RELATIONSHIPS OF ATTITUDE TOWARD A BEHAVIOR, SUBJECTIVE NORM, AND PERCEIVED BEHAVIORAL CONTROL AS ANTECEDENTS TO COMPUTER USE BY ELEMENTARY TEACHERS IN A PUBLIC SCHOOL SETTING

By

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A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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by

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Many individuals and influences have made this achievement possible at this particular point in my life. I first thank God for the many blessings and abundant grace He has bestowed on me. I firmly believe that every good gift comes from above (James 1:17) and that the greatest knowledge (Gk. gnosis) that we can have is knowledge of Him. My greatest earthly appreciation goes to my wife, Phyllis. I would not be what I am or where I am today without her unselfish love, encouragement, and support. I doubt she bargained for a life-long student when we got married in 1977, but she has never complained and has always been proud of my achievements, which I consider our achievements. I thank my mother, Frances, for her encouragement to persist early in my academic career, and for her example as an educator and an adult student. My thanks go to my doctoral committee chair, Dr. Kara Dawson, who was a great source of information, direction, inspiration, and motivation when needed, despite her own challenges of a busy schedule and a young family. My committee overall was extremely supportive and helpful and in this regard I thank Dr. Jeff Hurt for his leadership in my UF work, and the contribution to my life and academic work of Dr. Lee Mullally, Dr. Colleen Swain, and Dr. David Honeyman. Finally, I express my appreciation and thanks to my employer, the Citrus County School District. I work with a great group of colleagues and professionals who value life-long learning and they have been extremely supportive in my pursuit of an advanced degree. We work in a wonderful, real-life laboratory and I learn from them on a daily basis.
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RELATIONSHIPS OF ATTITUDE TOWARD A BEHAVIOR, SUBJECTIVE NORM, AND PERCEIVED BEHAVIORAL CONTROL AS ANTECEDENTS TO COMPUTER USE BY ELEMENTARY TEACHERS IN A PUBLIC SCHOOL SETTING

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December 2004

Chair: Kara M. Dawson
Major Department: School of Teaching and Learning

Despite significant financial investments made in recent years to equip public schools with computers, some observers believe we are not seeing an equivalent return in terms of the percentage of teachers who use computers for instruction and related improvements in teaching and learning. A number of factors, primarily external to teachers, have been suggested as reasons for lower levels of computer use. The purpose of this study was to investigate internal variables related to elementary teacher use of computers for instruction. The predictor variables for this study were derived from Ajzen’s Theory of Planned Behavior, and they included attitude toward the behavior (ATT), subjective norm (SN), perceived behavioral control (PBC) and behavioral intention (INT). The criterion variable was levels of computer use as measured by Marcinkiewicz’ Levels of Use instrument. The sample consisted of classroom-based elementary teachers (n = 203) in a central Florida school district.
A 73-item survey instrument was developed and validated to capture data for this study. The survey captured indirect (belief-based) and direct measures of the variables of interest as well as pertinent demographic data. Construct validity for the instrument was investigated through item analysis and confirmatory factor analysis. Internal consistency estimates for item groups were calculated through the use of Cronbach’s alpha (α). Descriptive statistics were also calculated for each item. Relationships among the variables were analyzed using Pearson’s correlation coefficient (r), and multiple linear regressions (R).

The findings revealed a positive correlation between attitude toward the behavior (ATT) and intention, between subjective norm (SN) and intention, and between perceived behavioral control (PBC) and intention. The three variables of ATT, SN, and PBC combined accounted for 65% of the effect size on behavioral intention (INT). The attitude variable had the largest influence on intention. A significant correlation was also identified between behavioral intention and levels of computer use reported by teachers.

Results of this study seem to validate the Theory of Planned Behavior as a predictive model in this context. The findings show the importance of internal, personological variables on the successful integration of computer technology in a K-12 setting and they suggest that more research is needed in this area.
CHAPTER 1
INTRODUCTION

Computers have a ubiquitous presence in school classrooms in 2004, yet many teachers have not embraced this technology as an instructional tool. My study analyzed elementary teacher use of instructional technology, specifically computers, from a behavioral perspective. The Theory of Planned Behavior (Ajzen, 1988, 1991) was used as the theoretical framework. The constructs of attitude toward the behavior, subjective norm, and perceived behavioral control were investigated as antecedent factors related to intention and demonstrated behavior of teacher computer use in the classroom.

Statement of the Problem

Investment in instructional technology by K-12 public education has been enormous in the last 15 years (Office of Technology Assessment, 1995). Total technology spending among U. S. public school districts for the 2002-2003 school year was $5.74 billion, with projections of $5.80 billion for the 2003-2004 school year (Quality Education Data, Inc., 2003). This investment has been made primarily in computers and in associated costs such as networking and Internet access. The claim of promoters has been that instructional technology will improve teaching and learning and that it will make the process of education more efficient and effective. Instructional technology in the form of computers is not the first technology promoted by such claims. Similar results were anticipated with earlier technologies such as instructional radio, instructional television, and various “teaching machines” (Ohles, 1985; Cuban, 1986).
Like those earlier technologies, computers have been embraced in classrooms by only a small percentage of teachers as effective users (Marcinkiewicz, 1994; Zhao & Frank, 2003). A quick walk-through of schools reveals large numbers of computers in classrooms. In 2002, student-to-computer ratios in Florida’s K-12 public school systems averaged 3.7:1 (Council for Education Policy, Research, and Improvement, 2002).

Despite their ubiquity, a relatively small percentage of teachers are using computers on a regular basis; and when they are used, computers are often used to support traditional curriculum and teaching methodologies and not in transformational ways (Hadley & Sheingold, 1993; Cuban, Kirkpatrick, & Peck, 2001; Zhao & Cziko, 2001).

Although the use of computers has become more widespread in the workplace, elementary and secondary teachers are less likely to use computers than are persons employed in other managerial or professional fields (USDOE, 2002). Significant investments in computer hardware and teacher training have been made in K-12 schools, yet a relatively small percentage of teachers are using computers effectively in instruction. In their discussion of policy in relation to technology, Means et al. state “technology’s potential for profound influences on instruction is yet to be realized” (Means, Roschelle, Penuel, Sabelli, & Haertel, 2003). This perceived low return on investment has become a source of concern for some, which has developed into criticism that financial resources could be better used in other ways to improve teaching and learning (Oppenheimer, 1997; Cuban, 2001). Implementers have been successful in getting computers in classrooms but they have failed to adequately consider factors that might predict or influence effective use by teachers.
Need for the Study

There is a need to better understand why teachers are not using computers in greater numbers so we can develop processes and strategies to help teachers become more effective in the use of these instructional tools to increase student achievement. An examination of instructional technology in an instructional setting reveals three related, interactive domains: the teacher, the innovation, and the context (Zhao, Pugh, Sheldon, & Byers, 2002). These three domains provide a useful framework for considering effective instructional technology use in a K-12 educational setting, and they facilitate analysis consistent with the approach taken by Ertmer (1999) in terms of internal and external factors. Of these three domains, the two most examined in relation to effective use of instructional technology in the classroom setting are innovation and context, because these domains are the easiest to visualize, examine, and quantify. There has been much less analysis of the teacher domain in relation to instructional technology use due to the complexities of human nature and the number of variables involved.

The use of computers in the classroom has been considered from the perspective of the computer as an educational innovation (Cuban, 1986; Marcinkiewicz, 1994). Rogers (1995) identified characteristics of innovations that facilitate higher levels of adoption, and these characteristics have merit in relation to teacher use of computers in the classroom. From a consideration of context, there is evidence suggesting that the traditional time, space and curriculum structures of K-12 public education are limiting factors in terms of teachers adopting computers in classrooms (Bossert, 1996; Cuban, Kirkpatrick, & Peck, 2001). Ely (1999) identified a number of conditions that facilitate change, and most of these conditions are external, or contextual to the user. Many contextual factors related to instructional technology in the classroom have been
addressed (such as training for sufficient knowledge and skills, accessibility, time to learn, and support). Despite the availability of computers in classrooms, and higher levels of teacher training, adoption and use levels of computer technology are still quite low. Becker (1994) observed that only a very small percentage of classroom teachers could be classified as exemplary computer users in 1993. Ten years later, the percentage of teachers using computers for instruction in transformational ways had not increased significantly (Florida Department of Education, 2003). To date, a number of studies have examined the phenomenon of low teacher use of computers in the classroom, but these studies have largely looked at first-order (external) barriers (Ertmer, 1999) such as limited resources and support. Second-order barriers to technology integration are intrinsic to teachers and include "beliefs about teaching, beliefs about computers, established classroom practices, and unwillingness to change" (Ertmer, 1999, p.48).

There has been much less research into second-order (internal) barriers to technology use such as belief systems, attitudes, values, and perceived control. Although change and the diffusion of an innovation is a social process (Rogers, 1995), it ultimately involves an individual going through an evaluation process and making a decision to change. In the change process, what people do and do not do is the crucial variable (Fullan & Stiegelbauer, 1991). Teachers are critical components of the change process in education (Fullan & Stiegelbauer, 1991), and their perspective is often overlooked when a decision is made to deploy a technology in a classroom setting (Cuban, 1986). Because internal and personological variables related to levels of computer use by teachers have often been overlooked (Marcinkiewicz, 1994), this study is needed to enable us to better understand these variables in the teacher domain to facilitate higher levels of use and
more effective use of computers by teachers. A more complete understanding of internal factors related to computer use by teachers will enable us to better predict how teachers will use computers in the instructional process, and it will facilitate the development of more effective implementation strategies for this technology in classrooms.

**Significance of the Study**

This study is important because it examines internal variables related to elementary teacher use of computers for instruction. Specifically, it looks at the constructs of attitude toward the behavior, subjective norm, perceived behavioral control, and behavioral intention as delineated in the Theory of Planned Behavior (Ajzen, 1988). Other studies have measured individual internal factors related to computer use such as attitude or self-efficacy, but a search of the literature found no study that measures attitude toward the behavior, subjective norm, and perceived behavioral control in relation to teacher computer use. Attitude toward the behavior, subjective norm, and perceived behavioral control, collectively, are the antecedents to behavioral intention which is highly correlated to actual behavior (Ajzen, 1988, 1991). The instrument developed from this study will be a useful tool for researchers and implementers interested in more effective computer use by teachers; and it will facilitate a better understanding of the related internal and personological variables. This study also extends previous research that used the Theory of Planned Behavior in other disciplines, and it tests the validity of this theoretical framework in relation to teacher use of computers in the classroom.

**Definition of Terms**

To provide a clear understanding of the concepts and terms related to this study, the following definitions are provided:
Theory of Planned Behavior (TPB) is a framework for the study of human behavior (Ajzen, 1988, 1991). This theory proposes that human behavior is guided by three belief areas: behavioral, normative, and control. TPB looks at the constructs of attitude, subjective norm, and perceived behavioral control as antecedents to behavior. TPB has been validated in a number of studies across various disciplines.

Attitude toward the behavior is the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question (Ajzen, 1988, 1991).

Subjective norm is the perceived social pressure to perform or not perform a particular behavior (Ajzen, 1988, 1991).

Perceived behavioral control is a person’s perception of the ease or difficulty of performing the behavior of interest (Ajzen, 1988, 1991). Perceived behavioral control is assumed to reflect a person’s previous experiences, as well as anticipated challenges and obstacles.

Behavioral intention is an individual’s intention to perform a given behavior (Ajzen, 1988, 1991). In this definition, intention is influenced by the constructs of attitude toward the behavior, subjective norm, and perceived behavior control.

Teacher computer use in my study refers to the use of a computer for instructional purposes by a classroom teacher. Teacher instructional use of computers involves having students use software programs as part of their instructional experience, as well as for demonstration or presentation of a lesson (Becker & Riel, 2000). It is operationally defined in this study as non-use, utilization, and integration as determined by the Levels of Use (LU) instrument (Marcinkiewicz, 1991).
Teacher beliefs are the ideas teachers believe in and are committed to. They are sometimes called core values (Lumpe & Chambers, 2001). Beliefs "shape goals, drive decisions, and create discomfort when violated" (Loucks-Horsley et al., 1998, p.18). Belief implies the mental acceptance of something as true. There is a critical relationship between the beliefs of teachers and the instructional decisions they make (Haney, Czerniak, & Lumpe, 1996).

**Limitations**

1. The study focused on elementary teachers in a public school district, and the results may not generalize to secondary teachers due to differences in curriculum needs, organizational climate, and school culture.

2. Though the overall response rate was good, the study was limited by the willingness of participants to complete the research instrument.

3. The generalizability of the results is limited to the sample of respondents from one school district that participated in the study.

4. The study was limited by the degree to which participants understood the research instrument. For example, there could be different interpretations by teachers of what it means to use a computer for instruction.

5. The study was limited by the degree to which participants could objectively analyze themselves in relation to the behavior of interest using a self-report (survey) based instrument.

**Assumptions**

This study is based on the following assumptions:
1. The instruments used measured attitude toward the behavior, subjective norm, and perceived behavioral control toward teacher use of computers in the classroom for instruction.

2. The participants adequately understood the research instrument.

3. The participants answered the research instrument honestly.

4. Behavioral intention is related to and predicted by attitude toward the behavior, subjective norm, and perceived behavioral control of a person toward the behavior.

5. Attitude as a construct in this study is a function of the strength of a person’s belief about the consequences of the behavior and evaluation of the consequences.

6. The participants are able to adequately rate themselves using a self-report instrument.

**Research Questions**

1. What is the relationship between attitude toward the behavior and an elementary teacher’s intention to use computers in classroom instruction?

2. What is the relationship between subjective norm and an elementary teacher’s intention to use computers in classroom instruction?

3. What is the relationship between perceived behavioral control and an elementary teacher’s intention to use computers in classroom instruction?

4. Do the constructs attitude toward the behavior, subjective norm, and perceived behavioral control have equal influence on an elementary teacher’s intent to use computers in classroom instruction?

5. Is there a correlation between an elementary teacher’s intent to use a computer for instruction and the teacher’s actual use of a computer for instruction?
Statement of Hypotheses

This study tested the following null hypotheses:

1. There is no correlation between attitude toward the behavior and behavioral intention to use computers by elementary teachers.

2. There is no correlation between subjective norm and behavioral intention to use computers by elementary teachers.

3. There is no correlation between perceived behavioral control and behavioral intention to use computers by elementary teachers.

4. There is no difference in the influence of the constructs attitude toward the behavior, subjective norm, and perceived behavioral control on an elementary teacher's intention to use computers for classroom instruction.

5. There is no correlation between behavioral intention and actual computer use by elementary teachers.
CHAPTER 2
REVIEW OF LITERATURE

Beginning in the early 1980s, relatively powerful personal computers became available for home use. The succeeding years have shown that this technology has had a dramatic and pervasive impact on our society, and on how we live, work, play, communicate, and function in general (International Society for Technology in Education, 2000). The development of and maturation of the Internet is a prime example of the ubiquity of computer technology in our society. K-12 public education is, in many ways, a mirror of society, and the same technological advances that have impacted society have had a pervasive and powerful impact on education as well. The introduction of computers into public education has held high hopes as a tool to make the instructional process more efficient and effective (Ohles, 1985; Cuban, 1986; Cuban, Kirkpatrick & Peck, 2001). There has been a considerable effort to provide computers to schools in high numbers, to network schools, and to connect schools to the “information superhighway.” The assumption has always been “if you build it they will come” and that if we provided the appropriate technology tools in the appropriate amounts to provide sufficient access, they would be used. In fact, this has not been the case. Despite significant investments in technology infrastructure and large numbers of computers in classrooms, teachers are using this technology for instruction in rather limited numbers and ways (Hadley & Sheingold, 1993; Becker, 1994).
Computer Use by Teachers

Three related, interactive domains (the innovation, the context, and the teacher) (Zhao, Pugh, Sheldon, and Byers, 2002) provide a useful framework for the consideration of technology implementation in a K-12 educational setting.

Teacher Use of Computers as an Innovation

In his research on the diffusion of innovations through social systems, Rogers (1995) identified characteristics of innovations that facilitate faster and higher levels of adoption: relative advantage, compatibility, complexity, trialability, and observability.

- Relative advantage refers to the degree to which an innovation is perceived as better than the idea it supersedes.
- Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters.
- Complexity refers to the degree to which an innovation is perceived as difficult to understand and use.
- Trialability is the degree to which an innovation may be experimented with on a limited basis.
- Observability is the degree to which the results of an innovation are visible to others.

A large body of research over 3 decades has validated these factors as characteristics of innovations more likely to be adopted by potential adopters (Rogers, 1995). These characteristics are also valid and important when considering teacher use of computers in the classroom. Teachers must see a benefit and advantage in using a computer for instruction over more traditional methods; the computer and related software systems must be compatible with existing classroom practice and educational goals; the computer system must not be too complex for teachers to use; teachers need to be able to “try out” the computer during the process of integration into classroom practice; and, teachers need to have opportunities to observe the effective use of computers in the classroom by peers and in settings similar to their own. Certainly some teachers have not adopted the use of
computers in their classroom because the computer or related software systems failed to meet these criteria (Cuban, 1986; Cuban, Kirkpatrick, & Peck, 2001). There are, however, instances when computers and software systems in the classroom do meet these criteria, and they still are not adopted by teachers for use in the instructional process. This scenario implies that it is necessary to consider more than just the computer as innovation when attempting to understand what is involved in teachers’ effective computer use in the classroom.

The Context of Teacher Computer Use

Another domain from which to consider effective use of instructional technology is the context of that technology use (Zhao, Pugh, Sheldon, and Byers, 2002). There is evidence suggesting that the traditional time, space, and curriculum structures of K-12 public education are limiting factors in terms of teachers adopting computers in classrooms (Bossert, 1996; Cuban, Kirkpatrick, & Peck, 2001). Ely (1999) identified a number of conditions that facilitate change. Many of these conditions are external, or contextual to the user:

1. There must be “dissatisfaction with the status quo.”
2. The individuals who will ultimately implement any innovation must possess sufficient knowledge and skills to do the job.
3. The things that are needed to make the innovation work should be easily accessible.
4. Implementers must have time to learn, adapt, integrate, and reflect on what they are doing.
5. Rewards or incentives must exist for the participants.
6. Participation in the change process must be expected and encouraged.
7. An unqualified go-ahead and vocal support for the innovation by key players and other stakeholders is necessary.
8. Leadership must be evident. (Ely, 1999).

Other than dissatisfaction with the status quo and sufficient knowledge and skills, these facilitating conditions are factors external to the individual in relation to the change process. Many contextual factors related to instructional technology in the classroom have been addressed (such as training for sufficient knowledge and skills, accessibility, time to learn, and support). Despite the availability of computers in classrooms, and high levels of teacher training, adoption and use levels of computer technology are still quite low. Becker (1994) suggested that only 3-5% of classroom teachers could be classified as exemplary computer users. More recent studies reveal similar evidence that the number of classroom teachers using computers for instruction in exemplary or transformational ways is minimal (Florida Department of Education, 2003). Thus contextual factors alone cannot provide the explanation for this phenomenon; and other domains must still be considered.

The Teacher and Computer Use

Teachers are critical components of the change process in education (Fullan & Stiegelbauer, 1991), and their perspective is often overlooked when a decision is made to deploy a technology in a classroom setting (Cuban, 1986; Tobin & Dawson, 1992). An evaluation of the innovation characteristics and external considerations described above reveal that some of them have internal influence that involves individuals (and in the case of computers in the classroom, teachers). Relative advantage has motivational implications by addressing what advantages an innovation may have for an end user (teacher) and her goals, thus making a learning curve investment worthwhile. This is also reflective of expectancy theory, which states that an individual will act in a certain way based on the expectation that the act will be followed by a given outcome and on the
attractiveness of that outcome to the individual (Vroom, 1964). Compatibility has internal implications because it relates to the values, beliefs, previous experiences, and needs of a user. Dissatisfaction with the status quo is also a powerful internal factor that can influence an individual to change and accept a new technology or innovation. The internal dissonance created by internal dissatisfaction can be a powerful motivating force for change (Schunk, 2000). On the other hand, the lack of this dissonance inhibits motivation to change. A number of psychological and social factors may influence teacher adoption and use of instructional technology in the classroom; and many have been studied in this regard, including self-efficacy (Jorde-Bloom, 1988; Pajares, 1996), computer anxiety, locus of control, level of innovativeness, self competence, perceived relevance, attitude toward computer technology, and levels of experience related to computer technology (Delcourt & Kinzie, 1993; Rogers, 1995; Marcinkiewicz, 1996).

Although change and the diffusion of an innovation is a social process (Rogers, 1995), it ultimately involves an individual going through an evaluation process and making a decision to change. A great deal of literature addresses organizational, or institutional, change. Fundamentally, organizations are made up of individuals. In the change process, what people do and do not do is the crucial variable (Fullan & Stiegelbauer, 1991). Hall and Hord (1987) address elements related to the individual in their Concerns Based Adoption Model (CBAM). In this model, intended adopters may go through seven stages:

- Awareness: Individual may know the innovation exists, but have little concern or involvement with it.
- Informational: Individual decides they would like to know more about the innovation.
- Personal: Prospective adopter's uncertainty about the demands of the innovation, their ability to meet them, and their role in the innovation.

- Management: The administrative and logistical challenges of innovation use.

- Consequence: Individual begins to ask how the innovation use is affecting students.

- Collaboration: How the individual adopter can coordinate and cooperate with others in the use of the innovation.

- Refocusing: When the adopter begins to have ideas about replacing or improving on the innovation.

A valuable perspective offered by the CBAM is that individuals are the critical consideration in the change process. In implementing change or an innovation, it is important to understand the point of view of the participants in the change process. The CBAM also makes the assumption that "to change something, someone has to change first" (Hall & Hord, 1987, p.10).

For analysis related to instructional technology integration, Ertmer (1999) describes first- and second-order barriers to integration. First-order barriers to technology integration are described as external to the teacher. For example, not having enough computers or not having enough training in how to use computers. Second-order barriers to technology integration are intrinsic to teachers and include "beliefs about teaching, beliefs about computers, established classroom practices, and unwillingness to change" (Ertmer, 1999, p.48). For many years it was assumed that providing technology resources in adequate quantities would automatically lead to effective integration in classrooms. Time and experience has shown this to not be the case. Technology is prevalent in schools and large amounts of training have been provided, and yet effective use, which is transformational and integrated, is minimal. The concept of second-order barriers to technology integration begins to recognize the social and psychological
complexity related to change and teacher practice. Personal change is complex because people are complex by nature. In this light, we need to focus on internal (motivational) considerations to see higher levels of implementation and more effective use of instructional technology among teachers. Internal variables related to levels of computer use by teachers have often been overlooked (Marcinkiewicz, 1994).

Stages of Technology Use

A number of instruments have been developed that measure stages of technology use among teachers. Examples of these models include research from Concerns Based Adoption Model (Hall & Hord, 1987); Apple Classrooms of Tomorrow (ACOT) (Dwyer, 1995); Texas Center for Educational Technology (Christensen, 1997) based on Russell (1995); Technology Maturity Model (Kimball & Sibley, 1997); and Technology Adoption Model (Hooper & Rieber, 1995). The models are similar in that they reflect a progression from non-use or awareness of technology in the classroom to a high level of dependence on technology in the classroom as a tool to improve teaching and learning. They typically provide a description of each stage to facilitate application and classification for specific individuals and settings. Stages from these various models are listed below for comparison.

Concerns Based Adoption Model-Levels of Use (Hall & Hord, 1987)

- Non-use
- Orientation
- Preparation
- Mechanical
- Routine
- Refinement
- Integration
- Renewal
Apple Classroom of Technology (ACOT) (Dwyer, 1995)

- Entry
- Adoption
- Adaptation
- Appropriation
- Invention

Texas Center for Educational Technology (Self-evaluation instrument) (Christensen, 1997)

- Stage 1: Awareness
- Stage 2: Learning the process
- Stage 3: Understanding and application of the process
- Stage 4: Familiarity and confidence
- Stage 5: Adaptation to other contexts
- Stage 6: Creative application to new contexts

Technology Maturity Model (Kimball & Sibley, 1997)

- Emergent Systems Stage
- Islands of Technology Stage – Level 1
- Integrated Systems Stage – Level 2
- Intelligent Systems Stage – Level 3

Technology Adoption Model (Hooper & Rieber, 1995)

- Familiarization
- Utilization
- Integration
- Reorientation
- Evolution

A 2002 study by the Council for Educational Policy, Research, and Improvement delineates 3 levels of computer use by teachers (Council for Educational Policy, Research, and Improvement, 2002). The levels are based on categories from the Milken Family Foundation’s Teaching in American Schools: Seven Dimensions for Gauging Progress. Dimension 3 of this series is termed “Professional Competency Continuum (PCC), Professional Skills for the Digital Age Classroom”. These levels were captured in
the Florida Department of Education 2001-2002 Technology Resources Survey (Florida Department of Education, 2003). The levels, description and statewide percentages reported are

- **Stage I – Entry.** Operate computers at a basic level, with instruction mostly teacher-centered and tasks are structured as exercises. (Statewide–36.5% teachers were in this category in 2001-2002).

- **Stage II – Adaptation.** Technology is integrated into the classroom in support of existing practices. Educators use a variety of applications. (Statewide–48.2% teachers were in this category in 2001-2002).

- **Stage III – Transformation.** Adept at transferring skills from current technology tools to new ones and often learn independently. (Statewide–15.3% teachers were in this category in 2001-2002; Council for Educational Policy, Research, and Improvement, 2002).

A more recent measure of teacher computer usage was measured by the State of Florida Department of Education’s 2003 Florida School Technology and Readiness (StaR) Survey (Florida Department of Education, 2004). This measure consisted of a rubric to evaluate levels of computer use. The four levels of the rubric and their descriptions are

**Level 1 – Entry**

- Teachers use e-mail and word processing programs.
- Technology not used to review student assessment information.

**Level 2 – Intermediate**

- Streamlined administrative tasks (grades, attendance, lesson planning, etc.).
- Technology used infrequently to review student assessment information.

**Level 3 – Advanced**

- Technology used for research; creating templates for students; multimedia and graphical presentations and simulations; and correspondence with experts, peers, and parents.
- Technology frequently used to review student assessment information.
Level 4 – Target

- Teachers explore and evaluate new technologies and their educational impact; technology used for inquiry, analysis, collaboration, creativity, content production, and communication.
- Technology regularly used to review student assessment information which results in needed changes in instruction. (Florida Department of Education, 2004).

The 2003 state average for elementary teachers on this rubric of computer use was 2.2, or just beyond the Level 2 use reflected in the above description.

The models listed above are helpful in classifying stages of technology use on an individual or organizational level. These models have not, however, been validated as measurement instruments that might be useful in a more rigorous analysis of teacher levels of computer use in the classroom. One instrument that has been validated as useful to measure teacher use of computers is Levels of Use (LU) (Marcinkiewicz, 1991). The LU assessment tool consists of four pairs of two cross-matched items each. Results from this instrument can be used to categorize teacher use of technology as nonuse, utilization, and integration. The LU will be described in greater detail in Chapter 3.

Teacher Beliefs

Teachers are critical components in the educational change process (Fullen & Stiegelbauer, 1991), and this is especially true in efforts to implement the use of technology in the instructional process (Ertmer et al., 1999). Real and lasting change in classrooms must be driven by changes in teachers’ beliefs about the purpose and nature of instruction, and teacher belief systems are very resistant to change (Ringstaff, Sandholtz, and Dwyer, 1991). There are strong relationships between teachers’ beliefs and their planning, instructional decisions, and classroom practices (Pajares, 1992). Rokeach (1992), referenced in Albion & Ertmer (2002), describes belief systems as
comprising five types of beliefs ordered along a dimension ranging from central to peripheral. At the central end are primitive beliefs (consensual), which are core beliefs "that are formed through personal experiences, reinforced through social consensus, and thus, most resistant to change" (Albion & Ertmer, 2002, p.35). Moving toward the peripheral end of the scale from these core beliefs are primitive beliefs (private), beliefs about authorities, beliefs derived from authorities, and inconsequential beliefs. Belief types toward the peripheral end of the scale are much more malleable and less resistant to change. Beliefs about the nature of teaching and classroom practice are formed over many years, and reside at the central end of the scale. These are core values and beliefs for teachers, and they are quite resistant to change. One interesting observation by Pajares (1992) is that "change in beliefs follows, rather than precedes, change in behavior" (p.321). The implications for this in terms of teacher use of computers is that teacher use of a computer for instruction may lead to changes in beliefs about teaching. The theory of planned behavior (Ajzen, 1988, 1991) is a useful theoretical framework for understanding behavior because it considers the underlying belief structures that motivate a person to perform a particular behavior. According to Ajzen (1991),

"... the theory postulates that behavior is a function of salient information, or beliefs, relevant to the behavior. People can hold a great many beliefs about any given behavior, but they can attend to only a relatively small number at any given moment (see Miller, 1956). It is these salient beliefs that are considered to be the prevailing determinants of a person’s intentions and actions.” (p.189).

The TPB constructs of attitude toward the behavior, subjective norm, and perceived behavioral control are determined by behavioral beliefs, normative beliefs, and control beliefs (Ajzen, 1988, 1991). The underlying belief structures of the Theory of Planned Behavior and their relation to TPB constructs are described next.
Theory of Planned Behavior

The Theory of Planned Behavior (TPB) (Ajzen, 1988, 1991) is a theoretical framework designed to understand and predict human behavior. It is based on the premise that humans are rational beings who make systematic use of the information available to them. According to the theory, humans behave in predictable ways, and consider the implications before choosing to engage or not engage in a particular behavior or activity. A first step in understanding behavior is to identify and measure the behavior of interest. According to TPB, once the behavior has been identified, it is possible to investigate what determines the behavior. The theory suggests that a person's intention to perform (or not perform) a behavior is the immediate determinant of that behavior. Merely acknowledging, however, that intent predicts behavior does not address the reasons for the behavior. A primary goal of TPB is to understand the "why" of human behavior. To this end it is then important to identify the determinants of intentions. TPB is concerned with the causal antecedents of volitional behavior (Ajzen, 1988). The theory postulates that a person's intention is a function of three basic determinants: attitude toward the behavior, subjective norm, and perceived behavioral control. The nature of these three determinants in an individual is a product of the individual's belief system. People develop a multitude of beliefs toward various objects, activities, and events during the course of their lives, but they can only attend to a relatively small number at a time (Miller, 1956). Ajzen (1988) refers to these as salient beliefs. To understand why a person holds a certain attitude toward an object, it is necessary to assess their salient beliefs about that object. Beliefs related to attitude toward a behavior are behavioral beliefs, beliefs related to subjective norm are normative beliefs, and beliefs related to perceived behavioral control are control beliefs.
Attitude Toward the Behavior

Attitude toward the behavior is a person's general feeling of favorableness or unfavorableness toward that concept: a person's judgment that performing the behavior is good or bad, or that they are in favor of or against performing the behavior. The more favorable a person's attitude is toward a behavior, the more he should intend to perform that behavior. The more unfavorable his attitude is, the more he should intend to not perform the behavior. A frequent technique used to assess a person's attitude toward a behavior is the semantic differential (Osgood, Soci, & Tannenbaum, 1957). It is critical that these scales be evaluative in nature (Ajzen & Fishbein, 1980).

The measures of attitude result in a single score, which represents a person's general evaluation or overall feeling of favorableness or unfavorableness toward the behavior in question. An estimate of the attitude toward the behavior can be obtained by multiplying belief strength and outcome evaluation, and summing the resulting products (Ajzen, 1988). This process is shown in the following equation:

\[ A_B = \sum b_i e_i \]

- \( A_B \) = Attitude toward behavior \( B \)
- \( b_i \) = Belief that performing behavior \( B \) will lead to outcome \( i \)
- \( e_i \) = Evaluation of outcome \( i \)
- \( \sum \) = Sum is over \( n \) salient beliefs.

Subjective Norm

Subjective norm is a person's perception that other people he considers important desire the performance or nonperformance of a specific behavior. This perception may or may not reflect what the important others actually think they should do. The more a person perceives that others who are important to him think he should perform a
behavior, the more he will intend to do so. Subjective norm as a determinant is social in nature. In TPB, people are viewed as intending to perform those behaviors they believe that important others think they should perform. If they believe important others think they should not perform a behavior, they will usually intend not to do so. The measure of subject norm is shown in the following equation:

\[
SN \propto \sum b_j m_j
\]

\( SN \) = Subjective norm  
\( b_j \) = Normative belief concerning referent \( j \)  
\( m_j \) = Person’s motivation to comply with referent \( j \)  
\( n \) = Number of salient normative beliefs.

TPB is an extension of a theory base called the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980). TRA was developed to deal with behaviors that are under volitional control (Ajzen, 1988) and included the constructs of attitude toward the behavior and subjective norm. A consideration of attitudes and subjective norms leads to the beginning of understanding why people behave the way they do (Ajzen, 1988). It must be acknowledged, however, that not all behavior is under complete volitional control. Many behaviors require the availability of necessary opportunities and resources. People should succeed in performing a behavior to the extent they intend to perform the behavior and have the required opportunities and resources (Ajzen, 1988). With the understanding that factors beyond a person’s volitional control can disrupt the intention-behavior relationship, Ajzen (1988) added another antecedent of intention called perceived behavioral control to his theory. The extended theoretical framework containing perceived behavioral control is the theory of planned behavior (TBP).
Perceived Behavioral Control

Perceived Behavioral Control as a construct is used to account for factors beyond a person’s volitional control that can disrupt the intention-behavior relationship (Ajzen, 1988). According to Ajzen, this element “refers to the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles” (Ajzen, 1988, p.132). The more resources and opportunities individuals believe they possess, and the fewer obstacles or challenges they expect, the greater will be their perceived control over the behavior. TPB does not address the actual control an individual has in regard to a particular behavior, but their perceived behavioral control on achievement of behavior goals. Beliefs about resources and opportunities underlie perceived behavioral control (Ajzen, 1991). Perceived behavioral control can be symbolized in the following equation:

\[ PBC \approx \sum_{i=1}^{n} C_i P_i \]

- **PBC** = Perceived behavioral control
- **C** = Control belief
- **P** = Perceived power of the particular control factor to facilitate or inhibit performance of the behavior
- **n** = Salient control beliefs.

In TPB, behavior is predicted and determined by intention, which mediates the effects of attitude toward the behavior, subjective norm, and perceived behavioral control. The stronger the intention to perform a behavior or achieve a goal, the more likely that behavior is expected. Elements and relationships of the theory of planned behavior are shown in Figure 2-1.
Ajzen (Ajzen & Fishbein, 1980; Ajzen, 1988) provides methodologies to capture and quantify a person’s attitude, subjective norm, and level of perceived behavioral control towards a behavior. Using these methodologies, TRA and TPB have been validated in their ability to predict behavior through analysis of intention (Ajzen & Fishbein, 1980; Ajzen, 1988). A number of studies, most using multiple linear regression procedures, have supported the link between attitude and subjective norm as predictors of intent and behavior. According to Ajzen (1988), consideration of attitudes and subjective norm permit “highly accurate prediction”, with correlations in representative studies ranging from 0.73 to 0.89. In a meta-analysis of 87 studies, Sheppard, Hartwick, and Warshaw (1988) found the average correlation between attitude/subjective norm and intention was 0.66. Armitage & Conner (2001) concluded from their meta-analysis of 185 independent studies that the theory of planned behavior is efficacious as a predictor of intentions and behavior. They calculated an average multiple correlation of attitude,
subjective norm and perceived behavioral control with intention at \( R = 0.63 \) (Armitage & Connor, 2001).

The theory of reasoned action and the theory of planned behavior have been used extensively to analyze and predict a broad range of behaviors (Sheppard, Hartwick, and Warshaw, 1988; Armitage & Connor, 2001). A May 2003 search of an extensive online database, UMI ProQuest Digital dissertations, returned 433 citations on the theory of reasoned action and 277 citations on the theory of planned behavior. A wide variety of behaviors were examined in the dissertation literature, including abstinence from vaginal intercourse, participation in cardiac rehabilitation, shopping on the Internet, intention to use condoms, physical activity among older women, and fast food consumption. Studies relating to K-12 education included teachers’ beliefs regarding the implementation of constructivism in their classroom, teacher perceptions of play, the use of the Internet for information retrieval, and the use of computers in mathematics instruction. A search on TRA and TPB in relation to technology use revealed a number of studies. Representative studies related to technology include Internet user attitudes, faculty use of web-based instruction, user acceptance of information technology, and the use of educational technology in hospitals. There were very few studies addressing teacher use of computer technology in the classroom. A representative study in this area related to the use of TRA for the development of an instrument to measure teachers’ attitudes toward their use of computers in mathematics instruction (Long, 1994). The premises of the theory of planned behavior make it an attractive theoretical framework with which to analyze the use of computers by elementary teachers in public education.
CHAPTER 3
RESEARCH DESIGN AND METHODOLOGY

This research was conducted to examine the relationship of attitude toward a behavior, subjective norm, perceived behavioral control, and behavioral intent to elementary school teacher use of computer technology for instruction. This chapter describes the research design and methodology used in this study. The topics covered are research design, population and sample, instrument development, procedures for piloting the survey instrument, data collection, and data analysis.

Research Design

This was a non-experimental, predictive study that examined variables related to the instructional use of computers by elementary school teachers. The theoretical base for my study was Ajzen’s Theory of Planned Behavior (Ajzen, 1980, 1988). Predictive research designs enable the investigator to predict the value of a dependent variable based on the values obtained from other independent variables (Burns & Grove, 1997). Prediction attempts to explore causal relationships between different variables. Non-experimental research allows us “(1) to increase our understanding of relationships among variables (to fulfill the explanatory purpose), (2) to predict a criterion outcome based on predictor information (to fulfill the predictive purpose), and (3) to test the contribution made by variables in a theoretical model that is being proposed to explain a phenomenon or behavior (to perform model testing)” (Keppel & Zedeck, 1989, p.389). A paper-based survey instrument was developed and distributed to capture data relevant to the variables of interest for the study. The variables of interest for this study are derived
from the Theory of Planned Behavior (Ajzen & Fishbein, 1980; Ajzen, 1988). The predictor variables are attitude toward the behavior (ATT), subjective norm (SN), perceived behavioral control (PBC), and behavioral intention (INT). The criterion variable for this study is actual computer use as a self-report by elementary teachers and measured using the Levels of Use (LU) instrument (Marcinkiewicz, 1991). Descriptive statistics, correlations, and multiple linear regressions were used for statistical analysis in my study. For statistical significance, a confidence level of 95% (α = .05) was determined in advance.

**Population and Sample**

The population of interest for this study was elementary teachers in a medium-sized school district in central Florida. Permission was requested, and granted, from the district’s Superintendent of Schools (Appendix A) to perform the study in the school district. The elementary teachers targeted for the study were classroom-based, and they represented 7 grade levels; Pre-kindergarten through 5th grade. These teachers were from the school district’s 10 elementary schools, and collectively, they taught 6,794 Pre-K through grade 5 elementary students, which represents 43.6% of the district’s overall student population. Of the elementary teacher population used for this study, 94.1% were female (n = 304) and 5.9% were male (n = 18). An electronic list of all classroom-based elementary teachers was obtained from the school district’s Information Services Department. A paper-based survey instrument was developed and distributed to all elementary teachers in the district (n = 322). Because this study involved variables related to computer use, a paper-based survey methodology was chosen over alternative survey methodologies, such as computer-mediated web-based surveys, to avoid any bias that
computer users or non-users may have. The sample consisted of those teachers who completed and returned the survey instrument by the designated deadline. Elementary teachers were chosen because they teach a variety of subjects, and they are less likely to be influenced in their degree of computer use because of a particular subject area or more complex instructional needs (Marcinkiewicz, 1991).

**Instrumentation Development**

A questionnaire was developed to measure the constructs of attitude, subjective norm, perceived behavioral control, and behavioral intention using the methodology outlined by Ajzen (Ajzen & Fishbein, 1980; Ajzen, 1985, 1988, 1992, 2002) for Theory of Planned Behavior (TPB) research. This methodology has been used in hundreds of studies across a variety of subject areas and it has demonstrated utility as a predictive model. Two large-scale meta-analyses conducted by Sheppard, Hartwick, and Warshaw (1988) provide strong support for the predictive utility of the Ajzen and Fishbein model. They calculated a frequency-weighted average correlation for the intent – behavior relationship at 0.53, based on 87 separate studies with a total sample of 11,566 and a significance level of 0.01. Sheppard, Hartwick, and Warshaw calculated a frequency-weighted average correlation for the (attitude + subjective norm) – intent relationship at .66, based on 87 separate studies with a total sample of 12,624 and significance at the .001 level (Sheppard, Hartwick, & Warshaw, 1988).

Detailed procedures for instrument development are provided in Ajzen (Ajzen & Fishbein, 1980; Ajzen, 1988). The general steps are listed below and they are elaborated on in the following sections. In general, the steps involved for instrument development include:
1. Define the behavior of interest in terms of its action, target, context and time elements.

2. Define the corresponding behavioral intention.

3. Define the corresponding TPB variables of attitude, subjective norm, and perceived behavioral control.

4. Elicit salient outcomes and referents.

5. Define beliefs and belief strength evaluations including behavioral beliefs, outcome evaluations, normative beliefs, motivation to comply, control beliefs, and perceived power of control factors.

6. Construct a questionnaire based on the set of beliefs identified.

**Behavior of Interest**

The first step of the instrument development process involved developing a definition of the behavior of interest that addressed the elements of action, target, context and time. The behavior of interest was defined as a teacher using a computer to present a lesson in your classroom during instruction. Action = Using a computer; Target = present a lesson; Context = in your classroom; and Time = during instruction. To facilitate an understanding of this definition for teachers taking the survey, the following explanation was provided in the survey instructions: “The phrase ‘present a lesson in your classroom’ refers to teacher use of a computer for the presentation of a lesson or a teacher involving students in using a computer as part of a lesson. It does not refer to management uses of a computer like keeping attendance records or electronic grade books”.

**Behavioral Intention**

The second step in instrument development was the development of a definition for the corresponding behavioral intention related to the behavior of interest. The common meaning of “intention” is the act or fact of intending, or a determination to do a specified thing or act in a specified manner (Guralnik, 1980). In the Theory of Planned Behavior,
behavioral intention is an individual's intention to perform a given behavior (Ajzen, 1988, 1991). In the TPB definition, intention is influenced by the constructs of attitude, subjective norm, and perceived behavioral control. Behavioral intention was defined as an elementary teacher's intention to use a computer to present a lesson in their classroom.

**Theory of Planned Behavior Variables**

The third step in the instrument development process involved defining the variables of interest in the context of the behavioral intention: using a computer to present a lesson in your classroom. These variables were defined as

- Attitude toward using a computer to present a lesson in your classroom.
- Subjective Norm toward using a computer to present a lesson in your classroom.
- Perceived Behavioral Control toward using a computer to present a lesson in your classroom.

These steps seem rather simplistic, but they are a formal declaration of the behavior of interest and of the four variables of interest: attitude toward the behavior, subjective norm, perceived behavioral control and behavioral intent, in relation to that behavior.

According to Ajzen (Ajzen & Fishbein, 1980) the above steps permit prediction and explanation of behavior at a general level. The variables of interest are measured in a direct manner using the survey method of semantic differential. Any standard attitude scaling procedure such as Likert or Thurstone could be used, but the semantic differential is commonly employed because of its ease of construction (Ajzen, 2002). Semantic differential scales use a series of adjectives to describe the topic or object of interest (Alreck & Settle, 1995). Adjectives must define a single dimension, and each pair must be bipolar opposites labeling the extremes. Whereas the steps described above permit prediction and explanation of behavior at a general level, the following steps in the TPB
instrument development process provide information about the cognitive foundations underlying the behavior of interest (Ajzen & Fishbein, 1980).

Elicitation Study

During the fourth step of the instrument development process, an elicitation study was performed to elicit salient outcomes, referents, and control factors related to the behavior of interest. The elicitation study in this process is similar to a pilot study in the development of an evaluation instrument. Ajzen and Fishbein (1980) provide four guidelines to assist in the development of the elicitation study:

- The elicitation study population and the main study population should be similar with respect to the participants’ demographic characteristics (ex. type of population, age, sex, race/ethnicity, and socioeconomic status).
- Open-ended statements are recommended because they allow the participants to record multiple behavioral, normative, and control beliefs about a behavior (ex. “List the advantages of using a computer for classroom instruction”).
- A content analysis (frequency count) is used to rank-order the participants’ beliefs. They can be rank-ordered into larger concept themes (e.g., improved student engagement) and raw data themes (e.g., use of electronic grade book, use of word processing for student work).
- The five to ten most common behavioral, normative, and control beliefs that emerge from the participants’ responses are used to develop the beliefs instrument for the main theory of planned behavior study.

An open-ended questionnaire was developed to capture data for this phase of the instrument development process (Appendix C). The phrasing of the open-ended questions was patterned after questions provided by Ajzen (Ajzen & Fishbein, 1980) for this kind of study.

A random sample of teachers (n = 60) was sent this questionnaire along with a cover letter (Appendix D), an approved University of Florida Institutional Review Board Form (Appendix B), and a return envelope. The elicitation study questionnaire was
distributed through the school district’s courier-based delivery system. A total of 34 completed surveys were returned that were usable for an effective response rate of 57%. The data captured from the elicitation study was aggregated and responses for each item were then analyzed to look for patterns that could be consolidated and synthesized as a basis for what Ajzen (Ajzen & Fishbein, 1980) calls “modal accessible beliefs” from the population of interest. Ajzen describes this process,

"Once the respondents have listed their beliefs, we have to make decisions concerning the number and kind of beliefs to be included in the model set. The first step is analogous to a content analysis of the various beliefs emitted by different individuals. It involves organizing the responses by grouping together beliefs that refer to similar outcomes and counting the frequency with which each outcome in a group was elicited." (Ajzen & Fishbein, 1980, p.68).

He goes on to state “To make the decision you have to use your common sense, since no clear rules can be provided” (Ajzen & Fishbein, 1980, p.69). Frequency lists developed from the elicitation study data are in Appendix E.

**Beliefs and Strength Evaluations**

In the fifth step of the instrument development process, the synthesized data from the elicitation study was used to define beliefs and the related strength evaluations of those beliefs. Beliefs related to the attitude measure are behavioral beliefs, and the related strength evaluations are outcome evaluations. Beliefs related to the subjective norm measure are normative beliefs, and the related strength evaluations are motivation to comply. Beliefs related to the perceived behavioral control measure are control beliefs, and the related strength evaluations are perceived power of control factors. A pilot questionnaire (Appendix J) was then developed based on the set of beliefs identified. The statements were phrased such that the beliefs corresponded to the constructs related to the behavior of interest. The pilot survey was administered to a random sample of elementary
teachers (n = 100) from the population of interest. In the survey instrument, the
respondents were asked to evaluate each of the outcomes and to indicate the subjective
probabilities that their performing the behavior would lead to each of the outcomes. A
bipolar evaluative scale was used for this assessment. It is essential to use a bipolar scale
in order to assess modal beliefs about the behavior of interest and the strength of these
beliefs (Ajzen & Fishbein, 1980). An example of an item to measure a belief would be
“My principal thinks that I should use a computer to present a lesson in my classroom
during instruction (likely – unlikely).” An item to measure the strength of that belief
would be “Generally speaking, how much do you want to do what your principal thinks
you should do (not at all – very much).” By measuring belief strength and evaluations
with respect to the modal salient beliefs, a given individual’s attitude toward a behavior,
subjective norm, and perceived behavioral control can be predicted. Information about
the determinants of these constructs can also be obtained. Use of the modal set of beliefs
enables comparisons across individuals.

Questionnaire Development

The sixth step of instrument development involved the construction of a
questionnaire based on the beliefs identified for the behavior of interest. A sample Theory
of Planned Behavior Questionnaire provided by Aizen (2004) was used as the model for
survey development in this study (Appendix I). A TPB instrument, as specified by Ajzen
(2002), consists of indirect measures and direct measures of the variables of interest. The
indirect (belief-based) measures of Attitude Toward the Behavior (ATT) are captured in
items 1-10 and 33-41 on the final survey. The indirect (belief-based) measures of

1 In recent years, Dr. Ajzen changed the spelling of his surname to Aizen. I reference both names
depending on publication attribution.
Subjective Norm (SN) are captured in items 28-32 and 59-63. The indirect (belief-based) measures of Perceived Behavioral Control (PBC) are captured in items 43-58. The direct measures of Attitude Toward the Behavior (ATT), Subjective Norm (SN), Perceived Behavioral Control (PBC), and Behavioral Intention (INT) are captured in items 12 through 27 in the final survey instrument (Table 3-1). Based on the guidelines provided by Ajzen (2002), the items for the different variables were intermingled in this section.

<table>
<thead>
<tr>
<th>TPB Construct</th>
<th>Survey Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome Evaluation (OE)</td>
<td>1-10</td>
</tr>
<tr>
<td>Behavioral Beliefs (BB)</td>
<td>33-41</td>
</tr>
<tr>
<td>Attitude – Direct</td>
<td>14, 17, 21, 25, 27</td>
</tr>
<tr>
<td>Normative Beliefs (NB)</td>
<td>59-63</td>
</tr>
<tr>
<td>Motivation to Comply (MC)</td>
<td>28-32</td>
</tr>
<tr>
<td>Subjective Norm – Direct</td>
<td>13, 20, 22, 26</td>
</tr>
<tr>
<td>Control Beliefs (CB)</td>
<td>43-50</td>
</tr>
<tr>
<td>Power of Control Beliefs (PC)</td>
<td>51-58</td>
</tr>
<tr>
<td>Level of Control – Direct</td>
<td>12, 16, 19, 24</td>
</tr>
<tr>
<td>Levels of Use (LU)</td>
<td>64-67</td>
</tr>
<tr>
<td>Intention (INT)</td>
<td>15, 18, 23</td>
</tr>
</tbody>
</table>

Levels of Computer Use

This study evaluated the theoretical constructs of attitude toward a behavior, subjective norm, perceived behavioral control, and behavioral intention in relation to levels of computer use by elementary teachers. The instrument development process described above is designed to measure and quantify attitude, subjective norm, perceived behavioral control, and behavioral intent. It was still necessary to have an instrument to measure teacher levels of computer use in some objective, quantifiable way for comparison of predicted intent to actual computer use. The Levels of Use (LU) assessment tool (Marcinkiewicz, 1991) was used to measure teacher levels of computer use based on a self-evaluation by the teacher. Permission was granted by the author to use
the Levels of Use instrument in this study. Marcinkiewicz (1993) provides background on the development of this instrument:

"The Levels of Use (LU) assessment. Computer use was the criterion of interest; it was operationally defined as the integration of computers in the classroom. The LU assessment (Marcinkiewicz, 1991) was used to categorize teacher’s level of use. The LU used the paired comparisons method because the levels of computer use that had been defined were mutually exclusive and exhaustive. Nunnally (1959) considered this method to be the "most exact psychophysical tool" (pp. 20-21) useful for precise information concerning judgments or preferences. The levels of utilization and integration were each represented by two items. One item from the utilization level was alternately paired with an item from the integration level. The response procedure used a forced-choice method. The design of the measure allowed the anticipation of the two patterns of response. Responses following either of the anticipated patterns indicated consistency; inconsistent responses were analyzed. Because subjects responded to each item twice, any inconsistent responses were readily evident. An item was included on the questionnaire as a measure with which criterion-related validity could be calculated for the LU. Respondents selected one statement from three that best described their use of computers in teaching. This item echoed the critical attribute of expendability of use as in the LU. A measure of association, Cohen’s kappa, was computed between the subjects’ responses to this item and their levels of use ($\kappa=.72$) to estimate the consistency of classification of the measures (Crocker & Algina, 1986; Suen 1990)” (Marcinkiewicz, 1993, pp. 225-227).

According to Marcinkiewicz (1993), this instrument is validated and has high reliability as measured with the Coefficient of Reproducibility (CR = .96). A CR of .90 is considered the criterion for demonstrating that the items of an assessment form an ordered scale of allowable response patterns (Torgerson, 1958; Bailey, 1987).

The LU assessment tool consists of four pairs with two cross-matched items each:

1. a. In my instruction, the use of the microcomputer is supplemental. 
b. The microcomputer is critical to the functioning of my instruction.

2. a. The use of the microcomputer is not essential in my instruction. 
b. For my teaching, the use of the microcomputer is indispensable.

3. a. The microcomputer is critical to the functioning of my instruction. 
b. The use of the microcomputer is not essential in my instruction.
4. a. For my teaching, the use of the microcomputer is indispensable.
   b. In my instruction, the use of the microcomputer is supplemental.

Teachers who do not use computers at all in their teaching were instructed to enter letter "c" on their response sheets for these items. This established them at the nonuse level. From Marcinkiewicz (1991, pp. 36-37), "The levels of utilization and integration are represented by two items each. One item from the utilization level is paired with an item from the integration level. The response procedure is forced choice; therefore, the subject is directed to select the statement that he or she most strongly feels is true to him or her. Because the subject was asked to respond to each of the items twice, any inconsistency in responding was readily evident". Using these criteria, a respondent's score can be either 4 or 8. Scores of 6 or 7 are possible, but they would indicate an inconsistency. A score of 4 would indicate the utilization category and 8 would indicate the integration category. The results from the LU instrument can be used to categorize teacher use of technology as nonuse, utilization, and integration. The utilization level is achieved when a teacher begins to use computers in their teaching. The integration level is realized when the teacher's computer use becomes critical to his or her teaching. Membership in these latter two categories is determined by how expendable computers are to a teacher's teaching (Marcinkiewicz, 1993).

**Procedures for Piloting the Instrument**

Using the results from the elicitation study, a pilot survey instrument was developed. As a first step, the pilot survey instrument was evaluated by domain experts for content validity. Based on their feedback (detailed in Content Validity section below), the pilot survey was then revised to improve focus, coverage, clarity, and readability. The pilot survey content was then organized and published using a computer desktop
publishing application. Once published, an optical character recognition program (OCR) software application was used to create an electronic template of the survey for later automated capture of the survey data. The pilot survey was next administered to a random sub-sample \( (n = 100) \) of the population of interest, and it was then evaluated for reliability and validity using a computer statistical software application. Based on statistical analysis, the pilot survey was revised and became the final survey instrument.

**Content Validity**

Content validity addresses the extent to which the instrument actually relates to the content of the area or issue under investigation (Gable, 1986). The best way to ensure content validity is to subject the instrument to judgmental validation by experts in the area (Wiersma, 1991; Nardi, 2003). The pilot survey instrument was submitted to six domain experts, prior to administration, for item analysis, review, and feedback relative to domain coverage. The domain experts were drawn from university and school district level instructional technology programs. Of the six domain experts invited to participate, four responded with feedback related to content validity. See Appendix F for a list of the domain experts who participated in the study. A cover letter (Appendix G) and pilot survey was sent via email to the domain experts. The domain experts provided helpful feedback and suggestions for improving the pilot version of the survey instrument on a form that was provided to them for this purpose (Appendix H). Their suggestions included the revision of some items, deletion of some items that were somewhat redundant, rewording of some items for consistency, clarification and refinement of a two scale descriptors, and recommendations for page layout of the survey. Based on this feedback revisions were made to the pilot survey instrument prior to distribution for the pilot study. The sample \( (n = 100) \) for the pilot study was randomly selected from the
population of interest. The pilot survey (Appendix J) was sent to the sample recipients, along with a cover letter, approved University of Florida Institutional Review Board form (Appendix B), and a return envelope, using the school district's courier-based mail system. The surveys were individually coded for tracking purposes. Approximately one week after the pilot survey was distributed, an email reminder and a paper reminder was sent to each recipient that had not returned their survey. Sixty-three (n = 63) of the 100 pilot surveys were returned by the deadline for an effective return rate of 63%. This higher than average return rate was attributed to the reminder sent out to pilot survey recipients, the convenience of the district courier-based mail system, and the fact that the survey was possibly viewed as an in-district study due to the role of the researcher in the school district as Coordinator of Instructional Technology.

Raw data from the pilot survey was captured using a scanner and the data file was exported into SPSS® Version 12.0 statistical software for analysis of descriptive statistics, reliability and validity.

Reliability

Internal consistency estimates of reliability and scale stability of the instrument were assessed using the coefficient alpha (Green, Salkind, & Akey, 2000; Netemeyer, Bearden, & Sharma, 2003) as calculated in the SPSS® statistical software program. The coefficient alpha (Cronbach, 1951) is an index of reliability associated with the variation accounted for by the true score of the "underlying construct." Alpha coefficients range in value from 0 to 1 and may be used to describe the reliability of factors extracted from dichotomous and/or multi-point formatted questionnaires or scales (i.e., rating scale: 1 = poor, 5 = excellent). The higher the score, the more reliable the generated scale is. Nunnaly (1978) has indicated 0.7 to be an acceptable reliability coefficient but lower
thresholds are sometimes used. Variables related to the Theory of Planned Behavior (TPB) can be evaluated directly through survey questions and indirectly through belief-based responses related to the constructs. Table 3-2 shows the constructs of the TPB, related pilot survey items, and their corresponding alpha coefficient.

<table>
<thead>
<tr>
<th>TPB Construct</th>
<th>Survey Items</th>
<th>Pilot Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome Evaluation (OE)</td>
<td>1-11</td>
<td>.678</td>
</tr>
<tr>
<td>Behavioral Beliefs (BB)</td>
<td>35-45</td>
<td>.823</td>
</tr>
<tr>
<td>Attitude – Direct</td>
<td>15,19,23,27,29</td>
<td>.932</td>
</tr>
<tr>
<td>Normative Beliefs (NB)</td>
<td>64-68</td>
<td>.944</td>
</tr>
<tr>
<td>Motivation to Comply (MC)</td>
<td>30-34</td>
<td>.796</td>
</tr>
<tr>
<td>Subjective Norm – Direct</td>
<td>14,18,22,24,28</td>
<td>.687</td>
</tr>
<tr>
<td>Control Beliefs (CB)</td>
<td>46-54</td>
<td>.553</td>
</tr>
<tr>
<td>Power of Control Beliefs (PC)</td>
<td>55-63</td>
<td>.581</td>
</tr>
<tr>
<td>Level of Control – Direct</td>
<td>13,17,21,26</td>
<td>.550</td>
</tr>
<tr>
<td>Levels of Use (LU)</td>
<td>69-72</td>
<td>.932</td>
</tr>
<tr>
<td>Intention (INT)</td>
<td>16,20,25</td>
<td>.910</td>
</tr>
</tbody>
</table>

As shown in Table 3-2, with the exception of the Perceived Behavioral Control variables (Control Beliefs, Power of Control Beliefs, and Level of Control – Direct), reliability was relatively high (Nunnally, 1978) for the constructs measured with the pilot survey instrument. Ajzen (2002) states that the direct measures in the TPB instrument should demonstrate reliability, but that the indirect measures may not, since they are belief-based, and thus more subjective. An item analysis of the pilot instrument was done using the SPSS® software and revisions were made to improve reliability. Revisions to the pilot survey instrument (Appendix J) included the elimination of items 11, 45, 53, and 63 to increase reliability for their corresponding construct measure. Instructions and an example were added for item 12 to enable respondents to better understand how to complete the grid for that item, which was in a different format than the other response types. Item 18 was eliminated because it did not contribute to the reliability of the
Perceived Behavioral Control (PBC) attribute it was intended to measure. Items 13, 17, 21, and 26 were revised in an attempt to strengthen reliability for the PBC direct measure. Items 55 through 62 were revised to make them more consistent and understandable.

And, finally, a “K” for kindergarten level was added to item 78 (grade level) in the demographic section. The elimination of items also required a renumbering of the revised pilot instrument. After changes were made, the revised version of the pilot survey instrument (Appendix K) was administered to a small random sample (n = 12) from the population for evaluation. Reliability for the revised pilot survey instrument is shown in Table 3-3.

Table 3-3. Revised Pilot Survey Measures, Item Numbers, and Alpha Coefficients (n = 12)

<table>
<thead>
<tr>
<th>TPB Construct</th>
<th>Survey Items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome Evaluation (OE)</td>
<td>1-10</td>
<td>.863</td>
</tr>
<tr>
<td>Behavioral Beliefs (BB)</td>
<td>33-41</td>
<td>.724</td>
</tr>
<tr>
<td>Attitude - Direct</td>
<td>14,17,21,25,27</td>
<td>.854</td>
</tr>
<tr>
<td>Normative Beliefs (NB)</td>
<td>59-63</td>
<td>.897</td>
</tr>
<tr>
<td>Motivation to Comply (MC)</td>
<td>28-32</td>
<td>.875</td>
</tr>
<tr>
<td>Subjective Norm - Direct</td>
<td>13,20,22,26</td>
<td>.652</td>
</tr>
<tr>
<td>Control Beliefs (CB)</td>
<td>43-50</td>
<td>.490</td>
</tr>
<tr>
<td>Power of Control Beliefs (PC)</td>
<td>51-58</td>
<td>.513</td>
</tr>
<tr>
<td>Level of Control - Direct</td>
<td>12,16,19,24</td>
<td>.145</td>
</tr>
<tr>
<td>Levels of Use (LU)</td>
<td>64-67</td>
<td>.985</td>
</tr>
<tr>
<td>Intention (INT)</td>
<td>15,18,23</td>
<td>.918</td>
</tr>
</tbody>
</table>

The statistical results from the revised pilot survey were somewhat inconclusive in terms of overall improved reliability, probably due to the small sample size (n = 12).

Increases in alpha occurred in Outcome Evaluation, Motivation to Comply, Levels of Use, and Intention. Behavioral Beliefs, Attitude – Direct, Normative Beliefs, Subjective Norm – Direct, Control Beliefs, Power of Control Beliefs, and Level of Control – Direct all decreased in alpha. What was clear from the statistical analysis was that the Perceived
Behavioral Control measure continued to reflect a low alpha coefficient, which indicated that the items still needed some improvement to adequately measure the construct. To this end, items 12, 16, 19 and 24 were completely worded for the final version of the survey as follows:

- **Item 12.** Using a computer in my classroom to present a lesson during instruction is within my control. True – False

- **Item 16.** I have control over using a computer in my classroom to present a lesson during instruction. Agree – Disagree

- **Item 19.** Factors beyond my control determine whether or not I can use a computer in my classroom to present a lesson during instruction. Disagree – Agree

- **Item 24.** The use of a computer in my classroom to present a lesson during instruction depends on factors beyond my control. True – False

The changes made to these items significantly increased the reliability for the control measure and specifics will be discussed below in relation to the final survey instrument. The revision of these four items were the only changes made to the second pilot survey instrument, which then became the final survey instrument (Appendix L).

Alpha coefficients for the final survey instrument are listed in Table 3-4.

<table>
<thead>
<tr>
<th>TPB Construct</th>
<th>Survey Items</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome Evaluation (OE)</td>
<td>1-10</td>
<td>.745</td>
</tr>
<tr>
<td>Behavioral Beliefs (BB)</td>
<td>33-41</td>
<td>.859</td>
</tr>
<tr>
<td>Attitude – Direct</td>
<td>14,17,21,25,27</td>
<td>.928</td>
</tr>
<tr>
<td>Normative Beliefs (NB)</td>
<td>59-63</td>
<td>.894</td>
</tr>
<tr>
<td>Motivation to Comply (MC)</td>
<td>28-32</td>
<td>.763</td>
</tr>
<tr>
<td>Subjective Norm – Direct</td>
<td>13,20,22,26</td>
<td>.756</td>
</tr>
<tr>
<td>Control Beliefs (CB)</td>
<td>43-50</td>
<td>.689</td>
</tr>
<tr>
<td>Power of Control Beliefs (PC)</td>
<td>51-58</td>
<td>.824</td>
</tr>
<tr>
<td>Level of Control – Direct</td>
<td>12,16,19,24</td>
<td>.789</td>
</tr>
<tr>
<td>Levels of Use (LU)</td>
<td>64-67</td>
<td>.935</td>
</tr>
<tr>
<td>Intention (INT)</td>
<td>15,18,23</td>
<td>.905</td>
</tr>
</tbody>
</table>
Table 3-5 provides a comparison of reliability measures for the pilot survey and the final survey instrument.

<table>
<thead>
<tr>
<th>TPB Construct</th>
<th>Pilot Survey (n = 63)</th>
<th>Final Survey (n = 203)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome Evaluation (OE)</td>
<td>.678</td>
<td>.745</td>
</tr>
<tr>
<td>Behavioral Beliefs (BB)</td>
<td>.823</td>
<td>.859</td>
</tr>
<tr>
<td>Attitude – Direct</td>
<td>.932</td>
<td>.928</td>
</tr>
<tr>
<td>Normative Beliefs (NB)</td>
<td>.944</td>
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</tr>
<tr>
<td>Motivation to Comply (MC)</td>
<td>.796</td>
<td>.763</td>
</tr>
<tr>
<td>Subjective Norm – Direct</td>
<td>.687</td>
<td>.756</td>
</tr>
<tr>
<td>Control Beliefs (CB)</td>
<td>.553</td>
<td>.689</td>
</tr>
<tr>
<td>Power of Control Beliefs (PC)</td>
<td>.581</td>
<td>.824</td>
</tr>
<tr>
<td>Level of Control – Direct</td>
<td>.550</td>
<td>.789</td>
</tr>
<tr>
<td>Levels of Use (LU)</td>
<td>.932</td>
<td>.935</td>
</tr>
<tr>
<td>Intention (INT)</td>
<td>.910</td>
<td>.905</td>
</tr>
</tbody>
</table>

Construct validity for the survey instrument was investigated by doing an item analysis to compute item discrimination, and by performing a factor analysis to identify groups of items that have variance in common. The dimensionality of the 13 items related to attitude toward the behavior, subjective norm, and perceived behavioral control was analyzed using confirmatory factor analysis. Three criteria were used to determine the number of factors to rotate: the a priori hypothesis that the measures were multidimensional, the scree test, and the interpretability of the factor solution. In factor analysis, variance of the factors is measured in Eigenvalues (Norusis, 2003). Eigenvalues are useful in determining how many factors should be used in the analysis (Green, Salkind & Akey, 2000). One criterion used to determine how many factors should be retained is to keep factors that have Eigenvalues greater than 1. A scree test is a graphic plot of Eigenvalues for a combination of variables. It frequently yields more accurate results than the Eigenvalue > 1 criteria by allowing the researcher to examine the plot of the Eigenvalues and retain all factors with values in the hard descent part of the plot.
before the Eigenvalues start to level off (Green, Salkind & Akey, 2000; Norusis, 2003). The scree plot for the TPB variables of ATT, SN, and PBC (Figure 3-1) descended sharply before leveling off at Factor Number 4, indicating that the initial hypothesis of multidimensionality was correct and suggesting three factors. Consequently, three factors were rotated using a Varimax rotation procedure. The rotated solution (Appendix O) yielded three interpretable factors; attitude, perceived behavioral control, and subjective norm. The attitude factor and the perceived behavioral control factor were clearly identifiable in the correlational analysis. For the subjective norm construct, two of the four items stood alone, and two of the items appeared to align with the attitude factor.

![Figure 3-1. Scree Plot of TPB Variable Factor Analysis.](image)

The final survey instrument consisted of 73 items. Six of the items captured demographic information including gender, age, number of years teaching, number of years using a computer, location of computer use, and grade level taught. The final
survey instrument also contained a coded field used to track which survey forms were returned.

Data Collection

After finalization of the survey instrument, it was distributed to the entire population of classroom-based elementary teachers \((n = 322)\) in the school district. The Salant and Dillman (1994) survey methodology was used in an effort to maximize response rate. All mailing and correspondence related to the study was distributed through the school district’s courier-based mail system. All elementary teachers received a personalized advance notice letter explaining the study and requesting their participation. Approximately one week later, the elementary teachers were sent a cover letter (Appendix M), the survey questionnaire (Appendix L), the approved University of Florida Institutional Review Board form (Appendix B), and a return envelope. Eight days after this mailing, a follow-up letter was sent to the teachers. This letter thanked those who had responded and requested a response from those who had not yet responded. Timing of the survey distribution was carefully considered so as not to conflict with other important events for elementary teachers such as statewide high-stakes testing. Of the total number of surveys distributed \((n = 322)\), 203 completed surveys were returned by the deadline for an effective return rate of 63%. It is interesting to note that this was the same return rate as the initial pilot study during instrument development. Like the pilot study, this higher than average return rate was attributed to the reminder sent out to pilot survey recipients, the convenience of the district courier-based mail system, and the fact that the survey was possibly viewed as an “in-district” study due to the role of the researcher in the school district as Coordinator of Instructional Technology. Raw data
from the final survey was captured using a scanner and the data file was then imported into SPSS® Version 12.0 statistical software for analysis.

Data Analysis

The variables of interest in this study were analyzed using descriptive statistics, correlations, and multiple linear regressions. Multiple regression and correlation statistical techniques are preferred over ANOVA techniques in non-experimental research because the former are not restricted by the conditions of collecting the data, the way in which subjects are assigned, or the nature or type of data collected (Keppel & Zedeck, 1989). The Pearson correlation coefficient (r) was used because it facilitates an understanding of the linear relationship between two variables (Keppel & Zedeck, 1989).

Using correlational analysis (r), the direction and strength of a relationship between two variables can be evaluated. The Pearson correlation coefficient (r) was used to analyze the variable relationships in this study between attitude (ATT) and intention (INT), subjective norm (SN) and intention (INT), perceived behavioral control (PBC) and intention (INT), and intention (INT) to levels of use (LU).

Multiple linear regression is a more advanced statistical technique that facilitates the evaluation of multiple relationships among variables. The multiple correlation (R) is an index that indicates the strength of the relationship between the predicted scores and the observed scores for a sample (Green, Salkind & Akey, 2000). It enables the prediction of values of a dependent variable as a linear combination of the values of multiple independent (predictor) variables (Norusis, 2003). Because of this capability, multiple linear regression was used to analyze the combined influence of attitude (ATT), subjective norm (SN) and perceived behavioral control (PBC) on the TPB behavioral intent (INT) variable.
Because this is a non-experimental study, the variables are referred to as predictor and criterion versus independent and dependent (Green, Salkind & Akey, 2000). The predictor variables of interest are attitude toward the behavior (attitude), subjective norm, perceived behavioral control, and behavioral intent. Demographic information was also captured including age, gender, number of years teaching, number of years using computers, and grade level. The criterion variable is computer use as established by the Levels of Use (LU) assessment tool. Three levels of use were identified: nonuse, utilization, and integration. Interaction of the predictor and criterion variables was analyzed using a regression model. Results from the data analysis are detailed in Chapter 4.
CHAPTER 4
RESULTS

The Theory of Planned Behavior (TPB) (Ajzen, 1988, 1991) can be used to predict behavior based on the antecedent variables of attitude, subjective norm, and perceived behavioral control. The purpose of my study was to test this predictive theory on the instructional use of computers by elementary school teachers. A survey instrument was developed and validated for use in this study. It was necessary to create a survey instrument for this research because a search of the literature revealed the unavailability of a validated instrument to test the Theory of Planned Behavior in relation to elementary teacher use of computers for instruction. Descriptive statistics, correlations, and multiple linear regression statistical analysis were used to examine the relationship between the predictor variables of attitude, subjective norm, perceived behavioral control, and behavioral intention to the criterion variable of computer use. The purpose of this chapter is to share the results from this study and it will include a review of the research questions, descriptive statistics for individual survey items, demographic characteristics of the population, statistical analysis of the predictor and criterion variables, statistical results of the hypotheses, and a summary.

Research Questions

The research questions for this study were

1. What is the relationship between attitude toward the behavior and an elementary teacher’s intention to use computers in classroom instruction?

2. What is the relationship between subjective norm and an elementary teacher’s intention to use computers in classroom instruction?
3. What is the relationship between perceived behavioral control and an elementary teacher’s intention to use computers in classroom instruction?

4. Do the constructs attitude toward the behavior, subjective norm, and perceived behavioral control have equal influence on an elementary teacher’s intent to use computers in classroom instruction?

5. Is there a correlation between an elementary teacher’s intent to use a computer for instruction and his or her actual use of a computer for instruction?

Survey Item Responses

A survey instrument was developed for this study using procedures recommended by Ajzen (Ajzen & Fishbein, 1980; Ajzen, 1988) for Theory of Planned Behavior (TPB) research. The survey development process, described in Chapter 3, addressed reliability during the development process, content validity, and construct validity. Reliability for the final survey instrument was determined by using the alpha coefficient. Overall reliability of the final survey instrument was high, at \( \alpha = .928 \), ranging from .689 to .935 for individual TPB constructs. Nunnally (1978) has indicated \( \alpha = .70 \) to be an acceptable reliability coefficient. Table 4-1 reflects the final survey items, response options, scaling, means, and standard deviations of the final survey instrument.

<table>
<thead>
<tr>
<th>Item#</th>
<th>Variable Name</th>
<th>Items, Response Options and Scaling</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
</table>
| 1     | oe1           | Holding students’ attention and keeping them interested is . . . 
(7) good – bad (1) | 6.52 | 0.72 |
| 2     | oe2           | Reducing student discipline problems in the classroom is . . . 
(7) good – bad (1) | 6.19 | 1.11 |
| 3     | oe3           | Enhancing the curriculum with the vast amount of information available from the Internet is . . . 
(7) good – bad (1) | 6.12 | 0.74 |
| 4     | oe4           | Demonstrating to students how computers can be used for learning is . . . 
(7) good – bad (1) | 6.28 | 0.79 |
| 5     | oe5           | Presenting a lesson to the whole class at once is . . . 
(7) good – bad (1) | 5.86 | 1.08 |
| 6     | oe6           | Helping students develop needed computer literacy skills because computers are an integral part of our society is . . . 
(7) good – bad (1) | 6.44 | 0.75 |
<table>
<thead>
<tr>
<th>Item #</th>
<th>Variable Name</th>
<th>Items, Response Options and Scaling</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>oe7</td>
<td>Encouraging student participation in the lesson is . . . (7) good – bad (1)</td>
<td>6.46</td>
<td>0.80</td>
</tr>
<tr>
<td>8</td>
<td>oe8</td>
<td>Accommodating different student learning styles is . . . (7) good – bad (1)</td>
<td>6.44</td>
<td>0.84</td>
</tr>
<tr>
<td>9</td>
<td>oe9</td>
<td>Having technical problems with computers during my lesson is . . . (7) good – bad (1)</td>
<td>2.27</td>
<td>1.31</td>
</tr>
<tr>
<td>10</td>
<td>oe10</td>
<td>Enhancing the learning experience of my students is . . . (7) good – bad (1)</td>
<td>6.55</td>
<td>0.65</td>
</tr>
<tr>
<td>11</td>
<td>pastbeh</td>
<td>During the current school year, how many times have you used a computer to present a lesson?</td>
<td>9.19</td>
<td>18.28</td>
</tr>
<tr>
<td>12</td>
<td>pbc1</td>
<td>Using a computer in my classroom to present a lesson during instruction is within my control. (7) true – false (1)</td>
<td>5.54</td>
<td>1.80</td>
</tr>
<tr>
<td>13</td>
<td>sn1</td>
<td>Most people who are important to me think that I _________ use a computer to present a lesson in my classroom during instruction. (7) should – should not (1)</td>
<td>4.88</td>
<td>1.32</td>
</tr>
<tr>
<td>14</td>
<td>att1</td>
<td>For me to use a computer to present a lesson in my classroom during instruction is . . . (1) harmful – beneficial (7)</td>
<td>5.48</td>
<td>1.14</td>
</tr>
<tr>
<td>15</td>
<td>int1</td>
<td>I intend to use a computer to present a lesson in my classroom during instruction. (1) unlikely – likely (7)</td>
<td>4.84</td>
<td>1.80</td>
</tr>
<tr>
<td>16</td>
<td>pbc2</td>
<td>I have control over using a computer in my classroom to present a lesson during instruction. (7) agree – disagree (1)</td>
<td>5.44</td>
<td>1.89</td>
</tr>
<tr>
<td>17</td>
<td>att2</td>
<td>For me to use a computer to present a lesson in my classroom during instruction is . . . (7) pleasant – unpleasant (1)</td>
<td>5.05</td>
<td>1.55</td>
</tr>
<tr>
<td>18</td>
<td>int2</td>
<td>I will try to use a computer to present a lesson in my classroom during instruction. (7) true – false (1)</td>
<td>5.46</td>
<td>1.65</td>
</tr>
<tr>
<td>19</td>
<td>pbc3</td>
<td>Factors beyond my control determine whether or not I can use a computer in my classroom to present a lesson during instruction. (7) disagree – agree (1)</td>
<td>3.73</td>
<td>2.06</td>
</tr>
<tr>
<td>20</td>
<td>sn2</td>
<td>The people in my life whose opinions I value would _________ of my using a computer to present a lesson in my classroom during instruction. (7) approve – disapprove (1)</td>
<td>6.19</td>
<td>1.12</td>
</tr>
<tr>
<td>21</td>
<td>att3</td>
<td>For me to use a computer to present a lesson in my classroom during instruction is . . . (7) good – bad (1)</td>
<td>5.76</td>
<td>1.33</td>
</tr>
<tr>
<td>22</td>
<td>sn3</td>
<td>Most people who are important to me use computers personally or in their work. (7) true – false (1)</td>
<td>6.32</td>
<td>1.18</td>
</tr>
<tr>
<td>23</td>
<td>int3</td>
<td>I plan to use a computer to present a lesson in my classroom during instruction. (1) disagree – agree (7)</td>
<td>5.20</td>
<td>1.72</td>
</tr>
<tr>
<td>24</td>
<td>pbc4</td>
<td>The use of a computer in my classroom to present a lesson during instruction depends on factors beyond my control. (1) true – false (7)</td>
<td>4.01</td>
<td>2.01</td>
</tr>
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<td>-------------------------------------</td>
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<td>-----</td>
</tr>
<tr>
<td>25</td>
<td>att4</td>
<td>For me to use a computer to present a lesson in my classroom during instruction is . . . (1) worthless – valuable (7)</td>
<td>5.61</td>
<td>1.30</td>
</tr>
<tr>
<td>26</td>
<td>sn4</td>
<td>The people in my life whose opinions I value computers personally or in their work. (7) use – do not use (1)</td>
<td>6.32</td>
<td>1.09</td>
</tr>
<tr>
<td>27</td>
<td>att5</td>
<td>For me to use a computer to present a lesson in my classroom during instruction is . . . (7) enjoyable – not enjoyable (1)</td>
<td>5.12</td>
<td>1.61</td>
</tr>
<tr>
<td>28</td>
<td>mc1</td>
<td>Generally speaking, how much do you want to do what your principal thinks you should do? (1) not at all – very much (7)</td>
<td>6.15</td>
<td>1.03</td>
</tr>
<tr>
<td>29</td>
<td>mc2</td>
<td>Generally speaking, how much do you want to do what parents of your students think you should do? (1) not at all – very much (7)</td>
<td>5.27</td>
<td>1.16</td>
</tr>
<tr>
<td>30</td>
<td>mc3</td>
<td>Generally speaking, how much do you want to do what other teachers think you should do? (1) not at all – very much (7)</td>
<td>4.69</td>
<td>1.31</td>
</tr>
<tr>
<td>31</td>
<td>mc4</td>
<td>Generally speaking, how much do you want to do what your students think you should do? (1) not at all – very much (7)</td>
<td>4.81</td>
<td>1.32</td>
</tr>
<tr>
<td>32</td>
<td>mc5</td>
<td>Generally speaking, how much do you want to do what your school technology and/or media specialist thinks you should do? (1) not at all – very much (7)</td>
<td>5.08</td>
<td>1.24</td>
</tr>
<tr>
<td>33</td>
<td>bb1</td>
<td>My use of a computer to present a lesson in my classroom during instruction will hold students’ attention and keep them interested. (7) likely – unlikely (1)</td>
<td>5.83</td>
<td>1.13</td>
</tr>
<tr>
<td>34</td>
<td>bb2</td>
<td>My use of a computer to present a lesson in my classroom during instruction will reduce student discipline problems. (7) likely – unlikely (1)</td>
<td>4.94</td>
<td>1.19</td>
</tr>
<tr>
<td>35</td>
<td>bb3</td>
<td>My use of a computer to present a lesson in my classroom during instruction will enhance the curriculum with the vast amount of information available from the Internet. (7) likely – unlikely (1)</td>
<td>5.66</td>
<td>1.13</td>
</tr>
<tr>
<td>36</td>
<td>bb4</td>
<td>My use of a computer to present a lesson in my classroom during instruction will demonstrate to students how computers can be used for learning. (7) likely – unlikely (1)</td>
<td>6.11</td>
<td>0.97</td>
</tr>
<tr>
<td>37</td>
<td>bb5</td>
<td>My use of a computer to present a lesson in my classroom during instruction will enable me to present a lesson to the whole class at once. (7) likely – unlikely (1)</td>
<td>5.84</td>
<td>1.45</td>
</tr>
<tr>
<td>38</td>
<td>bb6</td>
<td>My use of a computer to present a lesson in my classroom during instruction will help students develop the computer literacy skills they need in today’s society. (7) likely – unlikely (1)</td>
<td>5.61</td>
<td>1.33</td>
</tr>
<tr>
<td>39</td>
<td>bb7</td>
<td>My use of a computer to present a lesson in my classroom during instruction will encourage student participation in the lesson. (7) likely – unlikely (1)</td>
<td>5.66</td>
<td>1.12</td>
</tr>
<tr>
<td>Item #</td>
<td>Variable</td>
<td>Items, Response Options and Scaling</td>
<td>M</td>
<td>SD</td>
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</tr>
<tr>
<td>40</td>
<td>bb8</td>
<td>My use of a computer to present a lesson in my classroom during instruction will accommodate different student learning styles. (7) likely – unlikely (1)</td>
<td>5.46</td>
<td>1.22</td>
</tr>
<tr>
<td>41</td>
<td>bb9</td>
<td>My use of a computer to present a lesson in my classroom during instruction will increase the chances that my lesson will be disrupted because of technical problems. (1) likely – unlikely (7)</td>
<td>3.37</td>
<td>1.43</td>
</tr>
<tr>
<td>42</td>
<td>bb10</td>
<td>My use of a computer to present a lesson in my classroom during instruction will enhance the learning experience of my students. (7) likely – unlikely (1)</td>
<td>5.85</td>
<td>0.92</td>
</tr>
<tr>
<td>43</td>
<td>cb1</td>
<td>Having enough technology equipment in my classroom is important. (7) agree – disagree (1)</td>
<td>6.44</td>
<td>0.87</td>
</tr>
<tr>
<td>44</td>
<td>cb2</td>
<td>Training on the use of technology in instruction is important. (7) agree – disagree (1)</td>
<td>6.64</td>
<td>0.62</td>
</tr>
<tr>
<td>45</td>
<td>cb3</td>
<td>Adequate time is needed to try new or different instructional strategies in the classroom. (7) agree – disagree (1)</td>
<td>6.72</td>
<td>0.55</td>
</tr>
<tr>
<td>46</td>
<td>cb4</td>
<td>Technical glitches and equipment problems are a hindrance when using technology in the classroom. (7) agree – disagree (1)</td>
<td>5.85</td>
<td>1.25</td>
</tr>
<tr>
<td>47</td>
<td>cb5</td>
<td>A teacher needs support to use technology in the classroom. (7) agree – disagree (1)</td>
<td>6.47</td>
<td>0.80</td>
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<tr>
<td>48</td>
<td>cb6</td>
<td>A teacher needs knowledge on how to use technology in the classroom. (7) agree – disagree (1)</td>
<td>6.76</td>
<td>0.50</td>
</tr>
<tr>
<td>49</td>
<td>cb7</td>
<td>Classroom technology should be easy to learn and use. (7) agree – disagree (1)</td>
<td>6.61</td>
<td>0.56</td>
</tr>
<tr>
<td>50</td>
<td>cb8</td>
<td>Adequate resources are needed to use technology in the classroom. (7) agree – disagree (1)</td>
<td>6.67</td>
<td>0.74</td>
</tr>
<tr>
<td>51</td>
<td>pc1</td>
<td>Having enough technology equipment in my classroom would make it ___________ to use a computer to present a lesson during instruction. (1) more difficult – easier (7)</td>
<td>6.13</td>
<td>1.12</td>
</tr>
<tr>
<td>52</td>
<td>pc2</td>
<td>Having more training on the use of technology in instruction would make it ___________ to use a computer in my classroom to present a lesson during instruction. (1) more difficult – easier (7)</td>
<td>6.08</td>
<td>1.08</td>
</tr>
<tr>
<td>53</td>
<td>pc3</td>
<td>Having more time would make it ___________ to use a computer in my classroom to present a lesson during instruction. (1) more difficult – easier (7)</td>
<td>6.17</td>
<td>1.10</td>
</tr>
<tr>
<td>54</td>
<td>pc4</td>
<td>Having fewer technical glitches and equipment problems would make it ___________ to use a computer in my classroom to present a lesson during instruction. (1) more difficult – easier (7)</td>
<td>6.18</td>
<td>1.03</td>
</tr>
<tr>
<td>Item</td>
<td>Variable</td>
<td>Items, Response Options and Scaling</td>
<td>M</td>
<td>SD</td>
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</tr>
<tr>
<td>55</td>
<td>pc5</td>
<td>Having support would make it _______ to use a computer in my classroom to present a lesson during instruction. (1) more difficult – easier (7)</td>
<td>6.25</td>
<td>0.88</td>
</tr>
<tr>
<td>56</td>
<td>pc6</td>
<td>Lack of knowledge on how to use technology would make it _______ to use a computer in my classroom to present a lesson during instruction. (1) more difficult – easier (7)</td>
<td>6.32</td>
<td>1.07</td>
</tr>
<tr>
<td>57</td>
<td>pc7</td>
<td>Having classroom technology that is easier to learn and use would make it _______ to use a computer in my classroom to present a lesson during instruction. (1) more difficult – easier (7)</td>
<td>6.28</td>
<td>0.88</td>
</tr>
<tr>
<td>58</td>
<td>pc8</td>
<td>Having adequate resources would make it _______ to use a computer in my classroom to present a lesson during instruction. (1) more difficult – easier (7)</td>
<td>6.27</td>
<td>0.91</td>
</tr>
<tr>
<td>59</td>
<td>nb1</td>
<td>My principal thinks that I should use a computer to present a lesson in my classroom during instruction. (7) likely – unlikely (1)</td>
<td>4.59</td>
<td>1.36</td>
</tr>
<tr>
<td>60</td>
<td>nb2</td>
<td>Parents of my students think that I should use a computer to present a lesson in my classroom during instruction. (7) likely – unlikely (1)</td>
<td>4.19</td>
<td>1.21</td>
</tr>
<tr>
<td>61</td>
<td>nb3</td>
<td>Other teachers think that I should use a computer to present a lesson in my classroom during instruction. (7) likely – unlikely (1)</td>
<td>4.17</td>
<td>1.12</td>
</tr>
<tr>
<td>62</td>
<td>nb4</td>
<td>My students think that I should use a computer to present a lesson in my classroom during instruction. (7) likely – unlikely (1)</td>
<td>4.57</td>
<td>1.45</td>
</tr>
<tr>
<td>63</td>
<td>nb5</td>
<td>My school technology and/or media specialist thinks that I should use a computer to present a lesson in my classroom during instruction. (7) likely – unlikely (1)</td>
<td>4.91</td>
<td>1.48</td>
</tr>
<tr>
<td>64</td>
<td>lu1</td>
<td>a. In my instruction, the use of the computer is supplemental. (value=1)</td>
<td>0.94</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. The computer is critical to the functioning of my instruction. (value=2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. I do not use a computer in my teaching. (value=0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>lu2</td>
<td>a. The use of the computer is not essential in my instruction. (value=1)</td>
<td>1.07</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. For my teaching, the use of the computer is indispensable. (value=2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. I do not use a computer in my teaching. (value=0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>lu3</td>
<td>a. The computer is critical to the functioning of my instruction. (value=2)</td>
<td>1.04</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. The use of the computer is not essential in my instruction. (value=1)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>c. I do not use a computer in my teaching. (value=0)</td>
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Table 4-1. Continued

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<th>M</th>
<th>SD</th>
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<tbody>
<tr>
<td>67</td>
<td>lu4</td>
<td>a. For my teaching, the use of the computer is indispensable. (value=2)</td>
<td>0.97</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. In my instruction, the use of the computer is supplemental. (value=1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. I do not use a computer in my teaching. (value=0)</td>
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Demographic Characteristics of Respondents

The population of interest for this study included all classroom-based elementary teachers (n = 322) in a medium-sized school district in central Florida. Two hundred three (n = 203) useable surveys were returned for an effective return rate of 63%. Of the respondents, 93.1% (n = 189) were female and 6.9% (n = 14) were male. This difference in response rates by gender represents the reality that the vast majority of K-5 elementary school teachers are female, and this result is representative of the population at large, which was 94.1% female and 5.9% male. Respondents ranged in age from 22 years to 64 years old, with the mean age being 43 years old. Years teaching ranged from 1 year to 40 years, and the average years teaching from respondents was 14.2 years. Years using a computer ranged from 0 to 25. The overall average of years using a computer from the sample was 12.4 years. Of the total respondents, none (n = 0) reported using a computer at home only. Six percent of teachers (n = 13) reported using a computer only at school, and 79% of teachers (n = 160) reported using a computer at home and at school. These results suggest that approximately 15% of the sample (100% - 85% reported above) do not use a computer at all, either at home or at school. This assumption is somewhat consistent with the levels of non-computer use (13.3%) that was reported on the Levels of Use measures of the survey, which will be discussed below. Grade level taught by the teachers in the sample ranged from Pre-Kindergarten through 5th Grade. Demographic results are shown in Table 4-2.
Table 4-2. Demographic Characteristics of Respondents

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N</th>
<th>%</th>
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<tr>
<td><strong>Gender</strong></td>
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<tr>
<td>Female</td>
<td>189</td>
<td>93.1</td>
</tr>
<tr>
<td>Male</td>
<td>14</td>
<td>6.9</td>
</tr>
<tr>
<td><strong>Age</strong></td>
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<td></td>
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<tr>
<td>20 – 29</td>
<td>29</td>
<td>14.3</td>
</tr>
<tr>
<td>30 – 39</td>
<td>47</td>
<td>23.2</td>
</tr>
<tr>
<td>40 – 49</td>
<td>62</td>
<td>30.5</td>
</tr>
<tr>
<td>50 – 59</td>
<td>55</td>
<td>27.1</td>
</tr>
<tr>
<td>60 – 69</td>
<td>10</td>
<td>4.9</td>
</tr>
<tr>
<td><strong>Years Teaching</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 – 5</td>
<td>43</td>
<td>21.2</td>
</tr>
<tr>
<td>6 – 10</td>
<td>44</td>
<td>21.7</td>
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<tr>
<td>11 – 15</td>
<td>39</td>
<td>19.2</td>
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<td>16 – 20</td>
<td>29</td>
<td>14.3</td>
</tr>
<tr>
<td>21 – 25</td>
<td>22</td>
<td>10.8</td>
</tr>
<tr>
<td>26 – 30</td>
<td>12</td>
<td>5.9</td>
</tr>
<tr>
<td>31 – 35</td>
<td>10</td>
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<tr>
<td>36 – 40</td>
<td>4</td>
<td>2.0</td>
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<tr>
<td><strong>Years Using Computer</strong></td>
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<tr>
<td>0 – 5</td>
<td>21</td>
<td>10.3</td>
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<td>6 – 10</td>
<td>72</td>
<td>35.5</td>
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<td>11 – 15</td>
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<td>16 – 20</td>
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<td>21 – 25</td>
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<tr>
<td>26 – 30</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Where Computer Used</strong></td>
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<tr>
<td>Home Only</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>School Only</td>
<td>13</td>
<td>6.4</td>
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<tr>
<td>Home and School</td>
<td>190</td>
<td>93.6</td>
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<td><strong>Grade Level Taught</strong></td>
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<tr>
<td>Pre-K</td>
<td>10</td>
<td>4.9</td>
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<tr>
<td>K</td>
<td>23</td>
<td>11.3</td>
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<tr>
<td>1</td>
<td>35</td>
<td>17.2</td>
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<tr>
<td>2</td>
<td>32</td>
<td>15.8</td>
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<td>14.8</td>
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<td>5</td>
<td>32</td>
<td>15.8</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>2.0</td>
</tr>
</tbody>
</table>
Criterion Variable

The criterion variable for this study was levels of computer use. The Levels of Use (LU) assessment tool (Marcinkiewicz, 1991) was used for this measure. The LU instrument indicates three categories of computer use: non-use, utilization, and integration. A score of 0 indicates non-use, a score of 4 indicates the utilization category, and a score of 8 indicates the integration category. While scores other than 0, 4, or 8 are possible, they indicate an inconsistency that makes it difficult, if not impossible, to ascertain an accurate level of use. In terms of computer use, the non-use level is axiomatic. The utilization level is achieved when a teacher begins to use computers in their teaching, and the integration level is realized when the teacher’s computer use becomes critical to his or her teaching.

Levels of use results are reported in Table 4-3. Of the total respondents, 13.3% of the teachers (n = 27) indicated the non-use category. Fifty-nine percent (59.1%) of the teachers (n = 120) indicated the utilization level, and 8.4% of the teachers (n = 17) indicated the integration level. Nineteen percent (19.2%) of the respondents (n = 39) indicated LU scores other than 0, 4 or 8, which made it impossible to accurately categorize their level of computer use. These responses were labeled “Uncertain” in Table 4-3. For statistical analysis the LU score was treated as a continuous, versus a categorical, measure.

<table>
<thead>
<tr>
<th>Table 4-3. Levels of Use Reported</th>
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<tbody>
<tr>
<td>Levels of Use</td>
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<tr>
<td>Non-User</td>
</tr>
<tr>
<td>Utilization Level</td>
</tr>
<tr>
<td>Integration Level</td>
</tr>
<tr>
<td>Uncertain</td>
</tr>
</tbody>
</table>
Predictor Variables

This section will address the relationship of indirect measures to direct measures in a TPB study and it will include a description of how indirect measures were calculated. The section will also include correlations between the indirect and direct measures for the predictor variables of this study.

The premise of the Theory of Planned Behavior (TPB) is based on an individual’s beliefs about a particular behavior, including behavioral beliefs, normative beliefs, and control beliefs. Behavioral beliefs are the basis for an individual’s attitude toward a behavior, whether they have a positive or negative evaluation of it. Normative beliefs are the basis for an individual’s subjective norm toward a behavior, that is, what they perceive significant others expect from them in regard to that behavior. And control beliefs are the basis for an individual’s perceived behavioral control toward a particular behavior; whether or not they feel they have the resources or means to perform the behavior. It is difficult to directly measure relevant, or salient (Ajzen, 1988) beliefs, in relation to a behavior because these beliefs can change due to time, experience, and varying contexts. For this reason, indirect, or belief-based, measures of the TPB constructs are measured in addition to direct measures of the constructs. Even though either calculation, indirect or direct, can be used to predict intention, direct measures are usually preferred because the intention construct is assessed directly (Ajzen, 2004). In the Theory of Planned Behavior (TPB), belief-based (indirect) and direct measures of attitude, subjective norm, and perceived behavioral control are alternative ways of measuring the same underlying constructs. These two types of measures should correlate according to Ajzen (2002). A positive correlation between the belief-based (indirect) measure and direct measure of a particular TPB construct provides evidence that the direct measure is a reflection of an individual’s salient beliefs toward that behavior. A
correlational analysis was performed on the belief-based measures and direct measures of attitude, subjective norm, and perceived behavioral control. The indirect measures for each construct were calculated using the formulas provided by Ajzen (2002).

**Attitude**

Attitude toward the behavior is the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question (Ajzen, 1988, 1991). Using Ajzen’s (1988) methodology, two items comprise an indirect measure of attitude; a behavioral belief \( b \) and the evaluation of an outcome related to that belief \( e \). The scores for the behavioral belief and corresponding outcome evaluation are multiplied, and the total of all indirect measures related to that variable are summed, resulting in an overall value for the indirect measure of attitude. The belief-based measure of attitude is shown in Figure 4-1.

\[
    A_b = \sum b_i e_i
\]

- \( A_b = \) Attitude toward behavior \( B \).
- \( b_i = \) Belief that performing behavior \( B \) will lead to outcome \( i \).
- \( e_i = \) Evaluation of outcome \( i \).
- \( \sum \) = Sum is over \( n \) salient beliefs.

Figure 4-1. Belief-based Measure of Attitude.

There is no a priori way to determine the optimal scaling of the items that make up belief-based measures (Ajzen, 2002). Scaling analyses were performed for all three TPB constructs using both unipolar (1 to 7) and bipolar (-3 to +3) scoring. Ajzen (2002) recommends retaining the scores that produce the stronger correlation between belief-based and direct attitude measures. Unipolar x unipolar scoring was used for the belief-based attitude measure. Table 4-4 shows descriptive statistics for the belief-based attitude measure.
Subjective Norm

Subjective norm is the perceived social pressure to perform or not perform a particular behavior (Ajzen, 1988, 1991). Using Ajzen’s (1988) methodology, two items comprise an indirect measure of subjective norm; a normative belief related to a referent \( (b) \) and the person’s motivation to comply with that referent \( (m) \). The scores for the normative belief and corresponding motivation to comply are multiplied, and the total of all indirect measures related to that variable are summed, resulting in an overall value for the indirect measure of subjective norm. The belief-based measure of subjective norm is show in Figure 4-2.

\[
SN \propto \sum_{j} b_j m_j
\]

\( SN \) = Subjective norm.

\( b_j \) = Normative belief concerning referent \( j \).

\( m_j \) = Person’s motivation to comply with referent \( j \).

\( n \) = Number of salient normative beliefs.

Figure 4-2. Belief-based Measure of Subjective Norm.

Unipolar x unipolar scoring was used for the belief-based subjective norm measure. Table 4-5 shows descriptive statistics for the belief-based subjective norm measure.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>SN_UU_TOT</td>
<td>117.98</td>
<td>38.45</td>
</tr>
</tbody>
</table>

Perceived Behavioral Control

Perceived behavioral control is a person’s perception of the ease or difficulty of performing the behavior of interest (Ajzen, 1988, 1991). Using Ajzen’s (1988) methodology, two items comprise an indirect measure of perceived behavioral control; a control belief \( (C) \) and the perceived power of the control factor \( (P) \). The scores for the control belief and
corresponding perceived power of the control factor are multiplied, and the total of all indirect measures related to that variable are summed, resulting in an overall value for the indirect measure of perceived behavioral control. The belief-based measure of perceived behavioral control is shown in Figure 4-3.

\[ PBC \propto \sum_{i=1}^{n} C_i P_i \]

\( PBC \) = Perceived behavioral control
\( C \) = Control belief
\( P \) = Perceived power of the particular control factor to facilitate or inhibit performance of the behavior.
\( n \) = Salient control beliefs

Figure 4-3. Belief-based Measure of Perceived Behavioral Control.

Unipolar x bipolar scoring was used for the belief-based control measure. Table 4-6 shows descriptive statistics for the belief-based perceived behavioral control measure.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBC_UB_TOT</td>
<td>117.24</td>
<td>37.62</td>
</tr>
</tbody>
</table>

The correlational analysis showed mixed results for the belief-based and direct measures of attitude, subjective norm, and perceived behavioral control (Table 4-7). For attitude, the correlation for both measures was significant at \( r(201) = .62, p < .01 \). For subjective norm, the correlation for both measures was significant at \( r(201) = .36, p < .01 \). For perceived behavioral control, the correlation for both measures was not significant at \( r(201) = .02, p = .753 \). It is unclear why there was a lack of correlation between the belief-based (indirect) measures and the direct measures for the perceived behavioral control factor.

An example of a direct measure of this factor is item 12 of the final survey: “Using a computer in my classroom to present a lesson during instruction is within my control. true – false”. An example of indirect items for PBC include item 45, “Adequate time is needed to
try new or different instructional strategies in the classroom. agree – disagree” which is a
ccontrol belief statement, and the corresponding item 53, “Having more time would make it
more difficult – easier to use a computer in my classroom to present a lesson during
instruction.”, which is a power of control measure. It is possible that the phrasing of the
indirect items for this factor indicated a belief among respondents (based on information
captured in the elicitation study), but that they may not have perceived time as an element of
control related to this behavior. The same might be true for other PBC indirect measures that
addressed resources, training, technical problems, support, knowledge, and ease of use. The
lack of correlation between the PBC belief-based and direct items did not influence the
results of this study, because the direct measures appeared to more clearly address the control
construct, and, based on the recommendation of Aizen (2004), only the direct item measures
were used for hypothesis testing. The nature of the PBC indirect measures will be addressed
in the recommendations for further study section in Chapter 5.

Table 4-7. Correlation of Belief-based and Direct Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Indirect Variable</th>
<th>Direct Variable</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>AT_UU_TOT</td>
<td>ATT_DM_TOT</td>
<td>.62*</td>
</tr>
<tr>
<td>Subjective Norm</td>
<td>SN_UU_TOT</td>
<td>SN_SM_TOT</td>
<td>.36*</td>
</tr>
<tr>
<td>Perceived Behavioral Control</td>
<td>PBC_USB_TOT</td>
<td>PBC_DM_TOT</td>
<td>.02</td>
</tr>
</tbody>
</table>

*p < .01

Appendix P shows the overall construct reliability, correlations, and relationships between
the belief-based and direct measures on the final survey instrument.

Aizen (2004) suggests that either indirect or direct measures can be used to predict
intention, but because intentions are assessed directly, direct measures are usually preferred
for the sake of consistency. The direct measures of attitude, subjective norm, perceived
behavioral control, and behavioral intention were used for this statistical analysis. The data
were analyzed using Pearson product-moment correlation coefficients (r) and multiple linear regressions. The relevant statistics are presented in summary tables below.

**Statistical Analysis**

This section will address the research questions and hypotheses of this study. Correlational and multiple linear regression statistical procedures were used for hypothesis testing.

**Research Question 1.** What is the relationship between attitude toward the behavior and an elementary teacher’s intention to use computers in classroom instruction?

**Hypothesis 1.** There is no correlation between attitude toward the behavior and behavioral intention to use computers by elementary teachers.

A correlation coefficient was computed for the attitude measure and the intention measure. The correlation between the attitude measure and the intention measure was significant, \( r (201) = .80, p < .001 \) (Table 4-8). Therefore, this null hypothesis was rejected.

**Research Question 2.** What is the relationship between subjective norm and an elementary teacher’s intention to use computers in classroom instruction?

**Hypothesis 2.** There is no correlation between subjective norm and behavioral intention to use computers by elementary teachers.

A correlation coefficient was computed for the subjective norm measure and the intention measure. The correlation between the subjective norm measure and the intention measure was significant, \( r (201) = .53, p < .001 \) (Table 4-8). Therefore, this null hypothesis was rejected.

**Research Question 3.** What is the relationship between perceived behavioral control and an elementary teacher’s intention to use computers in classroom instruction?
Hypothesis 3. There is no correlation between perceived behavioral control and behavioral intention to use computers by elementary teachers.

A correlation coefficient was computed for the perceived behavioral control measure and the intention measure. The correlation between the perceived behavioral control measure and the intention measure was significant, r (201) = .32, p < .001 (Table 4-8). Therefore, this null hypothesis was rejected.

Table 4-8. Correlations among Attitude, Subjective Norm, Perceived Behavioral Control and Behavioral Intention

<table>
<thead>
<tr>
<th></th>
<th>Attitude</th>
<th>Subjective Norm</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Subjective Norm</td>
<td>.61*</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>.32*</td>
<td>.27*</td>
<td></td>
</tr>
<tr>
<td>Intention</td>
<td>.80*</td>
<td>.53*</td>
<td>.32*</td>
</tr>
</tbody>
</table>

*p < .001

Research Question 4. Do the constructs attitude toward the behavior, subjective norm, and perceived behavioral control have equal influence on an elementary teacher’s intent to use computers in classroom instruction?

Hypothesis 4. There is no difference in the influence of the constructs attitude toward the behavior, subjective norm, and perceived behavioral control on an elementary teacher’s intention to use computers for classroom instruction.

A multiple regression analysis was conducted to evaluate how well the variables attitude toward the behavior, subjective norm, and perceived behavioral control predicted behavioral intention, which according to the TPB, are antecedent to actual behavior. The linear combination of attitude, subjective norm, and control measures was significantly related to behavioral intention, F (3, 199) = 124.61, p = 000. The sample multiple correlation coefficient was .81, indicating that approximately 65% of the variance of the behavioral
intention measure in the sample can be accounted for by the linear combination of the attitude, subjective norm, and perceived behavioral control measures.

The general formula for a linear model for predicting the values of a dependent variable (Y) from one or more independent variables (X) is \( \hat{Y} = B_0 + B_1X_1 + B_2X_2 + \ldots + B_nX_n \) (Norusis, 2003). The regression equation for my study is \( BI = -2.952 + (.575\times ATT\_DM\_TOT) + (.083\times SN\_DM\_TOT) + (.051\times PBC\_DM\_TOT) \). Table 4-9 presents indices to indicate the relative strength of the individual predictors. All the bivariate correlations between the predictor measures and the behavioral intention measure were positive, as expected, and all three of the indices were statistically significant (p < .001). Only the partial correlation between the attitude measure and behavioral intention was significant. On the basis of these correlational analyses, it is tempting to conclude that the only useful predictor of behavioral intention is the attitude measure. It alone accounted for 64% \((.80^2 = .64)\) of the variance of behavioral intention, while the other variables contribute only an additional 1% \(65\% - 64\% = 1\%\). Judgments about the relative importance of these predictors, however, are difficult because they are correlated. The correlations among the predictor variables ranged from .27 to .61 (Table 4-8 above).

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Correlation Between each Predictor and BI</th>
<th>Correlation Between each Predictor and BI Controlling for all Other Predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>.80*</td>
<td>.70*</td>
</tr>
<tr>
<td>Subjective Norm</td>
<td>.53*</td>
<td>.08</td>
</tr>
<tr>
<td>Perceived Control</td>
<td>.32*</td>
<td>.10</td>
</tr>
</tbody>
</table>

*\( p < .001 \)

Figure 4-4 shows a graphic representation of the relationships of attitude, subjective norm, and perceived behavioral control to behavioral intention.
Figure 4-4. Correlation of ATT, SN, PBC to INT. *p < .001

Research Question 5. Is there a correlation between an elementary teacher’s intent to use a computer for instruction and their actual use of a computer for instruction?

Hypothesis 5. There is no correlation between behavioral intention and actual computer use by elementary teachers.

A correlation coefficient was computed for the behavioral intention measure and the levels of use measure. Three items on the final survey instrument, items 15, 18, and 23, captured the direct measure of the respondent’s intention to perform the behavior of using a computer to present a lesson. Scaling on these items ranged from 1 (unlikely, false, disagree) to 7 (likely, true, agree). The maximum potential value for the behavioral intention measure was 21, and the actual mean was 15.5 ($n = 203$). For the Levels of Use (LU) measures (items 64-67 on the final survey instrument) the levels of utilization and integration were represented by two items each. One item from the utilization level is paired with an item from the integration level. Using this criteria, a respondent’s score should be either 4 or 8. Scores of 6 or 7 are possible, but they would indicate an inconsistency. A score of 4 would
indicate the utilization category and a score of 8 would indicate the integration category. For statistical analysis the LU score was treated as a continuous measure, and the mean score was 3.88 (n = 203). Descriptive statistics for these measures are shown in Table 4-10. The correlation between the behavioral intention measure and the levels of use measure was significant, \( r(201) = .45, p < .01 \) (Table 4-11). Therefore, this null hypothesis was rejected.

| Table 4-10. Descriptive Statistics for Intention and Levels of Use Measures |
|-----------------------------|----------|----------|
| Variable Name               | M        | SD       |
| INT_DM_TOT                  | 15.50    | 4.74     |
| LU_DM_TOT                   | 3.88     | 2.06     |

<table>
<thead>
<tr>
<th>Table 4-11. Correlation of Behavioral Intention and Levels of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention (INT_DM_TOT)</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Levels of Use (LU_DM_TOT)</td>
</tr>
</tbody>
</table>

*p < .001

This relationship between behavioral intention and actual behavior (Levels of Use) is shown graphically in Figure 4-5.

![Behavioral Intention to Actual Behavior Diagram]

Figure 4-5. Relationship of Behavioral Intention to Actual Behavior. *p < .001

Summary

The purpose of this chapter was to examine the results of a survey designed to measure TPB constructs in relation to elementary teacher use of computers for instruction. An important part of this process involved the development of a survey instrument for this use. The 73-item survey instrument was evaluated for content validity, construct validity, and item reliability and there was evidence for strong validity and reliability. Statistical analysis revealed significant correlations between the attitude (ATT) and intention (INT) variables,
the subjective norm (SN) and intention (INT) variables, and the perceived behavioral control (PBC) and intention (INT) variables. The strongest correlation was between ATT and INT, followed by SN-INT and PBC-INT, respectively. The attitude variable had a significantly larger statistical effect on behavioral intention than did subjective norm or perceived behavioral control, either individually or combined. The results also indicated a statistically significant relationship between behavioral intention (INT) and actual levels of computer use (LU) by elementary teachers. Statistical procedures were used to evaluate 5 null hypotheses, and all 5 null hypotheses were rejected.
CHAPTER 5
DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this chapter is to discuss the findings from this study as well as conclusions and recommendations based on this research. The chapter will include an overview of the study, key findings, discussion, implications, recommendations for further research, and a summary.

Overview of the Study

A large amount of evidence suggests, that despite significant investments in hardware and training, a relatively small percentage of teachers use computers in significant ways for instruction. A number of ideas have been posited for this phenomenon, and there is a need to better understand some of the reasons for the relatively low level of adoption of computer technology by teachers. The purpose of this study was to examine internal variables related to elementary teacher use of computers for instruction and to evaluate the efficacy of the Theory of Planned Behavior (Ajzen & Fishbein, 1980; Ajzen, 1988) in this context. The Theory of Planned Behavior suggests that we can predict behavior based on our understanding of a person’s intention to perform that behavior. Behavioral intention is predicated on three variables that are belief-based: attitude toward the behavior, subjective norm, and perceived behavioral control. These variables can be measured indirectly through belief-based responses and directly with targeted responses. The indirect and direct measures of these constructs should correlate. Though either measure can be used to analyze effect, Aizen (2004) suggests using direct measures because they are more compatible with the direct measure
of behavioral intention specified in the research design. A 73-item survey instrument was developed and validated for use in capturing data for this study. The population for this study was all Pre-K through 5th grade teachers (n = 322) in a medium-sized school district in central Florida. Of the total distributed, 63% (n = 203) completed surveys were returned.

The data were analyzed using descriptive statistics, correlations, and multiple linear regressions. The criterion variable for this study was actual computer use (LU) and the predictor variables were attitude toward the behavior (ATT), subjective norm (SN), perceived behavioral control (PBC), and behavioral intention (INT). Attitude toward the behavior is the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question (Ajzen, 1988, 1991). Subjective norm is the perceived social pressure to perform or not perform a particular behavior (Ajzen, 1988, 1991). Perceived behavioral control is a person’s perception of the ease or difficulty of performing the behavior of interest. It is assumed to reflect a person’s previous experiences, as well as anticipated challenges and obstacles (Ajzen, 1988, 1991).

Behavioral intention is an individual’s intention to perform a given behavior. Intention is influenced by the constructs of attitude, subjective norm, and perceived behavioral control (Ajzen, 1988, 1991). Demographic data were also captured for this study including gender, age, number of years teaching, number of years using a computer, location of computer use, and grade level taught. The research questions for this study involved examining the relationship between attitude and intention, subjective norm and intention, perceived behavioral control and intention, and behavioral intention to actual computer use.
Research Questions

1. What is the relationship between attitude toward the behavior and an elementary teacher’s intention to use computers in classroom instruction?

2. What is the relationship between subjective norm and an elementary teacher’s intention to use computers in classroom instruction?

3. What is the relationship between perceived behavioral control and an elementary teacher’s intention to use computers in classroom instruction?

4. Do the constructs attitude toward the behavior, subjective norm, and perceived behavioral control have equal influence on an elementary teacher’s intent to use computers in classroom instruction?

5. Is there a correlation between an elementary teacher’s intent to use a computer for instruction and their actual use of a computer for instruction?

Key Findings

Research Question 1. What is the relationship between attitude toward the behavior and an elementary teacher’s intention to use computers in classroom instruction? The findings indicated that there was a high correlation between the attitude toward the behavior construct and behavioral intention ($r = .80, p < .001$). This suggests that those elementary teachers with a more favorable evaluation toward using a computer for instruction have a higher intention to do so. This favorable assessment by elementary teachers may include the practice of using the computer for instruction, as well as the outcomes that result from the use of a computer in instruction. These findings indicate that the first hypothesis, which states there is no correlation between attitude toward the behavior and behavioral intention to use computers by elementary teachers, was rejected.

Research Question 2. What is the relationship between subjective norm and an elementary teacher’s intention to use computers in classroom instruction? The findings indicated that there was a moderate correlation between the subjective norm construct and behavioral intention ($r = .53, p < .001$). This suggests that those elementary teachers
who intend to use a computer in instruction have the perception that others who are significant to them expect them to do so. These significant others could be their principal, other teachers, parents of their students, their students, or their technology specialist or media specialist. These findings indicate that the second hypothesis, which states there is no correlation between subjective norm and behavioral intention to use computers by elementary teachers, was rejected.

**Research Question 3.** What is the relationship between perceived behavioral control and an elementary teacher’s intention to use computers in classroom instruction? The findings indicated that, though significant, there was a somewhat low correlation between the perceived behavioral control construct and behavioral intention ($r = .32, p < .001$). This suggests that an elementary teacher’s perception of how easy or difficult it is to use a computer for instruction has little to do with their intention to perform this behavior. These findings indicate that the third hypothesis, which states there is no correlation between perceived behavioral control and behavioral intention to use computers by elementary teachers, was rejected.

**Research Question 4.** Do the constructs attitude toward the behavior, subjective norm, and perceived behavioral control have equal influence on an elementary teacher’s intent to use computers in classroom instruction? The findings indicated that the linear combination of attitude, subjective norm and perceived behavioral control account for the majority of effect size (65%) of the behavioral intent construct. However, the contribution of each variable appeared extremely disproportionate. Of the 65%, the attitude construct contributed 64%, and subjective norm and perceived behavioral control together contributed the other 1%. This suggests that those elementary teachers who
intend to use a computer for instruction are largely influenced by their evaluation of that particular behavior, and to a much lesser extent what they feel others expect of them in regard to that behavior or by the level of control they believe they have in performing it. The large effect size of attitude in comparison to subjective norm and perceived behavioral control was a surprising result from this study. These findings indicate that the fourth hypothesis, which states there is no difference in the influence of the constructs attitude toward the behavior, subjective norm, and perceived behavioral control on an elementary teacher’s intention to use computers for classroom instruction, was rejected.

Research Question 5. Is there a correlation between an elementary teacher’s intent to use a computer for instruction and his or her actual use of a computer for instruction? The findings indicated that there was a significant correlation between the behavioral intention construct and actual use of a computer in instruction ($r = .45, p < .001$). This suggests that those elementary teachers who intend to use a computer for instruction actually do so, and the findings tend to validate the TPB as a predictive model. Intention is predicated on their attitude toward that behavior, their perception of the expectation of others in that regard, and their perceived level of control in using a computer for instruction. These findings indicate that the fifth hypothesis, which states there is no correlation between behavioral intention and actual computer use by elementary teachers, was rejected.

Discussion

The findings from this study of elementary teachers and their use of computers for instruction suggest the validity of the Theory of Planned Behavior as a predictive model. The predictor variables of attitude, subjective norm, and perceived behavioral control all had a valid and significant correlation to the behavioral intent construct, and behavioral
intent was significantly correlated to actual use of a computer. This section will elaborate on some of the major findings from this study including the influence of teacher beliefs on teacher practice, the respective contribution of the Theory of Planned Behavior variables, and teacher levels of computer use.

**Influence of Teacher Beliefs on Practice**

Attitude, subjective norm and perceived behavioral control are mediated by personal beliefs, and this study is significant in relation to elementary teacher use of computers because so much of teacher practice is guided and motivated by personal and professional beliefs. Teachers hold the key to effective technology integration in the instructional process (Marcinkiewicz, 1993). Marcinkiewicz (1993) states, “Full integration of computers into the educational system is a distant goal unless there is a reconciliation between teachers and computers. To understand how to achieve integration, we need to study teachers and what makes them use computers” (p.234). An understanding of what makes teachers use a computer for instruction must take into account the role of teacher beliefs. Beliefs play a significant role in determining teacher practice (Albion & Ertmer, 2002). According to Cuban (1993) we have been less then successful with technology integration in the classroom because we have failed to take these beliefs, which dominate popular views of schooling, into account, including “cultural beliefs about what teaching is, how learning occurs, what knowledge is proper in schools, and the teacher-student (not student-machine) relationship” (p.186). The tendency to disregard the culture of schooling and classrooms is a problem with most curriculum reform efforts (Tobin & Dawson, 1992). Pajares (1992) noted the strong relationships among teachers’ beliefs and planning, their instructional decisions, and their classroom practices. He observed, “beliefs are the best indicators of the decisions
individuals make throughout their lives” (p.307). Teacher beliefs are at the core of teacher practice (Albion & Ertmer, 2002). The strong role of beliefs in teacher practice is reflected in the large contribution of the attitude construct toward behavioral intention in this study. An elementary teacher will not intend to use a computer for instruction until she believes in the efficacy of the computer as a tool to enhance instruction.

One of the most interesting findings from this study was the extremely large effect of an elementary teacher’s attitude toward using a computer for instruction on their intention to do so. The attitude-intention relationship in and of itself is not unusual and seems rather intuitive. What was unusual to the researcher was the relatively small impact that the subjective norm and perceived behavioral control components had on intention for this behavior, in relation to the attitude component. Subjective norm addresses what a teacher perceives as the expectations of others (i.e. social pressure), in regard to a particular behavior. For an elementary teacher these significant others are their principal, peer teachers, students, parents of students, and other school staff like their technology specialist or their media specialist. The results suggest that, while elementary teachers want to comply with their principal’s expectations ($M = 6.15$), they do not feel there is an extremely high expectation from principals that they use a computer for instruction ($M = 4.69$). In fact, the results indicate that these teachers believe their school technology specialist has higher expectations for them in that regard than their principal ($M = 4.91$), and yet the elementary teachers in this study have a lower motivation to comply with the expectations of their technology specialist ($M = 5.08$) (Table 4-1, items 28-32, 59-63).

This perception by elementary teachers of mediocre expectations for computer use by their principal is consistent with other research. Higgins & Russell (2003) state that the
elementary teachers (n = 1432) in their study of technology integration reported the
emphasis their principal placed on technology as: 27% “Heavy”, 60.1% “Some”, 11.3%
“Little” and 1.6% “None”. In the same study, the elementary teacher population gave an
even lower self-report of the emphasis they place on technology: 18.1% “Heavy”, 63.1%
“Some”, 17% “Little” and 1.8% “None” (Higgins & Russell, 2003). This perception by
elementary teachers of low expectations for computer use from others may be valid for a
number of reasons. The message many elementary teachers are getting the most
reinforcement on in 2004 relates to accountability and preparing students for success on
high-stakes tests. It is very possible that principals and teachers do not feel they have the
luxury of time or opportunity to focus on technology integration in light of other, very
immediate, demands and priorities. This assessment is consistent with the observations
others make about the culture and organization of schooling being inconsistent with
technological innovation (Cuban, 1986, 1993).

Another possibility to consider regarding the low contribution of subjective norm to
behavioral intention relates to a teacher’s perception of their role. In general, a teacher’s
influence on classroom practice is significant and they perceive it as such (Martin &
Clemente, 1990). Teachers have a high locus of control (Rotter, 1966) in the instructional
process that may neutralize the influence of others regarding expectations for a particular
behavior. Teachers play a strategic role in what occurs in the classroom (Burkman, 1989).
Elementary teachers have strong beliefs about their significant role in student learning,
and any change in their practice, like adoption of computer use, will take these beliefs
into account. If a teacher believes a practice or innovation will enhance the teacher-
student relation and their instructional role, they are more likely to embrace a change
involving that practice or innovation. “The direct relationship between personal teaching efficacy and change suggests that teachers are more likely to change their behavior in directions that may improve their classroom effectiveness if they believe that they themselves are instrumental to the learning of their students” (Smylie, 1988, p.22 as quoted in Martin & Clemente, 1990). Regarding the practice of instructional systems design as an innovation, Martin & Clemente (1990) note that teachers tend to prefer new approaches that maintain their influence in a teacher-student relationship. Though not the focus of their discussion, the same issues may influence teacher use of computers for instruction. As the instructional leader in the classroom, an elementary teacher will not take a secondary role to any other person, innovation, or practice. The role of the classroom teacher must be considered and valued for the successful integration of any instructional innovation, including computers. The innovation must be perceived to have relative advantage and compatibility (Rogers, 1995) for the teacher for them to adopt its use for instruction. This has significant implications for the way we approach technology integration to enhance teaching and learning. The decision to integrate technology cannot be a “top-down” or an “outside-in” decision. In many cases, innovations are attempted without the careful examination of whether or not they address what is perceived as priority needs by teachers (Fullan & Stiegelbauer, 1991). Teachers must have shared decision-making in the decision to use computers for instruction, and they must have flexibility to determine on their own the benefit this innovation will have for their instructional practice. Ely (1999) calls this level of teacher involvement “participation” in his list of necessary conditions that facilitate the implementation of educational technology innovations. In many cases, a teacher’s belief system about computer use and
any potential benefit will change only after they begin using the innovation. "Change in beliefs follow, rather than precede, change in behavior" (Pajares, 1992, p.321). The introduction of computers as a tool to enhance teaching and learning must be considered in the context of teacher expertise, experience, existing practice, and what they are trying to achieve in the classroom (Miller & Olson, 1994). Teachers must have a vision for how an innovation like computers can improve their practice and their outcomes and they must be allowed time for this vision to develop. Leadership is needed to facilitate the development of this vision (Ely, 1999).

The small influence of a teacher's perception of control in using a computer for instruction was also a surprising finding. There is evidence that teachers credit factors beyond their control as reasons they do not use technology in the classroom (Cuban, 1993; Ely, 1999). Some of the factors mentioned include not having enough computers, unreliability of technology, lack of time for planning and innovation, lack of training, and lack of support. The findings from this study suggests that these barriers are of less consequence in relation to the attitude factor, and this result seems congruent with the observation of teachers who use technology in the classroom. Ertmer, et al. (1999) discuss first-order and second-order barriers to technology use. First-order barriers include factors external to the teacher such as lack of equipment and lack of time. Second-order barriers relate to factors more internal to a teacher such as values and beliefs about the role of a teacher and the role of teaching and learning. Ertmer points out, however, that second-order barriers (i.e. values and beliefs), can mediate the impact and influence of first-order barriers. Higher levels of computer use can be expected to take place when perceived value is high and resources are low, than when perceived value is
low and resources high (Harrington, 1993; Ertmer, 1999). For example a teacher who values the use of computers in the instructional process may scavenge to get their hands on any hardware they are able to and make it work to serve their instructional purposes. A teacher who does not value a computer in the instructional process will not go to that effort and will tend to use the lack of equipment as an excuse to not use that particular technology for instruction. The findings from this study indicate that a teacher’s perception of their control or lack of control has a small role in whether or not they intend to, or actually use, a computer for instruction. Those teachers that value this behavior will “find a way” to use it.

**Contribution of TPB Variables**

The contribution of the Theory of Planned Behavior (TPB) variables to behavioral intention and actual use in this study is consistent with similar studies in other contexts. A literature search was performed prior to the decision to perform this particular study to see if there was any similar research done on computer use using the Theory of Planned Behavior model. The study that was closest in nature involved college and university park and recreation faculty intention to use instructional technology (Mak, 2000). The population for the Mak study was higher education faculty members (n = 1,188). In the Mak study, attitude, subjective norm, and perceived behavioral control accounted for 48% of the intention to use instructional technology, and the contribution of the individual variables was somewhat consistent with my study. The strongest predictor of intention was attitude (R = .43), followed by subjective norm (R = .29) and perceived behavioral control (R = .12) (Mak, 2000). This comparison suggests there could be some consistency in the factors that influence educators to use computers for instruction across different contexts and levels. This would be an interesting topic for further research.
Similar to the Mak (2000) study, it was clear from the results of my study that the three predictor variables of attitude toward the behavior, subjective norm, and perceived behavioral control made significantly different contributions to the overall effect size of the behavioral intention construct. This disparity may lead some to question the efficacy of the Theory of Planned Behavior in this regard. Aizen (2004) addresses this phenomenon and states,

“There is nothing in the theory to suggest that attitude, subjective norm, and perceived behavioral control will each make a significant contribution to the prediction of intention. The relative importance of these three factors is likely to vary from one behavior to another and from one population to another. In some cases, one or another of the three factors will be found to have no significant effect on intention. Assuming that the factors were measured with equal reliability, lack of predictive validity merely indicates that for this particular behavior and population, the factor in question is not an important consideration in the formation of intention.” (Aizen, 2004, unnumbered).

**Levels of Computer Use**

The results of this study indicate that there was a positive and significant (r = .45) relationship between teacher intent to use a computer for instruction and his or her actual use of a computer for instruction. As suggested in the previous discussion above, if an elementary teacher places value on a practice that they believe will enhance the instructional process, they are likely to use that practice. Fifty-nine percent (59.1%) of the elementary teachers in this study rated themselves at the “utilization” level of computer use. This level indicates that a teacher has started to use a computer in their classroom, but in non-essential or supplementary ways. Slightly over eight percent (8.4%) of the elementary teachers in this study rated themselves at the integration level of computer use, which indicates that the computer is critical or indispensable to his or her teaching. There are no state of Florida statistics using the Levels of Use instrument (Marcinkiewicz, 1993) for direct
comparison of levels of use statewide to teachers in this sample. The focus of this study was not on overall computer use, but on elementary classroom teacher use of a computer for instruction. With this difference in mind, the measures of levels of use identified in this study appear consistent with other indicators used in the state of Florida to measure teacher computer use (Florida Department of Education, 2003, 2004). The measures indicate that progress has been made in more teachers using computers in the classroom, but that there is still a long way to go before higher numbers of teachers are using computers in ways that transform teaching and learning. Use of computers by elementary teachers to date has been more evolutionary than revolutionary.

Implications

1. It would be helpful to evaluate a teacher’s attitude during pre-employment review to determine if it is compatible with technology use, change, and innovation. This type of evaluation can be difficult to do in the hiring process. Experience with personnel indicates that one can often influence the knowledge and skills of an individual if they are teachable, but that a person’s attitude is an internal element that is much more resistant to external influence. In other words, it is quite difficult to influence a person’s attitude resulting in a change of behavior. A positive attitude toward change and innovation may be more nature than nurture, thus it becomes important to evaluate this qualitative aspect when making hiring and retention decisions.

2. For teachers, the use of computers for instruction will be internally motivated, not externally mandated. In this light it is important to consider strategies that impact teacher attitude toward computer use in positive ways. The research indicates that teacher belief patterns do not precede, but follow, changes in behavior. It is necessary to help
teachers take “baby steps” in using a computer for instruction, through the use of mentors and modeling, to give them opportunities to see how this technology can improve their practice and their results in meaningful and significant ways. If the innovation cannot stand up to the “teacher test” in term of relative advantage and compatibility with existing practice, it will not be adopted.

3. The change agent needs to focus on the social, psychological, and personological aspects of technology integration. Personal and professional values, attitudes, and beliefs are powerful influences on teacher practice, and they cannot be ignored. There is an abundance of evidence suggesting that characteristics of an innovation are important factors that influence levels of adoption, as well as the environmental and contextual elements related to a particular innovation. In the past, technology integrators and change agents have focused on these two areas largely to the exclusion of personal and social internal factors. One reason for this is that external elements are easier to identify and measure. People and their related social contexts are complex entities that are difficult to understand and quantify. The psycho-social aspect of teacher integration must be a consideration in any strategies related to change in the area of higher levels of technology adoption and instructional computer use by teachers.

4. Change facilitators (like principals and technology specialists) in elementary schools need to take a leadership role to effect higher levels of teacher computer use for instruction. Proactive leadership will include creating a climate for change, experimentation, and innovation, and the expectation that teachers use computers for instructional purposes. As mentioned above, significant teacher use of computers for
instruction will not be externally mandated, but a good leader can establish a climate and expectation that will facilitate higher levels of computer use by teachers (Schiller, 2003).

Recommendations for Further Research

1. This study, related to the Theory of Planned Behavior (Ajzen & Fishbein, 1980; Ajzen, 1988) and elementary teacher computer use, necessitated the development and validation of a survey instrument to capture data relevant to the variables of interest. Overall, the survey instrument demonstrated high levels of reliability and validity. One area of question on the instrument was the lack of correlation between the indirect (belief-based) and direct measures of perceived behavioral control. It would be beneficial to evaluate and further test this survey instrument in this regard for additional development and refinement.

2. The generalizability of the results from this study are limited to the sample of respondents from one school district who participated in the study. It would be useful to duplicate this study in other elementary teacher populations for comparison of results.

3. The focus of this study was on elementary teachers and their use of computers for instruction. It would be informative to implement this study in other teacher populations such as middle school and high school, to explore any differences that might result in the context of different curriculum needs and school climates.

4. This study reflected the strong influence of teacher attitude on teacher use of a computer for instruction. It would be informative to further explore the subjective norm and control dimensions to determine the influence of factors such as strong principal leadership on levels of teacher computer use for instruction.

5. This study reflected the strong influence of teacher attitude on their use of a computer for instruction. Additional research is needed on the internal, personological,
and psychological aspects of teacher computer use for instruction. It would be useful to explore ways that teacher attitude toward computer use might be mediated and influenced.

Summary

This study examined internal variables identified in the Theory of Planned Behavior (Ajzen & Fishbein, 1980; Ajzen, 1988) in relation to elementary teacher use of computers for instruction. Significant correlations were identified between the variables of attitude toward the behavior and behavioral intention, subjective norm and behavioral intention, and perceived behavioral control and behavioral intention. Of the three, the attitude variable had the largest influence on behavioral intention. There was also a significant relationship between the predictor variable of behavioral intention and the criterion variable of actual computer use by elementary teachers. The results from this study seem to validate the Theory of Planned Behavior as a predictive model in the context of elementary teacher use of computers for instruction. The results underscore the importance of personal and social factors and their influence on teacher computer use, and the study contributes to our overall understanding of factors that might facilitate higher levels of instructional technology integration in the elementary classroom.
APPENDIX A
DISTRICT PERMISSION LETTER
Mr. David Hickey  
Superintendent  
Citrus County Schools  
1007 W. Main Street  
Inverness, Florida 34450

Dear Mr. Hickey:

I am currently conducting doctoral research under the supervision of Dr. Kara Dawson through the School of Teaching and Learning, College of Education, University of Florida in Gainesville. My research focus is on developing a better understanding of the factors that influence elementary teachers to use computers in instruction. I am using survey methodology to collect data for my study.

I am requesting permission from you to conduct this research in the Citrus County School District, and to allow the elementary teachers in our school district to participate in this study. I am also requesting that the completed surveys may be returned to me at the Instructional Resource Center in self-addressed envelopes I will provide for that purpose. Data collection for my study will involve three phases:

Phase One: An elicitation study involving approximately 50 elementary teachers. A brief open-ended survey will be distributed and collected for this purpose.

Phase Two: A pilot instrument will be developed and distributed to approximately 50-100 elementary teachers. The completed survey will then be analyzed and revised to maximize reliability and validity.

Phase Three: A final survey will be distributed to all elementary teachers in our school district to capture data relevant to the variables of interest in my study.

Participation in this study will be completely voluntary on the part of elementary teachers in the district, and they are allowed to not continue with the study at any point they desire. There is no risk to elementary teachers participating in this study, nor will any compensation be offered for participation. Individual identities will be protected to the extent allowed by law. This study will only involve elementary teachers, and there will be no student participation. I anticipate that the survey will take about 30 minutes for teachers to complete.
If allowed to conduct this study in the Citrus County School District:

- Elementary teachers will be invited to participate on a voluntary basis, and they will be asked to provide their permission on an Informed Consent Form.
- Surveys will not be distributed during critical instructional periods like FCAT preparation or testing.
- I will suggest that teachers complete this survey during planning time or other non-instructional time so there will be no disruption of classroom instructional time.
- I will make contact with and seek permission from every building administrator prior to distributing surveys or involving teachers from their school in this study.

The benefits of this study for our school district may include a better understanding of what influences an elementary teacher to use computers in the classroom for instruction. This understanding would help us develop better strategies to prepare elementary teachers to use computers in instruction and it would help us better utilize existing computer resources to improve teaching and learning.

I have attached a copy of the Informed Consent Form that will be used with teachers participating in the study. Questions concerning the procedures for this research can be directed to Dr. Kara Dawson, School of Teaching and Learning, Educational Technology, 2403 Norman Hall, University of Florida, Gainesville, Florida 32611. Phone (352) 392-9191, ext. 261.

Thank you for your consideration of my request, and I anticipate your response.

Sincerely,

James M. Geddes

XC: Dr. Kara Dawson
APPENDIX B
UNIVERSITY INSTITUTIONAL REVIEW BOARD FORM
School of Teaching and Learning  
2403 Norman Hall  
University of Florida  
Gainesville, Florida 32611

INFORMED CONSENT FORM

My name is Mike Geddes. I am currently conducting doctoral research under the supervision of Dr. Kara Dawson in the School of Teaching and Learning at the University of Florida. The focus of my research is aimed at better understanding what influences an elementary teacher’s intent to use computers in the classroom for instruction. Based on the intended benefits to the Citrus County School District instructional program, Superintendent David Hickey has approved the dissemination of the survey.

If you agree to participate in the study, I will provide you a survey and ask you to indicate your opinion and feelings about various aspects of using a computer in the classroom for instruction. In addition, I will ask you to complete a brief demographic questionnaire. You do not have to answer any questions you do not wish to answer. You are also free to withdraw from the study at any time without consequence. A self-addressed envelope will be provided for returning the survey and demographic questionnaire to me via our county mail system. There are no perceived risks to you as a participant in this survey, and there will be no compensation. The benefits may include a better understanding of what influences an elementary teacher to use computers in the classroom for instruction. The amount of time expected to complete the survey and demographic information is approximately 30 minutes. Your identity will be kept confidential to the extent provided by law. Results will be reported in the form of group data.

Questions concerning the procedures for this research can be directed to Dr. Kara Dawson, School of Teaching and Learning, Educational Technology, 2403 Norman Hall, University of Florida, Gainesville, Florida 32611. Phone (352) 392-9191, ext. 261. Questions or concerns regarding your right as a research participant may be directed to the University of Florida Institutional Review Board, P. O. Box 112250, Gainesville, FL 32611-2250, Phone (352) 392-0433.

I have read the procedure described above. I voluntarily agree to participate in this study and I have received a copy of the description.

Signature ___________________________ Date ____________
(Participant)

I wish to receive a copy of the results of this study.

Signature ___________________________ Date ____________
Mailing Address ___________________________

Please return signed form to Mike Geddes at the Instructional Resource Center. Thank You.
APPENDIX C
ELICITATION STUDY QUESTIONNAIRE

COMPUTER USE RESEARCH QUESTIONNAIRE

Instructions:

Please answer the following "open-ended" questions in the space provided. You may use additional space (ex. back of page) if needed.

There are no right or wrong answers to the questions. Please take your time and be reflective. Answer candidly and to the best of your ability.

Note: The phrase “present a lesson in your classroom” refers to teacher use of a computer for the presentation of a lesson or a teacher involving students in using a computer as part of a lesson. It does not refer to management uses of a computer like keeping attendance records or electronic grade books.

When you have completed the questionnaire, place it in the provided return envelope along with the signed Informed Consent Form, and return it via county mail to Mike Geddes at the Instructional Resource Center.

*The deadline for returning the completed questionnaire is December 10, 2003.*
COMPUTER USE RESEARCH QUESTIONNAIRE

1. What do you believe are the advantages of using a computer to present a lesson in your classroom during instruction?

2. What do you believe are the disadvantages of using a computer to present a lesson in your classroom during instruction?

3. Is there anything else you associate with using a computer to present a lesson in your classroom during instruction?

4. Are there any individuals or groups who would approve of your using a computer to present a lesson in your classroom during instruction?

5. Are there any individuals or groups who would disapprove of your using a computer to present a lesson in your classroom during instruction?

6. Are there any other individuals or groups who come to mind when you think about using a computer to present a lesson in your classroom during instruction?

7. What factors or circumstances would enable you to use a computer to present a lesson in your classroom during instruction?

8. What factors or circumstances would make it difficult or impossible for you to use a computer to present a lesson in your classroom during instruction?

9. Are there any other issues that come to mind when you think about the possibility or difficulty of using a computer to present a lesson in your classroom during instruction?

Please return completed questionnaire and signed Informed Consent Form via county mail using the envelope provided to Mike Geddes, Instructional Resource Center, by December 10, 2003.
TO: (Personalized name and school here)

FROM: Mike Geddes
Coordinator

RE: Research Questionnaire

I need your assistance! I am conducting doctoral research on factors related to computer use for instruction by elementary teachers. I have received permission from our Superintendent, Mr. Hickey, to conduct this research in our school district, and from your Principal to involve teachers from your school. You have been randomly selected to participate in Phase 1 of my study, which involves the development of a survey instrument. Here is how you can assist:

1. If you are willing to participate in this study, please read and sign the enclosed Informed Consent Form. Return it with the completed questionnaire.

2. Please complete the enclosed "open-ended" questionnaire.

3. Return the completed questionnaire and consent form, using the envelope provided, to Mike Geddes at the Instructional Resource Center through the county mail. The deadline for returning this questionnaire is December 10.

I will be using the aggregated response data from this initial questionnaire to develop a pilot survey instrument that will be used to collect data for my study.

Please note that I have sent this initial questionnaire to a relatively small sample of elementary teachers. With this in mind, it is important that I get as close to 100% response as possible. If you are able, I would really appreciate your time, your participation, and your contribution to this study.

Thank you.
## APPENDIX E

### ELICITATION STUDY RESULTS

**Table E-1. Advantages of Using the Computer to Present a Lesson During Instruction**

<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holds students attention, keeps them interested and reduces discipline problems.</td>
<td>16</td>
<td>18.8</td>
</tr>
<tr>
<td>Graphics/sound make learning more interesting, thus more engaging to students.</td>
<td>9</td>
<td>10.6</td>
</tr>
<tr>
<td>Vast amount of information on Internet enhances curriculum.</td>
<td>8</td>
<td>9.4</td>
</tr>
<tr>
<td>Demonstrates how computers can be used for learning, and they can easily share what they have learned.</td>
<td>6</td>
<td>7.1</td>
</tr>
<tr>
<td>Can present to whole group and whole group can see presentation.</td>
<td>5</td>
<td>5.9</td>
</tr>
<tr>
<td>Encourages student participation, provides hands on experiences, increasing motivation to learn.</td>
<td>5</td>
<td>5.9</td>
</tr>
<tr>
<td>Computers are part of society and students need computer skills.</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Provides opportunity for students to interact.</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Students can relate to computers and are interested in them.</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>Access up to date information.</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Accommodates different student learning styles.</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Adds positive dimension to lessons, a good alternative delivery method.</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Can tailor instruction to specific needs (facilitates individualized instruction).</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Easy to retrieve and update lessons.</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Easy to show lesson examples and non-examples and print hard copy for students.</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Helps keep students focused on topic.</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Involves students in real world applications and experiences.</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Motivates students to take a more active role in their learning. They can create lessons as well as the teacher.</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Provides immediate feedback to students in a less threatening manner.</td>
<td>2</td>
<td>2.4</td>
</tr>
<tr>
<td>Can &quot;pace&quot; your lesson presentation and pause when desired.</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

---

92
<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can easily track student progress on integrated learning system.</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Can personalize by using student pictures in a lesson.</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Children need to be familiar with the Internet.</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Efficient. There is no cleanup like when using transparencies.</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Facilitates student practice of a lesson.</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Provides opportunity for student self-directed learning.</td>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>
Table E-2. Disadvantages of Using the Computer to Present a Lesson During Instruction

<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not enough resources in classroom.</td>
<td>11</td>
<td>16.9</td>
</tr>
<tr>
<td>Unreliable / old computer equipment. (technical problems / glitches)</td>
<td>7</td>
<td>10.8</td>
</tr>
<tr>
<td>Time to set up equipment.</td>
<td>6</td>
<td>9.2</td>
</tr>
<tr>
<td>Unreliable Internet access. (technical problems / glitches)</td>
<td>6</td>
<td>9.2</td>
</tr>
<tr>
<td>Lack of knowledge (learning curve, skills, experience)</td>
<td>5</td>
<td>7.7</td>
</tr>
<tr>
<td>Not enough equipment for all students to participate or see</td>
<td>5</td>
<td>7.7</td>
</tr>
<tr>
<td>(behavioral problems)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited use for low grade levels / not appropriate for developmental age</td>
<td>4</td>
<td>6.2</td>
</tr>
<tr>
<td>Not having appropriate equipment (ex. larger monitors, video projectors)</td>
<td>4</td>
<td>6.2</td>
</tr>
<tr>
<td>Time to set up equipment.</td>
<td>4</td>
<td>6.2</td>
</tr>
<tr>
<td>Attention (lacking) of non-visual learners.</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Lack of time to search for web / age-appropriate material.</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Students too excited / eager and not listening.</td>
<td>2</td>
<td>3.1</td>
</tr>
<tr>
<td>Impersonal, less direct student contact.</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Lack of teacher comfort level.</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Lack of teacher training.</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Presentation disallows students from &quot;hands on&quot; practice.</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Software that does not adjust to child's ability level.</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Space, impact of cords / cables in the classroom.</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Using computers &quot;too much&quot; could become negative and ineffective.</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Response</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----</td>
<td>-------</td>
</tr>
<tr>
<td>Principal / Administration</td>
<td>22</td>
<td>28.9</td>
</tr>
<tr>
<td>Parents</td>
<td>17</td>
<td>22.4</td>
</tr>
<tr>
<td>Teachers</td>
<td>10</td>
<td>13.2</td>
</tr>
<tr>
<td>Students</td>
<td>9</td>
<td>11.8</td>
</tr>
<tr>
<td>Technology Specialist</td>
<td>8</td>
<td>10.5</td>
</tr>
<tr>
<td>Everyone</td>
<td>4</td>
<td>5.3</td>
</tr>
<tr>
<td>Curriculum Specialist</td>
<td>3</td>
<td>3.9</td>
</tr>
<tr>
<td>Media Specialist</td>
<td>2</td>
<td>2.6</td>
</tr>
<tr>
<td>Business Community</td>
<td>1</td>
<td>1.3</td>
</tr>
</tbody>
</table>
Table E-4. Disapprove of My Using a Computer to Present a Lesson During Instruction

<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No One</td>
<td>19</td>
<td>61.3</td>
</tr>
<tr>
<td>Some Parents</td>
<td>9</td>
<td>29.0</td>
</tr>
<tr>
<td>Amish</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Church Groups</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Close Minded</td>
<td>1</td>
<td>3.2</td>
</tr>
</tbody>
</table>
Table E-5. Factors or Circumstances that Enable You to Use a Computer to Present a Lesson During Instruction

<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>More Equipment</td>
<td>13</td>
<td>27.1</td>
</tr>
<tr>
<td>Time</td>
<td>8</td>
<td>16.7</td>
</tr>
<tr>
<td>Training</td>
<td>8</td>
<td>16.7</td>
</tr>
<tr>
<td>Software</td>
<td>5</td>
<td>10.4</td>
</tr>
<tr>
<td>Support</td>
<td>5</td>
<td>10.4</td>
</tr>
<tr>
<td>Working / Proper Equipment</td>
<td>5</td>
<td>10.4</td>
</tr>
<tr>
<td>Knowledge</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Knowledge of available resources</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Lesson Plans</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Nothing - I won't use it</td>
<td>1</td>
<td>2.1</td>
</tr>
</tbody>
</table>
Table E-6. Factors or Circumstances that make it Difficult or Impossible for You to Use a Computer to Present a Lesson During Instruction

<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of enough / proper equipment</td>
<td>29</td>
<td>25.0</td>
</tr>
<tr>
<td>Lack of time</td>
<td>23</td>
<td>19.8</td>
</tr>
<tr>
<td>Lack of resources</td>
<td>12</td>
<td>10.3</td>
</tr>
<tr>
<td>Lack of knowledge (confidence, experience)</td>
<td>11</td>
<td>9.5</td>
</tr>
<tr>
<td>Not enough training</td>
<td>11</td>
<td>9.5</td>
</tr>
<tr>
<td>Technical problems / glitches</td>
<td>8</td>
<td>6.9</td>
</tr>
<tr>
<td>Lack of personnel support</td>
<td>6</td>
<td>5.2</td>
</tr>
<tr>
<td>Developmental level of students</td>
<td>4</td>
<td>3.4</td>
</tr>
<tr>
<td>Lack of student knowledge / experience</td>
<td>2</td>
<td>1.7</td>
</tr>
<tr>
<td>Student's attention span</td>
<td>2</td>
<td>1.7</td>
</tr>
<tr>
<td>Computer hinders student interaction with others</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Does not match learning style of some students</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>I don't like computers</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Inability to monitor students on the Internet</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Inappropriate web sites</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Need software installed</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Other demands (ex. independent reading)</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Students needing different skills than computer lesson can offer (ex. hands on)</td>
<td>1</td>
<td>0.9</td>
</tr>
</tbody>
</table>
APPENDIX F
DOMAIN EXPERTS

Dr. Tina Barrios
Supervisor
Department of Instructional Technology
Manatee County, Florida, School District

Dr. Donna Baumbach
Professor, College of Education
Project Director
Instructional Technology Resource Center
University of Central Florida

Dr. Mark Brunner
Elementary Coordinator
Citrus County School District
Adjunct, Educational Leadership Department
University of Florida

Dr. Cathy Cavanaugh
Assistant Professor
College of Education and Human Services
University of North Florida
APPENDIX G
DOMAIN EXPERT COVER LETTER
Dear Dr. Barrios:

My name is James M. Geddes (you may know me as “Mike”), and I am a Ph.D. candidate at the University of Florida, College of Education, Department of Teaching and Learning, under the supervision of Dr. Kara Dawson.

My research involves testing the Theory of Planned Behavior (Ajzen, 1980, 1988) in relation to the use of computers for instruction by elementary teachers. The title of my dissertation is AN EXAMINATION OF THE RELATIONSHIPS OF ATTITUDE TOWARD A BEHAVIOR, SUBJECTIVE NORM, AND PERCEIVED BEHAVIORAL CONTROL AS ANTECEDENTS TO COMPUTER USE BY ELEMENTARY TEACHERS IN A PUBLIC SCHOOL SETTING.

A primary activity of this research project involves developing and validating a survey instrument to capture data relevant to my variables of interest. Before I get into more detail about my study, I want to ask if you would be willing to be a “content expert” for me to review the survey instrument I am developing and provide feedback germane to content and face validity. I will explain a little about my study, then some of the mechanics involved in reviewing the instrument and providing feedback.

The independent variables I am measuring come from the Ajzen theory base and include: Attitude Toward the Behavior, Subjective Norm, Perceived Behavioral Control, and Behavioral Intention. The dependent variable of this study is Levels of Use (Marcinkiewicz, 1991).

Here is a brief description of the independent variables related to this study:

**Theory of Planned Behavior (TPB)** is a framework for the study of human behavior (Ajzen, 1988, 1991). This theory proposes that human behavior is guided by three belief areas: behavioral, normative, and control. TPB looks at the constructs of attitude, subjective norm, and perceived behavioral control as antecedents to behavior. TPB has been validated in a number of studies across various disciplines.

**Attitude toward the behavior** is the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question (Ajzen, 1988, 1991).

**Subjective norm** is the perceived social pressure to perform or not perform a particular behavior (Ajzen, 1988, 1991).

**Perceived behavioral control** is a person’s perception of the ease or difficulty of performing the behavior of interest (Ajzen, 1988, 1991). Perceived behavioral control is assumed to reflect a person’s previous experiences, as well as anticipated challenges and obstacles.
Behavioral intention is an individual's intention to perform a given behavior (Ajzen, 1988, 1991). In this definition, intention is influenced by the constructs of attitude, subjective norm, and perceived behavior control.

As you can probably tell, this study addresses some of the psychological and social issues related to the instructional use of computers. You were selected as a content expert because of your appropriate experience, expertise, and familiarity with instruction and instructional technology. Your participation as a content expert reviewing my survey instrument would involve:

1. Reviewing the survey instrument and providing feedback through prompted questions using a Survey Feedback Form.

2. Agreeing to review the instrument and return feedback electronically (or by regular mail if preferred) within a two-week period after receipt of the survey. I will send the documentation to you upon your acceptance and request that you provide feedback by Friday, March 26, 2004.

To facilitate this process I would provide you in electronic format (.pdf or MS Word) via email:

b. Survey Feedback Form.
c. Methodology and Survey Development Background.

I would prefer to communicate via email, but I would accommodate any preference you have for communication if email is not the best method.

For your information, I am asking the following individuals to assist me in this critical phase of my study:

Dr. Tina Barrios  
Supervisor  
Instructional Technology  
Manatee County, Florida, School District

Dr. Donna Baumbach  
Project Director  
Instructional Technology Resource Center  
University of Central Florida

Dr. Mark Brunner  
Elementary Coordinator  
Citrus County, Florida, School District  
Adjunct, Educational Leadership  
University of Florida
Dr. Cathy Cavanaugh  
Assistant Professor  
Division of Curriculum and Instruction  
University of North Florida  

Dr. Lynn Nolan  
Director of Professional Development Services  
International Society for Technology in Education (ISTE)  
Clemson University  

Dr. Roy Winkelman  
Program Director  
Florida Center for Instructional Technology  
University of South Florida  

Would you be willing and able to assist me with my study? I know you are extremely busy, but please know I would be so appreciative of the positive contribution you would make as I develop my survey instrument and later use it as a key component of my study.

Thank you in advance for your consideration, and I look forward to your response.

Sincerely,

James M. Geddes  
(352) 746-3437 day  
(352) 746-3550 fax  
(352) 344-2989 evening  
geddes@tampabay.rr.com
APPENDIX II
PILOT SURVEY FEEDBACK FORM
Survey Feedback Form

To become a useful tool for this study, the questionnaire content must be valid. Content validity assessment depends upon several important judgments, which are listed below. Please review each question and add any additional comments you feel are relevant to your assessment.

I. Review the question content:

1. Do the respondents have the information necessary to answer each of the questions?

   ___ Yes  ___ No

   If the answer is No, what questions should be changed? How would you suggest that the question be modified?

2. Are any of the questions biased or loaded in one direction?

   ___ Yes  ___ No

   If the answer is Yes, what are those questions? How would you recommend they be modified?

3. Will the respondents give the information that is being asked for?

   ___ Yes  ___ No

   If the answer is No, why?

II. Review the question wording:

1. Can you understand all the questions?

   ___ Yes  ___ No

   If the answer is No, what are those questions? Please note your editorial suggestions.

III. Review the form of the response:

1. Is the questionnaire of a reasonable length?

   ___ Yes  ___ No

   If the answer is No, what do you think should be a reasonable length?
2. For each question, do the choices listed adequately cover all of the significant alternatives?

   ___ Yes  ___ No

If the answer is No, what are those questions that should be changed? How would you suggest?

3. Is the form of response used: easy, definite, uniform, and adequate for purpose?

   ___ Yes  ___ No

If the answer is No, please indicate your suggestions:

4. Are the questions arranged in a logical order?

   ___ Yes  ___ No

If the answer is No, please indicate your suggestions:

**IV. Additional Comments:**
APPENDIX I
SAMPLE TPB QUESTIONNAIRE
Sample TpB Questionnaire

Date: ____________________  Your Name: ____________________

Course Number: ________________

Class Attendance: Opinion Survey

As you know, class attendance at UMass varies widely. Some students attend all their classes while others miss many class meetings. The present survey is part of an investigation that tries to discover some of the reasons why students attend or fail to attend class meetings. Specifically, we are interested in your personal opinions regarding regular class attendance. By regular class attendance we mean being present at all lecture and discussion section meetings, except in cases of serious illness or other emergencies. Please read each question carefully and answer it to the best of your ability. There are no correct or incorrect responses; we are merely interested in your personal point of view.

Please enter the date, the course number, and your name in the designated spaces above. Your name is needed for follow-up surveys. However, all responses to this survey are completely confidential. The instructor of this course has nothing to do with this study and will not see your responses. All identifying information will be removed from this questionnaire and destroyed as soon as all data has been collected. Please be assured that the information you provide in this study will have no effect on your grade.

Thank you for your participation in this study.
Class Attendance Survey

Instructions

Many questions in this survey make use of rating scales with 7 places; you are to circle the number that best describes your opinion. For example, if you were asked to rate "The Weather in Amherst" on such a scale, the 7 places should be interpreted as follows:

The Weather in Amherst is:


If you think the weather in Amherst is extremely good, then you would circle the number 1, as follows:

The Weather in Amherst is:


If you think the weather in Amherst is quite bad, then you would circle the number 6, as follows.

The Weather in Amherst is:


If you think the weather in Amherst is slightly good, then you would circle the number 3.

The Weather in Amherst is:


If you think the weather in Amherst is neither good nor bad, then you would circle the number 4.

The Weather in Amherst is:


In making your ratings, please remember the following points:

* Be sure to answer all items – do not omit any.
* Never circle more than one number on a single scale.
Class Attendance Survey

Please answer each of the following questions by circling the number that best describes your opinion. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully.

[Outcome Evaluations]

1. For me to gain a better understanding of the subject matter of this course is extremely good: 1 : 2 : 3 : 4 : 5 : 6 : 7: extremely bad

2. For me to do well and get a high grade in this class is extremely good: 1 : 2 : 3 : 4 : 5 : 6 : 7: extremely bad

3. For me to have an opportunity to interact with the instructor and other students in this class is extremely good: 1 : 2 : 3 : 4 : 5 : 6 : 7: extremely bad

4. For me to miss sleep is extremely good: 1 : 2 : 3 : 4 : 5 : 6 : 7: extremely bad

5. For me to keep up with my studies in this class is extremely good: 1 : 2 : 3 : 4 : 5 : 6 : 7: extremely bad

6. For me to develop good study habits, self-discipline, and a feeling of self-satisfaction is extremely good: 1 : 2 : 3 : 4 : 5 : 6 : 7: extremely bad

7. My missing out on activities outside this class is extremely good: 1 : 2 : 3 : 4 : 5 : 6 : 7: extremely bad

8. My getting information and explanations regarding materials to be covered on tests in this class is extremely good: 1 : 2 : 3 : 4 : 5 : 6 : 7: extremely bad

9. My being subjected to tedium and boredom is extremely good: 1 : 2 : 3 : 4 : 5 : 6 : 7: extremely bad


[Past Behavior: Self-Report]

11. During the past 4 weeks, what percentage of meetings of this class have you attended? During the past 4 weeks, I have attended about ___% of the meetings of this class.
Class Attendance Survey

[Direct Measures of Perceived Behavioral Control, Subjective Norm, Attitude, and Intention]

12. For me to attend the meetings of this class on a regular basis is
    extremely difficult : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely easy

13. Most people who are important to me think that
    I should : 1 : 2 : 3 : 4 : 5 : 6 : 7 : I should not
    attend the meetings of this class on a regular basis

14. For me to attend the meetings of this class on a regular basis is

15. I plan to attend the meetings of this class on a regular basis
    extremely likely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely unlikely

16. If I wanted to I could easily attend about ___% of the meetings of this class

17. Most of the students in this class with whom I am acquainted attend meetings of this class on a
    regular basis

18. For me to attend the meetings of this class on a regular basis is
    extremely valuable : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely worthless

19. I am confident that if I wanted to I could attend the meetings of this class on a regular basis

20. It is expected of me that I attend the meetings of this class on a regular basis

21. For me to attend the meetings of this class on a regular basis is
    extremely pleasant : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely unpleasant

22. I will make an effort to attend the meetings of this class on a regular basis
    I definitely will : 1 : 2 : 3 : 4 : 5 : 6 : 7 : I definitely will not

23. For me to attend the meetings of this class on a regular basis is
Class Attendance Survey

24. Most people whose opinions I value would approve of my attending the meetings of this class on a regular basis

25. I intend to attend the meetings of this class on a regular basis is

26. I intend to attend the meetings of this class on a regular basis

[Motivation to Comply]

27. Generally speaking, how much do you care what the instructor of this course thinks you should do?
   not at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : very much

28. Generally speaking, how much do you care what your parents think you should do?
   not at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : very much

29. Generally speaking, how much do you care what your close friends think you should do?
   not at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : very much

30. Generally speaking, how much do you care what your classmates think you should do?
   not at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : very much

[Behavioral Beliefs]

31. Attending the meetings of this class on a regular basis will help me to gain a better understanding of the subject matter of this course
   extremely unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely likely

32. Attending the meetings of this class on a regular basis will help me to do well and get a high grade in this class
   extremely unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely likely

33. Attending the meetings of this class on a regular basis will give me an opportunity to interact with the instructor and other students in the class
   extremely unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely likely
Class Attendance Survey

34. Attending the meetings of this class on a regular basis will cause me to miss sleep
   extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely likely

35. Attending the meetings of this class on a regular basis will help me to keep up with my studies
   extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely likely

36. Attending the meetings of this class on a regular basis will help me to develop good study habits,
   self-discipline, and a feeling of self-satisfaction
   extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely likely

37. Attending the meetings of this class on a regular basis will make me miss out on activities outside of
   this class
   extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely likely

38. Attending the meetings of this class on a regular basis will help me to get information and
   explanations regarding materials to be covered on tests
   extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely likely

39. Attending the meetings of this class on a regular basis will subject me to tedium and boredom
   extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely likely

40. Attending the meetings of this class on a regular basis will help me to get my money’s worth during
   my time at UMass
   extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely likely

[Control Beliefs]

41. How often do you encounter unanticipated events that place demands on your time?
   very rarely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : very frequently

42. How often do you feel ill, tired or listless?
   very rarely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : very frequently

43. How often do family obligations place unanticipated demands on your time?
   very rarely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : very frequently

44. How often does work or employment place unanticipated demands on your time?
   very rarely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : very frequently
Class Attendance Survey

45. How often do other courses place heavy demands on your time?
   very rarely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : very frequently

46. How often do you fail to do the assignments of this course on time?
   very rarely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : very frequently

[Power of Control Factors]

47. If I encountered unanticipated events that placed demands on my time, it would make it more
difficult for me to attend the meetings of this class on a regular basis

48. If I felt ill, tired, or listless, it would make it more difficult for me to attend the meetings of this class
on a regular basis

49. If I had family obligations that placed unanticipated demands on my time, it would make it more
difficult for me to attend the meetings of this class on a regular basis

50. If work or employment placed unanticipated demands on my time, it would make it more difficult
for me to attend the meetings of this class on a regular basis

51. If other classes placed heavy demands on my time, it would make it more difficult for me to attend
the meetings of this class on a regular basis

52. If I failed to do the assignments for this course on time, it would make it more difficult for me to
attend the meetings of this class on a regular basis

[Normative Beliefs]

53. The instructor of this course thinks that I should attend the class meetings on a regular basis
   extremely likely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely unlikely

54. My parents think that I should attend the meetings of this class on a regular basis
   extremely likely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely unlikely
Class Attendance Survey

55. My close friends think that I should attend the meetings of this class on a regular basis
   extremely likely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely unlikely

56. My classmates think that I should attend the meetings of this class on a regular basis
   extremely likely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : extremely unlikely

[Behavior: Observed]

Percentage of classes actually attended.
APPENDIX J
PILOT SURVEY QUESTIONNAIRE
Instructions:

As you know, the use of a computer in the classroom for teaching varies widely among teachers. Some teachers use a computer as part of their instructional practice on a daily basis, while others do not use a computer at all. This survey has been developed to capture data for doctoral research on factors related to computer use for instruction by elementary teachers. The purpose of this survey is not to make a “judgment” about those who do or do not use a computer. The purpose of this survey is to better understand the variables that contribute to or detract from a teacher using a computer for instructional purposes.

Please answer each question included in this survey. The majority of questions in this survey make use of rating scales with 7 places; you are to fill in the circle that best describes your opinion. For example, if you were asked to rate “The Weather in Florida” on such a scale, the 7 places should be interpreted as follows:

The Weather in Florida is:

good: extremely quite slightly neither slightly quite extremely : bad

If you think the weather in Florida is extremely good, then you would fill in the first circle, as follows:

The Weather in Florida is:

good: extremely quite slightly neither slightly quite extremely : bad

If you think the weather in Florida is quite bad, then you would fill in the sixth circle, as follows:

good: extremely quite slightly neither slightly quite extremely : bad

Some response items form a scale from one value to another, without descriptive words underneath the bubbles. For example:

Exposure to the sun in Florida is harmful.

agree: extremely quite slightly neither slightly quite extremely : disagree

For these items, fill in the bubble on the scale that most closely matches your rating between values. In this example it would be from totally agree to totally disagree.
In completing the survey, please remember the following points:

- There are no right or wrong answers to the questions.
- Take your time and be reflective.
- Answer candidly and to the best of your ability.
- Complete the survey whether or not you use a computer in your classroom.
- Please work independently. This survey is not designed for group response.
- Be sure to answer all items – do not omit any.
- Only fill in one circle on a single scale.

Note: The phrase “present a lesson in your classroom” refers to:

*Instructional use of a computer for the presentation of a lesson or a teacher involving students in using a computer as part of a lesson.*

Examples include, but are not limited to, presenting curriculum related information to students using PowerPoint, the use of probes connected to a computer, and using the computer for demonstration or simulation. This phrase does not refer to management uses of a computer like keeping attendance records or electronic grade books, or to planning uses such as finding resources on the Internet.

When you have completed the questionnaire . . .

1) Place it in the provided return envelope.

2) Sign and enclose the Informed Consent Form.

3) Return the survey and the consent form in the envelope via county mail to Mike Geddes at the Instructional Resource Center.

Please return your completed survey by the deadline of Friday, April 16, 2004.

Thank you.
**April 2004**

**Elementary Teacher Computer Use in Instruction Survey - PILOT**

**Instructions:**

Please answer each of the following questions by circling the number that best describes your opinion. Some of the questions appear to be similar, but they do address somewhat different issues. Please read each question carefully.

1. Holding students' attention and keeping them interested is ...  
   
<table>
<thead>
<tr>
<th>good:</th>
<th>extremely quite</th>
<th>slightly neither</th>
<th>slightly</th>
<th>quite</th>
<th>extremely</th>
</tr>
</thead>
</table>

2. Reducing student discipline problems in the classroom is ...  
   
<table>
<thead>
<tr>
<th>good:</th>
<th>extremely quite</th>
<th>slightly neither</th>
<th>slightly</th>
<th>quite</th>
<th>extremely</th>
</tr>
</thead>
</table>

3. Enhancing the curriculum with the vast amount of information available from the Internet is ...  
   
<table>
<thead>
<tr>
<th>good:</th>
<th>extremely quite</th>
<th>slightly neither</th>
<th>slightly</th>
<th>quite</th>
<th>extremely</th>
</tr>
</thead>
</table>

4. Demonstrating to students how computers can be used for learning is ...  
   
<table>
<thead>
<tr>
<th>good:</th>
<th>extremely quite</th>
<th>slightly neither</th>
<th>slightly</th>
<th>quite</th>
<th>extremely</th>
</tr>
</thead>
</table>

5. Presenting a lesson to the whole class at once is ...  
   
<table>
<thead>
<tr>
<th>good:</th>
<th>extremely quite</th>
<th>slightly neither</th>
<th>slightly</th>
<th>quite</th>
<th>extremely</th>
</tr>
</thead>
</table>

6. Helping students develop needed computer literacy skills because computers are an integral part of our society is ...  
   
<table>
<thead>
<tr>
<th>good:</th>
<th>extremely quite</th>
<th>slightly neither</th>
<th>slightly</th>
<th>quite</th>
<th>extremely</th>
</tr>
</thead>
</table>

7. Encouraging student participation in the lesson is ...  
   
<table>
<thead>
<tr>
<th>good:</th>
<th>extremely quite</th>
<th>slightly neither</th>
<th>slightly</th>
<th>quite</th>
<th>extremely</th>
</tr>
</thead>
</table>

8. Accommodating different student learning styles is ...  
   
<table>
<thead>
<tr>
<th>good:</th>
<th>extremely quite</th>
<th>slightly neither</th>
<th>slightly</th>
<th>quite</th>
<th>extremely</th>
</tr>
</thead>
</table>

9. Having technical problems with computers during my lesson is ...  
   
<table>
<thead>
<tr>
<th>good:</th>
<th>extremely quite</th>
<th>slightly neither</th>
<th>slightly</th>
<th>quite</th>
<th>extremely</th>
</tr>
</thead>
</table>

10. Enhancing the learning experience of my students is ...  
    
    | good:         | extremely quite | slightly neither | slightly | quite | extremely |
    |---------------|-----------------|-------------------|----------|------|-----------|

11. Decreasing the personal interaction between teacher and student is ...  
    
    | good:         | extremely quite | slightly neither | slightly | quite | extremely |
    |---------------|-----------------|-------------------|----------|------|-----------|
April 2004  
Elementary Teacher Computer Use in Instruction Survey - PILOT

12. During the current school year, how many times have you used a computer to present a lesson?  
   __________ Times  
   0  O O O O  
   1  O O O O  
   2  O O O O  
   3  O O O O  
   4  O O O O  
   5  O O O O  
   6  O O O O  
   7  O O O O  
   8  O O O O  
   9  O O O O

13. For me to use a computer to present a lesson in my classroom during instruction would be . . .  
   impossible: O O O O O O O O O : possible

14. Most people who are important to me think that I should use a computer to present a lesson in my classroom during instruction.

15. For me to use a computer to present a lesson in my classroom during instruction is . . .  
   impossible: O O O O O O O O O : possible

16. I intend to use a computer to present a lesson in my classroom during instruction.

17. I have control over using a computer to present a lesson in my classroom during instruction.

18. It is expected of me that I use a computer to present a lesson in my classroom during instruction.

19. For me to use a computer to present a lesson in my classroom during instruction is . . .  
   impossible: O O O O O O O O O : possible
20. I will try to use a computer to present a lesson in my classroom during instruction.

21. If I wanted to I could use a computer to present a lesson in my classroom during instruction.

22. The people in my life whose opinions I value would approve of my using a computer to present a lesson in my classroom during instruction.

23. For me to use a computer to present a lesson in my classroom during instruction is . . .

24. Most people who are important to me use computers personally or in their work.

25. I plan to use a computer to present a lesson in my classroom during instruction.

26. It is mostly up to me whether or not I use a computer to present a lesson in my classroom during instruction.

27. For me to use a computer to present a lesson in my classroom during instruction is . . .

28. The people in my life whose opinions I value use computers personally or in their work.

29. For me to use a computer to present a lesson in my classroom during instruction is . . .
30. Generally speaking, how much do you want to do what your principal thinks you should do?  

31. Generally speaking, how much do you want to do what parents of your students think you should do?  

32. Generally speaking, how much do you want to do what other teachers think you should do?  

33. Generally speaking, how much do you want to do what your students think you should do?  

34. Generally speaking, how much do you want to do what your school technology and/or media specialist thinks you should do?  

35. My use of a computer to present a lesson in my classroom during instruction will hold students’ attention and keep them interested.  

36. My use of a computer to present a lesson in my classroom during instruction will reduce student discipline problems.  

37. My use of a computer to present a lesson in my classroom during instruction will enhance the curriculum with the vast amount of information available from the Internet.  

38. My use of a computer to present a lesson in my classroom during instruction will demonstrate to students how computers can be used for learning.
39. My use of a computer to present a lesson in my classroom during instruction will enable me to present a lesson to the whole class at once.

40. My use of a computer to present a lesson in my classroom during instruction will help students develop the computer literacy skills they need in today's society.

41. My use of a computer to present a lesson in my classroom during instruction will encourage student participation in the lesson.

42. My use of a computer to present a lesson in my classroom during instruction will accommodate different student learning styles.

43. My use of a computer to present a lesson in my classroom during instruction will increase the chances that my lesson will be disrupted because of technical problems.

44. My use of a computer to present a lesson in my classroom during instruction will enhance the learning experience of my students.

45. My use of a computer to present a lesson in my classroom during instruction will decrease the personal interaction between teacher and student.

46. Having enough technology equipment in my classroom is important.

47. Training on the use of technology in instruction is important.

48. Adequate time is needed to try new or different instructional strategies in the classroom.
49. Technical glitches and equipment problems are a hindrance when using technology in the classroom.

50. A teacher needs support to use technology in the classroom.

51. A teacher needs knowledge on how to use technology in the classroom.

52. A teacher should be confident when using technology in the classroom.

53. Resources like appropriate software are needed to use technology in the classroom.

54. It is important for a teacher to be in control of his/her classroom.

55. Having enough technology equipment in my classroom would make it _________ to use a computer to present a lesson in my classroom during instruction.

56. Having more training on the use of technology in instruction would make it _________ to use a computer to present a lesson in my classroom during instruction.

57. Having more time would make it _________ to use a computer to present a lesson in my classroom during instruction.

58. Having fewer technical glitches and equipment problems would make it _________ to use a computer to present a lesson in my classroom during instruction.

59. Having support would make it _________ to use a computer to present a lesson in my classroom during instruction.
60. Not having knowledge on how to use technology in the classroom would make it ___________ to use a computer to present a lesson in my classroom during instruction.

61. Having confidence when using technology would make it ___________ to use a computer to present a lesson in my classroom during instruction.

62. Having resources like appropriate software would make it ___________ to use a computer to present a lesson in my classroom during instruction.

63. The need to be in control of one’s classroom makes it ___________ to use a computer to present a lesson in my classroom during instruction.

64. My principal thinks that I should use a computer to present a lesson in my classroom during instruction.

65. Parents of my students think that I should use a computer to present a lesson in my classroom during instruction.

66. Other teachers think that I should use a computer to present a lesson in my classroom during instruction.

67. My students think that I should use a computer to present a lesson in my classroom during instruction.

68. My school technology and/or media specialist thinks that I should use a computer to present a lesson in my classroom during instruction.
April 2004  
Elementary Teacher Computer Use in Instruction Survey - PILOT

Instructions: Mark the item that best describes your computer use.

69. O a. In my instruction, the use of the computer is supplemen
tal.  
O b. The computer is critical to the functioning of my instruction.  
O c. I do not use a computer in my teaching.

70. O a. The use of the computer is not essential in my instruction.  
O b. For my teaching, the use of the computer is indispensable.  
O c. I do not use a computer in my teaching.

71. O a. The computer is critical to the functioning of my instruction.  
O b. The use of the computer is not essential in my instruction.  
O c. I do not use a computer in my teaching.

72. O a. For my teaching, the use of the computer is indispensable.  
O b. In my instruction, the use of the computer is supplemen
tal.  
O c. I do not use a computer in my teaching.

Demographic Information

<table>
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<tr>
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<th>74. Age</th>
<th>75. # of years teaching</th>
<th>76. # of years using a computer</th>
</tr>
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</tr>
<tr>
<td></td>
<td>9</td>
<td>9</td>
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</tr>
</tbody>
</table>

77. I use a computer:

- O at school only
- O at home only
- O at school and at home
- O I don't use a computer

78. Grade Level:

- O Pre-K
- O 1
- O 2
- O 3
- O 4
- O 5
- O Other, specify ____________

Disregard info in this box.  
For internal use only.

Thank you for your participation in this survey!
APPENDIX K
REVISED PILOT SURVEY QUESTIONNAIRE
Purpose of Survey

This survey has been developed to capture data for doctoral research on factors related to computer use for instruction by elementary teachers. The purpose of this survey is not to make a "judgment" about those who do or do not use a computer. The purpose of this survey is to better understand the factors that contribute to or detract from a teacher using a computer for instructional purposes.

Please answer each question included in this survey. The majority of questions in this survey make use of rating scales with 7 places; you are to fill in the circle that best describes your opinion. For example, if you were asked to rate "The Weather in Florida" on such a scale, the 7 places should be interpreted as follows:

The Weather in Florida is:

**good**: extremely **quite** slightly neither slightly **quite** extremely **bad**

If you think the weather in Florida is quite good, then you would fill in the first circle, as follows:

The Weather in Florida is:

**good**: extremely quite slightly neither slightly **quite** extremely **bad**

Some response items form a scale from one value to another, without descriptive words underneath the bubbles. Example:

Exposure to the sun in Florida is harmful. **agree**: extremely quite slightly neither slightly **quite** extremely **disagree**

For these items, fill in the bubble on the scale that most closely matches your rating between values. In this example it would be from *totally agree* to *totally disagree*.

In completing the survey, please remember the following points:

- There are no right or wrong answers to the questions.
- Take your time and be reflective.
- Answer candidly and to the best of your ability.
- Complete the survey whether or not you use a computer in your classroom.
- Please work independently. This survey is not designed for group response.
- Be sure to answer all items – do not omit any.
- Only fill in one circle on a single scale.

When you have completed the questionnaire . . .

1) Place it in the provided return envelope. Please do not fold the survey.
2) Sign and enclose the Informed Consent Form.
3) Return the survey and the consent form in the envelope via county mail to Mike Geddes at the Instructional Resource Center. Thank you.

Please return your completed survey by the deadline of ____________.
Instructions:

Please answer each of the following questions by circling the number that best describes your opinion. Some of the questions appear to be similar, but they do address somewhat different issues. Please read each question carefully.

Note: The phrase “use a computer in your classroom to present a lesson” refers to: Instructional use of a computer for the presentation of a lesson or a teacher involving students in using a computer as part of a lesson.

Examples include, but are not limited to, presenting curriculum related information to students using PowerPoint, the use of probes connected to a computer, and using the computer for demonstration or simulation. This phrase does not refer to management uses of a computer like keeping attendance records or electronic grade books, or to planning uses such as finding resources on the Internet.

1. Holding students’ attention and keeping them interested is . . . good: o o o o o o o o : bad
   extremely quite slightly neither slightly quite extremely

2. Reducing student discipline problems in the classroom is . . . good: o o o o o o o o : bad
   extremely quite slightly neither slightly quite extremely

3. Enhancing the curriculum with the vast amount of information available from the Internet is . . .
   good: o o o o o o o o : bad
   extremely quite slightly neither slightly quite extremely

4. Demonstrating to students how computers can be used for learning is . . .
   good: o o o o o o o o : bad
   extremely quite slightly neither slightly quite extremely

5. Presenting a lesson to the whole class at once is . . .
   good: o o o o o o o o : bad
   extremely quite slightly neither slightly quite extremely

6. Helping students develop needed computer literacy skills because computers are an integral part of our society is . . .
   good: o o o o o o o o : bad
   extremely quite slightly neither slightly quite extremely

7. Encouraging student participation in the lesson is . . .
   good: o o o o o o o o : bad
   extremely quite slightly neither slightly quite extremely

8. Accommodating different student learning styles is . . .
   good: o o o o o o o o : bad
   extremely quite slightly neither slightly quite extremely

9. Having technical problems with computers during my lesson is . . .
   good: o o o o o o o o : bad
   extremely quite slightly neither slightly quite extremely

10. Enhancing the learning experience of my students is . . .
    good: o o o o o o o o : bad
        extremely quite slightly neither slightly quite extremely
11. During the current school year, how many times have you used a computer to present a lesson?

*Print the number of times in the top line, and bubble in the answer filling in all columns. Ex. 10 times would be:*

<table>
<thead>
<tr>
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<th>1</th>
<th>0</th>
<th>Times</th>
</tr>
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<td>O</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
</tr>
</tbody>
</table>

12. It would be __________ for me to use a computer in my classroom to present a lesson during instruction.

impossible: O O O O O O O O : possible

13. Most people who are important to me think that I ______ use a computer to present a lesson in my classroom during instruction.

should: O O O O O O O O : should not

14. For me to use a computer to present a lesson in my classroom during instruction is . . .

harmful: O O O O O O O O : beneficial

15. I intend to use a computer to present a lesson in my classroom during instruction.

unlikely: O O O O O O O O : likely

16. I have control over using a computer in my classroom to present a lesson during instruction.

agree: O O O O O O O O : disagree

17. For me to use a computer to present a lesson in my classroom during instruction is . . .

pleasant: O O O O O O O O : unpleasant

18. I will try to use a computer to present a lesson in my classroom during instruction.

ture: O O O O O O O O : false

19. If I wanted to I could use a computer to present a lesson in my classroom during instruction.

agree: O O O O O O O O : disagree
20. The people in my life whose opinions I value would _______ of my using a computer to present a lesson in my classroom during instruction.

21. For me to use a computer to present a lesson in my classroom during instruction is ______.

22. Most people who are important to me use computers personally or in their work.

23. I plan to use a computer to present a lesson in my classroom during instruction.

24. It is mostly up to me whether or not I use a computer in my classroom to present a lesson during instruction.

25. For me to use a computer to present a lesson in my classroom during instruction is ______.

26. The people in my life whose opinions I value ______ computers personally or in their work.

27. For me to use a computer to present a lesson in my classroom during instruction is ______.

28. Generally speaking, how much do you want to do what your principal thinks you should do?

29. Generally speaking, how much do you want to do what parents of your students think you should do?
30. Generally speaking, how much do you want to do what other teachers think you should do?  

not at all : 〇 〇 〇 〇 〇 〇 〇 : very much

31. Generally speaking, how much do you want to do what your students think you should do?  

not at all : 〇 〇 〇 〇 〇 〇 〇 : very much

32. Generally speaking, how much do you want to do what your school technology and/or media specialist thinks you should do?  

not at all : 〇 〇 〇 〇 〇 〇 〇 : very much

33. My use of a computer to present a lesson in my classroom during instruction will hold students’ attention and keep them interested.  

likely : 〇 〇 〇 〇 〇 〇 〇 〇 : unlikely

34. My use of a computer to present a lesson in my classroom during instruction will reduce student discipline problems.  

likely : 〇 〇 〇 〇 〇 〇 〇 〇 : unlikely

35. My use of a computer to present a lesson in my classroom during instruction will enhance the curriculum with the vast amount of information available from the Internet.  

likely : 〇 〇 〇 〇 〇 〇 〇 〇 : unlikely

36. My use of a computer to present a lesson in my classroom during instruction will demonstrate to students how computers can be used for learning.  

likely : 〇 〇 〇 〇 〇 〇 〇 〇 : unlikely

37. My use of a computer to present a lesson in my classroom during instruction will enable me to present a lesson to the whole class at once.  

likely : 〇 〇 〇 〇 〇 〇 〇 〇 : unlikely

38. My use of a computer to present a lesson in my classroom during instruction will help students develop the computer literacy skills they need in today’s society.  

likely : 〇 〇 〇 〇 〇 〇 〇 〇 : unlikely
39. My use of a computer to present a lesson in my classroom during instruction will encourage student participation in the lesson.

40. My use of a computer to present a lesson in my classroom during instruction will accommodate different student learning styles.

41. My use of a computer to present a lesson in my classroom during instruction will increase the chances that my lesson will be disrupted because of technical problems.

42. My use of a computer to present a lesson in my classroom during instruction will enhance the learning experience of my students.

43. Having enough technology equipment in my classroom is important.

44. Training on the use of technology in instruction is important.

45. Adequate time is needed to try new or different instructional strategies in the classroom.

46. Technical glitches and equipment problems are a hindrance when using technology in the classroom.

47. A teacher needs support to use technology in the classroom.

48. A teacher needs knowledge on how to use technology in the classroom.

49. A teacher should be confident when using technology in the classroom.

50. Resources like appropriate software are needed to use technology in the classroom.
51. Having enough technology equipment in my classroom would make it _______ to use a computer to present a lesson during instruction.

52. Having more training on the use of technology in instruction would make it _______ to use a computer in my classroom to present a lesson during instruction.

53. Having more time would make it _______ to use a computer in my classroom to present a lesson during instruction.

54. Having fewer technical glitches and equipment problems would make it _______ to use a computer in my classroom to present a lesson during instruction.

55. Having support would make it _______ to use a computer in my classroom to present a lesson during instruction.

56. Lack of knowledge on how to use technology in the classroom would make it _______ to use a computer to present a lesson during instruction.

57. Having confidence when using technology would make it _______ to use a computer in my classroom to present a lesson during instruction.

58. Having resources like appropriate software would make it _______ to use a computer in my classroom to present a lesson during instruction.

59. My principal thinks that I should use a computer to present a lesson in my classroom during instruction.
60. Parents of my students think that I should use a computer to present a lesson in my classroom during instruction.

likely: 〇 〇 〇 〇 〇 〇 〇 〇: unlikely
extremely quite slightly neither slightly quite extremely

61. Other teachers think that I should use a computer to present a lesson in my classroom during instruction.

likely: 〇 〇 〇 〇 〇 〇 〇 〇: unlikely
extremely quite slightly neither slightly quite extremely

62. My students think that I should use a computer to present a lesson in my classroom during instruction.

likely: 〇 〇 〇 〇 〇 〇 〇 〇: unlikely
extremely quite slightly neither slightly quite extremely

63. My school technology and/or media specialist thinks that I should use a computer to present a lesson in my classroom during instruction.

likely: 〇 〇 〇 〇 〇 〇 〇 〇: unlikely
extremely quite slightly neither slightly quite extremely

Instructions: Mark the item that best describes your computer use.

64. 〇 a. In my instruction, the use of the computer is supplemental.
   〇 b. The computer is critical to the functioning of my instruction.
   〇 c. I do not use a computer in my teaching.

65. 〇 a. The use of the computer is not essential in my instruction.
   〇 b. For my teaching, the use of the computer is indispensable.
   〇 c. I do not use a computer in my teaching.

66. 〇 a. The computer is critical to the functioning of my instruction.
   〇 b. The use of the computer is not essential in my instruction.
   〇 c. I do not use a computer in my teaching.

67. 〇 a. For my teaching, the use of the computer is indispensable.
   〇 b. In my instruction, the use of the computer is supplemental.
   〇 c. I do not use a computer in my teaching.

(continued next page)
Demographic Information

Please provide information requested below:

68. Gender
   - O Female
   - O Male

69. Age [ ]
   - 0 O O
   - 1 O O
   - 2 O O
   - 3 O O
   - 4 O O
   - 5 O O
   - 6 O O
   - 7 O O
   - 8 O O
   - 9 O O

70. # of years teaching [ ]
   - 0 O O
   - 1 O O
   - 2 O O
   - 3 O O
   - 4 O O
   - 5 O O
   - 6 O O
   - 7 O O
   - 8 O O
   - 9 O O

71. # of years using a computer [ ]
   - 0 O O
   - 1 O O
   - 2 O O
   - 3 O O
   - 4 O O
   - 5 O O
   - 6 O O
   - 7 O O
   - 8 O O
   - 9 O O

72. I use a computer:
   - O at school only
   - O at home only
   - O at school and at home
   - O I don’t use a computer

73. Grade Level:
   - O Pre-K
   - O K
   - O 1
   - O 2
   - O 3
   - O 4
   - O 5
   - O Other, specify __________

Thank you for your participation in this survey!
May 2004

Elementary Teacher Computer Use in Instruction Survey

Purpose of Survey

This survey has been developed to capture data for doctoral research on factors related to computer use for instruction by elementary teachers. The purpose of this survey is not to make a "judgment" about those who do or do not use a computer. The purpose of this survey is to better understand the factors that contribute to or detract from a teacher using a computer for instructional purposes.

Please answer each question included in this survey. The majority of questions in this survey make use of rating scales with 7 places; you are to fill in the circle that best describes your opinion. For example, if you were asked to rate "The Weather in Florida" on such a scale, the 7 places should be interpreted as follows:

The Weather in Florida is:

| good: | extremely | quite | slightly | neither | slightly | quite | extremely | bad |

If you think the weather in Florida is quite good, then you would fill in the second circle, as follows:

The Weather in Florida is:

| good: | extremely | quite | slightly | neither | slightly | quite | extremely | bad |

Some response items form a scale from one value to another, without descriptive words underneath the bubbles. Example:

Exposure to the sun in Florida is harmful. agree:

For these items, fill in the bubble on the scale that most closely matches your rating between values. In this example it would be from totally agree to totally disagree.

In completing the survey, please remember the following points:

- There are no right or wrong answers to the questions.
- Take your time and be reflective.
- Answer candidly and to the best of your ability.
- Complete the survey whether or not you use a computer in your classroom.
- Please work independently. This survey is not designed for group response.
- Be sure to answer all items – do not omit any.
- Only fill in one circle on a single scale.

When you have completed the questionnaire . . .

1) Place it in the provided return envelope. Please do not fold the survey.
2) Sign and enclose the Informed Consent Form.
3) Return the survey and the consent form in the envelope via county mail to Mike Geddes at the Instructional Resource Center. Thank you.

Please return your completed survey by the deadline of May 14, 2004.
May 2004

Elementary Teacher Computer Use in Instruction Survey

Instructions:

Please answer each of the following questions by filling in the bubble that best describes your opinion. Some of the questions appear to be similar, but they do address somewhat different issues. Please read each question carefully.

Note: The phrase “use a computer in your classroom to present a lesson” refers to: Instructional use of a computer for the presentation of a lesson or a teacher involving students in using a computer as part of a lesson.

Examples include, but are not limited to, presenting curriculum related information to students using PowerPoint, the use of probes connected to a computer, and using the computer for demonstration or simulation. This phrase does not refer to management uses of a computer like keeping attendance records or electronic grade books, or to planning uses such as finding resources on the Internet.

<table>
<thead>
<tr>
<th>Question</th>
<th>Good:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Holding students’ attention and keeping them interested is . . .</td>
<td>extremely</td>
</tr>
<tr>
<td>2. Reducing student discipline problems in the classroom is . . .</td>
<td>extremely</td>
</tr>
<tr>
<td>3. Enhancing the curriculum with the vast amount of information available from the Internet is . . .</td>
<td>extremely</td>
</tr>
<tr>
<td>4. Demonstrating to students how computers can be used for learning is . .</td>
<td>extremely</td>
</tr>
<tr>
<td>5. Presenting a lesson to the whole class at once is . . .</td>
<td>extremely</td>
</tr>
<tr>
<td>6. Helping students develop needed computer literacy skills because computers are an integral part of our society is . . .</td>
<td>extremely</td>
</tr>
<tr>
<td>7. Encouraging student participation in the lesson is . . .</td>
<td>extremely</td>
</tr>
<tr>
<td>8. Accommodating different student learning styles is . . .</td>
<td>extremely</td>
</tr>
<tr>
<td>9. Having technical problems with computers during my lesson is . . .</td>
<td>extremely</td>
</tr>
<tr>
<td>10. Enhancing the learning experience of my students is . . .</td>
<td>extremely</td>
</tr>
</tbody>
</table>
May 2004

Elementary Teacher Computer Use in Instruction Survey

11. During the current school year, how many times have you used a computer to present a lesson?

Print the number of times in the top line, and bubble in the answer filling in all columns. Ex. 10 times would be:

<table>
<thead>
<tr>
<th>Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: 1: 0</td>
</tr>
</tbody>
</table>

12. Using a computer in my classroom to present a lesson during instruction is within my control.

true : o o o o o o o o o

false : o o o o o o o o o

13. Most people who are important to me think that I should use a computer to present a lesson in my classroom during instruction.

should : o o o o o o o o o

should not : o o o o o o o o o

14. For me to use a computer to present a lesson in my classroom during instruction is . . .

beneficial : o o o o o o o o o

harmful : o o o o o o o o o

15. I intend to use a computer to present a lesson in my classroom during instruction.

likely : o o o o o o o o o

unlikely : o o o o o o o o o

16. I have control over using a computer in my classroom to present a lesson during instruction.

agree : o o o o o o o o o

disagree : o o o o o o o o o

17. For me to use a computer to present a lesson in my classroom during instruction is . . .

unpleasant : o o o o o o o o o

pleasant : o o o o o o o o o

18. I will try to use a computer to present a lesson in my classroom during instruction.

false : o o o o o o o o o

ture : o o o o o o o o o

19. Factors beyond my control determine whether or not I can use a computer in my classroom to present a lesson during instruction.

disagree : o o o o o o o o o

agree : o o o o o o o o o
<table>
<thead>
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<th>Question</th>
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<td>would ____________ of my using a computer</td>
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</tr>
<tr>
<td>to present a lesson in my classroom during instruction</td>
<td>disapprove:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>21. For me to use a computer to present a lesson in my classroom during</td>
<td>good:</td>
</tr>
<tr>
<td>instruction is . . .</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Most people who are important to me use</td>
<td>true:</td>
</tr>
<tr>
<td>computers personally or in their work</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>23. I plan to use a computer to present a lesson in my classroom during</td>
<td>disagree:</td>
</tr>
<tr>
<td>instruction.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>24. The use of a computer in my classroom to</td>
<td>true:</td>
</tr>
<tr>
<td>present a lesson during instruction depends on factors beyond my control</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>25. For me to use a computer to present a lesson in my classroom during</td>
<td>worthless:</td>
</tr>
<tr>
<td>instruction is . . .</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>26. The people in my life whose opinions I value</td>
<td>use:</td>
</tr>
<tr>
<td>computers personally or in their work</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>27. For me to use a computer to present a lesson in my classroom during</td>
<td>enjoyable:</td>
</tr>
<tr>
<td>instruction is . . .</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>28. Generally speaking, how much do you want to</td>
<td>not at all:</td>
</tr>
<tr>
<td>do what your principal thinks you should do?</td>
<td></td>
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<td></td>
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<tr>
<td>29. Generally speaking, how much do you want to</td>
<td>not at all:</td>
</tr>
<tr>
<td>do what parents of your students think you should do?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
May 2004

Elementary Teacher Computer Use in Instruction Survey

30. Generally speaking, how much do you want to
do what other teachers think you should do?
not at all: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○: very much

31. Generally speaking, how much do you want to
do what your students think you should do?
not at all: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○: very much

32. Generally speaking, how much do you want to
do what your school technology and/or media
specialist thinks you should do?
not at all: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○: very much

33. My use of a computer to present a lesson in my
classroom during instruction will hold students' attention and keep them interested.
likely: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○: unlikely
                extremely quite slightly neither slightly quite extremely

34. My use of a computer to present a lesson in my
classroom during instruction will reduce student
discipline problems.
likely: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○: unlikely
                extremely quite slightly neither slightly quite extremely

35. My use of a computer to present a lesson in my
classroom during instruction will enhance the
curriculum with the vast amount of information available from the Internet.
likely: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○: unlikely
                extremely quite slightly neither slightly quite extremely

36. My use of a computer to present a lesson in my
classroom during instruction will demonstrate to students how computers can be used for learning.
likely: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○: unlikely
                extremely quite slightly neither slightly quite extremely

37. My use of a computer to present a lesson in my
classroom during instruction will enable me to present a lesson to the whole class at once.
likely: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○: unlikely
                extremely quite slightly neither slightly quite extremely

38. My use of a computer to present a lesson in my
classroom during instruction will help students develop the computer literacy skills they need in today's society.
likely: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○: unlikely
                extremely quite slightly neither slightly quite extremely
### Elementary Teacher Computer Use in Instruction Survey

<table>
<thead>
<tr>
<th>Question</th>
<th>Likely Options</th>
<th>Agree Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>39. My use of a computer to present a lesson in my classroom during instruction will encourage student participation in the lesson.</td>
<td>unlikely: extremely quite</td>
<td>disagree: strongly quite</td>
</tr>
<tr>
<td>40. My use of a computer to present a lesson in my classroom during instruction will accommodate different student learning styles.</td>
<td>unlikely: extremely quite</td>
<td>disagree: strongly quite</td>
</tr>
<tr>
<td>41. My use of a computer to present a lesson in my classroom during instruction will increase the chances that my lesson will be disrupted because of technical problems.</td>
<td>unlikely: extremely quite</td>
<td>disagree: strongly quite</td>
</tr>
<tr>
<td>42. My use of a computer to present a lesson in my classroom during instruction will enhance the learning experience of my students.</td>
<td>unlikely: extremely quite</td>
<td>disagree: strongly quite</td>
</tr>
<tr>
<td>43. Having enough technology equipment in my classroom is important.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44. Training on the use of technology in instruction is important.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45. Adequate time is needed to try new or different instructional strategies in the classroom.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46. Technical glitches and equipment problems are a hindrance when using technology in the classroom.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47. A teacher needs support to use technology in the classroom.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48. A teacher needs knowledge on how to use technology in the classroom.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49. Classroom technology should be easy to learn and use.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50. Adequate resources are needed to use technology in the classroom.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
May 2004

Elementary Teacher Computer Use in Instruction Survey

51. Having enough technology equipment in my classroom would make it __________ to use a computer to present a lesson during instruction.

more
difficult: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ : easier
        extremely quite slightly neither slightly quite extremely

52. Having more training on the use of technology in instruction would make it __________ to use a computer in my classroom to present a lesson during instruction.

more
difficult: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ : easier
        extremely quite slightly neither slightly quite extremely

53. Having more time would make it __________ to use a computer in my classroom to present a lesson during instruction.

more
difficult: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ : easier
        extremely quite slightly neither slightly quite extremely

54. Having fewer technical glitches and equipment problems would make it __________ to use a computer in my classroom to present a lesson during instruction.

more
difficult: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ : easier
        extremely quite slightly neither slightly quite extremely

55. Having support would make it __________ to use a computer in my classroom to present a lesson during instruction.

more
difficult: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ : easier
        extremely quite slightly neither slightly quite extremely

56. Lack of knowledge on how to use technology would make it __________ to use a computer in my classroom to present a lesson during instruction.

more
difficult: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ : easier
        extremely quite slightly neither slightly quite extremely

57. Having classroom technology that is easier to learn and use would make it __________ to use a computer in my classroom to present a lesson during instruction.

more
difficult: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ : easier
        extremely quite slightly neither slightly quite extremely

58. Having adequate resources would make it __________ to use a computer in my classroom to present a lesson during instruction.

more
difficult: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ : easier
        extremely quite slightly neither slightly quite extremely

59. My principal thinks that I should use a computer to present a lesson in my classroom during instruction.

likely: ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ : unlikely
       extremely quite slightly neither slightly quite extremely
May 2004

Elementary Teacher Computer Use in Instruction Survey

60. Parents of my students think that I should use a computer to present a lesson in my classroom during instruction.
likely: O O O O O : unlikely
extremely quite slightly neither slightly quite extremely

61. Other teachers think that I should use a computer to present a lesson in my classroom during instruction.
likely: O O O O O O : unlikely
extremely quite slightly neither slightly quite extremely

62. My students think that I should use a computer to present a lesson in my classroom during instruction.
likely: O O O O O O : unlikely
extremely quite slightly neither slightly quite extremely

63. My school technology and/or media specialist thinks that I should use a computer to present a lesson in my classroom during instruction.
likely: O O O O O O : unlikely
extremely quite slightly neither slightly quite extremely

Instructions: Mark the item that best describes your computer use.

64. O a. In my instruction, the use of the computer is supplemental.
✓ b. The computer is critical to the functioning of my instruction.
✓ c. I do not use a computer in my teaching.

65. O a. The use of the computer is not essential in my instruction.
✓ b. For my teaching, the use of the computer is indispensable.
✓ c. I do not use a computer in my teaching.

66. O a. The computer is critical to the functioning of my instruction.
✓ b. The use of the computer is not essential in my instruction.
✓ c. I do not use a computer in my teaching.

67. O a. For my teaching, the use of the computer is indispensable.
✓ b. In my instruction, the use of the computer is supplemental.
✓ c. I do not use a computer in my teaching.

(continued next page)
May 2004

Elementary Teacher Computer Use in Instruction Survey

Demographic Information

Please provide information requested below:

68. Gender
   ○ Female
   ○ Male

69. Age ______

70. # of years teaching ______

71. # of years using a computer ______

72. I use a computer:
   ○ at school only
   ○ at home only
   ○ at school and at home
   ○ I don't use a computer

73. Grade Level:
   ○ Pre-K
   ○ K
   ○ 1
   ○ 2
   ○ 3
   ○ 4
   ○ 5
   ○ Other, specify __________

Thank you for your participation in this survey!
TO: (Personalized teacher name and school here)

FROM: Mike Geddes

RE: Elementary Teacher Computer Use in Instruction Survey

Enclosed, please find an Elementary Teacher Computer Use in Instruction Survey.

This survey has been developed to capture data for doctoral research on factors related to computer use for instruction by elementary teachers. The data from this survey will help us better understand the factors that contribute to or detract from a teacher using a computer for instructional purposes. We will use the results from this study to improve the implementation of instructional technology in our school district.

I have received permission from our Superintendent, Mr. Hickey, to conduct this research in our school district, and from your Principal, to involve teachers from your school. The population for this study is elementary teachers. I need your assistance in completing and returning this survey.

A few points of information related to this survey:

- Some of you were previously selected “randomly” to complete a pilot of this survey instrument. That pilot was used to create this final version, so I would ask that you complete this final survey even if you were involved in the pilot study.
- This survey is intended for computer and non-computer users.
- The survey should take about 30 minutes to complete.
- Please read and sign the enclosed Informed Consent form. Return it with your completed survey form.
- Return the completed survey and consent form, using the envelope provided, by the deadline of Friday, May 14, 2004.

I know you are extremely busy as we near the end of the 03-04 school year. I sincerely hope you will take some time to complete this survey when you receive it. I appreciate your time and I thank you in advance for your participation and contribution to this study.

Thank you.

Enclosures: Informed Consent Form, Survey, Return Envelope
APPENDIX N
FINAL SURVEY REMINDER

REMEMBER REMINDER REMINDER REMINDER REMINDER REMINDER

TO: Survey Recipients

FROM: Mike Geddes
Instructional Resource Center

RE: Elementary Teacher Computer Use in Instruction Survey

Just a reminder that the Elementary Teacher Computer Use in Instruction Survey that you were invited to complete is due back on:

Friday, May 14, 2004

- I know you are busy, so thank you in advance for your assistance with this survey. Your response is very important and appreciated.

- Please complete and return the survey, along with the signed consent form, via county mail by the due date. Use the provided return envelope.

- Thanks also if you have already completed and returned your survey.

Sincerely,
Mike Geddes
# APPENDIX O

## CORRELATIONS BETWEEN TPB FACTORS AND SURVEY ITEMS

Table O-1. Correlations Between TPB Factors and Attitude Survey Items.

<table>
<thead>
<tr>
<th>Items</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>For me to use a computer to present a lesson in my classroom during instruction is . . . harmful – beneficial</td>
<td>ATT: .806  PBC: .085  SN: .111</td>
</tr>
<tr>
<td>For me to use a computer to present a lesson in my classroom during instruction is . . . pleasant – unpleasant</td>
<td>ATT: .865  PBC: .245  SN: .041</td>
</tr>
<tr>
<td>For me to use a computer to present a lesson in my classroom during instruction is . . . good – bad</td>
<td>ATT: .812  PBC: .069  SN: .231</td>
</tr>
<tr>
<td>For me to use a computer to present a lesson in my classroom during instruction is . . . worthless – valuable</td>
<td>ATT: .847  PBC: .101  SN: .143</td>
</tr>
<tr>
<td>For me to use a computer to present a lesson in my classroom during instruction is . . . enjoyable – not enjoyable</td>
<td>ATT: .862  PBC: .155  SN: .052</td>
</tr>
</tbody>
</table>

Extraction Method: Maximum Likelihood
Rotation Method: Varimax with Kaiser Normalization
Table O-2. Correlations Between TPB Factors and Subjective Norm Survey Items.

<table>
<thead>
<tr>
<th>Items</th>
<th>ATT</th>
<th>PBC</th>
<th>SN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most people who are important to me think that I use a computer to present a lesson in my classroom during instruction. should – should not</td>
<td>.638</td>
<td>.073</td>
<td>.164</td>
</tr>
<tr>
<td>The people in my life whose opinions I value would approve – disapprove of my using a computer to present a lesson in my classroom during instruction.</td>
<td>.547</td>
<td>.036</td>
<td>.335</td>
</tr>
<tr>
<td>Most people who are important to me use computers personally or in their work. true – false</td>
<td>.213</td>
<td>.081</td>
<td>.841</td>
</tr>
<tr>
<td>The people in my life whose opinions I value do not use computers personally or in their work. use –</td>
<td>.172</td>
<td>.122</td>
<td>.977</td>
</tr>
</tbody>
</table>

Extraction Method: Maximum Likelihood
Rotation Method: Varimax with Kaiser Normalization
Table O-3. Correlations Between TPB Factors and Perceived Behavioral Control Survey Items.

<table>
<thead>
<tr>
<th>Items</th>
<th>Factors</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ATT</td>
<td>PBC</td>
<td>SN</td>
</tr>
<tr>
<td>Using a computer in my classroom to present a lesson during instruction is within my control. true – false</td>
<td>.376</td>
<td>.455</td>
<td>.157</td>
</tr>
<tr>
<td>I have control over using a computer in my classroom to present a lesson during instruction. agree – disagree</td>
<td>.244</td>
<td>.486</td>
<td>.113</td>
</tr>
<tr>
<td>Factors beyond my control determine whether or not I can use a computer in my classroom to present a lesson during instruction. disagree – agree</td>
<td>-.015</td>
<td>.852</td>
<td>.026</td>
</tr>
<tr>
<td>The use of a computer in my classroom to present a lesson during instruction depends on factors beyond my control. true – false</td>
<td>.021</td>
<td>.853</td>
<td>.010</td>
</tr>
</tbody>
</table>

Extraction Method: Maximum Likelihood
Rotation Method: Varimax with Kaiser Normalization
Figure P-1. Statistical Relationships of Final Survey.
REFERENCES


BIOGRAPHICAL SKETCH

James M. "Mike" Geddes was born in Buffalo, New York in September 1956, to parents James and Frances Geddes. He grew up in central Florida and graduated from Mount Dora High School, Mount Dora, Florida, in 1974. Mike received his Associate of Arts degree from Lake-Sumter Community College, Leesburg, Florida in 1976 and his Bachelor of Arts degree in K-12 Educational Media from the University of Central Florida, Orlando, Florida, in 1978. He was married to Phyllis Kueffer in June 1977. After working for the Orange County Public Library System, Orlando, Florida, Mike and his wife moved to Fort Worth, Texas to attend graduate school in 1980. He graduated with a Master of Divinity degree from Southwestern Baptist Theological Seminary, Fort Worth, Texas, in 1983. In 1988, Mike was employed with the Citrus County School District, Inverness, Florida, where he is currently the district Coordinator of Instructional Technology and Library Media Services and administrator of the district’s Instructional Resource Center. He obtained his Master of Education degree (Educational Leadership) from the University of South Florida, Tampa, Florida, in 1998, and his Doctor of Philosophy degree in Educational Technology from the University of Florida, Gainesville, Florida, in December 2004. Mike resides in Inverness, Florida with his wife of 27 years, Phyllis. He and his wife have two adult children, daughter Kristen and son Allen.
I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Kara M. Dawson, Chair
Assistant Professor of Teaching and Learning

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

David S. Honeyman
Professor of Educational Leadership, Policy, and Foundations

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Jeffry A. Hurt
Associate Professor of Teaching and Learning

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Lee J. Mullally
Associate Professor of Teaching and Learning

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Colleen R. Swain
Associate Professor of Teaching and Learning
This dissertation was submitted to the Graduate Faculty of the College of Education and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

December 2004

[Signature]
Dean, College of Education

[Signature]
Dean, Graduate School