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# Exploring Factors Motivating Interns Learning and Using Technology: A Social Cognitive Perspective

Jun Li
*University of Tennessee - Knoxville*

To the Graduate Council:

I am submitting herewith a dissertation written by Jun Li entitled "Exploring Factors Motivating Interns Learning and Using Technology: A Social Cognitive Perspective." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.

Edward Counts, Major Professor

We have read this dissertation and recommend its acceptance:

John Lounsbury, Jay Pfaffman, Gary Skolits, Mary Sue Younger

Accepted for the Council:
Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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# Exploring Factors Motivating Interns Learning and Using Technology: A Social Cognitive Perspective

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Jun Li

August 2009

## Dedication

This dissertation is dedicated to my parents Li Buheng and Dong Meihong, who encouraged and supported me throughout my education, and to my lovely wife Wang Lihua, for always believing in me and encouraging me not to give up when times were tough.

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There were many people who encouraged me throughout this endeavor. There is no way to thank all of these people individually or rank them in order of contribution. I wish to thank some of them by name and to acknowledge their involvement.

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most importantly, my wife, Wang Lihua, and my daughter, YaYa, are my strongest supporters. They have helped me through dim, troubled times without hesitation, offering unconditional love. Their love, patience, encouragement, and belief in me have taken me further than I could have ever gone alone. They are without doubt the best part of my life.

## Abstract

The purpose of this study was to investigate factors influencing pre-service teachers' self-efficacy regarding technology integration during their studies in a teacher education program. The study examined self-efficacy, motivations, attitudes, intentions, as well as the personality traits of pre-service teachers who attended teaching methodologies courses in a Post-Baccalaureate program at a public university in the southeastern part of the United States. These pre-service teachers interned in elementary and secondary public schools around the area of Knoxville, Tennessee while they took coursework to pursue their Master's degree in education.

Participants were 151 students enrolled in the Post-Baccalaureate program. Data were collected by means of a user-reported self-assessment approach. The instruments consisted of a survey designed for the present study to measure interns' self-efficacy, motivations, attitudes, and intensions towards technology integration, and personality traits.

Bivariate correlation analysis revealed that interns' actual usage of technology integration during their internships was significantly correlated with their intention, motivation, attitudes, three sources of self-efficacy (Enactive Mastery Experiences, Vicarious Experiences, and Persuasion), and one personality trait-- Conscientiousness. Hierarchical regression showed that intention and vicarious experiences had direct relationships with interns' technology integration, and that Conscientiousness had an indirect relationship with the usage of technology integration via intention and vicarious experiences. Implications and ideas for future research were also discussed.

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# Chapter 1 Introduction

## *Background of the Study*

In recent decades there has been a growing emphasis on technology integration in K-12 education thanks to increased presence in schools of such technologies as computers, educational software, and networking equipment. According to a report by the National Center for Education Statistics (NCES, 2003), by 2002 about 92% of U. S. public schools reported using computers with access to the Internet in their classrooms. By 2003, the ratio of student to instructional computer in the public schools had decreased to about 4.4 to 1 from 12.1 to 1 in 1998 (Parsad & Jones, 2005).

The ability to utilize educational technology has become the new literacy for teachers in the 21st century (Bandura, 2002). Both in- and pre-service teachers are expected to have the necessary knowledge and skills to use the many technology tools available to them both to teach specific content areas as well as to enhance their personal productivity (Gomez, Sherin, Griesdorn, & Finn, 2008). Specifically, K-12 teachers are expected to have basic technology skills, understand the advantages of using technology in the classroom, and know how to use it to improve the instruction of their students. The challenge of integrating technology into schools and classrooms is not fundamentally about helping students operate machines; instead, it is about helping teachers master these technologies and integrate them into their teaching to support superior forms of learning (Office of Educational Research and Improvement, 1998). Even more importantly, teachers must be able to help their students learn with computers (Padilla-Melendez, Garrido-Moreno, & Aguila-Obra, 2008; Wright & Wilson, 2005-2006).

*NETS*T Standards*

In order to promote technology integration in K-12 schools, the International Society for Technology in Education (ISTE, 2000) published *National Educational Technology Standards for Teachers* in 2000. In June 2008, ISTE revised its standards, with the next generation of the *National Educational Technology Standards for Teachers (NETS*T).* These standards outline aspects of technology integration that are vital for success in producing technology-literate teachers (Bucci, Cherup, & Cunningham, 2003). Since the publication of these standards, the concept of integrating technology into the teacher education curriculum has increasingly been considered important (Hare, Howard, & Pope, 2002; Hargrave & Hsu, 2000), and the ISTE standards have been widely adopted by institutions to reform their teacher education programs by integrating technology into the teacher education curricula (Alobiedat, 2005).

Students in teacher education programs are required to take education technology courses and are expected to develop fundamental technology skills that will serve as the foundation for an ongoing ability to master new technologies throughout their teaching careers (Hargrave & Hsu, 2000). In order to help student teachers learn technology skills, faculty of teacher education are provided opportunities to develop their own expertise in technology integration and apply it to classes in their content areas (Education, 2006; ISTE, 2008). The ultimate goal is to enhance pre-service teachers' abilities and willingness to implement technology in their classrooms effectively (Abbott & Faris, 2000).

*Self-efficacy*

Social cognition has its roots in social psychology, which attempts "to understand and explain how the thoughts, feelings, and behavior of individuals are influenced by the actual,

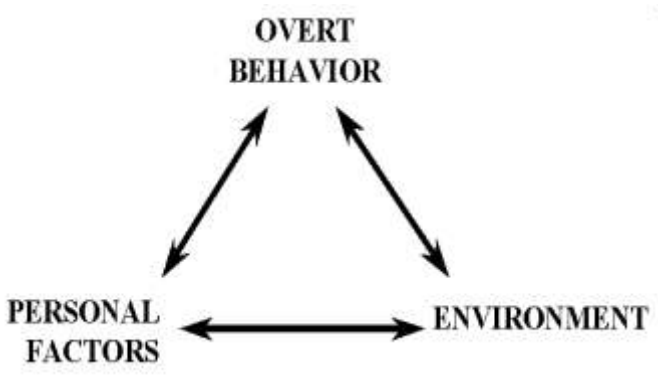


Figure 1 Bandura's (1986) Social Cognitive Learning Framework.

imagined, or implied presence of others" (Allport, 1985, p. 3). The focus of social cognition research is the individual within a social or cultural context. Its central question is how people perceive and interpret information they generate themselves and from others (Sternberg, 1994). From the perspective of social cognitive theories, learning represents the results of interactions among individuals' cognitions, their behaviors, and features of their environments (Bandura, 1986). That is to say, individuals acquire knowledge by interacting with the environment, other people, and/or by observing others' performance (Pintrich & Schunk, 2002). According to Bandura's (1986) social cognitive theory, self-efficacy refers to "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance" (p. 391). It is widely accepted that self-efficacy is one of the most important variables predicting learning, motivation, and achievement (Pajares, 1996; Schunk, 1995; Schunk & Pajares, 2004). See Figure 1.

Zimmerman (1995) pointed out that self-efficacy beliefs exist in specific domains (e.g., mathematics), and that there is no "general" or "global" self-efficacy. For example, students who hold strong self-efficacy beliefs about their social abilities may nevertheless lack self-

efficacy regarding their ability to achieve academic success. For this reason, self-efficacy in the present study will be considered only in terms of interns' technology integration.

It can be seen from a review of literature on technology integration that teachers' learning experiences in teacher education programs influence their development of self-efficacy beliefs regarding technology integration (Anderson & Maninger, 2007; Coffin & MacIntyre, 1999; Schwarz, Meyer, & Sharma, 2007) and, therefore, influence their future use of computer technology when teaching in the classroom(Wang, Ertner, & Newby, 2004). Bennett (1991) noted that new teachers often teach as they were taught, and, thus, may adopt the practices of their university faculty members. The observation of an effective model can benefit one's appraisal of one's own efficacy and motivation (Schunk, 1991). Pope, Hare, and Howard (2005) proposed that, when student teachers observe a role model (e.g., a university faculty member) successfully teaching with computer technologies, they can make themselves believe that they too are capable of using such technologies in their instruction. Student teachers' belief in their capabilities for using technology can motivate them to attempt to implement technology on their own. Therefore, motivating pre-service teachers to learn technology integration skills, by modeling such practices in teacher education programs, may be of great importance in promoting NETS*T standards and encouraging teachers to integrate educational technology into their classroom instruction.

In addition, teachers must have positive attitudes towards computers and feel efficacious in using them. Teachers' attitudes towards technology integration are most likely formed during time spent in the classroom when they are students of teacher education programs (Coffland & Strickland, 2004; Lumpe & Chambers, 2001). If pre-service teachers are involved with

technology integration over a lengthy time period as they work toward their degrees, it is likely that they can develop positive attitudes toward computer technology (Milbrath & Kinzie, 2000). Bai and Ertmer (2008) found that the attitudes of pre-service teachers toward educational technology were improved after they completed an introductory educational technology course.

*Personality*

Personality refers to the relatively stable characteristics of individuals (other than ability) that influence their cognition and behavior (Colquitt, LePine, & Noe, 2000). The development in personality psychology of a five-factor model--also known as Big Five (Costa & McCrae, 1994) --has attracted attention from theorists of the motivations for learning and teaching. The five-factor model distinguishes broad factors of Openness to Experience (also referred to as intellect or culture), Conscientiousness, Extraversion, Agreeableness (also referred to as Sociability), and Neuroticism (typically designated as Emotional Stability, which is the inverse of Neuroticism). A variety of research studies suggest that these personality characteristics may be important predictors of learning, development, and motivation to learn (Major, Turner, & Fletcher, 2006). In addition, many traits included in the Big Five personality taxonomy have been found to be related to motivation to learn (Digman, 1990). Wang and Ermheim (2007) found that personality plays a role in the development of goal orientation, which is a mediator between the five-factor model and the commitment to learn.

*The confluence of personality and efficacy*

The use of personality trait taxonomies can lead to a better understanding of phenomena typically associated with individual differences in pre-service teachers' development of self-

efficacy in technology integration. Personality stands at the confluence of socialization and integration. "One's social habits are shaped by personality, and at the same time, social experiences shape the personality" (Guastello, 2002, p. 172). As researchers move toward investigating how individuals differ in their motivation to integrate learning technology, the study of the personality traits can yield valuable insights. The topic of the present study is whether or not specific personality traits are related to pre-service teachers' self-efficacy regarding technology integration. If so, their identification in relation to self-efficacy could be used as an analytic tool for promoting technology integration. The relationships between personality traits and self-efficacy potentially can yield insights to assist in the tailoring of support strategies for university faculties in different content areas. Self-efficacy is expected to be related to pre-service teachers' actual usage of technology integration, and personality traits are also expected to be related to pre-service teachers' usage of technology integration.

*The Problem*

Technology has been widely used in many sectors of society in recent decades. Although technological hardware and software are increasingly available in schools across the country, and technology-related courses and professional development programs are provided to help teachers develop technology skills and knowledge (Kim & Baylor, 2008), the integration of technology into the teaching methods and practices of teachers has not been fully implemented. According to the report of the National Center for Education Statistics (NCES, 2000), only 20 percent of teachers with access to computers and the Internet reported that they were prepared to use them. Investigations into technology integration in classrooms have concluded that many teachers still

do not integrate technology effectively into their teaching activities in schools (Kim & Baylor, 2008; Pope, Hare, & Howard, 2002). These investigations indicated that:

1. There is still resistance and fear regarding the integration of technology among teachers (Hu, Clark, & Ma, 2003).
2. Teachers' expressed beliefs about technology integration are not consistent with their practices (Chen, 2008).
3. Few teachers used computer technologies for instructional purposes (Clark, 2000).
4. For some teachers, educational technology is still viewed as a curriculum objective (i.e., teaching about how to use it), rather than as a tool for teaching the curriculum to students (i.e., using the computer as an integral tool) (Coffland & Strickland, 2004).
5. Many new teachers, even those who feel comfortable with digital technologies in their daily lives, find it difficult to assimilate educational technology into their classroom instruction (Lewis & Finders, 2002).

Based on a review of the literature on what motivates pre-service teachers to learn about technology integration, many studies explore in- and pre-service teachers' cognitive and learning styles, while fewer studies have examined the impact of personality variables (Solimeno, Mebane, Tomai, & Francescato, 2008). According to Schunk and Zimmerman (2006), personality is an important factor in many motivation theories because it accounts for differences in the cognitive construction of individuals' environments and creates individual differences in behavior (Kanfer, 1991). By exploring the effects of personality traits on pre-service teachers' experiences learning about technology integration, university faculties may gain valuable information to improve their own teaching.

*The Purposes*

The purposes of the current study were fourfold. The first purpose was to discuss the current status of a group of interns' learning of technology integration skills. The second purpose was to investigate factors influencing these interns' self-efficacy regarding technology integration during their studies in a teacher education program. The third purpose was to gain useful information for framing future research on intern motivations for learning technology integration skills by adapting a new perspective that focuses on individual differences with the respect to personality traits. Finally, the present study investigated how personality and social cognitive variables affected the learning process as these interns learned about educational technology in their teacher education program. The independent variables of the current investigation included the interns' personality traits (Openness, Conscientious, Extraversion, Agreeableness, and Neuroticism), their attitudes towards computer technology, their self-efficacy, their motivation to learn and integrate technology, and their self-reported intention to use technology. The dependent variables were the interns' self-reported actual usage of technology as they conducted their student teaching in local schools.

*Research Hypotheses*

From the perspective of social cognition learning theory, individuals acquire knowledge by interacting with their environments, with other people, and/or by observing others' performance (Pintrich & Schunk, 2002). Self-efficacy is a strong and consistent predictor of motivation and performance (Pajares, 1996; Schunk, 1995; Schunk & Pajares, 2004). As researchers move toward investigating how individuals differ in their motivations to integrate the

learning technology, the study of personality traits can yield valuable insights. Furthermore, the identification of relationships between self-efficacy and personality types can help educators design an appropriate curriculum to better motivate pre-service teachers learning technology. The variables of this study include the interns' personality traits, their attitudes towards computer technology, their motivations to learn and integrate technology, their sources of self-efficacy, as well as their self-reported intention to use technology and their actual usages of technology.

Based on the previous discussion, the following hypotheses were formulated (see Figure 2 for details):

H1: Sources of self-efficacy will be positively related to interns' usage of technology integration during classroom instruction.

H2: The interns' personality traits (Openness, Extraversion, Conscientiousness, Agreeableness, and Neuroticism) will be positively related to their usage of technology integration during classroom instruction.

H3: The interns' personality traits (Openness, Extraversion, Conscientiousness, Agreeableness, and Neuroticism) will be positively related to technology self-efficacy.

H4: The interns' motivation, intention, and attitudes will mediate the relationship between self-efficacy and their usage of technology integration during classroom instruction.

*Significance of the Study*

Understanding individual difference in learning and then providing personalized instruction is an important issue for educators. According to Bandura's (1993) self-efficacy theory, social cognitive variables do not function alone, but rather are associated with other personal and contextual variable, such as personality traits and social influences from peers

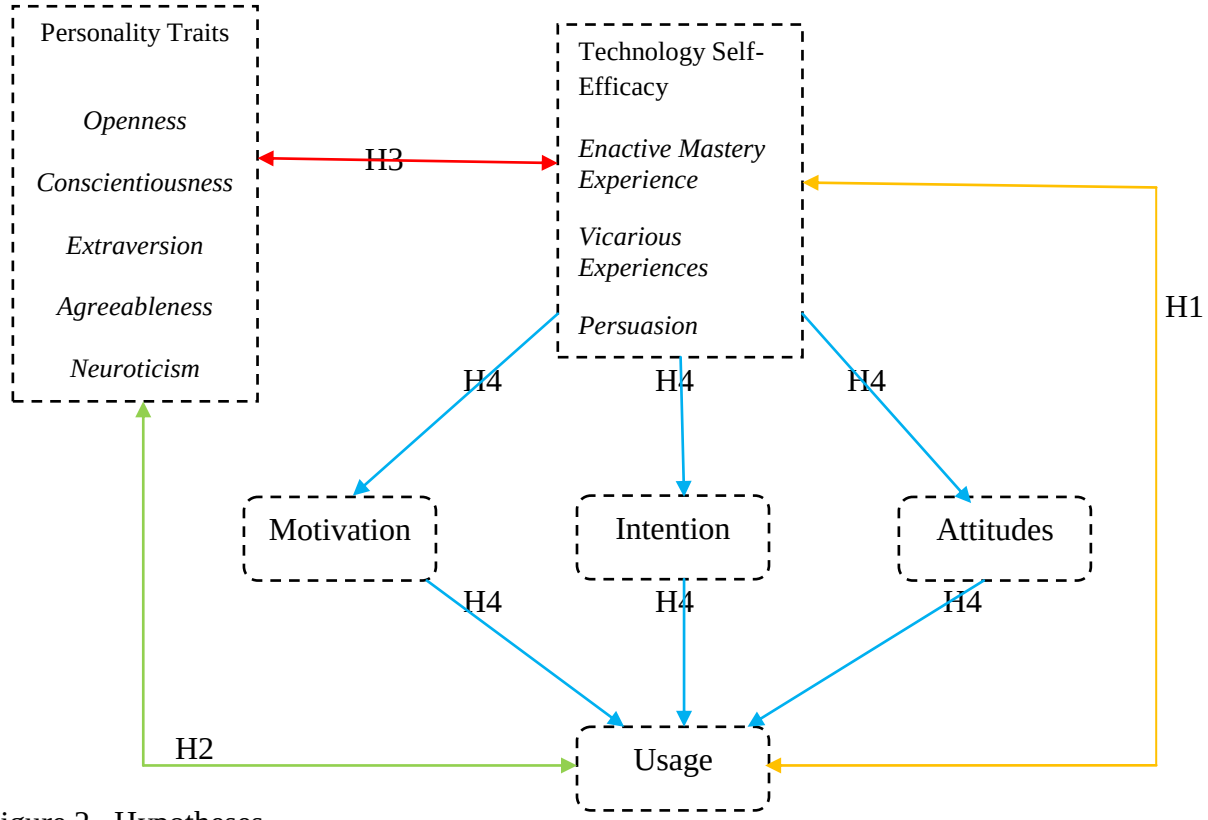


Figure 2. Hypotheses.

and instructors. In addition to the traditional beliefs that intelligence and motivation are considered as important predictors of learning behaviors and academic performance (Duff, Boyle, Dunleavy, & Ferguson, 2004), many other variables, especially personality traits, might play a significant role in learning new technologies (Furnham, 1995). If personality traits can be associated with ways pre-service teachers learn technology skills and techniques, university faculties and administrators can attempt to predict specific areas and capabilities of strength and weakness for pre-service teachers. The analysis of such relationships within teacher education programs can address the unique and collective concerns of those activities motivating pre-service teachers learning and integrating technology into their future professions. A review of the literature at the time of this study revealed only a few studies focusing on personality traits and technology integration (Rogers, 2003).

If personality traits are significantly related to self-efficacy for pre-service teachers who are learning technology skills and techniques, such relationships can be used to tailor training in technology integration. Such customized training can potentially improve training results both for individual pre-service teachers and institutional-wide.

While each of the three areas of investigation addressed here -- learning educational technology, social cognitive ability, and personality -- has been the focus of separate studies, there is scant research supporting the relations among all three areas. What the current study offers that other investigations did not achieve is insight into the influences of personality types on pre-service teachers' self-efficacy regarding technology integration. In an effort to incorporate a multidimensional approach using conceptually related constructs, I focused on pre-service teachers as they learned about educational technology integration in their teacher

preparation programs. It is expected that personality traits are predictive of pre-service teachers' motivations to learn and use technology, and will be mediated by the social cognitive variables of the four sources of influence on self-efficacy.

*Assumptions of the Study*

1. The pre-service teachers have been placed appropriately in the teaching methodology course as part of their degree requirement.
2. The pre-service teachers are computer-literate and able to conduct a variety of activities with computer and the Internet, such as word processing, data analysis, and sending and receiving emails.
3. The participants provide honest, undistorted answers to items on the study questionnaire.

*Limitations of the Study*

1. The pre-service teachers were not randomly selected to participate in this study.
2. The majority of participants of this study were White females aged from 21 to 25.
3. The study is limited only to those who have completed their survey with usable responses.
4. The content of technology integration taught in the teaching methodology courses were decided by the teacher education program and the instructors.

*Delimitations of the Study*

1. A convenience population, who were enrolled in a post-baccalaureate program in a teacher education program at a university in the Southeastern United States, was used for this study.
2. The researcher had no control on instructional content in the courses that participants attended.
3. The participants' identity was not displayed in their responses to survey.
4. The researcher did not have any control over the pre-service teachers' decisions to take teaching methodology courses and their personal learning styles.

*Definitions of Terms*

Attitudes: positive or negative feelings or mental states of readiness, learned and organized through experience, that exert specific influences on a person's responses to people, objects and situations.

Self-efficacy: "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391).

Personality: "the dynamic organization within the individual of those psychophysical systems that determine his unique adjustment to his environment" (Allport, 1937, p. 48).

Personality traits: "a neuropsychic structure having the capacity to render many stimuli functionally equivalent and to initiate and guide equivalent (meaningfully consistent) forms of adaptive and expressive behavior" (Allport, 1937, p. 347).

Five-factor model: also known as the Big Five, a generalizable taxonomy for studying individual differences in personality that includes five relatively independent dimensions - - Extraversion, Emotional Stability, Conscientiousness, Agreeableness, and Openness to Experience.

Agreeableness: being equable, participative, helpful, cooperative, and inclined to interact with others harmoniously.

Conscientiousness: being reliable, trustworthy, dependable, orderly, and rule-following.

Emotional Stability**:** overall level of adjustment and emotional resilience in the face of stress and pressure. We conceptualized this as the inverse of neuroticism.

Extraversion: tendency to be sociable, outgoing, gregarious, warmhearted, expressive, and talkative.

Openness**:** receptivity and openness to change, innovation, new experience, and learning.

*Organization of the Study*

This study is organized into the following five chapters:

Chapter I introduces the study and contains the following components: the problem, the purpose, research questions, the significance of the study, the assumptions of the study, the limitations of the study, the delimitations of the study, a definition of terms, and a guide to the organization of the study.

Chapter II includes a review of literature on the following topics: social self-efficacy theory, factors influencing teachers' beliefs in their own self-efficacy with regard to technology integration, personality psychology and academic performance. The chapter ends with a summary.

Chapter III describes the methodology used in the study. The following information is included: the design of the study, the setting, population, procedures, instrumentation, and the data analysis.

Chapter IV presents the findings of the study.

Chapter V summarizes the findings, draws conclusions, and offers recommendations for future research.

# Chapter 2 Literature Review

## *Introduction*

The purpose of the present study was to understand how social cognitive variables and personality traits affect motivation of interns to learn technology integration skills while they attended teaching methodology courses during their internships. Social cognitive variables – self-efficacy, motivation, attitudes, and intention – were expected to relate to the usage of technology integration. Furthermore, personality traits were expected to be mediated by social cognitive variables. In the first chapter, the literature on pre-service teachers' motivations regarding the learning of technology integration skills in teacher education programs is reviewed as well as research on the relationship between personality psychology and academic performance. The following sections are presented:

a. An introduction of NETS*T standards and computer competencies;
b. A brief introduction to motivation theories and social self-efficacy theory;
c. Factors influencing pre-service teachers' self-efficacy beliefs;
d. Personality psychology and how it influences learning processes;

## *ISTE's NETS*T Standards*

Computers have played a critical role in educational settings for several decades and it has become generally accepted that school teachers must be able to use existing technology effectively in their classrooms (Anderson & Maninger, 2007; Aust, Newberry, & O'Brien, 2005; Collier, Weinburgh, & Rivera, 2004). Teacher education programs have made it a priority to

educate pre-service teachers about how to integrate technology into their classroom instruction (Smith, 2001). Research has showed exposing pre-service teachers to a variety of computer uses in the majority of their undergraduate courses can enhance these prospective teachers' confidence in their own ability to use technology in the classroom (Rowley, Dysard, & Arnold, 2005; Russell & Butcher, 1999).

The International Society for Technology in Education (ISTE) has also played a unique role by revising its standards for teachers. In June 2008, ISTE published the next generation of the *National Educational Technology Standards for Teachers (NETS*T),* which focuses on "using technology to learn and teach." Particularly, ISTE's (2008) *National Educational Technology Standards (NETS) Project* provides specific requirements and references for appropriate uses of technology to support and improve learning, teaching, and administration:

1. Facilitate and inspire students learning and creativity;
2. Design and develop digital-age learning experiences and assessment;
3. Model digital-age work and learning;
4. Promote and model digital citizenship and responsibility;
5. Engage in professional growth and leadership (ISTE, 2008).

The NETS*T standards (2008) outline the aspects of technology integration that are vital for success in producing teachers who are technology-literate and effective. The standards also outline key technology skills that student teachers should possess by the end of predictable phases in the teacher preparation process (ISTE, 2000). There is no doubt that the ISTE standards have been widely accepted and teacher education programs have applied the ISTE standards through the integration of technology in educating future teachers (Bucci, et al., 2003).

## *Motivation*

Motivation is considered an important predictor for academic performance (Duff, et al., 2004). Motivation is primarily concerned with how behavior is activated and maintained (Bandura, 1977). According to Bandura, motivation is sometimes acquired through relatively short-term avoidance of aversive external stimuli such as hunger, thirst, and pain. A great deal of human motivation, however, is initiated and sustained over long periods in the absence of external stimulation. The study of motivation is often called as an inquiry into the "why" of behavior. According to Deci and Ryan (1987), organismic theories of motivation tend to view the organism as active, that is, as being volitional and initiating behaviors. According to organismic perspective, people have intrinsic needs and physiological drives, which provide energy for them to act on (rather than to be reactive to) their environments and to manage their drives and emotions.

### *Social Self-Efficacy Theory*

According to motivation theories, self-efficacy plays an important role in students' academic learning and school performance (Bandura, 1993; Eccles & Wigfield, 1995). Self-efficacy refers to "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986). Self-efficacy beliefs represent students' cognitive evaluations of their abilities to successfully perform tasks of a particular domain (Bandura, 1993). These beliefs are seen as constituting the most central and pervasive mechanism of personal agency (Bandura, 1989).

Bandura (1997) hypothesized that individuals use their self-efficacy beliefs to help choose activities and environments, as well as to adjust their effort expenditure, persistence, thought patterns, and emotional reactions when confronted by difficulties. Students with a high sense of efficacy would be readily to take on and accomplish tasks while those with a low sense of efficacy might avoid tasks purposely. Individuals who believe that they are capable are assumed to work harder and persist longer when facing difficulties than those who doubt their capabilities. Self-efficacy may go up and down depending on success or failure, but once self-efficacy is developed, failure may not have much of an influence (Schunk, 1991).

*Four Sources of Self-Efficacy*

Self-efficacy cannot be automatically developed by itself, but is, instead, cognitively appraised (Bandura, 1986). Efficacy appraisal is an inferential process by which persons evaluate the contribution to their success or failure in a task of personal and situational factors, including their perceived ability, the difficulty of the task, amount of effort expended, the amount of external assistance received, the number and pattern of successes and failures, their perceived similarity to models, and persuader credibility (Schunk, 1991).

Bandura (1997) contended that self-efficacy beliefs are actually constructed based on information from four principal sources: enactive mastery experiences, vicarious experiences, verbal persuasion and allied types of social influences, and physiological and affective states (p. 79). The appraisal of self-efficacy comes from one or more of these sources of efficacy information.

*Enactive mastery experiences*

The term "enactive mastery experience" refers to a previous experience of achievement from which an individual may appraise self-efficacy in the same or similar tasks of interest. Successful experiences of completing tasks raise efficacy and failure lowers it (Schunk, 1991). However, once a strong sense of efficacy is developed, a failure may not have much impact (Bandura, 1986). Research has shown that enactive mastery experiences are the most influential source of efficacy information because they provide the most direct, authentic evidence that an individual can gather the personal resources necessary to succeed (Bandura, 1977; Bandura, 1997).

*Vicarious experiences*

Vicarious experiences refer to the social comparisons made between an individual and an observed role model (Hodges, Stackpole-Hodges, & Cox, 2008). Efficacy can also be developed when individuals observe performance achievements by a role model and hold a belief that they too are capable of accomplishing similar tasks. However, such vicarious experiences, which rely on social comparisons and modeling, are postulated to be less dependable sources of efficacy about one's own capabilities than are experienced mastery. In other words, people develop less self-efficacy by observing other people's successes than by accomplishing tasks on their own. Furthermore, self-efficacy based on observed successes can be negated by future failures to complete similar tasks oneself (Schunk, 1991).

*Persuasions*

Persuasions are comments from observers and are most influential if the comments are feedback from competent others (Schunk, 1991). Such social persuasion is widely utilized in the classroom to help students believe that they can, in fact, cope with difficult situations. Individuals can increase self-efficacy when they are encouraged to believe in their capabilities to accomplish a task, but overly optimistic persuasive comments tend to be ineffective if the individual experiences failure on similar tasks in the subsequent stage (Bandura, 1977; Bandura, 1997).

*Physiological and affective states*

The fourth and final source of efficacy information comes from one's own physiological and emotional feedback during performance, particularly on tasks involving physical activity. For example, according to Bandura (1977; 1997), when individuals perform demanding tasks, they tend to experience increased heart rates, sweating, hyperventilation, and feelings of anxiety and fear, which are treated as signs of vulnerability. Excessive physiological and emotional states usually negatively impact performance. Therefore, when individuals feel "tense and viscerally agitated" (Bandura, 1997, p. 106) and are not overcome by stress reactions, successful performance would be expected. However, worries of failure will generate new thoughts of impending danger, significantly elevating an individual's anxiety level far beyond what may be warranted by the actual situation (Bandura, 1977). Ultimately, information conveyed by physiological reactions is cognitively assessed by individuals and can positively or negatively

influence efficacy beliefs, depending on the level of arousal and a person's cognitive appraisal (Bandura, 1997).

*Self-Efficacy and Academic Performance*

An important aspect of self-efficacy is its domain specificity. That is to say, there is no "general" or "global" self-efficacy for all kinds of human functioning (Bandura, 2002); personal efficacy is a self-judgment specific to the activity domain. High self-efficacy in one domain does not necessarily mean high efficacy in another. Therefore, to achieve predictive power, measures of perceived self-efficacy should be "tailored to domains of functioning and must represent gradations of task demands within those domains" (Bandura, 1997, p. 42).

The evidence has shown first, that academic self-efficacy is one of the strongest predictors of college students' academic achievement and performance (Robbins, et al., 2004), and second that students' self-efficacy about their capabilities to learn can influence their motivation and learning (Schunk, 1991). According to Bandura (1977), students with a high sense of efficacy for accomplishing educational tasks will work harder, participate more readily, and persist for a longer period of time than those with low self-efficacy. Also, perceived self-efficacy influences students' persistence (Bandura, 1997). For example, Schunk (1981) found that modeling arithmetic instruction increased students' self-efficacy beliefs and persistence during the pre- and post-tests, as well as the acquisition of arithmetic skills in students who had previously been very low achievers in mathematics. Students' perceived self-efficacy influences their skill acquisition both directly and indirectly by heightening persistence, indicating that perceived self-efficacy influences students' learning through cognitive as well as motivational mechanisms.

Pajares (1996) pointed out that previous research has focused on exploring the relationships among self-efficacy beliefs, related psychological constructs, and academic motivation and achievement. Zimmerman, Bandura, and Martinez-Pons (1992) used path analysis to demonstrate that academic self-efficacy mediates the influence of self-efficacy on self-regulated learning for academic achievement. According to their research, academic self-efficacy influenced achievement directly as well as indirectly, by raising students' grade goals. Other findings suggest that students who believe they are capable of performing academic tasks use more cognitive and metacognitive strategies and persist longer than those who do not (Pintrich & DeGroot, 1990).

*Factors Influencing Self-Efficacy about Technology Integration*

Social cognitive theories of motivation focus on individuals (Hickey, 2003). From the perspective of social cognitive theories, learning is the result of interactions among individuals, cognitions and behavior, and features of the environment (Bandura, 1986). That is to say, individuals acquire knowledge by interacting with their environment, with other people, and/or by observing others' performance (Pintrich & Schunk, 2002).

In the field of technology integration in teacher education programs, a variety of studies have been conducted to examine the relationship between Bandura's self-efficacy variables and pre-service teachers' learning about technology integration. There has been extensive research on teachers' perceived self-efficacy regarding the use of computer and the Internet (Collier, et al., 2004; Hawkes, 2001; Watson, 2006) and these research confirmed Bandura's theory (1982) that individuals who perceived themselves to have a strong ability to use computer technologies tended to have higher aspirations and to learn more than those who were less confident of their

ability. A high correlation has also been observed between efficacy judgments and subsequent performance (Bandura, Adams, & Beyer, 1977; Schunk, 1981), which is an important predictor of whether pre-service teachers will continue to learn to teach with technology beyond their teacher preparation programs (Ashton, 1985). Ropp (1999) surveyed 47 teacher candidates of secondary and elementary education programs about their computer self-efficacy beliefs, attitudes toward computers, and computer proficiency. Ropp's quantitative analyses revealed that when teacher candidates felt confident in their ability to perform computer tasks (computer self-efficacy), they tended to hold more positive attitudes toward technology and computers and to be more confident in their ability to perform tasks related to teaching with technology in their future teaching.

Several factors have been discovered to be related to pre-service teachers' self-efficacy beliefs about technology integration, including their past successful learning experiences (enactive mastery experiences) (Albion, 2001; Kellenberger, 1996; Ropp, 1999), modeling and coaching by their faculty instructors (Brock & Sulsky, 1994), and their attitudes toward educational technology (Al-Khaldi & Al-Jabri, 1998; Albion, 2001; Brock & Sulsky, 1994; Hargrave & Hsu, 2000), etc.

*Technology Integration Courses*

In order to use technology effectively throughout their careers, teacher education programs have turned either to integrate curriculum or stand-alone technology courses (Bucci, et al., 2003). The integrated curriculum approaches incorporate ISTE standards throughout the education sequence for pre-service teachers, and teach technology literacy within the context of each education courses. Stand-alone courses focus on the teaching of specific hardware and

software applications (Bucci, et al., 2003). There are advantages and drawbacks to each approach (Mehlinger & Powers, 2002).

*Benefits and drawbacks of stand-alone technology courses*

Stand-alone courses give future teacher proficiency in specific hardware and software applications, and provide sufficient time for students to learn and practice their skills. By attending these courses, students are able to attain very specific skills and knowledge which their professors faculty in subsequent educational courses can then ask them to apply (Bucci, et al., 2003). For example, in a typical stand-alone course, students are taught how to use some common software (e.g., Microsoft Office, Inspiration, or DreamWeaver) and create presentation materials with imported digital images or scanned documents. Pre-service teachers' self-efficacy beliefs regarding computers may be enhanced when they attend technology integration courses, receive peer coaching, and participate in cooperative learning (Enochs, Riggs, & Ellis, 1993). Drawbacks to this approach include the difficulty of adding an extra required class to education programs already filled with very many requirements. Also, some students may already possess the skills that are taught in the technology integrated course, and some skills and knowledge learned in these technology courses may not prove applicable to assignments in students other education courses or may even become outdated before students have the chance to apply it (Mehlinger & Powers, 2002).

*Benefits and drawbacks of integrated curriculum approach*

The integrated curriculum approach incorporates the NETS*T standards throughout the education sequence for pre-service teachers; technology literacy is taught within the context of

each education course. The advocates of integrated curriculum approach argue that it provides students opportunities to obtain a working knowledge of technology and to learn to use it to support and enhance their learning within the framework of course content at the same time (Cherup & Linklater, 2000). Integrating technology into their presentation of other units of study, faculty model for students how technology can be used in classroom instruction. Students in turn must demonstrate their proficiency in the technologies within the context of the course requirements. However, there are also some drawbacks for the integrated curriculum approach. A common obstacle is that some faculty members are reluctant to integrate technology with their own teaching styles. The level of technology integration with contexts of course work often depends on the professors' own knowledge and skills in using technology. Limited access to computer labs also can make it difficult for students to take the necessary time to develop technological proficiencies (Bucci, et al., 2003).

*Enactive Mastery Experiences*

According to Bandura's self-efficacy theory (1982), an individual's attainment of authentic mastery experiences is the most important influence on self-efficacy. Therefore, pre-service teachers should be given authentic opportunities to develop computer literacy and obtain sufficient skills and knowledge of technology integration through hands-on experiences before they begin their career teaching children (Alghazo, 2006; Bucci, et al., 2003; Chisholm, Carey, & Hernandez, 2002; Davis & Davis, 2007; Ertmer, Conklin, & Lewandowski, 2003; ISTE, 2000). Technology integration courses are ideal places for teacher candidates to gain this experience; offering opportunities for modeling, hands-on practice, collaboration, continuing support, and easy access to the technology (Rosenfeld, 2008).

*Vicarious Experiences*

While experienced mastery has been shown to produce the most powerful influence on efficacy beliefs, individuals also can learn by observing the successes and failures of others. According to Bandura (1977; 1997), so-called vicarious experiences can generate in observers the efficacy belief that they, too, can attain success through persistence and effort. Pre-service teachers not only need instruction and practice in integrating technology into their classroom methods and practices, but also to see the integration of technology modeled by their university faculty and by the supervising teachers with whom they are placed during student teaching (Pope, et al., 2005).

Wang, Ertmer, and Newby (2004) examined how 280 pre-service teachers who enrolled in an introductory educational technology course, were influenced by their vicarious learning experiences to adopt a belief in their own self-efficacy regarding technology integration into the classroom. They found that pre-service teachers experienced significantly greater increases in their judgments of personal self-efficacy regarding technology integration than their colleagues who were not exposed to vicarious experiences. The results of their study suggest that pre-service teachers will reach higher levels of self-efficacy regarding the integration of technology in their own classroom when they have opportunities to observe exemplary technology-using teachers.

Other studies confirm that modeling is useful for pre-service teachers to increase their self-efficacy (Groth, Dunlap, & Kidd, 2007; Pope, et al., 2002). For example, Ertmer, Conklin, and Lewandowski (2003) surveyed a group of 69 students before and after they completed an educational technology course, and then interviewed 10 of them about the effects of electronic

models on their perception of self-efficacy regarding technology integration. Both quantitative and qualitative research methods were used in this study. The results of a paired *t* test showed that students' perceptions of self-efficacy were significantly increased after they completed the technology integration course. By analyzing qualitative data from interviews, the researchers found that student teachers held positive attitudes toward the electronic modeling which was used in the technology integration course, that the use of electronic modeling enhanced these student teachers' self-efficacy about technology integration, and that student teachers indicated that they would be more likely to implementing technology-integration behavior in their future classroom instruction (Ertmer, et al., 2003).

Investigating linkages between self-efficacy and pre-service teachers' learning technology integration skills is one of the main focuses of this study. This study will also examine and understand the role of personality traits and how they influence pre-service teachers' learning of technology integration skills.

*Personality Psychology and Academic Performance*

Motivation to learn is an indication of desire and willingness to exert effort in the learning process. Motivation is influenced by both internal individual characteristics and external environmental factors (Colquitt, et al., 2000). According to Bandura's (1993) self-efficacy theory, social cognitive variables do not function alone, but rather are associated with other personal and contextual variable, such as personality traits and social influences from peers and instructors. In addition to intelligence and motivation – factors traditionally considered important predictors for learning behaviors and academic performance (Duff, et al., 2004) – many other variables, especially personality traits, might play a significant role in learning new

technologies (Furnham, 1995). Personality variables, individual characteristics that indicate general tendencies and predispositions, are relatively enduring and stable, and thus may be especially important in generating motivation to learn (Major, et al., 2006).

*Personality and Personality Traits*

While personality occupies a well-established place in popular thinking and culture, it is accorded a relatively low scientific status in top-ranking journals of psychology and other disciplines (Pickering & Gray, 1999). Yet, personality psychology may be analogous to unifying theories in physics: Buss (1999) contends that the field itself aspires to be the most integrative branch of the psychological sciences. To better understand the dichotomous view of personality and its current position in research, we must investigate its origins.

*Definitions*

Allport (1937) defined personality as "the dynamic organization within the individual of those psychophysical systems that determine his unique adjustment to his environment" (p. 48). Funder (2001) offered that "personality refers to an individual's characteristic patterns of thought, emotion, and behavior, together with the psychological mechanisms—hidden or not—behind those patterns" (p. 1). Personality theory rests upon the assumption that each person is basically different from all others. The modern psychological study of personality is rooted in the 19th century intellectual themes of a deep belief in individualism, a pervasive concern with irrationality and the unconscious, and a strong emphasis on measurement (Winter & Barenbaum, 1999). Studies implementing a psychometric approach of measurement through intelligence testing emerged in the first two decades of the 20th century, which evolved into a psychometric

tradition, integrating with the study of individual differences in humans. Winter and Barenbaum pointed to intense research activity from 1921-1938 as an important time period for the emergence of personality psychology, when Allport and Allport (1921) adopted a behaviorist division of traits and designed measures of those traits to describe basic features of personality.

A personality trait is defined as "a neuropsychic structure having the capacity to render many stimuli functionally equivalent and to initiate and guide equivalent (meaningfully consistent) forms of adaptive and expressive behavior" (Allport, 1937, p. 347). In personality psychology, the concept of traits is central to the understanding of individual differences in human behavior. By using basic personality traits, which are relatively more enduring, stable, and individualized tendencies and predispositions (Major, et al., 2006), personality psychologists are able to describe personality. The basic traits can be portrayed as a hierarchical structure that accommodates numerous correlated primary traits, together with a more parsimonious second-order factor structure (Funder, 2001). Such a taxonomic system provides a framework for systematic research, and allows personality psychologists to integrate the diversity of existing individual difference measures (Costa & McCrae, 1995).

*The Study of Personality*

Studies of personality and social psychology offer inherent contradictions. Baumeister (1999) summarized these contradictions:

> In principle, personality and social psychology are natural allies and natural competitors. Social psychologists examine how external, situational causes operate, using mainly experimental methods, whereas personality psychologists study how people's inner traits and processes operate, relying heavily on correlations and other methods. (p. 367)

To social cognitive theorists, the trait-centric nature of personality psychology is unidirectional and all too often ignores the elements of context. "Personality is multifaceted, richly contextualized, and conditionally expressed in the diverse transactions of everyday life" (Bandura, 1999, p. 187). Their agentic view of human nature is seen as self-organizing, self-reflective, and self-regulating. Trait-driven interpretations of human behavior are seen as unidirectional or a reactive combination between environmental influences and internal predispositions. To the social cognitive theorists, human behavior cannot merely be interpreted as reactive to situations based upon predisposed traits. Bandura expressed this thought: "In this 'one size fits all' approach, the items are decontextualized by deleting information about the situations with which people are dealing" (p. 160). He further stated, "The influence of personal factors on human functioning is often insufficiently recognized because the issue tends to be construed in static terms of individual differences rather than personal determination of action" (p. 161). To Bandura, the trait analysis of personality minimizes the very influence of human agency. Traits are viewed by social psychologists as an outcome construct.

*Measuring Personality Traits*

The effort to define and refine personality instruments continues to drive a body of research aimed at better understanding human behavior. The five-factor model (FFM, also known as the Big Five), recently introduced as a research-based approach to personality, has become ubiquitous in personality research, being robust and generalizable across rating sources, cultures, languages, and factor extraction and rotation methods (Hough & Furnham, 2002). It distinguishes five broad factors of Extraversion, Neuroticism (also referred to as Emotional

Stability), Conscientiousness, Agreeableness (also referred to as sociability), and Openness to Experience (also referred to as intellect or culture).

Extraversion refers to the degree to which people tend towards sociability, positive emotions and a high activity. Higher scores of Extraversion relate to being outgoing and sociable. Agreeableness is associated with a disposition toward nurturance, altruism, trust, and friendly compliance. Higher scores of Agreeableness relate to cooperativeness and trust. Conscientiousness has to do with the will to achieve, self-control, persistence, and dependability. Higher scores of Conscientiousness relate to being methodical, organized, and motivated by achievement. Neuroticism refers to the degree to which people experience negative emotions. Higher scores of neuroticism are related to higher levels of anxiety or depression. Openness to experience is associated with receptivity to new ideas, a preference for varied sensations, and intellectuality. High scores of Openness to Experience relate to creativity and artistic interests (Busato, Prins, Elshout, & Hamaker, 2000; Ferguson, James, & Madeley, 2002; Wang & Erdheim, 2007) .

By using the five-factor model, it is possible to condense personality traits into five relatively independent categories and provide a sound framework to describe personality. Barrick and Mount (1991) clarified each of the five factors by using common adjectives to describe each factor and concluded that the five-factor model was a valid and reliable measure when used in many different contexts. Digman (1990) determined that the five-factor model adequately represents a hierarchy of personality traits that could be subsumed within the five factor structure.

*Potential Impact of Personality on Academic Performance*

Researchers have recently begun to investigate the role that personality plays in determining academic success. When evaluating students' performance in tasks involves characteristic modes of behavior such as perseverance, Conscientiousness, talkativeness, dominance, and so forth, individual differences in specific personality traits justifiably can be hypothesized to be related to scholastic success (Rothstein, Paunonen, Rush, & King, 1994). In fact, academic performance, quantified as grade point average or course grades, has already been found to be related to agreeableness (Rothstein, et al., 1994), Openness (Paunonen & Ashton, 2001), and most of all, Conscientiousness (Busato, et al., 2000).

Ramsden (1992) suggested that students' academic performances are directly influenced by their orientation to learning. Recent empirical investigations have found support for the hypothesis that an individual's learning orientation is related to their personality (Busato, et al., 2000). Accordingly, personality traits have been examined as non-cognitive predictors of academic performance. Furthermore, personality measures can be helpful in predicting academic performance (Dean, Conte, & Blankenhorn, 2006), and personality variables such as drive, persistence, and interests, are likely to contribute the success in a given learning environment (Cronbach & Snow, 1977).

Messick (1979) has listed a variety of non-cognitive attributes of personality, such as affect and motivation, that may predict likelihood of success in a given learning environment. These non-cognitive traits "… may both serve as mediating or instrumental variables, either facilitative or disruptive, influencing level and rate of subject-matter learning; or as moderator or interactive variables determining differential responses, either qualitative or quantitative, to

different aspects of instructional method or context, or as outcome variables reflective of educational goals in their won right or of valued personal characteristics" (Messick, 1979, p. 281).

*Potential Impact of Personality on Motivation to Learn*

It has been proposed that four factors -- Conscientiousness, Openness to Experiences, Extraversion, and Neuroticism -- are relevant to students' motivation to learn and to their academic performance in educational settings (Barrick & Mount, 1991).

*Conscientiousness*

Conscientiousness is a factor of the five-factor model that research has expressly linked to motivation to learn (Colquitt, et al., 2000; Shiner, Masten, & Roberts, 2003) as well as to academic performance (Chamorro-Premuzic & Furnham, 2003; Duff, et al., 2004). High scores on Conscientiousness may be associated with personal attributes necessary for learning and academic pursuits such as being organized, dependable, efficient, striving for success, and exercising self-control (Matthews, Deary, & Whiteman, 2003).

In their meta-analysis of motivation-related variables and learning, Colquitt and his colleagues (2000) searched 106 journal articles published from 1975 to 1999 in academic journals from areas of psychology and education to investigate the relationship between 17 motivational variables, including personality traits. In each of the 106 journal articles, there were some significant correlations between certain motivation-related variables. Each correlation from a given study was weighted by that study's sample size and a weighted mean estimate of the correlation was calculated. Before a meta-analytic correlation was conducted,

factors of sampling error and unreliability were corrected to obtain a more accurate estimate. The results of the meta-analytic correlation indicated that Conscientiousness (a factor of five-factor model) positively predicted motivation to learn, which in turn was related to learning outcomes. Colquitt, et al, (2000) also found that anxiety, a component of the five-factor model's Emotional Stability factor, was negatively related to motivation to learn.

*Openness to Experience*

Openness to Experience and Extraversion were positively related to intellect (Costa & McCrae, 1992; Duff, et al., 2004). Intellectual ability is by far the most important predictor of academic performance by means of grades for students in high schools and beyond (Teachman, 1996). Ackerman and Heggestad's (1997) meta-analysis revealed a positive relation between Openness and standardized measures of knowledge and achievement. This review suggested that, through the potential mediator of intelligence (i.e., acquired cognitive skills), there is relationship between Openness and scholastic ability.

After controlling for intelligence, Openness has been found to be positively related to final grades (Farsides & Woodfield, 2003). Paunonen and Ashton (2001) also found Openness to be significantly, positively related to academic performance. In their meta-analysis of personality predictors of academic performance, Barrick and Mount (1991) found that Openness to Experience was a significant predictor of learning proficiency. Individuals with high scores on Openness to Experience were more likely to have positive attitudes toward learning experiences, were more willing to engage in learning activities, and, thus, were more likely to benefit from learning programs. Furthermore, when learners need basic skills or techniques to

advance learning programs, Openness to Experience is a good predictors for learning progress (Herold, Davis, Fedor, & Parsons, 2002)

*Extraversion*

The influence of Extraversion on academic performance is displayed at different degrees at different ages. Before the age of 11-12, extraverted children seemed superior in GPA to introverted children (Entwisle & Entwisle, 1970), while among adolescents and adults, achievement was higher for introverts than extraverts (Chamorro-Premuzic & Furnham, 2003). Such a difference can be explained by the move from the social and less competitive environment of elementary schools to the rather formal and competitive environment of secondary schools and higher education, where introverted behaviors such as avoidance of intensive socializing become advantageous. Extraverts and introverts are also different in their methods of processing information, such as speech production, attention, and reflective problem-solving (Zeidner & Matthews, 2000). For example, extraverts showed better ability to contribute orally in seminars, but poorer ability at essay writing than introverts (Furnham & Medhurst, 1995).

Extraversion has also been found to be related to the motivation to learn. Elliot and Thrash (2002) found a significant, positive relation between Extraversion and goal orientation. They speculated that personality traits may have an impact on students' goal orientation, which has important motivational implications for learning and academic performance (VandeWalle, 2001). Barrick and Mount (1991) found a significant meta-analytic relationship between Extraversion and academic performance when the learning programs were highly interactive and required a high energy level.

*Neuroticism (Emotional Stability)*

Although some research has indicated a negative, correlation between Neuroticism and academic success (Entwisle & Cunningham, 1968), such a relationship has have not been widely corroborated. In most studies there is no significant correlation between Neuroticism and academic performance (Busato, et al., 2000; Heaven, Mak, Barry, & Ciarrochi, 2002). However, Wang and Ernheim (2007) found that Neuroticism was positively related to goal orientation, which led to motivation to learn. It was agreed that Neuroticism is more likely a moderator than a facilitator of academic success (Matthews, et al., 2003). However, the relationship between Agreeableness and academic performance is consistently non-significant (Shiner, et al., 2003).

*Attitudes towards Technology Instruction*

As student teachers learn new technology skills and techniques, their learning processes can be impacted by a variety of variables. One variable that has been widely studied is the attitude of student teacher toward technology integration.

*A definition of attitude*

Rosenberg (1960) defines attitude as the way an individual feels about and is disposed towards some "object". Gibson, Ivancevich, and Donnelly (1991) further define attitude as "a positive or mental state of readiness, learned and organized through experience, that exerts specific influence on a person's response to people, object and situation" (p. 125).

*How Attitudes Influence Learning of Technology*

Brock and Sulsky (1994) believed that attitudes toward computers involved of two aspects: whether students believed in computers as beneficial tools and whether they believed in them as autonomous entities. Brock and Sulsky surveyed 165 psychology undergraduate students, and, by conducting a factor analysis, found that both aspects of students' attitudes toward computers were predictive of their computer usages. Students' attitudes toward computers were significantly correlated with computer use especially when they perceived computers as beneficial tools. As long as users possessed a positive attitude toward computers, no matter how complex or complicated the task, they tended to use computers in their workplaces (Al-Khaldi & Al-Jabri, 1998).

Attitudes have been found to serve as predictors of behaviors (Bai & Ertmer, 2008; Kay, 1990; Milbrath & Kinzie, 2000). Studies have shown that individuals' uses of computer technology were influenced by their attitudes toward computers. For instance, Al-Khaldi and Al-Jabri (1998) surveyed a sample of 300 undergraduate business majors about the relationship between their attitudes and their computer utilization. The results of correlation analysis indicated that attitude was strongly related to computer utilization, and the results from regression analysis also showed that attitudes had a significant impact on the level of computer utilization. Their findings suggested that students' attitudes, especially, their confidence and liking of computers, did affect their computer utilization.

*How Attitudes Are Formed*

In order to use technology effectively in classroom instruction, teachers must have positive attitudes towards computers and feel self-efficacious in using them. Teachers' attitudes towards technology integration are mostly likely formed during time spent in the classroom when they are students of teacher education programs (Coffland & Strickland, 2004; Lumpe & Chambers, 2001). Therefore, if pre-service teachers are involved with technology integration over a lengthy time period as they complete programs, it is likely that they can develop positive attitudes towards computer technology (Milbrath & Kinzie, 2000). For example, Bai and Ertmer (2008) surveyed pre-service teachers about their attitudes toward technology in relation to teacher educators' pedagogical beliefs and technology uses. The results of the survey showed that the attitudes of pre-service teachers towards educational technology were improved after they completed an introductory educational technology course.

Abbott and Faris (2000) found similar results. They examined a group of 63 pre-service teachers' attitudes toward the use of computers before and after attending a semester-long literacy course that required the use of technology to complete assignments and activities. There were statistically differences in the mean scores between pre- and post-tests on the attitudes toward computer usages. The findings suggested that student teachers' attitudes toward computer usage were enhanced when they experienced computer-related activities (Abbott & Faris, 2000).

*Summary*

Technology plays a crucial role in teaching and learning and is a necessary instrument for teaching and learning successfully. Technology helps extend the subject materials that can be taught and it enhances student learning. Teachers should find the most effective ways to use technology in their classroom instruction to enhance teaching, learning, and assessment. Teachers have to make daily decisions about when to incorporate technology and how to help students use technology most effectively. The use of technology in classroom instruction provides students more opportunities for learning, for real-world problem-solving and for adapting to what awaits them in the future.

Since the International Society for Technology in Education (ISTE) published its National Educational Technology Standards for Teachers (NETS*T) in 2000 and provided specific requirements and references for appropriate uses of technology to support and improve learning, teaching, and administration, institutions of higher education have been reformed their teacher education programs (Bucci, 2003; Rowley, et al., 2005; M. Russell, Bebell, O'Dwyer, & O'Connor, 2003). Teacher education programs, either through integrated curriculum courses or stand-alone technology courses (Mehlinger & Powers, 2002), now not only provide pre-service teachers opportunities of learning technology skills and techniques (Pope, et al., 2002), but also show them how to effectively integrate technology in their future teaching via university faculties' modeling and coaching (Ertmer, et al., 2003; Groth, et al., 2007; Salanova, Grau, Cifre, & llorens, 2000).

It is widely accepted (Eccles & Wigfield, 1995; Hill, Smith, & Mann, 1987; Schunk & Zimmerman, 2006) that students' self-efficacy -- their cognitive evaluations of their abilities to

successfully perform tasks in a particular domain (Bandura, 1993) -- plays an important role in motivating pre-service teachers learning of technology integration skills (Albion, 2001; Jorde-Bloom, 1988; Markauskaite, 2007; Ropp, 1999). According to Bandura's social cognitive theory, individuals construct their self-efficacy beliefs by appraising information from four major sources: enactive mastery experiences, vicarious experiences, verbal persuasion and allied types of social influences, and physiological and affective states (Bandura, 1997).

Research on pre-service teachers' learning of technology integration skills has shown that several factors are related to their self-efficacy beliefs, such as their past learning experiences with technology (Albion, 2001), social support from university faculty (Markauskaite, 2007), and their attitudes toward technology (Hargrave & Hsu, 2000).

Academic learning behavior, including the learning of technology integration skills, is basically a general process of information processing (Lindsay & Norman, 1972), in which perception, attention, memory, and thinking are all involved (De Raad & Schouwenburg, 1996). Non-cognitive personality factors may appear as moderators of the general process of learning because they interact with or moderate successive stages of information processing. Therefore, the personality variables influencing learning may be effective as either moderators or as variables moderated by certain features of the task situation (De Raad & Schouwenburg, 1996).

Although personality has been discussed in many motivation theories (Schunk & Zimmerman, 2006) because of its unique contribution to individual differences in learning behaviors (Kanfer, 1991), from the perspective of personality, research on the intersection of personality and education appears to be rather scattered, since personality variables function differently depending on the educational context (De Raad & Schouwenburg, 1996). Even

though personality variables are assumed to play a significant role in the learning of new technologies (Furnham, 1995), very little research has been conducted on how personality motivates pre-service teachers' learning of technology integration skills.

However, much research has been conducted on the relationships between personality variables and academic performance. the research has shown that, as non-cognitive predictors of academic performance, personality traits can be helpful in predicting learning success (Dean, et al., 2006) in given learning environments (Cronbach & Snow, 1977; Messick, 1979).

The literature review presented above shows that pre-service teachers' self-efficacy beliefs play an important role in the learning of technology integration skills, but that self-efficacy cannot function alone. Much research has examined the relationship between internal and external factors that influence learning processes. The review shows that personality variables might also play a significant role in determining individual differences in learning processes. Although little research has been conducted on pre-service teachers' learning of technology integration skills, the five-factor model has proven effective and efficient in predicting students' academic performance and learning success in given educational settings. The review shows that personality variables can play an important role in relation to motivating students learning, but that the role of personality variables is mediated by such social cognitive factors as self-efficacy beliefs.

# Chapter 3 Methodology and Procedures

The purposes of the present study were fourfold. The first purpose was to review the current status of pre-service teachers' learning of technology integration skills. The second purpose was to investigate factors influencing pre-service teachers' self-efficacy regarding technology integration during their studies in a teacher education program. The third purpose was to gain useful information for framing future research on pre-service teachers' motivation for learning of technology integration skills by adopting a new perspective that focuses on individual differences with the respects of personality traits. Finally, I investigated how personality and social cognitive variables affect the learning process when teacher education students learned about educational technology in their teacher education program. Chapter 3 provides a description of the methodology used in the study, including the study sample, instrumentation, data collection and processing, and data analysis.

## *Research Design*

### *Variables*

The study's hypotheses regarding the influence of personality traits and interns' self-efficacy on their learning of technology integration skills were used to establish the independent and dependent variables. The independent variables were not manipulated in this study, but formed the basis for grouping during analysis. Personality traits, self-efficacy factors (enactive mastery experiences, vicarious experiences, and persuasion), motivation, attitudes, and intention

were defined as independent variables. The personality traits assessed for the present study were Openness, Extroversion, Conscientiousness, Agreeableness, and Neuroticism.

A key question guiding the design of the study was whether or not the usage of technology integration is related to personality, self-efficacy factors, or other social cognitive factors. The variable of the usage of technology integration was thus defined as the frequency of use of technology integration. The term "technology integration" refers collectively and at a macro level to the usage of technology in any of the following tasks of instruction: instruction preparation, delivery of instruction, communication, and grading.

*Hypotheses*

The following hypotheses were tested:

H1: Sources of self-efficacy will be positively related to interns' usage of technology integration during classroom instruction.

H2: The interns' personality traits (Openness, Extraversion, Conscientiousness, Agreeableness, and Neuroticism) will be positively related to their usage of technology integration during classroom instruction.

H3: The interns' personality traits (Openness, Extraversion, Conscientiousness, Agreeableness, and Neuroticism) will be positively related to technology self-efficacy.

H4: The interns' motivation, intention, and attitudes will mediate the relationship between self-efficacy and their usage of technology integration during classroom instruction.

*Setting*

The Post-Baccalaureate Program is offered by the Department of Theory and Practice in the Teacher Education at a public university in southeastern of the United States. In this program, students are required to complete a two-semester, year-long, school-based internship experience, which distinguishes the teacher education program from other teacher preparatory colleges. The program is a fifth-year program; interns enter into their internship year already having earned undergraduate degrees in their chosen content areas. By completing nine-month internship, interns are offered the opportunity to become a real contributing members of the school in which they intern as well as a valuable member of the educational community in general.

Regardless of teaching area (e.g., elementary, secondary, etc.), interns complete a common, teacher licensure, core of 24 credit hours during the internship year. Additionally, interns must complete an extra 12 credit hours of course work that is unique to their particular teacher preparation field. After completing their internships in local schools, those interns who have met the requirements for their MS degrees may also be awarded Masters' degrees in education.

Before they obtain teacher licensures, interns are required to take a technology integration course, which uses the *National Educational Standards for Teachers (NETS*T)* (ISTE, 2008) as a framework to guide the activities and projects developed in the coursework. During internship year, interns attend required courses either on- or off-campus with classmates from the same teaching areas. The size of classes ranges from 10 to 25 according to the interns enrolling in each licensure program.

*Participants*

Participants in this study included a group of students enrolled in the Post-Baccalaureate programs in Education at the university. During the 2008-2009 academic year, 197 students enrolled in the Post-Baccalaureate Program. These students interned in elementary and secondary public schools around the area of Knoxville, TN. Among the 197 interns who enrolled in the internship program, 151 completed and returned the surveys, with a response rate of 76.65%.

The ages of the participants who completed the surveys ranged from 22 to 52, with a mean of 25.57 year of age. 137 (90.7%) participants were females and fourteen (9.3%) were males (see Table 1 for details). 146 (96.7%) were white, 4 (2.6%) were African-Americans, and 1 (0.7%) was Native American.

Of the 151 participants, 6 (4%) participants were enrolled in Art Education, 12 (8%) in Deaf/Special Education, 20 (13.2%) in Early Childhood Education, 79 (52.3%) in Elementary Education (emphasis in Neighborhood, Reading, Small Systems, and Urban/Multicultural Education), and 34 (22.5%) in Secondary Education (emphasis in English, ESL, Foreign Language, Mathematics, Middle School, Science, and Social Science). See Table 2 for details.

Table 1 Demographic information.

| | | Age | | | | |
|---|---|---|---|---|---|---|
| | | 21-25 | 26-30 | 31-35 | Over 36 | Total |
| Gender | Female | 107(70.8%) | 11 (7.3%) | 6 (4.0%) | 13 (8.6%) | 137 (90.7%) |
| | Male | 7 (4.6%) | 5 (3.3%) | 2 (1.3%) | 0 (0%) | 14 (9.3%) |
| Total | | 114 (75.5%) | 16 (10.6%) | 8 (5.3%) | 13 (8.6%) | 151 (100.0%) |

Table 2 Enrolled programs.

| Enrolled Programs | Frequency | Percent |
|---|---|---|
| Art Education | 6 | 4.0% |
| Deaf/Special Education | 12 | 8.0% |
| Early Childhood Education | 20 | 13.2% |
| Secondary Education | 34 | 22.5% |
| Elementary Education | 79 | 52.3% |
| Total | 151 | 100.0% |

### *Measures*

The study targeted full-time interns currently enrolled in the Internship program. It was believed that a study of these interns would provide a good understanding of practicing interns' actual use of the technology integration in a real educational environment. Data were collected by means of a user-reported, self-assessment approach. The design of the instrument was developed using literature from the field of technology integration in teacher education. The instrument was used in the study to collect data measuring each of the variables discussed in the hypotheses and was analyzed with the statistical software SPSS v.17. The instrument consisted of three sections: 1) Demographic Information; 2) A Computer Technology Integration Survey; 3) Big Five personality measures. The questionnaire is provided in Appendix-A.

#### *Demographic Information*

The Demographic Information Form included five items. Participants were asked information about their gender, race, college major, and age. They were also asked to provide their enrolled programs and their intern schools.

#### *Computer Technology Integration Survey*

The Computer Technology Integration Survey (Russell, et al., 2003) included six (6) subscales which measured participants' attitudes, motivation to use technology, sources of self-efficacy beliefs, intention to use technology, and actual usage of technology. A total of 29 five-point Likert scale items were included in this section to address all these domains. Because likert is recognized as the most widely used response scale for attitudinal research (McMillan, 2000), 5-point Likert scale was used to measure variables. All items, except the usage subscale,

were measured with 1 as “Strongly Disagree”, 2 as “Disagree”, 3 as “Neutral”, 4 as “Agree”, and 5 as “Strongly Agree”. Thus, a high mean on a subscale represented a positive level toward the examined domains. For the usage subscale, 1 was represented as “Never”, 2 as “Several times a semester”, 3 as “Several times a month”, 4 as “Several times a week”, and 5 as “Several times a day”. Thus, a high mean on a sub-scale represented a higher level of usage and low mean represented less usage.

Participants were asked to identify their level of agreement with statements about their technology integration experiences during their internships. For example, participants were asked to report the frequencies of using technology to prepare and deliver instruction as well as directing students to use technology. They were also asked questions such as “I think it would be very wise to use technology in my classroom instruction”, “In my opinion, it would be very desirable to use technology in my classroom instruction.”

*Big Five Personality Measures*

*Personality Style Inventory* (Lounsbury, Sundstrom, Loveland, & Gibson, 2003) was used to assess the “big five” personality traits of Conscientiousness, Extraversion, Openness to experience, Neuroticism, and Agreeableness. This scale is developed based on the short form of the NEO Personality Inventory – Revised (Costa & McCrae, 1992), and consists of 60 items. Briggs (1992) claimed that NEO PI R is the best measure of the five-factor model. The short form has been shown to be reliable and to have a factor structure comparable to that of the full scale test (Rogers, Creed, & Glendon, 2008). The Cronbach coefficient alphas were observed: Neuroticism -- .81, Extraversion – 0.83, Openness – 0.84, Agreeableness -- .81, and Conscientiousness – 0.78. It takes approximately 10-15 minutes to complete, and contains five

12-item subscales, each with a 5-point Likert scale ranging from "Strongly Disagree" as 1 to "Strongly Agree" as 5.

## *Procedures*

### *Data Collection*

Once the application of Review for Research Involving Human Subjects was approved, the investigator contacted all faculty members teaching Clinical Studies (Education 591), and asked permission to enter their classrooms to hand out surveys for this research. Among the 13 faculty members teaching this course, eleven (11) of them allowed the investigator to conduct the survey during their weekly class meetings. Two faculty members refused the request and did not allow the survey. In order to survey the entire sample of students without excluding any groups, the investigator contacted two other faculty members who taught the same groups of interns but in a different course and obtained permission to conduct the surveys in their weekly class meetings.

The data were collected in February and March, 2009. The investigator scheduled a time to conduct surveys with each of 13 faculty members. One week before the survey was conducted, the faculty members informed their interns that a survey would be conducted in the next class meeting and that participation in the survey would be voluntary. All students agreed orally to participate in the survey. On the day of the survey, the investigator entered the classroom and made a brief introduction about the purpose of the survey and the procedures for completing it. Participation in the study was voluntary and anonymous. Interns were informed that no reprisals would be taken against individuals electing to not participate in the study and

that no incentives or compensation would be offered for participation. Printed surveys were distributed to the interns. It took about 15 minutes for most interns to complete surveys.

*Data Analysis*

All completed surveys were converted into statistical data and statistical procedures were used to analyze these data. Specifically, SPSS (v.17) was used to conduct statistical analyses. All subscales of the survey were tested for reliability using Cronbach's Alpha. Statistical analyses including Pearson product-moment correlations and hierarchical regression analyses were used to evaluate the data. The analyses included the following statistical procedures.

1. Descriptive statistical analyses were conducted of all demographic variables and instrument items, and all study variables for the purpose of organizing, clarifying and summarizing the data.
2. A series of bivariate correlation analyses were conducted to examine relationships between each pair of various predictor variables and outcome variables. All the statistical tests were analyzed at a significance level of $a = .05$.
3. Multiple regression analyses were conducted to examine the relative contribution of the independent variables in explaining variation in the dependent variables. All statistical tests were analyzed at a significance level of $a = .05$.
4. Hierarchical multiple regression analyses were used to examine the relationship between the independent variables of motivation and sources of self-efficacy, and the dependent variable of usage of technology integration. All the statistical tests were analyzed at a significance level of $a = .05$. These analyses were used for logical and theoretical reasons. First, hierarchical regression analyses can determine the relative

contributions of the predictor variables to the outcome variables. Second, they can test the moderating effects of support on the relationship between the goals and the outcome variables (using interaction terms), and determine the amount of variance accounted for by the interaction terms. Third, they can test for mediation, where the standardized beta weight for a predictor variable (or set of variables) at one step of the analysis may be reduced at the next step when another predictor variable (or set of variables) is included.

*Hypotheses Testing*

The following statistical techniques were used to evaluate the hypotheses:

H1: Sources of self-efficacy will be positively related to interns' usage of technology integration during classroom instruction.

Bivariate correlation analyses were conducted to examine relationships between each pair of various independent variables and the dependent variable. All statistical tests were analyzed at a significance level of $a = .05$.

H2: Interns' personality traits (Openness, Extraversion, Conscientiousness, Agreeableness, and Neuroticism) will be positively related to their usage of technology integration during classroom instruction.

Bivariate correlation analyses were conducted to examine relationships between each pair of various independent variables and the dependent variable. All statistical tests were analyzed at a significance level of $a = .05$.

H3: Interns' personality trait (Openness, Extraversion, Conscientiousness, Agreeableness, and Neuroticism) will be positively related to technology self-efficacy.

Bivariate correlation analyses were conducted to examine relationships between each pair of various independent variables and the dependent variable. All statistical tests were analyzed at a significance level of $a = .05$.

H4: Interns' motivation, intention, and attitudes will mediate the relationship between self-efficacy and their usage of technology integration during classroom instruction.

Hierarchical multiple regression analyses were used to examine the relationship between the independent variables of motivation and sources of self-efficacy, and the dependent variable of usage of technology integration. All statistical tests were analyzed at a significance level of $a = .05$.

### *Summary*

Interns enrolled in the Post-Baccalaureate programs were administered the survey during their Education 591 class meetings. A total of 151 interns completed and returned the surveys. Both bivariate correlation and hierarchical regression were used to measure the effects of various independent variables on the dependent variable of the usage of technology integration.

# Chapter IV Presentation of the Findings

This chapter reports the results of the study. This chapter is divided into three sections: (a) a summary of the study, (b) a report on the data analysis of the hypotheses, (c) and a summary of the chapter.

## *Summary of the Study*

### *Reliability and Validity*

To ensure content validity of the scales used, the items selected must represent the concept around which generalizations are to be made. Items selected for the constructs in this study were adapted from prior studies in order to ensure content validity (Russell, et al., 2003). Well-developed instruments should establish at least content validity and construct validity (one does not replace the other), and also have a high reliability coefficient (Abu-Bader, 2006, p. 9).

Additionally, before performing any analysis, the subscales used in this study were examined for reliability. Reliability has to do with the quality of measurement. In its everyday sense, reliability is the "consistency" or "repeatability" of the measures. Reliability is concerned with the extent of random variation or random error in the results of a study(Trochim & Donnelly, 2006). Cronbach's Alpha was used to test for reliability. Some social science researchers use scales with a reliability coefficient of .70. However, a reliability coefficient of .60 is considered acceptable for a measuring scale (Abu-Bader, 2006, p. 7). All subscales were above 0.70 except two subscales which were 0.613 for usage and 0.689 for self-efficacy, close enough to .70 to be considered acceptable (see Table 3).

Table 3 Reliabilities of the Scales

| | Cronbach's Alpha | N of Items |
|---|---|---|
| Usage | .613 | 6 |
| Attitude | .913 | 3 |
| Intention | .867 | 5 |
| Self-efficacy | . 689 | 9 |
| Motivation | .730 | 6 |
| Openness | .840 | 12 |
| Conscientiousness | .780 | 12 |
| Extraversion | .830 | 12 |
| Agreeableness | .810 | 12 |
| Neuroticism | .810 | 12 |
| Total | .847 | 89 |

Bivariate correlation analysis and hierarchical multiple regression analysis were conducted to test the relationship between the independent variables of personality, self-efficacy, motivation, and attitudes, and the dependent variables of intention and usage. These analyses were used for logical and theoretical reasons. First, bivariate correlation analysis can display the relationships between dependent and independent variables. Second, hierarchical regression analysis can determine the relative contributions of independent variables to the dependent variables. Third, hierarchical analyses can test for mediation, where the standardized beta weight for a predictor variable (or set of variables) at one step of the analysis may be reduced at the next step when another predictor variable (or set of variables) is included.

### *Testing of Hypotheses*

The dependent variable of Usage was significantly correlated with the independent variables, including Intention, Motivation, Attitudes, with the three sources of self-efficacy (Enactive Mastery Experiences, Vicarious Experiences, and Persuasion), and with one of the personality traits, Conscientiousness (see Table 4). Hierarchical regression was then conducted to test the effects of the independent variables on the dependent variables. All independent variables used in the hierarchical regression were statistically significant correlated with the dependent variables. The personality variable of Conscientiousness was entered at Step 1, to determine its direct effect on interns' usage of technology. Three sources of self-efficacy were entered at Step 2, as they were expected to mediate the relationship between the personality variables and interns' usage of technology. Motivation, attitude, and intention were entered at Step 3, as these were expected to mediate the relationship between all the independent variables

Table 4 Summary data and bivariate correlations for all measures used in the study

N=151

| | | Mean | SD | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Usage | 3.580 | .647 | .230** | .255** | .344** | .180* | .412** | .545** | .130 | .168* | -.008 | .026 | -.045 |
| 2. | Persuasion | 3.942 | .547 | | .522** | .421** | .178* | .290** | .305** | .128 | .126 | .131 | -.078 | .049 |
| 3. | Enactive Mastery Experience | 3.981 | .468 | | | .315** | .098 | .323** | .351** | .081 | .087 | -.073 | .050 | .132 |
| 4. | Vicarious Experiences | 3.934 | .616 | | | | .263** | .360** | .292** | .092 | .192* | .043 | -.006 | -.191* |
| 5. | Motivation | 4.040 | .527 | | | | | .367** | .320** | .180* | .195* | .181* | .055 | -.087 |
| 6. | Attitude | 4.744 | .440 | | | | | | .709** | .015 | .209** | .117 | -.059 | -.033 |
| 7. | Intention | 4.534 | .473 | | | | | | | .028 | .077 | .028 | -.014 | .096 |
| 8. | Openness | 3.099 | .255 | | | | | | | | .102 | .195* | .264** | -.016 |
| 9. | Conscientiousness | 3.612 | .259 | | | | | | | | | .288** | .085 | -.048 |
| 10. | Extraversion | 3.394 | .326 | | | | | | | | | | .021 | .000 |
| 11. | Agreeableness | 2.896 | .291 | | | | | | | | | | | .332** |
| 12. | Neuroticism | 2.645 | .326 | | | | | | | | | | | --- |

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

and usage. A mediating mediator and dependent variables, and (b) when there is a reduction in the relationship between the independent and dependent variable in the presence of the mediator. Full mediation occurs when the influence of an initial independent variable (or set of independent variables) is reduced to zero; partial mediation occurs when this influence is substantially reduced (Baron & Kenny, 1986; James & Brett, 1984). Thus, the independent variables at Step 2 of the regression analysis should account for significant variance in the dependent variable, and when the mediator variables are included at Step 3, the effects of the independent variables at Step 2 should be reduced (Jimmieson, Terry, & Callan, 2004).

### *Testing Results*

This chapter presents the data and the findings of this study as related to the hypotheses that were presented in the introductory chapter. Throughout this paper, alpha level of 0.05 was used for all t-tests and F-ratio tests. The following hypotheses were tested using different forms of data analysis.

Hypothesis 1: Sources of self-efficacy will have a significant relationship with interns' usage of technology integration during classroom instruction.

Bivariate correlation analysis was conducted to test the relationship between the variables of interns' sources of self-efficacy and their usage of technology integration. Specifically, the interns' enactive mastery experiences ($M$ = 3.98, $SD$ = .47, $N$ = 151) and usage ($M$ = 3.58, $SD$ = .65, $N$ = 151) were significantly correlated with a Pearson correlation coefficient $r$ = .26, $p$ < .05. The interns' persuasion ($M$ = 3.94, $SD$ = .55, $N$ = 151) and usage ($M$ = 3.58, $SD$ = .65, $N$ = 151) were also significantly correlated, with a Pearson correlation coefficient $r$ = .23, $p$ < .05.

The interns' vicarious experiences ($M$ = 3.93, $SD$ = .62, $N$ = 151) and usage ($M$ = 3.58, $SD$ = .65, $N$ = 151) were significantly correlated with a Pearson correlation coefficient $r$ = .34, $p$ < .05.

H2a: Interns' personality traits (Openness, Extraversion, Conscientiousness, Agreeableness, and Neuroticism) will be positively related to their usage of technology integration during classroom instruction.

Bivariate correlation analysis was conducted to test the relationship between the variables of interns' personality traits and their usage of technology integration. Specifically, the interns' Openness ($M$ = 3.10, $SD$ = .26, $N$ = 151) and usage ($M$ = 3.58, $SD$ = .65, $N$ = 151) were not significantly correlated, with a Pearson correlation coefficient of only $r$ = .13. The interns' Conscientiousness ($M$ = 3.61, $SD$ = .26, $N$ = 151) and usage ($M$ = 3.58, $SD$ = .65, $N$ = 151) were significantly correlated, with a Pearson correlation coefficient $r$ = .17, $p$ < .05. The interns' Extraversion ($M$ = 3.39, $SD$ = .33, $N$ = 151) and usage ($M$ = 3.58, $SD$ = .65, $N$ = 151) were not significantly correlated, with a Pearson correlation coefficient $r$ = - .01. The interns' Agreeableness ($M$ = 2.90, $SD$ = .29, $N$ = 151) and usage ($M$ = 3.58, $SD$ = .65, $N$ = 151) were not significantly correlated, with a Pearson correlation coefficient $r$ = .26. The interns' Neuroticism ($M$ = 2.65, $SD$ = .33, $N$ = 151) and usage ($M$ = 3.58, $SD$ = .65, $N$ = 151) were not significantly correlated, with a Pearson correlation coefficient of only $r$ = - .05.

Hypothesis 3: Personality traits (Openness, Extraversion, Conscientiousness, Agreeableness, and Neuroticism) will have significant relationships with technology self-efficacy.

Bivariate correlation analysis was conducted to test the relationship between the variables of interns' personality traits and their self-efficacy regarding technology integration. Personality

traits were not significantly correlated with interns' sources of self-efficacy with two exceptions. Conscientiousness ($M$ = 3.61, $SD$ = .26, $N$ = 151) and Neuroticism ($M$ = 2.65, $SD$ = .33, $N$ = 151) were significantly correlated with interns' vicarious experiences of faculty modeling technology, with a Pearson correlation coefficient $r$ = .19 and $r$ = - .19, $p$ < .01, respectively.

Hypothesis 4: Interns' motivation, intention, and attitudes will mediate the relationship between self-efficacy and their usage of technology integration during classroom instruction.

Hierarchal regression analysis was conducted to test this hypothesis. Conscientiousness, entered at Step 1, accounted for a significant 2.8% of the variance in usage, $F(1, 149) = 4.344$, $p < .05$. Those interns who reported higher level of Conscientiousness also reported more usage of technology in classroom instruction. At Step 2, adding the three sources of self-efficacy variables accounted for a further significant 12.5% of the variance, $R^2_{\text{Change}}$ (4, 146) = 6.569, $p< .01$. Those interns who reported more persuasion from peers and faculty reported more usage of technology members (β = .27, $p<$. 01). Conscientiousness no longer made a significant, unique contribution. At Step 3, the addition of motivations, intentions, and attitudes accounted for a further significant 19.4% of the variance, $R^2_{\text{Change}}$ (7, 143) = 3.110, $p < .01$. Those interns who reported more observation of faculty members modeling technology usage (β = .20, $p <$. 05) and intention (β = .51, $p<$. 01) reported more usage of technology themselves. At this step, the addition of motivation, intention, and attitude reduced the standardized beta weights for persuasion (from .27 to .20). This indicated a partial mediating role for intention; attitude and motivation did not meet the criteria for being mediators, as they were not significantly associated with the dependent variable at this step. The analysis summary is reported in Table 5.

Table 5 Summary data for hierarchical regression analysis for variables predicting usage

N=151

| Variables | Step 1 | | | Step 2 | | | Step 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| | *B* | *SEB* | *β* | *B* | *SEB* | *β* | *B* | *SEB* | *β* |
| Conscientiousness | .42 | .20 | .17 * | .25 | .19 | .10 | .27 | .18 | .11 |
| Persuasion | | | | .03 | .11 | .03 | -.02 | .10 | -.02 |
| Enactive Mastery Experiences | | | | .21 | .12 | .15 | -.04 | .11 | .03 |
| Vicarious Experiences | | | | .28 | .09 | .27 ** | .21 | .08 | .20 * |
| Motivation | | | | | | | -.06 | .09 | -.05 |
| Attitude | | | | | | | -.05 | .15 | -.03 |
| Intention | | | | | | | .70 | .14 | .51 ** |
| $\Delta R^2$ | | | | | | 12.5 ** | | | 19.4 ** |
| $R^2$ | | | 2.8 * | | | 15.3 ** | | | 34.7 ** |
| Adjusted $R^2$ | | | 2.2 * | | | 12.9 ** | | | 31.5 ** |

* $p < .05$.

** $p < .01$.

*Summary*

This chapter has presented the data and the findings of this study as related to the hypotheses that were presented in the introduction. Throughout this paper, both alpha levels of 0.05 and 0.01were used for all t-tests and F-ratio tests. These hypotheses were tested using different forms of data analysis. See Table 6 for a summary of the hypotheses test results.

Table 6 Summary of hypotheses testing results.

| | Hypotheses | Results |
|---|---|---|
| 1. | Sources of self-efficacy have a significant relationship with interns' usage of technology integration during classroom instruction. | Supported |
| 2. | Interns' personality traits have a significant relationship with their usage of technology integration during classroom instruction. | Supported |
| 3. | Conscientiousness of personality traits has significant relationships with technology self-efficacy. | Supported |
| 4. | Interns' motivation, intention, and attitudes mediate the relationship between self-efficacy and their usage of technology integration during classroom instruction. | Partially Supported |

# Chapter V Summary, Discussion, and Conclusions

Presented below are a summary and discussion of the findings of this study. The study tested four hypotheses based on data collected from interns enrolled in the Post-Baccalaureate Program during the spring 2009 semester.

Limitations of this study are also described along with recommendations for future research.

## *Summary of the Results*

The present study sought to extend Bandura's self-efficacy theory to the domain of technology integration and to test how personality and other social cognitive factors contribute to technology integration in teacher education programs. The results indicated that personality trait of Conscientiousness and other social cognitive factors, such as motivations, attitudes, and intentions, are related to technology integration both directly and indirectly.

The present study examined personality traits, self-efficacy, motivations, attitudes, and intentions as well as usage of technology integration in a group of interns enrolled in the Post-Baccalaureate Program during the spring 2009 semester. The group consisted of 137 females (90.7%) and 14 males (9.3%). The participants had a mean age of 25.57 with a minimum age of 22 and a maximum age of 52. By ethnicity, the participants included 146 Whites (96.7%), 4 African-Americans (2.6%), and 1 Native American (0.7%). A summary of gender, ages, ethnicity and enrolled programs of these interns can be viewed in Table 1 and 2.

Participants' self-efficacy, attitudes, motivations, intentions, and usage of technology integration were studied using a *Computer Technology Integration Survey* to collect data from interns enrolled in the Post-Baccalaureate program in the 2008-2009 academic year. Interns' personality traits were also studied by using *Personality Style Inventory*. Using various statistical measures, it was determined that interns' self-efficacy, attitudes, motivations, and intentions to use technology integration were significantly correlated with their actual usage of technology integration during their internships in local schools. It was also determined that interns' Conscientiousness, one of the five core personality traits in the five-factor model, was significantly correlated with interns' actual usage of technology integration during their internship.

Furthermore, hierarchal regression analysis also showed that intention and observation had direct relationships with interns' usage of technology integration, while Conscientiousness had an indirect relationship with the usage of technology integration via intention and persuasion. These findings suggest that individuals who report strong intention and observations of technology integration are more likely to use technology integration in reality. The indirect relationship between Conscientiousness and usage of technology integration, via observation and intention, supports other research that has found a relationship between Conscientiousness and self-efficacy and technology integration (Judge & Ilies, 2002). Contrary to predictions, Openness, extroversion, agreeableness, and neuroticism were not found to be associated with the usage of technology integration.

The finding that intention mediated the relationship between observation and usage of technology integration was consistent with the hypothesis of the hypothesis 4. The relationship

between intention and usage of technology integration was an interesting finding, as intention, in combination with observation, was associated with the usage of technology integration. This suggests that high levels of intention and observation may result in substantial usage of technology integration by interns. In other words, when they observe their faculty members teaching content subjects with technology, the pre-service teachers will increase their intention to integrate technology into teaching.

*Discussion*

The present study sought to extend self-efficacy theory to the domain of technology integration and to test how personality traits and social cognition factors contribute to learning and using technology integration. Results indicate that both personality traits and social cognition factors are related to the use of technology integration, both directly and indirectly.

Conscientiousness was found to have an indirect relationship with the usage of technology integration via intention and self-efficacy factors. This finding suggests that individuals who are conscientious are more likely to engage in using technology integration during classroom instruction. Conscientiousness refers to individual's will to achieve, self-control, and motivation to achievement. In terms of technology integration, if an intern has a higher level of conscientiousness, he/she will intend to be motivated to succeed and to engage more time learning and using technology. The indirect relationship between personality traits and the usage of technology integration, via self-efficacy factors, supports other research that has found a relationship between Conscientiousness and self-efficacy factors. The relationship is consistent with similar findings of a relationship between personality traits and the usage of

technology integration. Erdle, Murray, and Rushton's (1985) finding that specific personality traits of teachers are reflected in their selection of classroom materials and instructional technology strategies was supported by the finding of this study. Usage of technology integration could be considered somewhat indicative of instructional strategies. Interns using the communication function of technology integration may be implementing constructed-response assessment strategies.

The present study's findings of a significant relationship among personality traits and the usage of technology integration runs counter to the general contentions of social cognitive theory. It sets in question that social cognitive theorists' view of trait-driven interpretations of human behavior as unidirectional, or as a reactive combination between environmental influences and internal predispositions (Bandura, 1999). For the investigation of phenomena associated with technology integration, Bandura's call for an interactional framework focusing on process, rather than outcome, might not offer a better construct than the study of personality. To understand how and why interns use technology integration, the examination of personality traits from collective research should not be excluded as the social cognitive theorists contend. However, these findings cannot, at present, be generalized back to the population as a whole as they were derived from an exploratory study of a specific group.

Contrary to predictions, Openness, Extraversion, and Neuroticism were not found to be associated with usage of technology integration. Agreeableness was also unrelated to usage of technology integration, which is consistent with previous research (Duff, et al., 2004; Eysenck, 1992, James, Montgomery, & Saphian, 2006; Judge & Ilies, 2002).

The present study also found that self-efficacy factors and social cognition factors were related to the interns' actual technology integration in classroom instruction. Strong support was found for the relationship between interns' self-efficacy factors and their usage of technology integration: those who held higher levels of belief about their self-efficacy in technology were more likely to use technology during their classroom instruction. Interns' attitudes and motivation were found to be substantively related to their usage of technology, supporting previous findings that positive attitudes toward technology lead to more usage of technology integration during classroom instruction (Bai & Ertmer, 2008; Christensen, 2002; Germann & Sasse, 1997).

Among self-efficacy factors, the construct of faculty modeling was found to have both indirect and direct influences on interns' usage of technology integration. The direct influence of faculty modeling technology integration suggests that when interns have opportunities to observe their own teachers using technology in their teaching, they are more likely to teach with technology themselves during their classroom instruction. This finding is consistent with a previous study by Hall (2007) that increased modeling of technology integration in instruction by university faculty members led to more teaching with technology in classrooms by the participating teachers.

In order to improve or enhance the use of technology in their teaching, interns need different supports from both university and K-12 schools. The university faculty members need to grasp technology skills and know ways to engage in technology integration activities. Therefore, they are able to design curriculum in accordance to the ISTE NETS-T standards and apply technology integration into their overall content and pedagogy. University faculty

members can model technology integration to interns. It is important for interns to observe their university faculty member to use hardware and software effectively for instruction. Required by their faculty members to complete their assignments with technology, interns need to learn skills to use hardware and software tools. With knowledge and skills they learn from their university faculty, interns are able to apply what they have learned from their faculty into their own classroom teaching and develop their own instructional patterns with technology.

*Limitations*

There were several limitations of the present study. First, there are numerous factors affecting the actual usage of technology integration in school environment, but only five kinds of factors (self-efficacy, attitudes, motivation, intentions, and personality) were the focus of this study. It might be a good topic to explore other potential determinants that are related to the usage of technology integration.

Second, all the participants in this study were from the Post- Baccalaureate programs, which is not common in other higher education institutes. The findings of the present investigation should be applied cautiously elsewhere, and future studies might seek to replicate this study with larger, more diverse samples. In order to generalize the findings from this study, additional studies should be done by using participants from other institutes with different level of exposure to technology integration.

Furthermore, as the survey was conducted using a self-reported methods, it is hard to know how accurately the self-reports reflect actual behavior patterns. The standards that participants applied to answer the questionnaires might also be different. Observation from a

third party could be combined with the self-reports to provide complete description of interns' behavior patterns of technology integration.

Last, the majority of the participants of this study were female Whites, a fact that suggests a need to replicate it for various ethnic groups. Although both the Computer Technology Integration Survey and Personality Style Inventory have been shown to be fairly consistent across cultures and ethnic groups (Lounsbury, et al., 2003; Paunonen, Haddock, Forsterling, & Keinonen, 2003), it would be good to test the generalizability of the present findings to other samples that vary with respect to ethnicity, race, age, and geographic locale, to list but a few.

*Recommendations for Future Research*

Based on the results of this study and the previous discussion, the following recommendations are suggested for further research. In order to better understand The present study should be replicated in order to better understand the factors influencing new teachers' usage of technology integration by using both qualitative and quantitative methods that to gather both objective and subjective responses. An exploration of how new teachers feel about and use technology integration, particularly about their learning after their faculty members modeling, will help researchers understand the effects of various means used by higher education institutes to enhance new teachers' learning of technology integration skills.

Many other factors may influence new teachers' learning and use of technology and could be included in the future studies. For example, the availability of technology in classroom and the attitudes from the administration, especially, the principals, could influence teachers'

perception of technology integration(Rogers, 2007). A complete and thorough examination of all such factors will undoubtedly help both administrative and educational authorities to design better ways to teach technology integration skills in teacher education programs.

There are many different software and hardware packages and different ways to integrate technology for each subject area. Further studies should be conducted to compare subject areas and see if there are any different trends and patterns among teachers in different subjects in terms of technology integration. The results from such comparisons could guide the redesign of new teacher education curricula appropriate to the different demands of different subjects.

Future research should be conducted to test if there are different trends and patterns among interns of different cultural, ethnics, and age backgrounds. Since research suggests and this study confirms that modeling by university faculty members plays a crucial role in helping new teachers to successfully learn and integrate technology into their classroom instruction, a study should be conducted to see how such modeling is being provided and what effect this modeling has on pre-service teachers' later usage of technology integration. A longitudinal study can be conducted to test the causality relationship between modeling and interns' actual usage of technology integration.

*Conclusions*

The present study was initiated to investigate factors that influenced new teachers to learn and integrate technology into their classroom instruction. The investigator tested whether personality traits, self-efficacy, and social cognitive factors such as attitudes and motivation could enhance new teachers' learning and integration of technology.

The review of literature in present study showed that very little research had been conducted on the roles that personality traits and self-efficacy regarding technology integration might play in pre-service teachers' usage of technology integration. The literature further suggested that continued research needed to be conducted in order to see what is working and what is not working as teacher education programs try to encourage new teachers to learn and integrate technology into their classroom instruction.

The present study examined a group of interns enrolled in a Post-Baccalaureate program and interning in local public schools in East Tennessee. Both the results of the study and the literature suggest that positive changes can be made in the instructional process and that research needs to be an ongoing practice. The current study can be considered as a starting point for future research on how to encourage new teachers to learn and integrate technology into their classroom instruction.

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# Appendices

*Appendix A*

A Computer Technology Integration Survey

**Part I Demographic information**

*Please answer the following questions and select all the answer which applies to your situations.*

1. What is your gender?
    a. Female
    b. Male
2. How old are you?

    _____

3. What is your racial/ethnic status?
    a. African-American
    b. Asian/Pacific Islander
    c. Native American
    d. White
    e. Other _____
4. Which program do you enroll in currently? (Pick all applicable)
    a. Art Education
    b. Deaf Education
    c. English Education
    d. Elementary Education
    e. ESL Education
    f. Foreign Language Education
    g. Middle School
    h. Reading Education
    i. Secondary Education
    j. Secondary Math Education
    k. Science Education
    l. Social Studies Education
    m. Special Education
    n. Urban/Multicultural Education
    o. Others:_____
5. Where are you teaching this year? (pick all applicable)
    a. Kindergarten (PreK-K)
    b. Elementary school (1-4)
    c. Middle grades (5-8)
    d. High schools (9-12)
    e. Other _____

**Part II. Computer Technology Integration Survey**

*The purpose of this survey is to determine factors which will influence your experiences about integrating technology into classroom teaching. For each statement below, indicate the strength of your agreement or disagreement by circling one of the five scales.*

6. When you do student teaching in the elementary/secondary schools, to what extent do you use technology (e.g., computers or the Internet) to conduct following teaching-related jobs?

| | **Never** | **Several times a semester** | **Several times a month** | **Several times a week** | **Several times a day** |
|---|---|---|---|---|---|
| a. Use of technology for preparation | 1 | 2 | 3 | 4 | 5 |
| b. Use of technology for delivery | 1 | 2 | 3 | 4 | 5 |
| c. Directing student to use technology | 1 | 2 | 3 | 4 | 5 |
| d. Use of technology for special education and accommodation purposes | 1 | 2 | 3 | 4 | 5 |
| e. Teacher use of email | 1 | 2 | 3 | 4 | 5 |
| f. Use of technology for recording grades | 1 | 2 | 3 | 4 | 5 |

7. As an intern/teacher, to what extent do you agree with the following statements about technology integration?

**SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree**

| | | | | | |
|---|---|---|---|---|---|
| 1. I think it would be very wise to use technology in my classroom instruction | SD | D | N | A | SA |
| 2. In my opinion, it would be very desirable to use technology in my classroom instruction | SD | D | N | A | SA |
| 3. I think it would be worthwhile in my classroom instruction | SD | D | N | A | SA |
| 4. I would use technology in my classroom instruction when it becomes available | SD | D | N | A | SA |
| 5. I would use technology to improve my teaching performance or quality | SD | D | N | A | SA |
| 6. I would use technology routinely in my classroom instruction | SD | D | N | A | SA |
| 7. To the extent possible, I would use technology to do different teaching tasks | SD | D | N | A | SA |
| 8. To the extent possible, I would use technology in my classroom instruction frequently | SD | D | N | A | SA |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 9. Use of technology enables me to accomplish teaching tasks more quickly | SD | D | N | A | SA |
| 10. Using technology improves my teaching performance | SD | D | N | A | SA |
| 11. Using technology makes my teaching easier | SD | D | N | A | SA |
| 12. Using technology enhances my teaching effectiveness | SD | D | N | A | SA |

8. As an intern/teacher, to what extent do you agree with the following statements about technology integration?

**SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree**

| | | | | | |
|---|---|---|---|---|---|
| 1. Technology is useful to me for my teaching | SD | D | N | A | SA |
| 2. It is easy to get technology to do what I want it to do | SD | D | N | A | SA |
| 3. It is easy to become skillful at using technology for my teaching | SD | D | N | A | SA |
| 4. It is easy to learn new technology for my teaching | SD | D | N | A | SA |
| 5. Overall, I find technology easy to use in my teaching | SD | D | N | A | SA |
| 6. I could use technology in my teaching if I had seen my colleague/professor using it before trying it myself | SD | D | N | A | SA |
| 7. I could teach with new technology if I had lot of time to complete | SD | D | N | A | SA |
| 8. I could teach with new technology if I had just the built-in help facility for assistance | SD | D | N | A | SA |
| 9. I could teach with new technology if someone showed me how to do it first | SD | D | N | A | SA |
| 10. I could use new technology if I had used similar package in the past | SD | D | N | A | SA |
| 11. I could complete a job with new technology if I had used similar package to do the same job in the past | SD | D | N | A | SA |
| 12. My professors often use technology when they are teaching | SD | D | N | A | SA |
| 13. My professors encourage me to use technology to teach | SD | D | N | A | SA |
| 14. My professors/colleagues think I am good at using technology | SD | D | N | A | SA |
| 15. I enjoy using computers | SD | D | N | A | SA |
| 16. I would take any opportunity to use computers | SD | D | N | A | SA |
| 17. Once I start using computers, I cannot stop | SD | D | N | A | SA |
| 18. Computers are a necessary tool for everyone in the future | SD | D | N | A | SA |
| 19. Everyone should know how to use computers | SD | D | N | A | SA |
| 20. Everyone will need to use computers more in the future | SD | D | N | A | SA |

## Thank you very much for your participation!

*Appendix B*

CONFIDENTIALITY and NON-DISCLOSURE AGREEMENT

CONFIDENTIALITY and NON-DISCLOSURE AGREEMENT

AGREEMENT and acknowledgement between Resource Associates, Inc. (Company) and Jun Li (undersigned).

1. The Undersigned agrees to hold all confidential or proprietary information or trade secrets ("information") of the psychological scales, items, and norms of Resource Associates, Inc. in trust and confidence and agrees that it shall not be disclosed to any third party.
2. The information shall not be disclosed to any employee, consultant, or third party unless said party agrees to execute and be bound by the terms of this agreement, and disclosure by Company is first approved.
3. The Undersigned acknowledges the information disclosed herein represents proprietary or trade secrets and in the event of any breach, the Company shall be entitled to injunctive relief as a cumulative and not necessarily successive or exclusive remedy to a claim for monetary damages.
4. The Undersigned agrees not to use or publish our scale items in any periodical, journal, book, dissertation, or any other publicly available document without our consent.
5. This agreement shall be binding upon and inure to the benefit of the parties, their successors and assigns.
6. This constitutes the entire agreement.

Signed this 31st day of October 2008.

Witnessed:

Jun Li
PhD student, Instructional Technology
College of Education, Health, Human Science
The University of Tennessee
Knoxville, TN USA

John W. Lounsbury, Ph. D.
President
Resource Associates, Inc.
Knoxville, Tennessee USA

# Vita

Jun Li was born in Suzhou, China on July 4, 1971. He attended schools in Suzhou and Shijiazhuang before going to Hebei Teachers College, China, where he received his Bachelor degree in English Language and Literature in 1993. In September, 1993, he began teaching English in Hebei University of Economics and Trade in China until 2001. In 2002, he entered the University of Southern Mississippi, Hattiesburg and obtained the Master of Science degree in Elementary Education in 2004. Then he began work on a Doctorate of Education with a concentration in Instructional Technology and Educational Studies during the fall 2004 semester. The doctorate degree was received August 2009.