermore, Beckers, Wicherts, and Schmidt (2007) have found that computer anxiety is more related to a trait anxiety than state anxiety, which views computer anxiety as a stable trait of the individual and not as a temporary or isolated state the individual may emerge from. The authors note that this concept of trait anxiety has profound implications on the ability of teachers to implement technology into their

curricula due to its deep-seated nature and difficulties in treatment. Therefore, a teacher may harbor such a negative belief toward computers that treatment, in the form of training, may be unlikely to resolve those feelings. In turn, this makes the integration of technology into the curricula a complicated and daunting task.

Research indicates that there is a strong correlation between a positive perception of computer importance among students in a classroom and the level of anxiety the teacher feels in relation to computers (Christensen, 2002). This anxiety extends not only to computers but to the integration of computer technology into the curricula.

Hardy (1998) noted that the diffusion and integration of computer technology "into a school's curriculum are often associated with the attributes of disgust, despair, unreasonable fears, phobias, and high levels of computer anxiety" (p. 125) that the teacher may experience. Each of these factors is responsible for shaping an individual's attitude toward ICT. There are many studies that delve into this focus on computer anxiety and phobias, such as those that focus on teachers' computer phobias in relation to their grade levels taught.

According to Rosen and Weil (1995), 52% of elementary school teachers surveyed were categorized as having low or high levels of technophobia. The study goes on to point out that age, the school's socioeconomic status, computer availability, gender, computer experience, and teaching experience are all ample predictor's of technophobia (Rosen & Weil). Similarly, Bradley and Russell (1997) found that 30% of the primary and secondary teachers they surveyed displayed some level of computer anxiety. Furthermore, computer anxiety was highly correlated with computer competence and the

levels of task-related concerns showed to be the serious issue among the teachers (Bradley & Russell).

In West Virginia, a study was conducted to determine the levels of computer anxiety among 116 randomly selected technical education teachers. Almost half (46%) of those surveyed indicated they experienced some sense of computer anxiety (Gordon, 1993). Interestingly, Gordon found no differences to exist between the anxieties felt by male or female teachers toward computers but did note that the perceived computer skills of the teachers were a viable predictor of teacher anxiety.

These and other studies like them are concerning as they point to a common theme of computer anxiety among teachers. One thing to consider with regards to studies in this genre, is the impact that this anxiety or phobia would have on the students. Any teacher that uses technology and retains a technological phobia or anxiety may, unknowingly, impart that phobia, in some manner, upon the students, which creates a cyclical issue that future teachers of the student's will be forced to address. Technophobia, computer anxiety, and other factors of that may alter or influence the attitude of teachers, may be best addressed during a teachers' professional development or pre-service periods.

Self-Efficacy

Teacher self-efficacy refers to a teacher's individual beliefs about their own abilities to successfully perform specific teaching and learning related tasks within the context of their own classrooms (Dellinger, Bobbett, Olivier, & Ellett, 2008). These beliefs can dictate what actions a teacher may take, how much effort they put forth, and how long they persist when faced with obstacles or failures (Bandura, 1997). A teacher's

perceived self-efficacy toward information and communication technology will directly impact the use of technology by the teacher in the classroom and, subsequently, the curricula the teacher develops.

As part of Bandura's self-efficacy theory, personal factors and the environment influence behaviors, while the environment is impacted by behaviors and personal factors (cognitive, affect), and personal factors are impacted by behaviors and the environment (Dellinger et al., 2008). From a cognitive perspective, teachers with high self-efficacy are more likely to have high aspirations, think soundly, assign themselves difficult challenges, and commit themselves firmly to meeting those challenges. In addition, teachers with high self-efficacy exhibit less stress and anxiety by acting in ways that provide for a less threatening environment (Bandura, 1997). This is particularly important as teachers' attitudes toward ICT are concerned.

Research suggests that positive attitudes toward ICT equates to successful integration of ICT into the classroom and curriculum (Beckers, Wicherts, & Schmidt, 2007; Sadik, 2006). Conversely, teachers with low self-efficacy avoid difficult tasks, and retain low aspirations and weak commitment to their goals (Bandura, 1997). Bandura described individuals with low self-efficacy as such:

> They have low aspirations and weak commitment to their goals. They turn inward on their self-doubts instead of thinking about how to perform successfully. When faced with difficult tasks, they dwell on obstacles, the consequences of failure, and their personal deficiencies. Failure makes them lose faith in themselves because they blame their own inadequacies. They slacken or give up in the face of difficulty, recover slowly from setbacks, and easily fall victim to stress and depression. (p. 2)

For teachers to utilize ICT in the classroom in such a way that enhances student learning the teacher must retain a high level of self-efficacy toward ICT and maintain a strong sense of efficacy expectation.

Efficacy Expectation

Efficacy expectation is the conviction that a teacher can successfully perform a behavior necessary to produce an outcome (Bandura, 1977). For teachers, a strengthened sense of being able to introduce technology into their curricula in such a way that student learning is enhanced requires a strong sense of efficacy expectation. According to Bandura, expectations of self-efficacy for teachers are based on four sources of information: (1) performance accomplishments, (2) vicarious experience, (3) verbal persuasion, and (4) physiological states. These sources of information potentially impact teacher behavior in significant and different ways.

According to Bandura (1994), performance accomplishment refers to the success and failure that teachers endure and how those outcomes affect the individual. Should a teacher experience only easy successes, they will come to expect quick results and will be easily discouraged should failure befall them. Generally speaking, after teachers become convinced they can succeed they tend to persevere in the face of adversity (Bandura). For example, a teacher with strong efficacy expectations due to a number of technology integration successes tends to suffer a reduced level of negative impact when the occasional failure occurs.

Vicarious experience refers to the observation of another individual succeeding due to a sustained effort which, in turn, raises the beliefs of the observer that they, too,

can possess the capabilities to master activities of a similar nature (Bandura, 1994). Therefore, teachers that witness other teachers successfully using computers in the classroom without incident may generate expectations that they may succeed, as well, should they persist and intensify their efforts. Conversely, observing others' failures despite sustained effort lowers the observers' judgments of their own efficacy and undermines their efforts (Bandura).

The third source of information that can be used to strengthen a teacher's beliefs that they can succeed is verbal persuasion. Teachers that are persuaded verbally that they possess the ability to integrate technology into their classroom activity are likely to generate greater effort and sustain it than if they harbor self-doubts and dwell on personal deficiencies when problems arise (Bandura, 1994). Bandura (1977) notes, however, that efficacy expectations induced in this manner tend to be weaker than in nature than those arising from accomplishment.

The physiological state, or emotional arousal, of a teacher may impact their efficacy expectation, as well. Bandura (1977) stated that "stressful and taxing situations generally elicit emotional arousal that, depending on the circumstances, might have informative value concerning personal competency" (p. 198). To that end, Bandura surmised that because high arousal incapacitates performance, teachers are more likely to expect technology integration success when they are not under siege with arousal that is indifferent than if they are tense and agitated. Teachers with a negative disposition as it pertains to ICT will also maintain low efficacy expectations diminishing the chances they will integrate ICT into their curricula.

To be sure, the successful use of information and communication technology in the classroom is as much about internal factors as it is external factors. For teachers, the expectations of a teacher to master the integration of ICT in to their curricula affect both the initiation and persistence of coping behavior. In the end, however, given appropriate skills and adequate incentives efficacy expectations play a major role in determining how a teacher may act when faced with integrating ICT in the classroom.

Studies in Self-Efficacy and ICT

The current literature is ripe with instances of research into teachers' beliefs about their ability to successfully perform a task or activity. Instances of technology and self-efficacy research are plentiful but tend to reflect pre-service and student teacher samples. Most researchers agree, however, that in order to best prepare students for a global information age schools are increasing access to technology as best as possible. This sudden access to technology triggers circumstances whereby teachers must determine what, if any, impact ICT will have on their curricula.

A study published in 2005 by Bakar and Mohamed evaluated the preparedness of pre-service vocational teachers to integrate computers into their teaching and learning tasks. The researchers measured the pre-service vocational teacher's ability to perform tasks related to word processing, spreadsheets, databases, and other computer-related functions. The study consisted of 139 students that were primarily represented by female (87.8%) students preparing to teach in agriculture, home-science, languages, economics, and math.

Bakar and Mohamed (2005) found that the pre-service vocational teachers showed to have moderate efficacy in using spreadsheets, while half were categorized as having high efficacy in word processing. The researchers found that a significant difference in self-efficacy existed between those pre-service vocational teachers that had not taken a computer course while at the university compared to those that had. Furthermore, no significant difference in self-efficacy was found based on gender, but there was a strong, positive correlation found between self-efficacy and attitude based on the particular computer functions. Similar correlations were found by Piper and Yan (2001) and Levine and Donitsa-Schmidt (1998). To that end, Bakar and Mohamed (2005) insisted that to be successful using technology in the classroom teachers "must have positive attitudes towards the use of computers in teaching"
(p. 2388).

Research conducted by Wang, Ertmer, and Newby (2004), investigated the impact of vicarious learning experiences and goal setting on pre-service teachers' self-efficacy for technology integration was examined. Vicarious learning experiences refers to the notion that viewing others successfully completing a task can increase the learners' perceptions of others' efficacy as well as their own efficacy for accomplishing a similar task (Wang, Ertmer, & Newby). In this study, the vicarious experience itself was presented in the form of an instructional CD-ROM that illustrates technology practices and models of effective technology integration. Using a 2 x 2 factorial research design, Wang, Ertmer, and Newby found that there were indications that pre-service teachers exposed to the instructional CD-ROM experienced significantly greater increases in

judgments of self-efficacy for technology integration than those who were not exposed to the CD-ROM. This study underscores the overall benefit of teacher training in technology integration and further highlights the importance of teacher educators and the roles they play in building teacher self-efficacy.

In 2005, Littrell, Zagumny, and Zagumny explored whether or not pre-service computer experiences, modeling, or other personal experiences could predict classroom computer use. Among the many factors analyzed, teacher self-efficacy rated as among the highest (ß=.21) in predicting the use of instructional technology in the teacher's curriculum (Littrell, Zagumny, & Zagumny, 2005). Littrell, Zagumny, and Zagumny recommended that undergraduate teacher preparation should be infused with instructional technology instead of simply teaching computer literacy as a means for fostering technology use by the pre-service teachers. In other words, in order to best help pre-service teachers develop a high level of self-efficacy toward instructional technology the curriculum for pre-service teachers should be rich with opportunities for instructional technology interaction.

As stated by Usluel (2007), information literacy skills are among the key skills required for success in an information-based society. Information literacy refers to queries about the type of information that is required, when it is required, where it can be obtained, and how it can be used (Ulsuel). Usluel noted that these skills should be possessed by teachers as they teach and lead others in our society and that a high level of self-efficacy in these skills will affect the success of the teacher's work performance. Usluel's study sought to determine the level of student teachers' information literacy self-

efficacy and what demographic information might explain significant variances in their self-efficacy in using ICT. The researcher issued an Information Literacy Self-Efficacy scale to more than seventeen-hundred primary education students in Turkey and found that their information literacy self-efficacy was very high (Ulsuel). Usluel further found that gender and grade level of the students were significant factors for differences in information literacy self-efficacy. In addition, Usluel recommended that a full evaluation of the students' self-efficacy beliefs should be evaluated as a measurement of the success of the teacher education program.

Research has clearly underscored the importance of self-efficacy in a teachers' use of ICT. A teachers' perceived level of self-efficacy toward ICT likely develop over time and with a steady dose of ICT knowledge and skills. For both pre-service and in-service teachers a consistent diet of training and professional development into how ICT can be integrated into the classroom as well as how to function within an ICT classroom environment breeds higher levels of perceived self-efficacy. This leaves teachers in the best position to use ICT as an enhancement of a student's learning process and learning environment.

Cultivating Positive Teacher Attitudes and Self-Efficacy

Shaping a teacher's attitude or improving upon how they perceive themselves can be a daunting task. However, those possessing influence with teachers such as administrators, trainers, and educators are working to find ways to do just that in the hopes of integrating more technology into the classroom curriculum. Simply put, there is an assortment of personal and technical factors that must be overcome in order to

cultivate positive teacher attitudes and perceived self-efficacy toward technology use in the classroom.

In 2000, Soner Yildirim conducted a study, which included 114 pre-service and in-service teachers that attended a California university, with the purpose of measuring the effects of an educational computing class on the attitudes of the teachers. The course, according to Yildirim, was designed for those with no prior computing experience with goals for the students that included demonstrating knowledge of basic operations, terminology, capabilities of computer-based technologies, and basic knowledge of and ability to use representative software applications, among others.

In a pretest distributed to the teachers the researcher noted differences among the varying levels of competencies on pretest attitudes toward computers where attitudes were measured on three levels; anxiety, confidence, and liking (Yildirim, 2000). In addition, the pretest noted that those indicating a high level of competency toward computer-based technologies "had significantly more positive attitudes, more confidence, and less anxiety" (Yildirim, p. 483) than those indicating a lower level of computer competency.

As a consequence of injecting this educational computing course into the curriculum, and according to the posttest scores, the pretest attitudinal differences among those students with varying competencies were nullified (Yildirim, 2000). Yildirim further noted that there was a significant interaction indicating that those teachers labeled as having novice competencies had as much of a "positive attitude, less anxiety, and more confidence" (p. 486) as those identified as having greater competencies. The computer

course resulted in teachers with the least amount of experience and knowledge in computer-based technologies gaining the most from the course (Yildirim).

As part of the research, Yildirim interviewed and asked for open-ended responses on a questionnaire from the teachers. Yildirim (2000) reported that all of the respondents noted that the course had positive effects on their attitudes and even their confidence in using the computers, which is a sign of a growing perceived self-efficacy. One such student in Yildirim's study had the following to say:

> This course changed my attitude toward educational uses of computers by teaching me how computers can make instruction more meaningful for K-12 students and how they can bring students to make connections across content areas. For instance, a hypermedia environment on a real life problem, such as building a bridge near the school, can bring pieces of the real world into the classroom and bring them under students' control. The course also changed my attitude toward computers by broadening my background on the possibilities they offer, and on the content available through software and the Internet. (p. 489)

Another teacher noted that just seeing their student's working on computers and learning from them made him want to learn more about computers (Yildirim, 2000). This form of observation correlates with what Albert Bandura calls vicarious experience, which refers to the observation of another individual succeeding due to a sustained effort which, in turn, raises the beliefs of the observer that they, too, can possess the capabilities to master activities of a similar nature (Bandura, 1994). The results of Yildirim's research demonstrate that with proper training teachers can experience a more positive attitude and increased perceived self-efficacy toward computer-based technologies.

According to a Williams, Coles, Wilson, Richardson, and Tuson (2000) research study, teachers have a wide variety of priorities for developing their ICT skills and knowledge. These priorities include technical skills and knowledge, technology

application, skills in how to best teach with technology, and technology management skills and knowledge (Williams et al., 2000). Furthermore, the teachers in this study felt they needed to develop these skills in the context of classroom management, professional development and personal use (Williams et al.).

With the results of their study in mind, Williams et al. offered five recommendations for how technical training for teachers should be designed in the future: 1) to increase a familiarity with a variety of technologies, 2) to focus on the types of ICT resources available to teachers in school, 3) to be flexible, providing choices and guidance based on the teachers competency with technology, 4) to encourage teachers to reflect on and make decisions about their own technology development needs regularly, and 5) to focus on technology as a mechanism for "lifelong learning for teachers as well as for pupils" (Williams et al., 2000, p. 317).

In addition to training, Williams et al., identify support as an important factor when discussing a teacher's development with technology. The researchers noted that 80% of primary teachers and 80% of secondary teachers in their study state they rely on colleagues to keep them up-to-date on technology changes (Williams et al., 2000). These same teachers are keenly aware of the culture of the school when they discuss ICT development and identify a need for an organizational culture "which promotes a positive attitude" (Williams et al., 2000, p. 318). To that end, the administrators of schools become vitally important. Williams et al. expressed the need for school administrators that create the "kind of organizational culture which is both forward looking and dynamic

but also sympathetic to the stage which teachers are at in their own ICT skills and knowledge development" (p. 318).

Both Williams et al. (2000) and Yildirim (2000) identified training as an important factor in the cultivation of positive attitudes toward technology and its integration into the classroom. However, the integration of technology practices into a pre-service teacher's education can have a positive impact on the teacher's confidence level (Pope, Hare, & Howard, 2002). Yildirim's research even touched on the importance of training in the development of increased teacher confidence toward technology.

Wang and Ertmer (2003) took a more detailed look at self-efficacy in a study that sought to discover whether or not vicarious learning experiences and goal setting could influence pre-service teacher's self-efficacy for integrating technology in the classroom. Vicarious experiences refer to the observation of another individual succeeding due to a sustained effort which, in turn, raises the beliefs of the observer that they, too, can possess the capabilities to master activities of a similar nature (Bandura, 1994). The subjects for this study included 21 Teacher Education students enrolled in an introductory educational technology course during a four week summer session.

For this study, vicarious learning experiences for technology integration were presented utilizing VisionQuest software (Wang & Ertmer, 2003). The VisionQuest software allow the teachers to explore teacher classrooms and listen to how those teachers planned for technology integration, how they implement the technology into their classroom, and how they assess the impact of that integration (Wang & Ertmer). Overall, the software demonstrated how technology integration could be successfully

achieved despite differences in environmental variables and student backgrounds (Wang & Ertmer). The teachers were given the software to view during a two-hour lab each week.

The results of the study indicate that pre-service teachers engaging in vicarious learning experiences "related to successful technology integration, experienced a significantly greater increase in judgments of computer self-efficacy" (p. 10) than those teachers who did not engage in those same experiences (Wang & Ertmer, 2003). Wang and Ertmer found that their study demonstrated the potential benefit of providing pre-service teachers with vicarious learning experiences as but one way to increasing their self-efficacy for effectively integrating and utilizing technology into the classroom.

The literature clearly demonstrates that cultivating positive attitudes and an increased self-efficacy toward technology integration is possible. Educating pre-service teachers on how to best approach technology integration (Yilidirim, 2000) as well as developing their basic technology skills (Williams et al., 2000) can positively impact the attitudes of those pre-service teachers. In addition, a culture of technological acceptance coupled with administrative support for the use of technology within the school environment breeds positive attitudes toward technology integration (Williams et al.). There is further evidence that utilizing vicarious learning experiences within a teacher education program can increase a pre-service teacher's perceived self-efficacy toward technology (Wang & Ertmer, 2003). All told, the cultivation of positive attitudes and increased self-efficacy toward technology integration in the classroom is certainly

feasible and can be quite effective, as the literature indicates, in the pre-service environment.

Summary

Our nation's educators are charged everyday with providing the best possible learning environment for their students. The implementation of technology into the classroom as shown to be an effective mechanism in supplementing an educator's curriculum. However, these educators must be adequately supported as they strive to integrate ICT into the classroom. Two important forms of support come in the shape of positive attitudes and high perceived levels self-efficacy toward technology. Educators possessing these qualities are positioned to be successful as they move to integrate technology into their curricula.

The literature is full of research and academic articles examining the attitudes and self-efficaciousness of K-12 educators toward ICT. The literature has shown that with positive attitudes and high perceived levels of self-efficacy an educator is better prepared to successfully integrate and implement technology into their curricula. However, the literature's focus on K-12 educators has left a void. This void exists because the attitudes and self-efficacy of career and technical educators toward ICT has been left largely unexamined. It is due, in part, to this void that highlights a clear need to discover the attitudes and perceived level of self-efficacy toward ICT of career and technical educators in Mississippi.

CHAPTER III

METHODOLOGY

The purpose of the study was to investigate attitudes and perceived self-efficacy of career and technical educators at high schools in Mississippi as they pertain to information and communication technology. Research has indicated that teachers are greatly assisted as they strive to integrate technology into their curricula should they possess a positive attitude toward ICT and a high perceived level of self-efficacy (Beckers, Wicherts, & Schmidt, 2007; Sadik, 2006; Wang & Ertmer, 2003; Williams et al., 2000). The impact of technology integration into the classroom is evident in its ability to aid in the facilitation of learning in students as well as its overall enhancement of the learning environment and content. Knowledge into these teacher characteristics is vital as technology becomes more prevalent in today's classrooms.

This chapter seeks to describe the methodology used to conduct this study and is organized into the following sections: (1) research design, (2) participants, (3) instrumentation, (4) data collection, (5) data analysis, and (6) summary.

Research Design

For this study, a non-experimental design was utilized that included descriptive, causal comparative, and correlational elements. Descriptive studies seek to define a particular state of affairs as completely as possible, while causal comparative studies are

useful in determining the cause for differences among groups of people (Fraenken & Wallen, 2006). Correlational studies are utilized to determine whether or not a relationship exists between two or more quantifiable variables (Gay, Mills, & Airasian, 2006). With regard to this study, the non-experimental design was utilized for the purposes of analyzing and describing the attitudes and perceived levels of self-efficacy that Mississippi career and technical educators possess as those characteristics pertain to information and communication technology.

Participants

The subjects (n=181) chosen for this study were done so by convenience sampling. Convenience sampling, as defined by Gay, Mills, and Airasian (2006) is the process of using participants that happen to be available. Participants for this study included secondary career and technical (CTE) educators in high schools and career and educational centers in the State of Mississippi. The CTE educators consisted of teachers in following disciplines: (1) Agricultural and Environmental Science and Technology (AEST), (2) Allied Health, and (3) Business and Computer Technology (BCT).

The AEST program is taught to students starting in ninth grade and continuing through twelfth grade. The AEST program seeks to provide instruction in technology, production, environmental stewardship, and agricultural literacy. The Allied Health program is a two-year skills program that introduces students to health careers, the basic health sciences, and basic health career skills. The Allied Health program is taught to those students in tenth to twelfth grades. Finally, the Business and Computer Technology program, also taught to tenth to twelfth graders, is designed to educate, train, and provide

guidance for high school students. BCT students receive instruction in word processing, spreadsheets, and databases, as well as, financial management, accounting, and web design. Students who complete the AEST, Allied Health, or BCT program earn Carnegie units that can be applied toward graduation credit (MDE, 2007).

The aforementioned career and technical disciplines were chosen due to their inclusion in to a project at the Research and Curriculum Unit at Mississippi State University. The *Redesigning Education for the 21st Century Workforce* (2007), or Redesign plan, aims to "implement workforce education starting in kindergarten and coach students to select a career pathway in the 10th grade. This plan will make the overwhelming experience of choosing the best career path less intimidating and will better prepare" (MDE, 2007, ¶ 1) Mississippi high school students for a future workplace. This study's targeted population teaches a specific career pathway to tenth through twelfth grade students in one of 500 high schools in the state of Mississippi (Mississippi Department of Education, 2004). Thus, their attitudes and perceived levels of self-efficacy toward ICT may impact the integration of newly instituted curricula and will be important teacher characteristics to investigate.

Instrumentation

For this study, Section I of Dr. Albirini's The Ohio State University Attitudes toward Computer Technology instrument was selected utilizing those instrument-selection considerations set forth by Fraenkel and Wallen (2006). In addition, Dr. Ling Wang's entire Computer Technology Integration Survey was utilized as a means of measuring teacher self-efficacy toward ICT. The researcher combined Section I of The

Ohio State University Attitudes toward Computer Technology instrument with the Computer Technology Integration Survey to create a new, forty-nine question survey that was used to measure teachers' attitude toward computer technology, their perceived levels of self-efficacy toward computer technologies, and general demographic and experience information. The three sections of the new instrument were as follows: (1) Teacher Computer Attitudes, (2) Teacher Self-Efficacy, and
(3) Demographics and Experience and is referred to as the Information and Communication Technology Attitude and Self-Efficacy Survey (ICTASES) (see Appendix B).

Section I of the ICTASES, Teacher Computer Attitudes, was originally developed by Abdulkafi Albirini and was utilized to measure teachers' attitudes toward computer technologies. Permission to use a portion of that survey was granted per a Letter of Permission sent by Dr. Albirini (see Appendix C). This section of the instrument is consistent with what Fraenkel and Wallen (2006) described as an attitude scale, which is a set of statements to which an individual responds and the pattern of responses are viewed as confirmation of one or more underlying attitudes. Questions 1 through 20 measure the affective (items 1-6), cognitive (items 7-15), and behavioral (items 16-20) domains in an attempt to describe teachers' attitudes toward information and communication technologies utilizing a Likert scale. The participants were asked to rate their levels of agreement from 1 (strongly disagree) to 5 (strongly agree) with statements related to their attitudes regarding technology.

Section II of the ICTASES, Teacher Self-Efficacy, was developed by Dr. Wang of NOVA Southeastern University for the purpose of measuring teachers' self-efficacy beliefs for technology integration. Permission to use Dr. Wang's instrument was granted per a Letter of Permission (see Appendix B). This section of the survey was considered an attitude scale as questions 21 through 41 measured participants' confidence for technology use utilizing a Likert scale. The participants were asked to rate their levels of agreement from 1 (strongly disagree) to 5 (strongly agree) with statements related to their levels of confidence regarding technology use.

Section III of the instrument, Demographics and Experience, was developed by the researcher and contains questions pertaining to the participants' general demographics and teacher experiences. Questions 42 through 49 asked the participant to provide demographic and teacher experience information.

Validity and Reliability

Validity is the degree to which a test measures what it is supposed to measure and, consequently, permits appropriate interpretation of scores. Content validity is the level to which a test measures an intended content area (Fraenkel & Wallen, 2006). Content validity for Section I of the ICTASES was conducted by Dr. Albirini who invited experts to evaluate The Ohio State University Attitudes toward Computer Technology instrument for content and face validity. Face validity refers to the degree that an instrument or test appears to measure what it states it will measure (Gay, Mills, & Airasian, 2006). In addition, Dr. Albirini cited a Cronbach's alpha reliability coefficient of .90 for the computer attitudes section of the instrument to be utilized in ICTASES (Albirini, 2006).

As noted by Fraenkel and Wallen (2006), reliability refers to the overall consistency of the scores gathered by the instrument.

Similarly, Dr. Wang indicated that the Computer Technology Integration Survey instrument was reviewed by experts for content validity and construct validity, which is the degree to which a test measures an intended hypothetical construct (Gay, Mills, & Airasian, 2006). The experts rated each question and made suggestions for each item on the instrument. Revisions were made to the instrument demonstrating sufficient content validity for the instrument.

Dr. Wang conducted a factor analysis on the data collected from the survey, and it was determined that the instrument was valid and measured a single construct. In addition, Cronbach's alpha was calculated for the Computer Technology Integration Survey to determine the reliability of the instrument. Alpha coefficients of .94 for the pre-survey and .96 for the post-survey indicated that the instrument was highly reliable (Wang, Ertmer, & Newby, 2004).

In order to identify any defects with the questions housed in Section III of ICTASES, Demographics and Experience, a panel of experts were convened. These experts, including eight Allied Health secondary teachers and two program coordinators, Dr. Robin Parker, the Coordinator of Workforce Education, and Betsey Smith, a Curriculum Project Manager, both with the Research & Curriculum Unit at Mississippi State University, reviewed Section III of the instrument and were asked to provide recommendations for improving the questions. The researcher reviewed the recommendations and determined that the following changes to the survey were required:

(1) question 44 was alphabetized, (2) question 45 was alphabetized, and (3) in question 48 the option labeled ‘Health’ was changed to ‘Allied Health.

Data Collection

The participants of this study (n=181) consisted of career and technical educators at high schools and career centers in Mississippi. The email addresses of the sample were housed at the Research & Curriculum Unit (RCU) at Mississippi State University. For the purposes of this study, the RCU requested and was granted access to these email addresses. Access to this listserv email address was only granted when the researcher was prepared to disseminate the email invitation for the study. The researcher secured the listserv email address on the researcher’s personal network drive at Mississippi State University.

A total of 415 email invitations were sent to career and technical educators targeted for this study. Of those, 79 were returned as undeliverable, which may be a result of educators changing their email addresses and not notifying MDE of that change, or are individuals who may no longer be employed with MDE. Therefore, the total number of email invitations sent to participants was 336 (see Table 3.1).

Table 3.1 Distribution of Email Invitations to Career and Technical Educators by Subject Taught

	Originally Sent	Returned as Undeliverable	Total Received
Business & Technology	107	14	93
Agriculture	151	36	115
Allied Health	157	29	128
Total	415	79	336

An email request letter (Appendix D) was sent on August 4, 2008, to each of the participants. The email request letter contained instructions on how to access the ICTASES instrument as well as inform them of the purpose of the research. In addition, the email request informed the participants that electronic submission of the instrument was their informed consent for the researcher to utilize the data collected for the purposes outlined. Furthermore, the email request letter informed the participant that their responses to the instrument were collected without the aid of an identifier keeping their responses anonymous. A reminder email request letter was sent to the participants on August 23, 2008 (see Appendix E).

Collection of the responses was handled using Survey Monkey (http://www.surveymonkey.com), an online survey instrument delivery and collection web site. Survey Monkey provided a safe and secure environment with which to disseminate the instrument as well as collect participant responses. The researcher generated the instrument electronically using Survey Monkey's survey tools. The instrument was closed to participants on September 10, 2008. At that time data were

downloaded from Survey Monkey and securely stored on the researcher's personal network drive at Mississippi State University.

The researcher submitted a request to conduct the study to the Mississippi State University Institutional Review Board (IRB) for the Protection of Human Subjects in Research (see Appendix A). Furthermore, the participants were informed of their right to refuse to be included in the study as well as the choice to withdraw at any time. In addition, participants were guaranteed that their responses and the use of their data would remain confidential.

Data Analysis

The following research questions were designed to guide this study as it sought to investigate attitudes and perceived levels of self-efficacy of career and technical educators at high schools in Mississippi as they pertain to information and communication technology:

1. What are the attitudes of career and technical educators in Mississippi toward information and communication technology?
2. Is there a significant difference in attitudes toward information and communication technology of career and technical educators in Mississippi based on selected characteristics of the educators?
3. What is the perceived level of self-efficacy of career and technical educators in Mississippi toward information and communication technology?

4. Is there a significant difference in the perceived level of self-efficacy toward information and communication technology of career and technical educators in Mississippi based on selected characteristics of the teachers?
5. What is the relationship, if any, between the attitudes of career and technical educators in Mississippi toward information and communication technology and their perceived levels of self-efficacy?

The data collected by the ICTASES survey were analyzed using both descriptive and inferential statistics. Descriptive statistics, such as those measuring frequency, mean, and standard deviation, were utilized to examine selected demographic characteristics of the career and technical educators such as race, gender, and level of education, years of teaching experience, years of experience using computers, and the subject the educators taught. In order to analyze the overall attitudes and perceived levels of self-efficacy of these educators toward ICT, commonly utilized descriptive statistics such as mean and standard deviation were employed. In addition, an analysis of the distribution of answers was undertaken. For the purposes of this study, individual or group means equaling or exceeding 3.5 on the attitude or self-efficacy scales constituted a positive attitude or high perceived level of self-efficacy.

In order to determine whether a significant difference existed in the attitudes or perceived levels of self-efficacy of career and technical educators toward ICT, a Kruskal-Wallis one-way analysis of variance by ranks test was applied. The Kruskal-Wallis test is a non-parametric method of data analysis that is utilized when data are not normally

distributed and when the data are ordinal. The Kruskal-Wallis test is used to determine if a significant difference exists among the medians of three or more populations.

In those instances where the Kruskal-Wallis identified a significant difference within the specific population, a Mann-Whitney *U* test was utilized in a post hoc fashion to discover whether the central tendencies of two independent populations were significantly different (Howell, 2002). The Mann-Whitney *U* test is a non-parametric equivalent to the t-test for two independent samples.

The Kruskal-Wallis and Mann-Whitney *U* tests were used because the data were normally distributed (see Figures 3.1 and 3.2). Transformations of the data, for the purpose of forming homogeneous variances, were undertaken but failed to normalize the data.

A Spearman's rank correlation was employed to examine the relationship between teachers' attitudes toward ICT and their perceived levels of self-efficacy. The Spearman rank correlation, or Spearman Rho, substitutes ranks scores for raw scores in order to measure the linear relationship between two variables (Howell, 2002). All data was analyzed utilizing version 16.0 of the Statistical Package for the Social Sciences (SPSS).

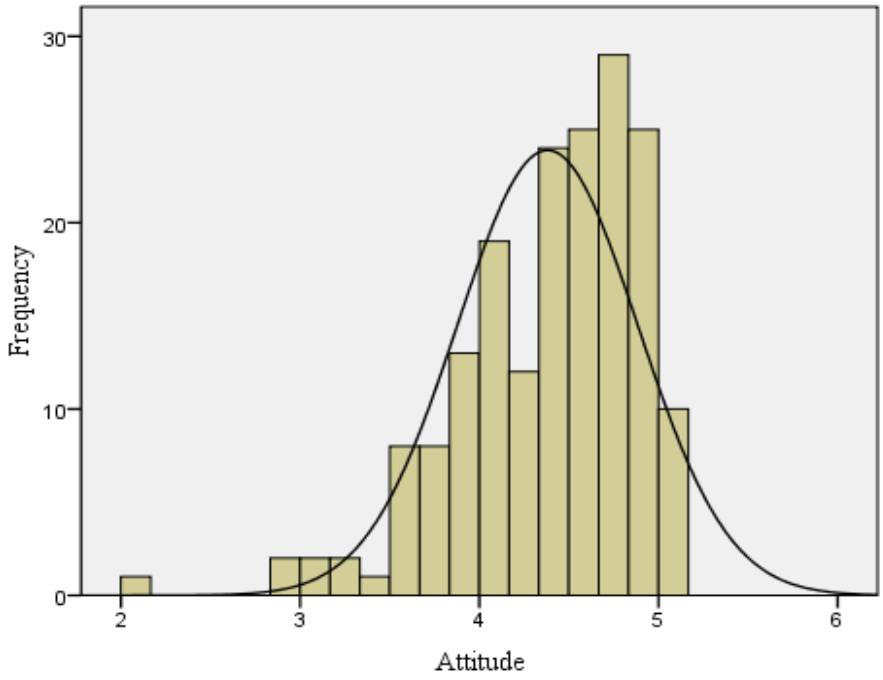

Figure 3.1 Histogram of Mean Responses on the Attitude Scale

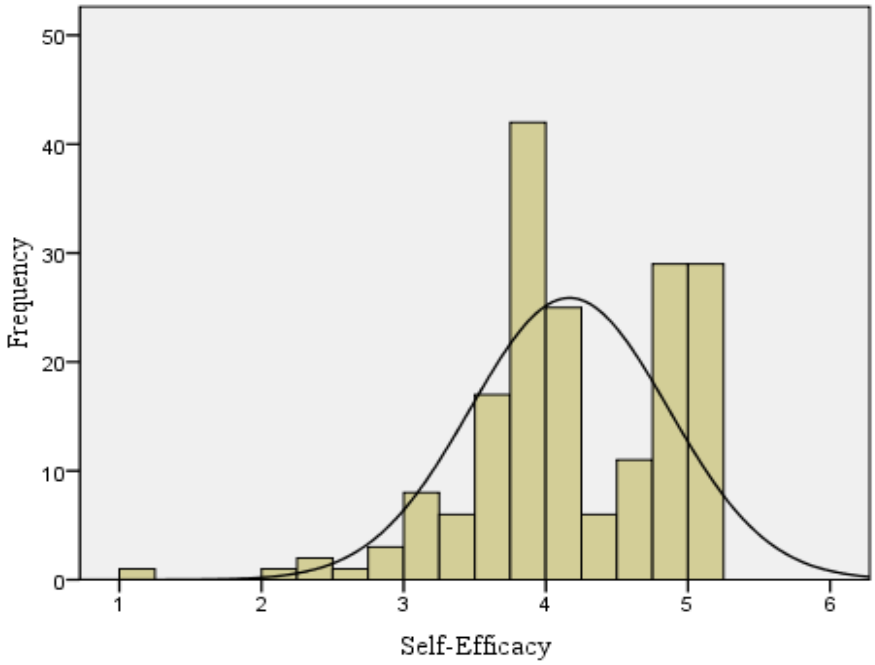

Figure 3.2 Histogram of Mean Responses on the Self-Efficacy Scale

Summary

The purpose of the study was to investigate attitudes and perceived levels of self-efficacy of career and technical educators at high schools in Mississippi as they pertain to information and communication technology. A survey instrument was developed to measure teachers' attitudes and perceived self-efficacy toward technology in the classroom. Data collection involved an email invitation sent to the participants with a reminder email sent two weeks later. Data analysis included descriptive statistics as well as inferential statistics.

CHAPTER IV

RESULTS

This study investigated the attitudes and perceived levels of self-efficacy of career and technical educators at high schools in Mississippi as they pertain to information and communication technology. The instrument used to collect data for this study was the Information and Communication Technology Attitude and Self-Efficacy Survey (Appendix B). Participants in the study were career and technical educators teaching Agriculture, Allied Health, or Business and Technology career pathway subjects to tenth through twelfth graders in Mississippi high schools and career centers. The educators were sent an email invitation to participate in the survey, which provided a link to Survey Monkey, an online survey tool used to disseminate the survey and to collect the results.

A total of 336 email invitations were successfully sent to secondary career and technical educators in Mississippi. Of those, a total of 187 participants responded to the survey via Survey Monkey. Six of the respondents completed less than half of the survey and were, as a consequence, purged from the total sample size and were not included in any data analysis. Therefore, a total of 181 participants were included in this study providing a return rate of 53.87%. Eleven career and technical educators replied to the email invitation for this study lamenting their inability to respond to the survey due to a lack of access to the World Wide Web in their school, thereby reducing the potential respondents for this study.

This chapter will focus on the statistical analysis of the data collected as well as the interpretation of the data as it pertains to the research questions set forth in Chapter I. It must be noted that on the ICTASES instrument items 2, 4, 6, 8, 10, 13, 15, 16, 18, and 20 are negatively worded. In other words, strong disagreement or disagreement with these items' statements would indicate a positive attitude. Therefore, the scores for these negatively-worded items were reversed so that the scores for all of the attitude items are consistent.

The research questions for this study were:

1. What are the attitudes of career and technical educators in Mississippi toward information and communication technology?
2. Is there a significant difference in attitudes toward information and communication technology of career and technical educators in Mississippi based on selected characteristics of the educators?
3. What is the perceived level of self-efficacy of career and technical educators in Mississippi toward information and communication technology?
4. Is there a significant difference in the perceived level of self-efficacy toward information and communication technology of career and technical educators in Mississippi based on selected characteristics of the teachers?
5. What is the relationship, if any, between the attitudes of career and technical educators in Mississippi toward information and communication technology and their perceived levels of self-efficacy?

Demographics

Information regarding the general demographics of the career and technical educators was collected utilizing the ICTASES instrument. A presentation of that information is found in Table 4.1. The majority of those who responded were female (75.8%) and categorized themselves as being Caucasian – Non-Hispanic (80.9%) compared to 16.3% that categorized themselves as Black or African American. Over 85% of respondents stated that they held a bachelor or master's degree, and 9.6% indicated they held an associate's degree. Those who classified themselves as teachers of Business and Technology (49.4%) greatly outnumbered those who teach Allied Health (25.3%) and Agriculture (21.9%).

The number of years these respondents had in teaching experience was diverse but closely distributed. Those educators who identified themselves as possessing over 20 years of teaching experience (29.8%) outnumbered those educators identifying themselves as having 1 to 5 (22.5%), 6 to 10 (18.5%), 11 to 15 (19.7%), and 16 to 20 (8.4%) years of teaching experience.

The age of the respondents was also closely distributed with a majority of the respondents indicating that they were between the ages of 35 and 54 (58.9%). Almost 21% of the educators identified themselves as being between the ages of 23 and 34 years of age, while the remaining 20% identified themselves as being over 55 years of age.

Almost three-fourths (74.6%) of the respondents noted that they had between 6 and 20 years of experience in using computers. Those educators with 11 to 15 (33.1%)

years of experience using computers outnumbered those with 1 to 5 (6.7%), 6 to 10 (20.2%), 16 to 20 (21.3%), and over 20 (18%) years of experience using computers.

Table 4.1 Demographic Characteristics of Career and Technical Educators

	Frequency	Percent
Age		
23-34	35	20.8
35-44	38	22.6
45-54	61	36.3
Over 55	34	20.2
Did not answer	13	
Gender		
Female	135	75.8
Male	41	23.0
Did not answer	5	
Race		
American Indian or Alaska Native	1	.6
Asian	0	0
Black or African-American	29	16.3
Caucasian – Hispanic	2	1.1
Caucasian – Non-Hispanic	144	80.9
Native Hawaiian or Other Pacific Islander	0	0
Did not answer	5	
Level of Education		
Associate	17	9.6
Bachelor	78	43.8
Master	75	42.1
Doctorate	3	1.7
Specialist	5	2.8
Did not answer	3	
Years of Teaching Experience		
1-5	40	22.5
6-10	33	18.5
11-15	35	19.7
16-20	15	8.4
Over 20	53	29.8
Did not answer	5	

Table 4.1 Continued

	Frequency	Percent
Years of Computer Use		
1-5	12	6.7
6-10	36	20.2
11-15	59	33.1
16-20	38	21.3
over 20	32	18.0
Did not answer	4	
Subject Taught		
Agriculture	39	21.9
Allied Health	45	25.3
Business & Technology	88	49.4
Did not answer	9	

Note: Due to missing data, percentages may not equal to 100 due to rounding, and reflect the number of respondents, not the total sample size. Frequency totals have been appended with the number of non-responses to illustrate the total number of respondents, which equals 181.

Research Question One

Research question one asked what are the attitudes of the career and technical educators in Mississippi toward information and communication technology. The 20 questions in this section of the survey were broken down into three categories: 1) the affect category sought to capture the participant's emotional response or liking toward ICT and was represented by statements 1-6 on the instrument, 2) the cognitive category addressed the educator's factual knowledge about ICT and was represented by statements 7-15 on the instrument, 3) and the behavioral category was represented by statements 16-20 on the instrument and sought to address the overt behavior of the educators toward ICT (Albirni, 2006). Table 4.2 presents the attitude of the educators toward ICT. Ten of the 20 statements on the attitude scale were worded negatively and are reflected in

statements 2, 4, 6, 8, 10, 13, 15, 16, 18, and 20, as shown in Table 4.4. Therefore, those 10 statements' scores were reversed in order to reflect a positively construed statement.

Table 4.2 Distribution of Mean Scores of Career and Technical Educators on the Attitude Scale

Scale	Percent					Mean	SD
	SD	D	N	A	SA		
Affect	1.20	4.34	8.68	30.66	55.12	4.34	.90
Cognitive	2.11	5.46	7.20	27.36	57.88	4.33	.97
Behavioral	1.46	1.91	5.68	25.96	64.94	4.51	.81
Overall	1.67	4.24	7.28	28.01	58.80	4.38	.91

SD, strongly disagree (1); D, disagree (2); N, neutral (3); A, agree (4); SA, strongly agree (5).

Over three-fourths of responses on the attitude scale (80.8%) were answered with either an Agree or Strongly Agree, which corresponds with a positive response to the statement. The categories within the attitude scale highlighted the positive attitude these respondents perceive themselves to have toward ICT. Almost 86% of the respondents answered positively toward those statements in the affect category, with 85% of the cognitive and 91% of the behavioral responses also indicating a positive attitude toward ICT. A mean was calculated for each category (affect, cognitive, behavioral) and each was above 4.3. In addition, the overall mean (M=4.38) was calculated, and indicated the respondents had a positive attitude toward ICT. The mean scores of the career and technical educators based on the subject they teach are shown in Table 4.3, and indicate that the three disciplines represented in this study (Agriculture, Allied Health, and Business and Technology) are represented by educators with positive attitudes toward ICT.

Table 4.3 Mean Scores of Career and Technical Educators on the Attitude Scale by Subject Taught

Subject	N*	Mean	SD
Agriculture	39	4.09	.51
Allied Health	45	4.22	.56
Business and Technology	88	4.59	.38

* N=172

A mean score was calculated based on the individual attitude statements of the ICTASES instrument and is represented in Table 4.4. Only 2 of the 20 statements had mean scores below 4.0 and they include the following: “Students must use computers in all subject matters” (M=3.52) and “Computers would motivate students to do more study” (M=3.41).

Table 4.4 Item Mean Scores of Career and Technical Educators on the Attitude Scale

Statement	Mean	SD
Affect		
1. Computers do not scare me at all.	4.43	.90
2. Computers make me feel uncomfortable.*	4.46	.87
3. I am glad there are more computers these days.	4.35	.89
4. I do not like talking with others about computers.*	4.00	1.03
5. Using computers is enjoyable.	4.34	.78
6. I dislike using computers in teaching.*	4.48	.81
Cognitive		
7. Computers save time and effort.	4.51	.77
8. Schools would be a better place without computers.*	4.53	.79
9. Students must use computers in all subject matters.	3.52	1.27
10. Learning about computers is a waste of time.*	4.72	.65
11. Computers would motivate students to do more study.	3.41	1.10
12. Computers are a fast and efficient means of getting information.	4.52	.67
13. I do not think I would ever need a computer in my classroom.*	4.75	.63
14. Computers can enhance students' learning.	4.62	.69
15. Computers do more harm than good.*	4.42	.87
Behavioral		
16. I would rather do things by hand than with a computer.*	4.26	1.03
17. If I had the money, I would buy a computer.	4.50	.76
18. I would avoid computers as much as possible.*	4.64	.70
19. I would like to learn more about computers.	4.36	.83
20. I have no intention to use computers in the near future.*	4.79	.54

*Denotes those survey items whose scores were reversed in order to reflect a statement that would be positively construed.

Research Question Two

Research question two asks if there is a significant difference in attitudes toward ICT of career and technical educators in Mississippi based on selected demographic characteristics of the educators. A Kruskal-Wallis test was executed on the following

demographic information gathered by the ICTASES instrument: subject taught, level of education, race, age, the number of years of teaching experience, and the number of years using computers. In addition, a Mann-Whitney *U* test was used to determine whether a statistically significant difference existed based on gender.

The Kruskal-Wallis test revealed significant differences in attitude based on the subject the educators taught, $\chi^2(2, N=172) = 34.565$, $p < .05$ (see Table 4.5). Results of the Mann-Whitney *U* test show that the differences in the population distributions of Business and Technology educators (mean rank = 75.57) and Agriculture educators (mean rank = 37.90) were found to be statistically significant when compared on the attitude scale (see Table 4.6). Similarly, differences in the population distributions of Business and Technology educators (mean rank=76.68) and Allied Health educators (mean rank = 48.08) were found to be statistically significant when compared on the attitude scale. The results indicate that Business and Technology educators exhibited significantly more positive attitudes toward ICT than did those educators in the Agriculture and Allied Health disciplines.

Table 4.5 Kruskal-Wallis Test for Attitude and Career and Technical Educator Characteristics

	Mean Rank	χ^2	p
Subject Taught		34.56	.000*
Agriculture	56.59		
Allied Health	70.88		
Business & Technology	107.74		
Level of Education		11.798	.019*
Associate	57.47		
Specialist	75.90		
Doctorate	83.67		
Bachelor	85.60		
Master	101.95		

*p < .05

The Kruskal-Wallis further revealed significant differences in attitude based on the level of education of the educators, $\chi^2(3, N=178) = 11.798$, $p < .05$ (see Table 4.5). A post hoc Mann-Whitney *U* test found significant differences in the population distributions of educators with an associate's degree (mean rank = 35.65) and those educators with a bachelor's degree (mean rank = 50.69). Likewise, differences in the population distributions of educators with an associate's degree (mean rank = 28.35) and those educators with a master's degree (mean rank = 50.61) were found to be statistically significant when compared on the attitude scale. These results suggest that educators possessing a bachelor or master's degree have attitudes significantly more positive than those educators possessing an associate's degree (see Table 4.7). Mann-Whitney *U* testing further found that the attitudes of career and technical educators possessing a master's degree (mean rank = 84.19) were significantly more positive than those educators possessing a bachelor's degree (mean rank = 70.08).

Additionally, the Mann-Whitney *U* test revealed a significant difference ($U = 1527.50$, $p<.05$) in the population distributions of male (mean rank = 58.26) and female (mean rank = 97.69) career and technical educators when compared on the attitude scale indicating female educators in this study had more positive attitudes toward ICT than did their male counterparts.

Table 4.6 Ranked Group Comparisons of Attitude by Subject Taught

	Agriculture		Allied Health		Business & Technology			
	N	Mean Rank	N	Mean Rank	N	Mean Rank	*U*	p
Pair 1[a]	39	37.90			88	75.57	698.00	.000*
Pair 2[b]			45	48.08	88	76.68	1128.50	.000*
Pair 3[c]	39	38.69	45	45.80			729.00	.183

*p < .05

[a]Agriculture and Business & Technology. [b]Allied Health and Business & Technology. [c]Agriculture and Allied Health.

Table 4.7 Ranked Group Comparisons of Attitude by Level of Education

	Associate		Bachelor		Master		Specialist		Doctorate			
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	*U*	p
Pair 1[a]	17	35.65	78	50.69							453.00	.041*
Pair 2[b]	17	28.35			75	50.61					329.00	.002*
Pair 3[c]	17	10.68					5	14.30			28.50	.272
Pair 4[d]	17	9.79							3	14.50	13.50	.203
Pair 5[e]			78	70.08	75	84.19					2385.50	.049*
Pair 6[f]			78	42.28			5	37.60			173.00	.673
Pair 7[g]			78	41.04					3	39.83	113.50	.930
Pair 8[h]					75	41.28	5	28.80			129.00	.244
Pair 9[i]					75	39.87			3	30.33	85.00	.474
Pair 10[j]							5	4.20	3	5.00	6.00	.655

*p < .05

[a]Associate and Bachelor. [b]Associate and Master. [c]Associate and Specialist. [d]Associate and Doctorate. [e]Bachelor and Master. [f]Bachelor and Specialist. [g]Bachelor and Doctorate. [h]Master and Specialist. [i]Master and Doctorate. [j]Specialist and Doctorate.

Research Question Three

Research question three sought to determine the perceived level of self-efficacy of the career and technical educators as they pertain to information and communication technology. Questions 21 through 41 of the ICTASES instrument were used to capture data pertaining to this question. Table 4.8 presents the overall perceived level of self-efficacy of the participants toward ICT.

Table 4.8 Distribution of Mean Scores of Career and Technical Educators on the Self-Efficacy Scale

Percent					Mean	SD
SD	D	N	A	SA		
1.29	4.52	8.95	46.71	38.53	4.17	.86

SD, strongly disagree (1); D, disagree (2); N, neutral (3); A, agree (4); SA, strongly agree (5).

Over three-fourths of responses on the self-efficacy scale (85.3%) were answered with either an Agree or Strongly Agree, which corresponds with a high perceived level of self-efficacy. In addition, the overall mean (M=4.17) indicated the respondents perceive themselves as having a high level of self-efficacy toward ICT. The mean scores for each of the three subject disciplines represented in this study can be seen in Table 4.9, and indicate that the three disciplines represented in this study (Agriculture, Allied Health, and Business and Technology) are represented by educators with high perceived levels of self-efficacy toward ICT.

Table 4.9 Mean Scores of Career and Technical Educators on the Self-Efficacy Scale by Subject Taught

Subject	N*	Mean	SD
Agriculture	39	4.02	.55
Allied Health	45	3.86	.76
Business and Technology	88	4.56	.43

*N=172

A mean score was calculated based on the individual self-efficacy statements of the ICTASES instrument and are represented in Table 4.10. Only 2 of the 21 statements had mean scores below 4.0 and they include the following: "I feel confident about using technology resources (such as spreadsheets, etc.) to collect and analyze data from student tests and products to improve instructional practices" (M=3.82) and "I feel confident that I can develop creative ways to cope with system constraints (such as budget cuts on technology facilities) and continue to teach effectively with technology" (M=3.66).

Table 4.10 Item Mean Scores of Career and Technical Educators on the Self-Efficacy Scale

Statement	Mean	SD
21. I feel confident that I understand computer capabilities well enough to maximize them in my classroom.	4.14	.94
22. I feel confident that I have the skills necessary to use the computer for instruction.	4.28	.78
23. I feel confident that I can successfully teach relevant subject content with appropriate use of technology.	4.31	.74
24. I feel confident in my ability to evaluate software for teaching and learning.	4.05	.96
25. I feel confident that I can use correct computer terminology when directing students' computer use.	4.13	.93
26. I feel confident I can help students when they have difficulty with the computer.	4.09	.94
27. I feel confident I can effectively monitor students' computer use for project development in my classroom.	4.14	.92
28. I feel confident that I can motivate my students to participate in technology-based projects.	4.21	.78
29. I feel confident I can mentor students in appropriate uses of technology.	4.19	.85
30. I feel confident I can consistently use educational technology in effective ways.	4.32	.72
31. I feel confident I can provide individual feedback to students during technology use.	4.21	.80
32. I feel confident I can regularly incorporate technology into my lessons, when appropriate to student learning.	4.34	.73
33. I feel confident about selecting appropriate technology for instruction based on curriculum standards.	4.22	.78
34. I feel confident about assigning and grading technology-based projects.	4.15	.88
35. I feel confident about keeping curricular goals and technology uses in mind when selecting an ideal way to assess student learning.	4.13	.76
36. I feel confident about using technology resources (such as spreadsheets, etc.) to collect and analyze data from student tests and products to improve instructional practices.	3.82	1.13
37. I feel confident that I will be comfortable using technology in my teaching.	4.32	.70

Table 4.10 Continued

Statement	Mea	SD
38. I feel confident I can be responsive to students' needs during computer use.	4.24	.78
39. I feel confident, as time goes by, my ability to address my students' technology needs will continue to develop.	4.44	.62
40. I feel confident that I can develop creative ways to cope with system constraints (such as budget cuts on technology facilities) and continue to teach effectively with technology.	3.66	1.10
41. I feel confident that I can carry out technology-based projects even when I am opposed by skeptical colleagues.	4.12	.80

Research Question Four

Research question four asks if there is a significant difference in the perceived level of self-efficacy toward ICT of career and technical educators in Mississippi based on selected demographic characteristics of the educators. A Kruskal-Wallis test was performed on the following demographic information gathered by the ICTASES instrument: subject taught, level of education, race, age, the number of years of teaching experience, and the number of years using computers. Post hoc testing of differences using the Mann-Whitney *U* test was carried out for all significant differences found with the Kruskal-Wallis tests. In addition, a Mann-Whitney *U* test was utilized to determine whether or not a statistically significant difference existed based on gender.

The Kruskal-Wallis test revealed a significant difference existed in the perceived levels of self-efficacy toward ICT that educators possessed based on the subject the teachers taught, $\chi^2(2, N=172) = 46.176$, $p < .05$ (see Table 4.11). The results of the Mann-Whitney *U* post hoc test show that the differences in the population distributions of

Business and Technology educators (mean rank = 75.37) and Agriculture educators (mean rank = 38.35) were found to be statistically significant when compared on the self-efficacy scale indicating that Business and Technology educators possessed higher perceived levels of self-efficacy than Agriculture educators. Similarly, differences in the population distributions of Business and Technology educators (mean rank = 80.69) and Allied Health educators (mean rank = 40.23) were found to be statistically significant when compared on the self-efficacy scale again indicating that Business and Technology educators possessed higher perceived levels of self-efficacy than Allied Health educators. Results of the Mann-Whitney *U* post hoc testing based on the subject the career and technical educators taught are reported in Table 4.12.

Kruskal-Wallis testing revealed a significant difference existed in the perceived levels of self-efficacy toward ICT based on the level of education of the participants, $\chi^2(3, N=178) = 19.671$, $p < .05$. Mann-Whitney *U* post hoc testing revealed significant differences were found in the population distributions of educators with an associate's degree (mean rank = 33.79) and those with a bachelor's degree (mean rank = 51.10) indicating that those career and technical educators with a bachelor's degree demonstrated a higher perceived level of self-efficacy toward ICT than those with an associate's degree. Similarly, significant differences in the perceived levels of self-efficacy of career and technical educators toward ICT were found between those with an associate's degree and those with either a master's degree (mean rank = 51.68) or a doctoral degree (mean rank = 19.00). These results indicate that those educators

possessing an associate's degree demonstrated having lower perceived levels of self-efficacy toward ICT than those possessing a master's degree or doctoral degree.

Additionally, the differences in the population distributions of educators indicated that those educators with a bachelor's degree (mean rank = 68.94) demonstrated a lower perceived level of self-efficacy toward ICT than those with a master's degree (mean rank = 85.39). Results of the Mann-Whitney *U* post hoc testing based on the level of education of the career and technical educators are reported in Table 4.13.

Kruskal-Wallis testing revealed a significant difference existed in the perceived levels of self-efficacy toward ICT based on the number of years of teaching experience the career and technical educators possessed, $\chi^2(4, N=176) = 11.736$, $p < .05$ (see Table 4.11). Post hoc Mann-Whitney *U* testing found significant differences in the population distributions of educators with 1 to 5 years of teaching experience (mean rank = 32.44) and those with 11 to 15 years of experience (mean rank = 44.36). Statistically significant differences were also found in the population distributions of educators with 6 to 10 (mean rank=29.45) and 11 to 15 (mean rank=39.26) years of teaching experience as well as those with 11 to 15 (mean rank=28.03) and 16 to 20 years (mean rank=19.60) of teaching experience. These results indicate that those educators with 11 to 15 years of experience are more likely to have higher perceived levels of self-efficacy than those educators with 1 to 5, 6 to 10, and 16 to 20 years of teaching experience.

In addition, educators with 16 to 20 years (mean rank=26.10) of teaching experience were found to have significantly lower perceived levels of self-efficacy than those educators with over 20 (mean rank=36.88) years of similar experience. Results of

the Mann-Whitney *U* post hoc testing based on the number of years of teaching experience the career and technical educators possessed are reported in Table 4.14.

Further Kruskal-Wallis testing revealed a significant difference existed in the perceived levels of self-efficacy toward ICT that the educators possessed based on the number of years the teachers had been using computers, $\chi^2(4, N=177) = 14.368$, $p < .05$ (see Table 4.11). Post hoc Mann-Whitney *U* testing found statistically significant differences in population distributions between those educators with 1 to 5 (mean rank = 24.46) and 11 to 15 (mean rank = 38.35) years of experience using computers. Similarly, educators with 1 to 5 years of experience using computers (mean rank = 17.83) were found to have significantly different population distributions than those identifying themselves as having 16 to 20 years of experience using computers (mean rank = 27.92). Further statistically significant differences were found in the population distributions of educators with 1 to 5 (mean rank = 12.58) years of experience using computers and those with over 20 (mean rank = 26.22) years of similar experience. These results indicate teachers with 1 to 5 years of experience using computers have significantly lower perceived levels of self-efficacy than those educators with 11 to 15, 16 to 20, and over 20 years of experience using computers.

Additionally, those career and technical educators with 6 to 10 (mean rank = 27.29) years of experience using computers had significantly lower perceived self-efficacy than those educators with over 20 (mean rank = 42.61) years of experience using computers. Results of the Mann-Whitney *U* post hoc testing based on the number of

years of experience using computers the career and technical educators possessed are reported in Table 4.15.

Table 4.11 Kruskal-Wallis Test for Self-Efficacy and Career and Technical Educator Characteristics

	Mean Rank	χ^2	p
Subject Taught		46.176	.000*
Allied Health	57.48		
Agriculture	63.45		
Business & Technology	111.56		
Level of Education		19.671	.001*
Associate	50.68		
Specialist	61.60		
Bachelor	84.43		
Master	103.77		
Doctorate	131.00		
Years of Teaching Experience		11.736	.019*
1-5	74.28		
16-20	74.10		
6-10	77.45		
Over 20	100.81		
11-15	102.70		
Years Using Computers		14.368	.006*
1-5	55.67		
6-10	73.29		
11-15	89.97		
16-20	95.50		
Over 20	109.66		

*p < .05

Lastly, the Mann-Whitney *U* test revealed a significant difference ($U = 2021.50$, $p<.05$) in the population distributions of male (mean rank = 70.30) and female (mean rank = 94.03) educators when compared on the self-efficacy scale indicating that female

educators in this study demonstrated higher perceived self-efficacy toward ICT than their male counterparts.

Table 4.12 Ranked Group Comparisons of Self-Efficacy by Subject Taught

	Agriculture		Allied Health		Business & Technology			
	N	Mean Rank	N	Mean Rank	N	Mean Rank	*U*	p
Pair 1[a]	39	38.35			88	75.37	715.50	.000*
Pair 2[b]			45	40.23	88	80.69	775.50	.000*
Pair 3[c]	39	45.10	45	40.24			776.00	.362

*p < .05

[a]Agriculture and Business & Technology. [b]Allied Health and Business & Technology. [c]Agriculture and Allied Health.

Table 4.13 Ranked Group Comparisons of Self-Efficacy by Level of Education

	Associate		Bachelor		Master		Specialist		Doctorate			
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	*U*	p
Pair 1[a]	17	33.79	78	51.10							421.50	.019*
Pair 2[b]	17	23.65			75	51.68					249.00	.000*
Pair 3[c]	17	11.24					5	12.40			38.00	.724
Pair 4[d]	17	9.00							3	19.00	.00	.007*
Pair 5[e]			78	68.94	75	85.39					2296.00	.021*
Pair 6[f]			78	42.65			5	31.90			144.50	.333
Pair 7[g]			78	40.25					3	60.50	58.50	.143
Pair 8[h]					75	41.65	5	23.30			101.50	.086
Pair 9[i]					75	39.06			3	50.50	79.50	.389
Pair 10[j]							5	3.00	3	7.00	.00	.024*

*p < .05

[a]Associate and Bachelor. [b]Associate and Master. [c]Associate and Specialist. [d]Associate and Doctorate. [e]Bachelor and Master. [f]Bachelor and Specialist. [g]Bachelor and Doctorate. [h]Master and Specialist. [i]Master and Doctorate. [j]Specialist and Doctorate.

Table 4.14 Ranked Group Comparisons of Self-Efficacy by Years of Teaching Experience

	1-5		6-10		11-15		16-20		Over 20			
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	*U*	p
Pair 1[a]	40	36.54	33	37.56							641.50	.837
Pair 2[b]	40	32.44			35	44.36					477.50	.018*
Pair 3[c]	40	27.98					15	28.07			299.00	.985
Pair 4[d]	40	38.82							53	53.17	733.00	.011
Pair 5[e]			33	29.45	35	39.26					411.00	.041*
Pair 6[f]			33	24.58			15	24.33			245.00	.956
Pair 7[g]			33	36.86					53	47.63	655.50	.051
Pair 8[h]					35	28.03	15	19.60			174.00	.060*
Pair 9[i]					35	45.06			53	44.13	908.00	.867
Pair 10[j]							15	26.10	53	36.88	271.50	.061*

*p < .05

[a]1-5 and 6-10. [b]1-5 and 11-15. [c]1-5 and 16-20. [d]1-5 and over 20. [e]6-10 and 11-15. [f]6-10 and 16-20. [g]6-10 and over 20. [h]11-15 and 16-20. [i]11-15 and over 20. [j]16-20 and over 20.

Table 4.15 Ranked Group Comparisons of Self-Efficacy by Years Using Computers

	1-5		6-10		11-15		16-20		Over 20			
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank	*U*	p
Pair 1[a]	12	20.29	36	25.90							165.50	.229
Pair 2[b]	12	24.46			59	38.35					215.50	.033*
Pair 3[c]	12	17.83					38	27.92			136.00	.036*
Pair 4[d]	12	12.58							32	26.22	3.00	.002*
Pair 5[e]			36	42.60	59	51.30					867.50	.135
Pair 6[f]			36	33.00			38	41.76			522.00	.079
Pair 7[g]			36	27.29					32	42.61	316.50	.001*
Pair 8[h]					59	47.76	38	50.92			1048.00	.588
Pair 9[i]					59	42.57			32	52.33	741.50	.091
Pair 10[j]							38	33.39	32	38.00	528.00	.342

*$p < .05$

[a]1-5 and 6-10. [b]1-5 and 11-15. [c]1-5 and 16-20. [d]1-5 and over 20. [e]6-10 and 11-15. [f]6-10 and 16-20. [g]6-10 and over 20. [h]11-15 and 16-20. [i]11-15 and over 20. [j]16-20 and over 20.

Research Question Five

Research question number five asked what the relationship is, if any, between the attitudes of career and technical educators in Mississippi toward ICT and their perceived levels of self-efficacy toward ICT. A Spearman Rho correlation test was utilized in an effort to answer this question. Results of that test can be seen in Table 4.16.

Table 4.16 Correlation Between Attitude and Self-Efficacy of Career and Technical Educators

		Attitude	Self-Efficacy
Attitude	Correlation Coefficient	1.000	.746*
	Sig. (2-tailed)		.000
	N	181	181
Self-Efficacy	Correlation Coefficient	.746*	1.000
	Sig. (2-tailed)	.000	
	N	181	181

*p < .01

Results of the Spearman Rho correlation test indicate that a positive relationship (rho = .746, p<.01) exists between the attitude of the career and technical educators toward information and communication technology and their perceived level of self-efficacy toward information and communication technology. This result indicates that as the level of self-efficacy of the career and technical educators increases so does the likelihood that the positivity of their attitude will increase.

Summary

Results of this study indicate that the career and technical educators in this study possess positive attitudes (M=4.38) toward information and communication technology. Results of this study further indicate that the career and technical educators participating in this study possess high levels of self-efficacy toward (M=4.17) toward information and communication technology. Additionally, results indicate that a strong, positive relationship exists between the attitudes of the career and technical educators toward ICT and their perceived level of self-efficacy toward information and communication technology.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of the study was to investigate the attitudes and perceived levels of self-efficacy of career and technical educators in Mississippi as they pertain to information and communication technology. Attitude, as defined by Fazio (2007), is based on associations between an object and the overall evaluation of that object, while teachers' perceived self-efficacy, as defined by Dellinger, Bobbett, Olivier, and Ellett (2008), refers to teachers' individual beliefs about their own abilities to successfully perform specific teaching and learning-related tasks within the context of their own classrooms. In this regard, the educators were assessed based on their attitudes and perceived levels of self-efficacy toward information and communication technology, which is any technology that can transmit, store, create, share or exchange information (Fengchun, 2008).

The participants for the study included 181 career and technical educators that teach tenth to twelfth grade high school students in one of three career pathways. Of those that indicated what subject they taught (n=172), 88 identified themselves as Business and Technology teachers, 45 identified themselves as Allied Health teachers, and 39 identified themselves as Agriculture teachers. The vast majority of these educators classified themselves as Caucasian-Non-Hispanic (n=144) and female (n=135). The participants for this study varied greatly in their age, the number of years they had in

teaching experience, and the number of years they had been using computers. Additionally, the majority of the educators noted having an associate (n=17), bachelor (n=78), or master's (n=75) degree with 3 and 5 educators possessing a doctorate or specialist, respectively.

The instrument used in this study was the Information and Communication Technology Attitude and Self-Efficacy Survey, or ICTASES. The ICTASES instrument consisted of 49 questions used to assess educators' attitudes, and perceived levels of self-efficacy toward information and communication technology. In addition, the survey collected information pertaining to basic demographic characteristics of the educators, such as race, gender, age, and level of education.

This research study sought to resolve the following five research questions:

1. What are the attitudes of career and technical educators in Mississippi toward information and communication technology?
2. Is there a significant difference in attitudes toward information and communication technology of career and technical educators in Mississippi based on selected characteristics of the educators?
3. What is the perceived level of self-efficacy of career and technical educators in Mississippi toward information and communication technology?
4. Is there a significant difference in the perceived level of self-efficacy toward information and communication technology of career and technical educators in Mississippi based on selected characteristics of the teachers?

5. What is the relationship, if any, between the attitudes of career and technical educators in Mississippi toward information and communication technology and their perceived levels of self-efficacy?

A variety of statistical analyses were utilized to address the research questions. These analyses included descriptive statistics, Kruskal-Wallis tests, Mann-Whitney *U* tests, and a Spearman Rho. All data were analyzed using version 16.0 of the Statistical Package for the Social Sciences (SPSS) software.

Summary

The rationale for this study centered on the poor assessments of the quality of education in Mississippi's K-12 schools (Swanson, 2008; "From Cradle to Career," 2007), the inability of Mississippi's educational system to keep pace with national graduation rates for high school students (Swanson, 2008), and because the existing literature concentrates greatly on K-12 educators and not those educators in career and technical disciplines. The study's purpose was to investigate the attitudes and self-efficaciousness of career and technical educators teaching tenth to twelfth grade in Mississippi's high schools toward information and communication technology. The study was limited to only those career and technical educators teaching in one of three disciplines: (1) Agricultural and Environmental Science and Technology, (2) Allied Health, and (3) Business and Technology. Using the ICTASES instrument and a variety of statistical analyses, this research answered the aforementioned research questions.

Attitude

In terms of attitude, the career and technical educators showed highly positive attitudes toward information and communication technology as demonstrated by the overall mean score on the attitude scale (M=4.38). In fact, over three-fourths (80.8%) of all the responses on the attitude scale were answered with a positive response.

A Kruskal-Wallis test showed a statistically significant difference in the attitudes of the participants based on the subject they taught and the level of their education. Further examination through Mann-Whitney *U* testing indicated that the attitudes of educators teaching Business and Technology were significantly more positive toward ICT than those educators teaching Allied Health or Agriculture. Additionally, Mann-Whitney *U* testing showed that the attitudes of educators with a bachelor or master's degree toward ICT were significantly more positive than those with an associate's degree. Further testing showed a similar difference in attitude, albeit positive, between those educators with a bachelor's degree and those with a master's degree.

Self-Efficacy

Results found on the attitude scale were similar to the results found on the self-efficacy scale. The career and technical educators' responses indicate that their overall perceived level of self-efficacy toward ICT was very high (M=4.17). Over three-fourths (85.3%) of responses on the self-efficacy scale were answered with an Agree or Strongly Agree, corresponding to a high perceived level of self-efficacy.

Significant differences in mean self-efficacy scores in the subject the educators taught, their level of education, their years of teaching experience, and the number of

years the educators had in using computers were found through Kruskal-Wallis testing. Further Mann Whitney rank sum testing was utilized in order to ascertain where those differences lay within specific populations. The Mann-Whitney *U* test indicated that Business and Technology educators had significantly higher perceived levels of self-efficacy toward ICT than those educators teaching Allied Health or Agriculture. Those educators with an associate's degree showed to have significantly lower perceived levels of self-efficacy toward ICT than those educators with a bachelor or master's degree. A similar result found that those educators with an associate's degree had significantly lower perceived levels of self-efficacy than those with a doctorate. However, because the sample size for educators with a doctorate was exceptionally small (n=3), those results are not considered valid.

Further Mann-Whitney *U* testing indicated that those educators with 11 to 15 years of teaching experience had a greater level of perceived self-efficacy toward ICT than those having taught 1 to 5, 6 to 10, and 16 to 20 years. Additionally, those educators with over 20 years of teaching experience showed to have a greater level of perceived self-efficacy toward ICT than those having taught 16 to 20 years. The study further indicated that those educators with 1 to 5 years of computer use had lower levels of perceived self-efficacy toward ICT than those with 6 to 10, 11 to 15, and over 20 years of experience. Similarly, those educators with over 20 years of experience using computers had a superior level of perceived self-efficacy toward ICT than those with 6 to 10 years of experience.

Relationship between Attitude and Self-Efficacy

Finally, the results of the Spearman Rho indicated that a strong correlation exists between the educators' attitude toward ICT and their perceived level of self-efficacy toward ICT. This correlation can be described as positive (rho = .746), indicating that the higher the level of perceived self-efficacy toward ICT, the higher their attitude toward ICT.

Conclusions

Based on the results of this study, several conclusions can be made regarding the attitude and self-efficaciousness of Mississippi career and technical educators toward information and communication technology.

Attitude

The attitude toward information and communication technology of career and technical educators that teach tenth through twelfth grade in Mississippi high schools is very positive (M=4.38). This finding corresponds with the results found by Sadik (2006) and Albirini (2006), but contrasted those findings in the Miller (1997) study. This positive attitude is evidenced in not only the overall population of the study but in the sub-populations, as well. The educators in each of the three disciplines targeted in this study (Agriculture [M=4.22], Allied Health [M=4.09], and Business and Technology [M=4.59]) demonstrated positive attitudes toward ICT despite significant differences in the level of their positivity. This is also true with other characteristics of the educators.

Those educators with an associate's degree had positive attitudes toward ICT, but those attitudes were significantly less positive than those educators with a bachelor and/or master's degree. These results may indicate that career and technical educators with degrees from four-year institutions are more likely to exhibit higher levels of positivity toward ICT than those educators obtaining two-year degrees. This insinuates that the curricula the educators are exposed to, and the depth of that exposure, may impact the educators' attitude toward ICT. Similarly, those educators with a bachelor's degree demonstrated positive attitudes toward ICT but had significantly less positive attitudes than those educators with a master's degree. Again, this finding indicates that the more advanced a degree the educator holds, the greater the likelihood that he/she will exhibit a more positive attitude toward ICT. This finding should move school administrators to encourage their career and technical educators to pursue undergraduate and graduate degrees, as well as, encouraging those same administrators to hire career and technical educators that already possess degrees from four-year institutions.

Self-Efficacy

The results of this study indicate that career and technical educators teaching tenth through twelfth grade in Mississippi high schools perceive themselves to have a very high level of self-efficacy (M=4.17) as it pertains to information and communication technology and its integration in to the classroom environment. This finding corresponds with the results found by Usluel (2007), but contrasted much of the study conducted by Bakar and Mohamed (2005). According to Bandura (1997), this high level of self-efficacy may mean that these educators will likely have higher aspirations, think more

soundly, assign themselves difficult challenges, and commit themselves firmly to meeting those challenges, and all with technology integration into the classroom in mind. Furthermore, the results of this study suggest that these educators feel strongly about their ability to integrate technology into their teaching and learning-related tasks. Similar to the attitudes of the educators, the perceived level of self-efficacy of the educators in this study are not only high in the overall population, but in the sub-populations, as well.

The educators in each of the three disciplines targeted in this study (Agriculture [M=4.02], Allied Health [M=3.86], and Business and Technology [M=4.56]) showed to have very high perceived levels of self-efficacy toward ICT despite significant differences in those high levels. Those educators with an associate's degree had high perceived levels of self-efficacy. However, those high perceived levels of self-efficacy were significantly lower then those educators holding a bachelor and/or master's degree indicating, again, that educators with degrees from four-year institutions are more likely to exhibit higher perceived levels of self-efficacy toward ICT than those educators obtaining two-year degrees.

Additionally, the study found that those educators with a bachelor's degree showed to have a high perceived level of self-efficacy toward ICT but had significantly lower levels of self-efficacy than those educators with a master's degree. Once again, this indicates that the more advanced a degree the educator holds, the greater the likelihood that he/she will exhibit a greater level of perceived self-efficacy toward ICT and its integration into the classroom environment. As mentioned previously, this finding should move school administrators to encourage their career and technical educators to pursue

undergraduate and graduate degrees, as well as, encouraging those same administrators to hire career and technical educators that already possess degrees from four-year institutions.

The results of the study further found that those educators with 11 to 15 years of teaching experience have significantly higher perceived levels of self-efficacy than those with 1 to 5, 6 to 10, and 16 to 20 years of experience. Based on these results, no definitive conclusion can be made as to why those educators with 11 to 15 years of teaching experience have higher perceived levels of self-efficacy than those with fewer and more years of experience. However, it is possible that those with 11 to 15 years of teaching experience have realized a certain level of maturity in their profession that their younger counterparts have yet to realize. In addition, those educators with 16 to 20 (n=15) years of teaching experience were not as represented in the population as those with 11 to 15 (n=35) years of teaching experience. Therefore, this under-representation of educators with 16 to 20 years of teaching experience may have impacted the results.

Further results of the study indicated that those educators with 1 to 5 years of experience using computers showed to have high perceived levels of self-efficacy. However, those high levels of self-efficacy were significantly lower than those educators with 11 to 15, 16 to 20, and over 20 years of experience using computers, which may indicate that as the number of years these educators are exposed to and use computers, the higher their perceived level of self-efficacy toward ICT will increase. This is further highlighted as those educators with over 20 years of experience using computers have

significantly higher perceived levels of self-efficacy toward ICT than those with 6 to 10 years of experience using computers.

Relationship between Attitude and Self-Efficacy

The final result of this study suggests that the perceived level of self-efficacy of these educators toward ICT was positively correlated with their attitudes toward ICT, which corresponds with research conducted by Bakar and Mohamed (2005). These findings indicate that for educators to develop positive attitudes, their perceived level of self-efficacy toward ICT must be high. To that end, the results of this study suggest that Mississippi career and technical educators teaching tenth to twelfth grade and possessing a degree from a four-year institution, coupled with prolonged experience in using computers, will have higher levels of perceived self-efficacy and may have, subsequently, a more positive attitude toward information and communication technology.

Recommendations

Based on the results of the study, the following recommendations are made for future research and school administrators:

1. Results of this study found that career and technical educators with 11 to 15 years of experience had significantly higher perceived levels of self-efficacy than those educators with 1 to 5 and 6 to 10 years of experience. For the purpose of better understanding this phenomenon, a descriptive case study may be useful as it would be conducted from a grassroots point-of-view.

2. Based on the results of this research, it is recommended that school administrators hire those career and technical educators possessing a bachelor or master's degree. Additionally, it is recommended that school administrators encourage their career and technical educators to pursue higher order degrees as the results of this study suggest that the more advanced a degree the educator holds, the greater the likelihood that he/she will exhibit a greater level of perceived self-efficacy toward ICT and its integration into the classroom environment.
3. It is recommended that the current study be extended to include all K-12 educators throughout the State of Mississippi. Doing so will give local and state school administrators a better understanding of the attitudes and self-efficaciousness of these educators toward ICT and its integration into the classroom.
4. As part of the 1997 "Report to the President on the Use of Technology to Strengthen K-12 Education" the Panel of Educational Technology stated the importance of integrating technology throughout the K-12 curriculum. Based on the results of this study and the aforementioned report, further research is recommended that investigates the integration and implementation of information and communication technologies into the K-12 classroom for the purposes of better understanding the depth to which educators are supplementing their curricula with technology. It is further recommended that research be conducted to determine what impact, if any, the integration and implementation of technology into the classroom is having on student achievement.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD (IRB)

APPROVAL LETTER

Mississippi State University

June 12, 2008

Jason Crittenden
Academic Outreach and Continuing Education
Mail Stop 9634

RE: IRB Study #08-149: Any Investigation Into the Attitudes and Perceived Levels fo Self-Efficacy of High-School Educators in Mississippi Toward Information and Communication Technology

Dear Mr. Crittenden:

The above referenced project was reviewed and approved via administrative review on 6/12/2008 in accordance with 45 CFR 46.101(b)(2). Continuing review is not necessary for this project. However, any modification to the project must be reviewed and approved by the IRB prior to implementation. Any failure to adhere to the approved protocol could result in suspension or termination of your project. The IRB reserves the right, at anytime during the project period, to observe you and the additional researchers on this project.

Please note that the MSU IRB is in the process of seeking accreditation for our human subjects protection program. As a result of these efforts, you will likely notice many changes in the IRB's policies and procedures in the coming months. These changes will be posted online at http://www.orc.msstate.edu/human/aahrpp.php. The first of these changes is the implementation of an approval stamp for consent forms. The approval stamp will assist in ensuring the IRB approved version of the consent form is used in the actual conduct of research. You must use copies of the stamped consent form for obtaining consent from participants.

Please refer to your IRB number (#08-149) when contacting our office regarding this application.

Thank you for your cooperation and good luck to you in conducting this research project. If you have questions or concerns, please contact MSU IRB at irb@research.msstate.edu or by phone at .

Sincerely,

Katherine Crowley
Assistant IRB Compliance Administrator

cc: Dr. Connie Forde

Office for Regulatory Compliance
P. O. Box 6223 • 70 Morgan Avenue • Mailstop 9563 • Mississippi State, MS 39762 • (662) 325-3294 • FAX (662) 325-8776

APPENDIX B

INFORMATION AND COMMUNICATION TECHNOLOGY ATTITUDE AND SELF-EFFICACY SURVEY (ICTASES)

Section I. Teacher Computer Attitudes

The purpose of this section is to determine your attitude/beliefs toward computer technology.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Instructions: Please check the box that most closely matches your agreement with each of the following statements:	1	2	3	4	5
1. Computers do not scare me at all					
2. Computers make me feel uncomfortable					
3. I am glad there are more computers these days					
4. I do not like talking with others about computers					
5. Using computers is enjoyable					
6. I dislike using computers in teaching					
7. Computers save time and effort					
8. Schools would be a better place without computers					
9. Students must use computers in all subject matters					
10. Learning about computers is a waste of time					
11. Computers would motivate students to do more study					
12. Computers are a fast and efficient means of getting information					
13. I do not think I would ever need a computer in my classroom					
14. Computers can enhance students' learning					
15. Computers do more harm than good					
16. I would rather do things by hand than with a computer					
17. If I had the money, I would buy a computer					
18. I would avoid computers as much as possible					
19. I would like to learn more about computers					
20. I have no intention to use computers in the near future					

Section II. Teacher Self-Efficacy

The purpose of this section is to determine how you feel about integrating technology into classroom teaching.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Instructions: Please check the box that most closely matches your agreement with each of the following statements:	1	2	3	4	5
21. I feel confident that I understand computer capabilities well enough to maximize them in my classroom.					
22. I feel confident that I have the skills necessary to use the computer for instruction.					
23. I feel confident that I can successfully teach relevant subject content with appropriate use of technology.					
24. I feel confident in my ability to evaluate software for teaching and learning.					
25. I feel confident that I can use correct computer terminology when directing students' computer use.					
26. I feel confident I can help students when they have difficulty with the computer.					
27. I feel confident I can effectively monitor students' computer use for project development in my classroom.					
28. I feel confident that I can motivate my students to participate in technology-based projects.					
29. I feel confident I can mentor students in appropriate uses of technology.					
30. I feel confident I can consistently use educational technology in effective ways.					
31. I feel confident I can provide individual feedback to students during technology use.					
32. I feel confident I can regularly incorporate technology into my lessons, when appropriate to student learning.					
33. I feel confident about selecting appropriate technology for instruction based on curriculum standards.					
34. I feel confident about assigning and grading technology-based projects.					
35. I feel confident about keeping curricular goals and technology uses in mind when selecting an ideal way to assess student learning.					
36. I feel confident about using technology resources (such as spreadsheets, etc.) to collect and analyze data from student tests and products to improve instructional practices.					
37. I feel confident that I will be comfortable using technology in my teaching.					
38. I feel confident I can be responsive to students' needs during computer use.					
39. I feel confident, as time goes by, my ability to address my students' technology needs will continue to develop.					
40. I feel confident that I can develop creative ways to cope with system constraints (such as budget cuts on technology facilities) and continue to teach effectively with technology.					
41. I feel confident that I can carry out technology-based projects even when I am opposed by skeptical colleagues.					

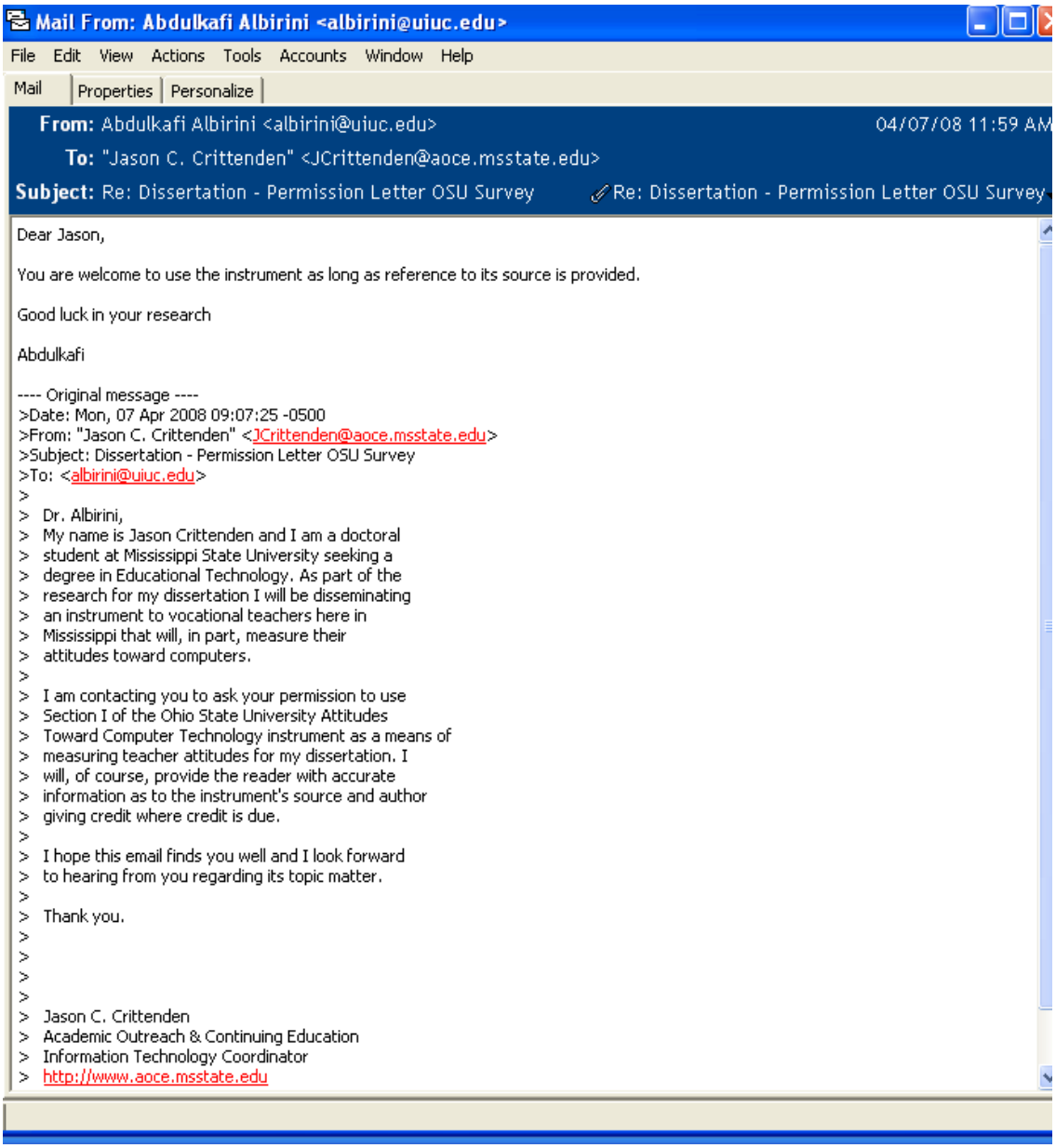
Section III. Demographics and Experience

The purpose of this section is to identify items relating to your general and professional characteristics.

Instructions: Please indicate your current status by checking the appropriate button:
42. What is your gender? ○ Male o Female
43. What is your age?
44. What is your race? o American Indian or Alaska Native o Asian o Black or African-American o Caucasian – Hispanic o Caucasian – Non-Hispanic o Native Hawaiian or Other Pacific Islander
45. What is the highest completed academic degree? o Associate o Bachelors o Doctorate o Masters
46. Including the current year, how many years have you been teaching? o 1–5 o 6–10 o 11–15 o 16–20 o over 20
47. Including the current year, how many years have you been using computers? o 1–5 o 6–10 o 11–15 o 16–20 o over 20
48. What subject(s) do you teach? o Business and Technology o Agriculture o Allied Health
49. Please select the school district where you teach. (drop down of school districts be available)

APPENDIX C

LETTERS OF PERMISSION



Mail From: Abdulkafi Albirini <albirini@uiuc.edu>

File Edit View Actions Tools Accounts Window Help

Mail | Properties | Personalize

From: Abdulkafi Albirini <albirini@uiuc.edu> 04/07/08 11:59 AM

To: "Jason C. Crittenden" <JCrittenden@aoce.msstate.edu>

Subject: Re: Dissertation - Permission Letter OSU Survey Re: Dissertation - Permission Letter OSU Survey

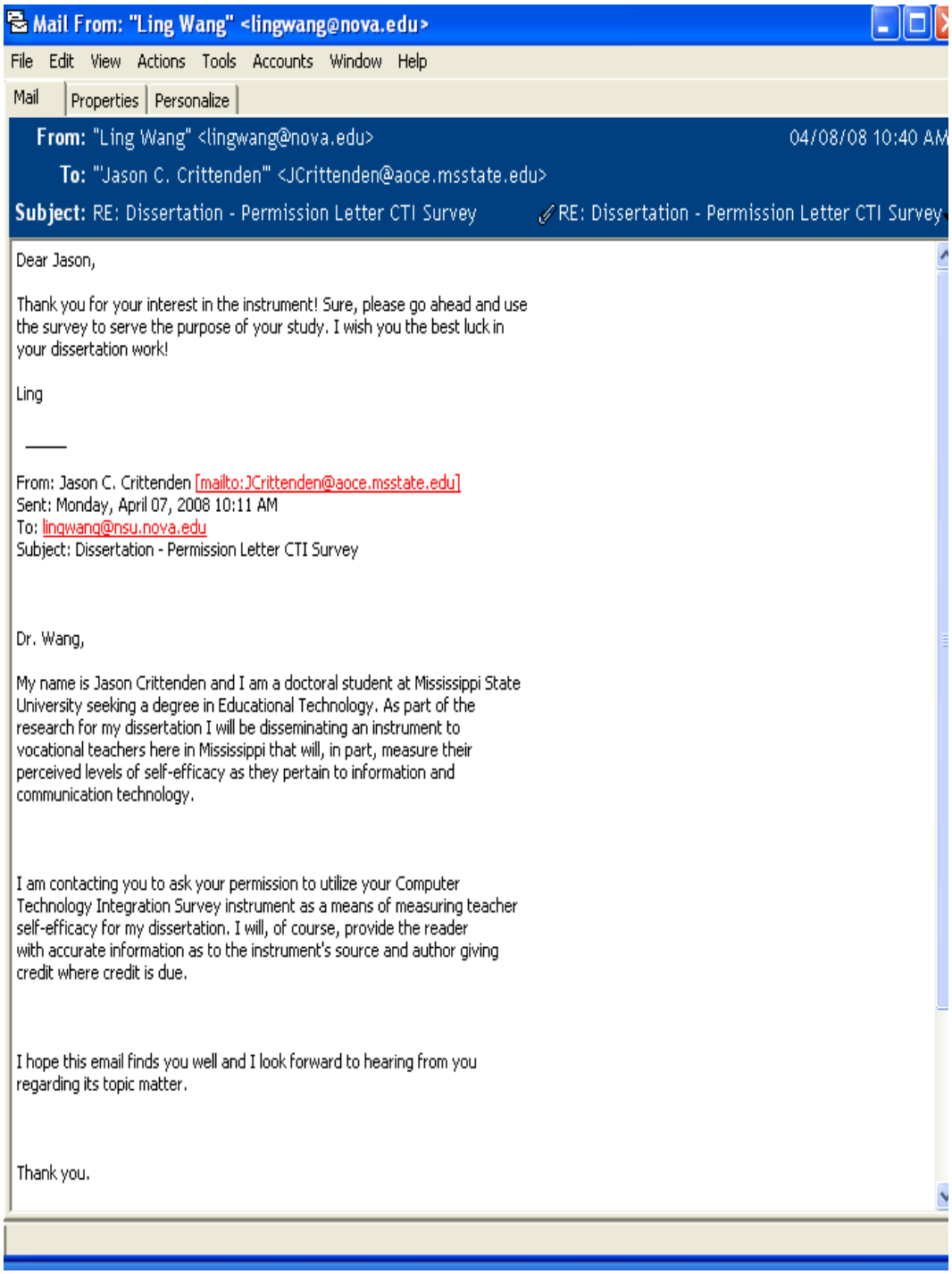
Dear Jason,

You are welcome to use the instrument as long as reference to its source is provided.

Good luck in your research

Abdulkafi

---- Original message ----
>Date: Mon, 07 Apr 2008 09:07:25 -0500
>From: "Jason C. Crittenden" <JCrittenden@aoce.msstate.edu>
>Subject: Dissertation - Permission Letter OSU Survey
>To: <albirini@uiuc.edu>
>
> Dr. Albirini,
> My name is Jason Crittenden and I am a doctoral
> student at Mississippi State University seeking a
> degree in Educational Technology. As part of the
> research for my dissertation I will be disseminating
> an instrument to vocational teachers here in
> Mississippi that will, in part, measure their
> attitudes toward computers.
>
> I am contacting you to ask your permission to use
> Section I of the Ohio State University Attitudes
> Toward Computer Technology instrument as a means of
> measuring teacher attitudes for my dissertation. I
> will, of course, provide the reader with accurate
> information as to the instrument's source and author
> giving credit where credit is due.
>
> I hope this email finds you well and I look forward
> to hearing from you regarding its topic matter.
>
> Thank you.
>
>
>
>
> Jason C. Crittenden
> Academic Outreach & Continuing Education
> Information Technology Coordinator
> http://www.aoce.msstate.edu



Mail From: "Ling Wang" <lingwang@nova.edu>

File Edit View Actions Tools Accounts Window Help

Mail | Properties | Personalize

From: "Ling Wang" <lingwang@nova.edu> 04/08/08 10:40 AM

To: "'Jason C. Crittenden'" <JCrittenden@aoce.msstate.edu>

Subject: RE: Dissertation - Permission Letter CTI Survey RE: Dissertation - Permission Letter CTI Survey

Dear Jason,

Thank you for your interest in the instrument! Sure, please go ahead and use the survey to serve the purpose of your study. I wish you the best luck in your dissertation work!

Ling

From: Jason C. Crittenden [mailto:JCrittenden@aoce.msstate.edu]
Sent: Monday, April 07, 2008 10:11 AM
To: lingwang@nsu.nova.edu
Subject: Dissertation - Permission Letter CTI Survey

Dr. Wang,

My name is Jason Crittenden and I am a doctoral student at Mississippi State University seeking a degree in Educational Technology. As part of the research for my dissertation I will be disseminating an instrument to vocational teachers here in Mississippi that will, in part, measure their perceived levels of self-efficacy as they pertain to information and communication technology.

I am contacting you to ask your permission to utilize your Computer Technology Integration Survey instrument as a means of measuring teacher self-efficacy for my dissertation. I will, of course, provide the reader with accurate information as to the instrument's source and author giving credit where credit is due.

I hope this email finds you well and I look forward to hearing from you regarding its topic matter.

Thank you.

APPENDIX D

EMAIL REQUEST LETTER TO PARTICIPANTS

Dear CTE Educator,

My name is Jason Crittenden and I am a doctoral student at Mississippi State University. I am contacting you to ask for your assistance as I conduct research for my dissertation. The purpose of my research is to investigate teachers' attitudes and perceived capabilities as they pertain to information and communication technology in the classroom. I have chosen to research CTE educators, specifically, because of the unique impact vocational and technical educators have on our communities.

Your participation will take approximately 15 minutes of your time.

Participation in this survey is voluntary, and you may cease participating at any time or decline to answer any question(s) without penalty.

Your participation in this survey will remain anonymous at all times. Upon electronic submission, only the survey responses are deposited into a secure database; your email address/signature is eliminated.

Upon completion, you will be asked to submit your responses electronically. Clicking on the "Submit" button indicates your consent for the researcher to use the information collected for the purposes described above.

https://www.surveymonkey.com/s.aspx?sm=PRyACOKQsC0a0gED3z7YLw_3d_3d

Should you have any questions about this survey and/or your participation in this research, please contact either:

Mr. Jason Crittenden, Instructional Technology Coordinator, Office of Technology @ 662.325.2637 or jcrittenden@aoce.msstate.edu.

Mississippi State University's Office of Regulatory Compliance @ 662.325.3294

Please look for a reminder email in your inbox in approximately two weeks.

Thank you in advance for your participation in this research!

APPENDIX E

EMAIL REQUEST LETTER TO PARTICIPANTS (REMINDER)

Dear CTE Educator,

There's still time to participate in my doctoral research, which is designed to investigate teachers' attitudes and perceived capabilities as they pertain to information and communication technology in the classroom.

If you have already submitted your response, thank you for your time!

If you have not submitted your responses, you may do so by clicking on the Online Orientation Survey link below:

https://www.surveymonkey.com/s.aspx?sm=PRyACOKQsC0a0gED3z7YLw_3d_3d

Your participation will take approximately 15 minutes of your time.

Participation in this survey is voluntary, and you may cease participating at any time or decline to answer any question(s) without penalty. You may skip any item(s) that you do not wish to answer. Whether or not you participate in this survey will have no bearing on your relationship with **Mississippi State University.**

Your participation in this survey will remain anonymous at all times. Upon electronic submission, only the survey responses are deposited into a secure database; your email address/signature is eliminated.

Upon completion, you will be asked to submit your responses electronically. Clicking on the "Submit" button indicates your consent for the researcher to use the information collected for the purposes described above.

Should you have any questions about this survey and/or your participation in this research, please contact either:

Mr. Jason Crittenden, Instructional Technology Coordinator, Office of Technology @ 662.325.2637 or jcrittenden@aoce.msstate.edu.

Mississippi State University's Office of Regulatory Compliance @ 662.325.3294

Thank you in advance for your participation in this research!