COLLEGE AND THE DIGITAL GENERATION: ASSESSING AND TRAINING STUDENTS

FOR THE TECHNOLOGICAL DEMANDS OF COLLEGE BY EXPLORING

RELATIONSHIPS BETWEEN COMPUTER SELF-EFFICACY

AND COMPUTER PROFICIENCY

by

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A DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in the
Program of Instructional Leadership,
in the Graduate School of
The University of Alabama

TUSCALOOSA, ALABAMA

2010

ABSTRACT

Today's college students are often labeled the "Net Generation" and assumed to be computer savvy and technological minded. Exposure to and use of technologies can increase self-efficacy regarding ability to complete desired computer tasks, but students arrive on campuses unable to pass computer proficiency exams. This is concerning because some colleges and universities have eliminated introductory computer courses following the 120-Hour Rule. This study's purpose was to investigate relationships between computer self-efficacy and computer proficiency and to determine whether students are prepared for technological demands of college.

Quantitative data were collected from pre- and postcourse surveys and pre- and postcourse proficiency exams. Participants included students enrolled in introductory computer courses at one university. Courses used the competency based training product, SimNet for Office 2007, to train and assess students. Results indicated general computer self-efficacy (GCSE) ratings were highest for students that had taken three or more computer classes in high school. GCSE was higher than task-specific computer self-efficacy (TSCE) for Excel and Access applications, but lower than TSCE for the Vista operating system and Word. TCSE was found to be higher than performance scores for Vista, Access, Excel, PPT, and Word. Completing an introductory computer class was found to increase computer self-efficacy ratings and computer proficiency scores.

Results suggested that many students are not proficient in Office 2007 applications needed in college. Colleges and universities need to assess computer proficiency of incoming students and train them in the computer skills needed to be successful in college and beyond.

DEDICATION

"If I have the belief that I can do it, I shall surely acquire the capacity to do it
Even if I may not have it at the beginning."

Mahatma Gandhi

This dissertation is dedicated to my children, Brantley Christine Morris and Robert Daxton Morris. I hope I can inspire you both to become lifetime learners. During this process you often asked why I felt the need to pursue this. I hope as you grow older you will fully understand my desire and drive to earn my doctoral degree and be able to appreciate and admire the fact that I accomplished this long-term goal. I love you both so much.

LIST OF ABBREVIATIONS OR SYMBOLS

ANOVA Analysis of Variance

CSE Computer self-efficacy

d Cohen's *d* value

df Degrees of freedom

ε Huynh-Feldt estimate of sphericity: a correction used to adjust the F-ratio to be more valid and reduce Type 2 error

F Fisher's *F* ratio

GCSE General computer self-efficacy

M Mean

N number in population

n number in sample

OS Operating System

p Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value

PPT PowerPoint

r Pearson product-moment correlation

sd Standard Deviation

SE Self-efficacy

SPSS Analytical software product original standing for Statistical Package for the Social Sciences

t	Computed value of *t* test
TCSE	Task-specific computer self-efficacy
$>$	Greater than
$<$	Less than
$=$	Equal to
$^{+}$	and more

ACKNOWLEDGMENTS

I want to praise and thank Jesus Christ, my Lord and Savior, for blessing me with the opportunity to embark on and complete such an incredible journey. All things are possible through him and because of him.

I want to thank my family, especially my husband, for their continuous support and encouragement to pursue my goal of earning my doctoral degree. They have remained positive through my up and down moments and never gave up on me even when, at times, I was ready to give up on myself. Thank you and know I love you each so much.

A huge thank you goes to my committee members: Dr. Angela D. Benson, Dr. David J. Heggem, Jr., Dr. Margaret L. Rice, Dr. Deann K. Stone and my incredibly inspirational committee chairperson, Dr. Vivian H. Wright. I thank each of them for their time, guidance and support. Each played a vital part in making this dream a reality.

To my doctoral cohort and program instructors, you were one of the liveliest groups of individuals I have had the blessing of being a part of. You certainly made the journey fun and enjoyable. The encouragement and friendship I received from each of you means more to me than you know and I thank each of you for your part in this process.

I want to thank my students and co-workers that motivate and challenge me on a daily basis to be the best teacher I can be. I continue to learn from all of you.

To every individual that encouraged me whether it was a kind word, pat on the back, a bit of advice or a break from it all, I thank you. I needed every one of you during this process and

credit you with helping me attain one of my long term goals. My blessings abound and I thank you all!

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CHAPTER 1

INTRODUCTION

Colleges and universities face the daunting task of assessing the computer proficiency of incoming students and training them in the computer skills they will need to be successful in college and beyond. Skill knowledge involving word processing, spreadsheets, databases, presentation software, emailing, internet, and other basic computer concepts are the fundamental computer skills used in academia as well as in industry (Hardy, 2005; Hulick & Valentine, 2008; Wilkinson, 2006; Wolk, 2008). The widespread assumption that individuals raised in this “digital world” possess adequate computing skills to be successful in entry-level college courses is unsubstantiated (Hulick & Valentine, 2008; Wallace & Clariana, 2005). Although computer use is likely to increase one’s self-efficacy when it comes to completing computing tasks (Hill, Smith, & Mann, 1987), numerous studies have concluded that many students are not computer proficient upon entering college (Coolbaugh, 2004; Hardy, 2005; Hulick & Valentine, 2008; Rafaill & Peach, 2001; Shannon, 2008; Templeton, Jones, & Li., 2003; VanLengen, 2007; Wallace & Clariana, 2005). Assessing relationships between students’ task-specific computer self-efficacy and task-based computer proficiency is the focus of this study.

The youth of Generation Y are being raised in a culture immersed in technology. Similar to the way television influenced the culture and values of the baby boomer generation, computers, cell phones, video games, music players, social networking sites, and search engines are shaping the values and culture of this generation (Tapscott, 1998). Generation Y, also referred to as the Net Generation (Tapscott, 1998), Millennial Generation (Howe & Strauss, 2000), Music Television (MTV) generation, Nexters, and the I.P.O.D.ers (Akande, 2008), are identified as individuals born after 1980 (Akande, 2008; Bennett, Maton, & Kervin, 2008) and account for the largest and most diverse group of learners in our nation's history (U.S. Department of Education, 2004). The multitasking youth of this generation have reported that they often spend up to a fourth of their day engaged in technology activities (Giles & Price, 2008; Hulick & Valentine, 2008; Tapscott, 1998). Because they spend a large amount of time engaged in computer use, when surveyed, these generational youths rate themselves high when it comes to confidence regarding their computer skills and abilities (Considine, Horton, & Moorman, 2009; Imhof, Vollmeyer, & Beierlien, 2007; Lahore, 2008; Wilkinson, 2006). Students with higher levels of computer self-efficacy may view introductory computer applications classes as being easy and may not exert the necessary effort to learn the computer skills and concepts taught in such classes (Smith, 2001).

This past year more than 2 million Generation Y high school graduates enrolled in college (U. S. Bureau of Labor Statistics, 2007). It would be easy to presuppose that these "techno-savvy" youth would arrive on campus with the basic computer skills needed to be successful in entry-level course work. After all, technology standards involving basic computer concepts, word processing, spreadsheets, databases, and presentation software are a common element of the technology course of study in high schools across the nation (NETS, 2007). However, although 99% of high schools offer computer literacy courses, only 13% of high schools require a computer literacy course for graduation, and only two states (Nevada and North Carolina) have a computer literacy graduation exam requirement (Ceccucci, 2006). Hardy (2005) reported that students at the college level need basic computer application skills in order to function at the postsecondary level of learning. Although studies have concluded that these skills are necessary for postsecondary education, only a small percentage of college students are passing computer skills proficiency exams offered by colleges and universities (Coolbaugh, 2004; Hardy, 2005; Hulick & Valentine, 2008; Rafaill & Peach, 2001; Shannon, 2008; Templeton et al., 2003; VanLengen, 2007; Wallace & Clariana, 2005). This is cause for concern, because many colleges and universities are amending curricula to remove introductory computer courses from their baccalaureate degree programs. Removal of introductory computer courses is partly due to the nationwide push by state legislatures to reduce degree programs to 120 degree credit hours (Shannon, 2008; THECB, 2009), as well as the theory that there is no longer a need for such courses (Hulick & Valentine, 2008). In 2001, Rafaill and Peach predicted that in a few short years, introductory computer courses would not be necessary. However, a review of proficiency studies by Hulick and Valentine (2008) consistently found that college students did not possess the basic computer applications skills needed to be successful in college. Hulick and Valentine concluded their study by recommending that college students be required to take a formal course in computer applications or take a proficiency exam to demonstrate mastery of skills. Smith (2001) suggested that task-specific computer self-efficacy (TCSE) assessments be used along with proficiency exams and/or introductory classes to fully assess the strengths, weaknesses, and training needs of students.

Statement of the Problem

Research has documented the importance of college-bound individuals possessing basic computer skills related to word processing, spreadsheets, presentation software, and computer concepts (Hardy, 2005; Hulick & Valentine, 2008; Wilkinson, 2006; Wolk, 2008). Research also indicates that although students should be exposed to and taught these skills during their high school years, computer courses in high school are often only offered as elective courses

(Ceccucci, 2006). Based on proficiency testing scores, the majority of entering college students are not passing skill-based computer literacy exams (Coolbaugh, 2004; Hardy, 2005; Hulick & Valentine, 2008; Rafaill & Peach, 2001; Shannon, 2008; Templeton et al., 2003; VanLengen, 2007; Wallace & Clariana, 2005), although they appear to be self-confident regarding their computer skills. Students entering college and not exhibiting the necessary basic computer skills should enroll in an introductory computing course to acquire those skills that will assist them in being successful in entry-level college offerings (Hulick & Valentine, 2008; Shannon, 2008), but the future of such class offerings at many colleges is in jeopardy (Hulick & Valentine, 2008; Shannon, 2008; Wallace & Clariana, 2005).

Some campuses continue to offer introductory computer courses due to growing campus enrollments, computer literacy requirements, and elective offerings. It is important for these colleges and universities to provide research-based computer proficiency assessments, to be aware of what students already know upon entering college, and to offer individualized instruction or remediation to students lacking needed computer skills. It is also important to assess students' computer self-efficacy, because it may have a relationship with computer task performance (Smith, 2001).

This study took place at a large university in the Southeast that is experiencing these same types of challenges. The enrollment in the university's introductory computer skills course, referred to in this document as CS102, is growing as campus enrollment increases. The course is attempting to service more students, therefore, facilitating the course is utilizing more faculty resources. In the fall of 2007, the university adopted McGraw-Hill's web-based training and assessment product titled, SimNet Online for Office 2007. SimNet Online for Office 2007 allows the university to (1) proficiency test students who elect to take the assessment in an attempt to place out of CS102 (meaning the student does not have to take the course and may move on to the next class); (2) pre- and posttest students that enroll in CS102; and (3) custom design lessons for students taking CS102 to provide training and practice for skills not mastered as determined by the pretests and practice exams.

Statement of Purpose

The purpose of this study was to explore the relationship between task-specific computer self-efficacy (TCSE) and computer proficiency regarding completion of tasks using the Vista operating system and Office 2007 applications Access, Excel, PowerPoint (PPT), and Word. Self-efficacy theory (SET) states that self-efficacy is a reliable indicator of performance (Bandura,1977), however recent research assessing computer self-efficacy and computer performance has found that computer self-efficacy ratings are often higher than performance scores (Grant, Malloy, & Murphy, 2009 ; Shannon, 2008; Smith, 2001). This study also examined whether students enrolling in the introductory course (CS102) were already computer proficient. Additionally, this study sought to determine whether computer self-efficacy and performance increased after completing an introductory college-level computer course, and whether data indicate that there is still a need to offer introductory computer courses at the college level.

Significance of the Problem

This study is significant because there is a growing interest and need for empirical studies regarding computer self-efficacy and computer performance especially as it pertains to proficiency testing at the postsecondary level. Many colleges and universities are eliminating introductory computer course requirements in favor of moving to a required computer proficiency exam. However, studies report that a large number students are coming to college without the necessary computer applications skills they need to be successful in college and are not passing computer proficiency exams (Coolbaugh, 2004; Hardy, 2005: Hulick & Valentine, 2008; Rafaill & Peach, 2001; Shannon, 2008; Templeton et al., 2003; VanLengen, 2007; Wallace & Clariana, 2005) despite students indicating high levels of computer self-efficacy (Grant et al., 2009; Shannon, 2008; Smith, 2001). Findings from this study add to the general literature base on the topics of basic computer proficiency skills needed by college students, computer self-efficacy and computer proficiency, as well as computer proficiency assessments and training. Additionally, the study contributes data to the current debate regarding the need for introductory computer courses and/or proficiency testing at the postsecondary level.

Research Questions

1. Are general computer self-efficacy (GCSE) ratings higher than task-specific computer efficacy (TCSE) ratings?
2. Is there a relationship between the number of computer classes taken in high school and task-specific computer self-efficacy (TCSE) regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word?
3. Is there a relationship between task-specific computer self-efficacy (TCSE) and computer proficiency regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word?
4. Does task-specific computer self-efficacy (TCSE) regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word increase after completing an introductory computer class?

5. Does computer proficiency regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word increase after completing an introductory computer class?

Assumptions of the Study

The following assumptions exist in regard to this study:

1. Survey questions regarding student demographics, prior computer use, and training were appropriate and relate to this study.
2. Survey respondents' answers were truthful.
3. Proficiency exam questions were relevant to the computer skills needed in college courses across campus.
4. Students completed all components of study, including both surveys and the proficiency test (pretest and posttest).

Limitations of the Study

The following indicates identifiable limitations to guide the interpretation of this study:

1. The study was limited to multiple sections of one course, at one university.
2. The pre- and postcourse surveys were original surveys designed according to specific course curriculum and proficiency definitions of one introductory computer course at one university.
3. All participants did not complete all pre- and postcourse proficiency exams, so pairwise numbers are not equal across topic areas.
4. Only one type of training and assessment, which was a competency-based training product, was used in the courses for this study. Alternate methods of instruction and assessment may have produced other results.

5. Students previously trained in Office 2003 applications may have overrated their ability to complete tasks using Office 2007 software. The user interface of Office 2007 is quite different from that of Office 2003. New learning needs to take place in the transition from Office 2003 to Office 2007, and some participants may not have been aware of the differences.

Definition of Terms

Computer Proficiency. The dictionary.com definition of the word *proficiency* means "the state of being proficient, skill; expertness." The passing computer proficiency exam score varies depending on the college or university administering the exam. For the purpose of this study, the passing proficiency score was 75% in each subdomain tested. This scoring scale was partly determined by the fact that students with majors requiring CS102 must pass the course with a "C" average.

Computer self-efficacy. Judgment of one's ability or effectiveness using a computer (Compeau & Higgins 1995).

General computer self-efficacy (GCSE). Assessment of an individual's CSE for all computing domains (Downey & McMurtrey, 2007; Marakas et al., 1998; Stephens, 2006).

Introductory computer course. Micro-computer applications course that is traditionally the first computer course taken at the college level. The purpose of the class is to provide basic computer literacy in the areas of computer applications important for success at the college level.

Self-efficacy (SE). Judgment of one's ability or effectiveness to produce a desired result (Bandura, 1977, 1982, 1986).

Task-specific computer self-efficacy (TSCS). This refers to one's belief in how well he/she can use a computer to complete specified tasks within the domain of general computing

(Marakas, Yi, & Johnson, 1998). In this study, the term is used to refer to one's belief in how well he/she can use a computer to complete specified tasks using the Vista operating system and basic Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word. The term is use d interchangeably with specific computer self-efficacy (TCSE).*Training* – instruction involving how to complete application based tasks using a computer and the actual repeated practice of completing such tasks using a computer

Organization of the Study

This study is organized into five chapters. Chapter 1 includes an introduction to the study by providing a brief background of the problem being studied. Chapter 1 also contains a statement of purpose, the significance of the study, research questions, assumptions, and limitations of the study. Chapter 2 offers a review of the literature that provides the background for this study. Chapter 3 gives an explanation of the methods used to implement the study, including an introduction, setting, participants involved, instrumentation used, data collection, and data analysis. Chapter 4 provides the results of the study, and Chapter 5 contains a discussion of the findings and the resulting conclusions and recommendations for future studies.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

Using technology is a daily occurrence for the youth of Generation Y. They were born during the information age and have grown and developed along with the Internet. Smart-phones, i-Pods, the Web, online gaming, and social networking sites are staples in their environment. The ease of access to and the daily use of technology generate a confidence level in these young persons in regard to their beliefs as to whether they can complete other computing tasks or not (Considine et al., 2009; Imhof, Vollmeyer, Beierlien, 2007; Wilkinson, 2006). Judgment of capability to perform a given task is called *self-efficacy* (SE; Bandura, 1977, 1982, 1986), and when the judgment pertains to one's ability to complete a task using a computer it is called *computer self-efficacy* (CSE; Compeau & Higgins, 1995).

Self-efficacy theory stems from social cognitive theory (Bandura, 1977, 1982, 1986). Social cognitive theory suggests that behavior, cognition, and the environment exist in a shared relationship working together to assist in one being able to generate self-appraisals of capability. Although research has attained that self-efficacy is a valid predictor of performance (Marakas et al., 1998), recent research shows a trend of Generation Y students arriving on campus with high levels of computer self-efficacy (Considine et al., 2009; Imhof et al., 2007; Lahore, 2008; Shannon, 2008; Wilkinson, 2006), but they are unable to pass basic computer proficiency assessments (Coolbaugh, 2004; Hardy, 2005; Hulick & Valentine, 2008; Rafaill & Peach, 2001; Shannon, 2008; Templeton et al., 2003; VanLengen, 2007; Wallace & Clariana, 2005). This may be a result of heightened general computer self-efficacy levels or it may be a result of a lack of technology training.

Although opportunities to learn and use technology have increased in elementary and secondary schools (Stephens, 2006), differences exist when it comes to mandatory technology training in our nation's secondary schools. An additional problem is that instructors and administrators also make assumptions about the computing skills of the Net Generation and often expect or assume that today's youth are arriving on campuses with the computer skills needed to be successful in college. This assumption has led to the discontinuation of introductory computer classes on some college campuses across the country (Hulick & Valentine, 2008; Shannon, 2008).

Computer self-efficacy plays an important role in assessing the effectiveness of computer education programs as well as assessing the computer proficiency of students (Stephens, 2006). Because training increases levels of SE (Bandura, 1986), it is important to find relevant applicable training methods to enhance CSE (Marakas et al., 1998). Self-efficacy levels need to be adequate so that students will decide to take advantage of opportunities to use their ability (Compeau et al., 1999; Stephens, 2006). One of the first things technology instructors need to do is assess the proficiency of incoming students and provide individualized training and assessment to afford students the computing skills they need to be successful in college and to increase levels of computing self-efficacy.

Generation Y and Computing Experiences

The Net Generation encompasses young individuals under 30 years old (Akande, 2008; Howe & Strauss, 2000; Sanchez, 2003; Shannon, 2008; Tapscott, 2008) often described as having grown up digital due to the availability of digital devices in their lifetime. Aside from exposure to computers, cell phones, i-Pods, and social networking sites, the generation is also defined by perceived generational relationships. Tapscott (2008) considered the youth of the Net Generation to be part of what he called a democratic family, which is much different from the top-down hierarchy of the typical family in the 1950s and 1960s. Tapscott further suggested that growing up in collaborative families increases the closeness between parents and children. Researchers and media often describe “Gen Net” parents as “helicopter parents,” meaning that they are deeply involved in all aspects of their children’s lives including keeping their children very scheduled (Tapscott, 2008). Unstructured, free time for the youth of this generation experience has declined by 37% (Sanchez, 2003).

The public perception of this generation of individuals is that they are technological wiz-kids who possess a plethora of technological skills (Wallace & Clariana, 2005). Additionally, many of the “Net-Geners” consider themselves technologically skilled based on their personal use and noneducational use of computers and digital gadgets. Use of technology can lead to high levels of self-efficacy regarding one’s own computing abilities (Considine et al., 2009; Imhof et al., 2007; Wilkinson, 2006). Tapscott (2008) claimed that by the time the youth of this generation enter their 20s, they will have spent approximately 30,000 hours surfing the Internet and playing video games. However, skills used to navigate social networking sites, download music, and instant message do not transfer to academic subjects (Shannon, 2008). Transfer of knowledge can be positive, negative, or nonexistent (Beard, 1993). The digital skills boys and girls have grown up with are not necessarily the skills they are required to use in college or business settings, so there appears to be a nonexistent transfer of skills (Shannon, 2008), and higher education is left to fill in the gaps in technology training between secondary education and the business world (Hulick & Valentine, 2008). Yet, even without specific computer skill training, technology-immersed youths may develop a heightened level of generalized computer self-efficacy, which can create a false sense of belief that one will be able to complete specific computer tasks based on general computer experiences (Downey & McMurtrey, 2007).

Self-Efficacy Theory (SET)

Bandura (1986) defined *self-efficacy* as “people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances” (p. 391). Perceived self-efficacy is a judgment of capability to perform a given task (Bandura, 2006). Research consistently uses this definition, and it has not appeared to change over the years. Bandura (2006) also stated that one’s perceived efficacy determines whether one thinks positively or negatively about a task and influences decisions that individuals make regarding whether or not to attempt a task. The idea of self-efficacy derived from the widely accepted and empirically validated model of individual behavior referred to as social cognitive theory (Bandura, 1977, 1982, 1986). Social cognitive theory suggests that behavior, cognition, and the environment exist in a shared relationship working together to assist in one being able to generate self-appraisals of capability.

Bandura (1977, 2006) suggested that actually mastering a behavior that one thought one could not can increase one’s sense of efficacy and reduce fears or self-doubt associated with that behavior. Multiple research studies have concluded that SE is a significant predictor of subsequent task-specific performance (Marakas et al., 1998). Self-efficacy plays a part in deciding whether to attempt various kinds of behavior, including computing behavior. Experience in completing tasks on a computer is likely to increase self-efficacy regarding computers (Compeau & Higgins, 1995; Hill et al., 1987). Many research studies have been conducted regarding one's self-efficacy in regard to using a computer. This type of self-efficacy is referred to as computer self-efficacy (CSE).

Computer-Self Efficacy (CSE)

Computer self-efficacy is a growing research field of study (Downey & McMurtrey, 2007; Marakas et al., 1998). Compeau and Higgins (1995) defined *computer self-efficacy* (CSE) as an individual judgment of one's capability to use a computer. CSE helps one decide whether to use a computer (Marakas et al., 1998). It is not concerned with what one has done in the past but is focused on what one can do in the future. CSE is multileveled, meaning CSE reflects computing ability at an application-specific level or task-specific level (TCSE) as well as at a general level (GCSE; Marakas et al., 1998). General computer self-efficacy (GCSE) assesses an individual's CSE for all computing domains, whereas task-specific computer self-efficacy or TCSE assesses individual CSE within subdomains (Downey & McMurtrey, 2007; Marakas et al., 1998; Stephens, 2006). Another form of CSE called profession-oriented computer self-efficacy (PCSE) is a collection of TCSE's needed to work in a particular profession (Stephens, 2006). Computer self-efficacy reflects the capability of what is to be expected. Students with higher levels of computer self-efficacy may perceive themselves more able to complete difficult computing tasks than students with lower levels of CSE. The more self-efficacy one has, the higher the confidence one has regarding his or her ability to perform computing tasks.

According to Bandura (2006), no all-purpose measure of self-efficacy exists. Many instruments exist to measure CSE. Computer self-efficacy instruments do not differentiate between GCSE and TCSE. Ideally, one scale should exist to measure CSE, whereas multiple scales should exist to measure TCSE and PCSE (Stephens, 2006). Computer self-efficacy can be measured on either the specific or the general level (Downey & McMurtrey, 2007). Computer self-efficacy of specific computer applications such as word processing, spreadsheets, databases, or presentation software is measured using a TCSE instrument. These instruments are usually task based, asking participants to judge their confidence or ability to complete a specific task of varying levels of difficulty within a particular domain. The results are summed or averaged to determine an individual's computer self-efficacy for that domain (Downey & McMurtrey, 2007). TCSE scales are designed to fit the particular domain of performance that is being assessed (Bandura, 2006).

Measuring CSE for the entire computing domain can be done using a general CSE instrument that is not task specific and is much larger than a TCSE instrument (Downey & McMurtrey, 2007). The advantage of such an instrument is that it provides information spanning the entire computing domain that transfers between computing domains, whereas TCSE instruments only provide information on particular types of applications or software packages (Downey & McMurtrey, 2007).

Compeau and Higgins (1995) cited many early studies regarding self-efficacy and computing in their research. Some of the research cited by Compeau and Higgins includes studies by Hill et al. (1987) regarding computer self-efficacy and enrollment in computer classes, adoption of technology products (Hill et al., 1987), innovations (Burkhardt & Brass, 1990), and performance training software (Gist, Schwoerer, & Rosen, 1989). Compeau and Higgins (1995) reported that previous studies suggest the need for further research exploring the role of self-efficacy and computing behaviors. Compeau and Higgins's (1995) research on assessing computer self-efficacy focused on the CSE of business managers and professionals in a workplace. Prior to Compeau and Higgins's study, Burkhart and Brass (1990) used a three-item scale to measure CSE. Their study measured general perceptions about an individual's ability to use computers in the workplace. Gist et al. (1989) examined the CSE of managers using two training methods. Participants were pretested and then trained for 3 hours via modeling or tutorials. A mid-point assessment was taken of software self-efficacy, and post-training measures were taken of performance, working style, affective responses, and course satisfaction. They concluded that the behavior modeling training sessions increased CSE more so than the tutorial training session did. However, both types of training increased the CSE of participants at the conclusion of training. In 1987, Hill et al. conducted a study regarding self-efficacy and people's readiness to enroll in computer classes. A questionnaire to assess CSE beliefs was administered to 204 students enrolled in an introductory psychology class. The questionnaire also probed students' intentions to enroll in computer courses in the future. The questionnaire was developed by the researchers during an earlier study in 1985 and used a 5-point scale ranging from 1 (*totally agree*) with the statement to 5 (*totally disagree*) with the statement. Results were then coded and measured against actual enrollment in a computer class 12 weeks after the survey was completed. Results showed that higher levels of CSE could be used to predict future enrollment in computer classes.

Another study by Hill et al. (1986) explored the role CSE plays in the decision to adopt certain technologies. Their research provided evidence that computer self-efficacy, as an important factor in student decision making regarding using computers and CSE, can be generalized to affect an individual's adoption choices regarding various technologically advanced products.

Havelka (2003) conducted a study to explore the impact of individual characteristics on computer self-efficacy. Results suggest that males, younger aged users, overall confidence level, computer experience, low math anxiety, and a creative cognitive style are associated with higher levels of CSE. Chung, Schwager, and Turner (2002) conducted a computer self-efficacy study to determine which college major had students with the highest CSE levels. Their study revealed that business majors had higher levels of computer self-efficacy than education, forest/wildlife, or liberal arts majors did. Additionally, Havelka's (2003) study found significant differences of CSE among the various business disciplines. MIS and economics majors had the highest levels of CSE, whereas management and general business majors had the lowest levels of CSE. Findings in the Havelka study also showed a positive relationship between the number of years of experience using a computer and a student's level of CSE.

Imhof, Vollmeyer, and Beierlein (2007) surveyed a small group (N = 48) of university students regarding computer self-efficacy. Based on earlier research findings, they predicted that males would report higher computer self-efficacy than females; but their findings did not support this theory. They suggested that the gap between male and female self-efficacy is closing. This is a realistic assumption, because CSE has been associated with time spent using a computer, and studies report that girls now use computers at the same rate as boys (Lewis, 2007). Havelka (2003) reported similar findings. Although males tended to report higher levels of CSE, the difference was not significant enough to state that gender affected computer self-efficacy.

Other studies have been conducted to explore relationships between CSE and computer performance. Smith (2001) designed and administered a CSE assessment to a small group (N = 10) of undergraduate students at a Midwest university, and then administered a computer performance assessment asking students to complete tasks using word processing, spreadsheets, databases, presentation graphics, graphical user interface (GUI) management and telecommunications. Findings concluded that students' perceived ability to complete computing tasks surpassed performance. Grant et al. (2009) conducted a similar study. In their study, TCSE results were compared to performance assessment scores of word processing, spreadsheet, and presentation tasks. Their results indicate some difference between CSE and word processing performance, little to no difference between CSE and presentation performance, and significant differences between CSE and spreadsheet performance. The results of this study were then used to realign and enhance the university's introductory computer courses. Less time was devoted to teaching word processing and presentation skills, and more time was allocated for teaching spreadsheet skills (Grant et al., 2009).

The number of computer courses taken in high school also appears to have a relationship with CSE. Havelka (2003) found significant differences between those with greater than three computer courses and those students with only one or two courses. The researcher suggested that computer self-efficacy in not significantly affected by computer courses until they have completed more than three computer courses.

Computer self-efficacy levels need to be adequate so that students will decide to take advantage of opportunities to use their ability (Compeau, Higgins, & Huff, 1999; Stephens, 2006). General self-efficacy develops over time and is a compilation of experiences (Bandura, 1997). General self-efficacy can transfer among similar domains (Downey & McMurtrey, 2007) and may account for higher computer self-efficacy ratings than actual performance scores among the digital generation of college students. This can be detrimental for college students, because some students will use their heightened sense of computer self-efficacy as a reason to believe that introductory college courses are easy and, therefore, may not prepare adequately for lessons or exams (Downey & McMurtrey, 2007; Smith, 2001).

Secondary Technology Standards

Despite the facts that computer skills are important in secondary and postsecondary education (Shannon, 2008) and that opportunities to learn and use technology have increased in elementary and secondary schools (Stephens, 2006), discrepancies abound when it comes to mandatory technology training in our nation's secondary schools. Henke (2007) believed that this is due to the lack of strong national technology policies, empowered educational leadership, and continued communication involving business, education, government, and the community. Unlike graduation requirements for Math or English, schools differ greatly in the number and type of elective computer classes they offer (Ceccucci, 2006). Whereas some schools offer only basic computer skill courses, others like Tucson, Arizona's Empire High School (McHale, 2008) are changing the pedagogy of education and are operating in a one-to-one computing environment where their entire secondary educational experience involves utilizing technology. In 2005, Ceccucci reviewed technology standards of over 100 high schools of varying region, locality, and size. Her findings indicate that 99% of the high schools surveyed offered some type of computer application class, but only 13% required students to take a semester or more of computer applications courses. The other 87% do not require students to pass any computer courses, although many schools offer elective courses in web publishing, ecommerce, programming, and graphics. These statistics are important to consider because CSE levels are said to be predictors of computing performance, and according to Havelka's 2003 study, self-efficacy does not significantly increase until students have completed three or more computing classes.

Additionally, 21 states offer technology exit exams, but only two states (North Carolina and Nevada) require a computer proficiency exam as part of the state's graduation requirement.

For example, Nevada requires students to pass a proficiency exam or to complete a semester-based course involving computer literacy. Even with consistent national education standards for technology (NETS, 2007), there is inconsistency in high school computer course offerings and requirements. Technology Counts' 2008 report card (Education Week, 2008) indicated that only three states received a grade of A when it came to technology leadership (access to, use of, and capacity to use technology) in our country's secondary schools. States receiving A's were West Virginia, South Dakota, and Georgia. The average grade for all states was a C+ (Education Week, 2008). Rhode Island was one of the states that received a grade of D on the Technology Counts report card (Education Week, 2008). When interviewed about technology practices, all Rhode Island teachers participating in the study indicated that they integrated technology in the classroom, but 80% of the interviewees and 62% of the survey respondents indicated that they did not know that National Education Technology Standards-Students (NETS-S) existed (Mancieri, 2008).

The business world acknowledges the importance of technology training. When asked to list the top five skills sought in job candidates, job recruiters indicated computer proficiency was second only to oral and written communication skills (Moody, Stewart, & Bolt-Lee, 2002). In 1996, local businesspersons in Napa, CA began discussions about creating a high school that would prepare students for the internet-enabled world and economy. These discussions began because of the community's frustration with schools not preparing students for jobs in the technologically complex market place. The solution resulted in the creation of New Technology High School. New Technology High, part of the Napa Valley Unified School District, has graduated over 750 students. Students in the school use technology with the most recent software to engage in project-based learning (PBL) throughout the day. Administrators compare the school environment to being more like being in college or the workplace. In an effort to keep up with the latest technological developments, the school created the New Technology Foundation (NTF; 2007) to create support for the school and manage grant money. The NTF offers support to other communities creating their own New Technology High Schools. The NTF is a 501(c)(3) nonprofit organization working toward national education reform with schools that wish to model themselves after Napa's New Technology High School (NTF, 2007). The goal of NTF is to help high school students and teachers use technology in ways to create social networking-like collaborative learning environments (Utsler, 2008). There are over 42 New Technology High schools in 10 states, and 13-15 more will open in August 2009 (NTF, 2007). In March 2009, the national public education philanthropy, Knowledge Works Foundation, announced a 4-year, $10 million commitment to NTF calling the New Technology High School project "the best-in class, most highly-scalable approach to learning in the 21st century that we have seen" (Knowledge Works Foundation, 2009).

Additional technology education incentives are finding their way across the country. Eleven states (Arizona, Iowa, Kansas, Maine, Massachusetts, New Jersey, North Carolina, South Carolina, South Dakota, West Virginia, and Wisconsin) currently consider themselves 21st Century States, whereas many other states are moving in that direction (Partnership for 21st Century Skills, 2007). The primary goal of Partnership for 21st Century Skills is preparing students for 21st century life by focusing on the learning needs of the future especially in the areas of science and technology. In 21st century skill schools, the core subjects are still the strong base of the framework, but interdisciplinary themes such as global awareness, financial, economic, business, civic, and entrepreneurial literacy all play a role in instruction of the core subjects. Critical thinking and problem solving, creativity and innovation, and communication and collaboration are the emphasis in such schools, along with information, media, and technology skills, as well as life and career skills (Partnership for 21st Century Skills, 2007).

New Technology High Schools, 21st Century Schools and one-to-one computing initiatives are working to meet the technology demands of our digital society (McHale, 2008; NTF, 2007; Partnership for 21st Century Skills, 2007). However, not all students have access to such innovative programs, and students are coming to college with varying degrees of computer knowledge. Colleges and universities need to prepare to assess the computer self-efficacy and computer proficiency of incoming students and must plan to meet the advanced or remedial training needs of students (Ceccucci, 2006).

College and Computing

Colleges and universities are discovering firsthand the lack of computer knowledge of incoming students. Rafaill and Peach (2001) predicted that computer proficiency would increase with each new group of students arriving on campus. Literature disagrees on what constitutes computer literacy, computer competency, and computer proficiency (Templeton et al., 2003). The terms can be used interchangeably and have various meanings depending on the source (Hulick & Valentine, 2008). Part of the problem with defining computer literacy/competency/ proficiency is that the definition is constantly changing due to technology not being static (VanLengen, 2007). Wilkinson (2006) stated, “The definition is broad but usually entails the knowledge of basic computer concepts as well as hardware concepts and the basic use of word processing, spreadsheet, database, and presentation software” (p. 110). Hulick and Valentine reported multiple meanings of computer literacy from various sources. He reported that the Harvard Law website defines computer literacy as “the degree to which individuals are familiar with computer operating systems and applications” (p. 1). The definition on the Austin

Community College website states a student is computer literate when “a user has basic knowledge of computer operations (copying files, printing documents, etc.); basic software applications (word processing, spreadsheets, etc.); email functions (sending/receiving messages, attaching files, etc.)” (as cited in Hulick & Valentine, 2008). Colleges and Universities often develop their own definition for computer proficiency and create their own computer proficiency requirements (Wilkinson, 2006). The definition of computer proficiency and the content of computer course offerings are to be continually reviewed and updated as technology, employer demands, and student capabilities change (VanLengen, 2007).

Regardless of varying definitions, studies conducted in the past 10 years assessing computer proficiency of postsecondary students have concluded with similar findings indicating that computer literacy is not improving. For example, in the fall of 1999, Georgetown College implemented an Information Technology Program. The purpose of the program was to ensure the computer proficiency of all students. Passing the proficiency exam became a graduation requirement. Although it was a requirement for graduation, the college acknowledged the importance of attaining these skills early in the college experience and required a passing proficiency score prior to the student’s sophomore year in college. In the first 2 years of testing, less than 50% of students passed the test (Rafaill & Peach, 2001). No information regarding Georgetown’s Information Technology Program is available dating after 2003. A study conducted by Wallace and Clariana (2005) tested 140 entering business students and reported that only 36% of the students would be able to “test out” of an introductory computer course if given that option. Hulick and Valentine’s (2008) study of computer competency of 1,500 incoming college students during the spring of 2008 found that over half of students assessed did not have the necessary computer skills to function in an information-based society. At least one study is reporting change. A study at Butler University's College of Business Administration suggests that some students may be coming into their program with increased computer skills, but more than half are not, causing a wider gap between student needs (Templeton et al., 2003).

Research cited has established that less than half of the students entering college and universities are able to pass a basic computer proficiency test. This research affirms the need and importance of introductory computer courses offerings at the postsecondary level (Ceccucci, 2006; VanLengen, 2007). However, some schools are doing away with computer course requirements based on the assumption that students arrive on campus with the computer skills necessary to be successful (Wallace & Clariana, 2005). Other reasons cited for eliminating introductory computer courses include low faculty resources and reduction of graduation requirements due to the 120-Hour Rule (Shannon, 2008; Templeton et al, 2003). Richard Bland College reported that beginning in fall 2008 the 3-hr computer proficiency requirement changed to a computer proficiency requirement of 0-3 hrs. A search of the college's website and core requirements did not reveal the reasoning for this change (Richard Bland College, 2008). Butler University moved its freshman level computer class to an online computer proficiency requirement and effectively reduced the overall graduation requirement by 3-credit hours (Templeton et al., 2003). Like Butler University, many schools are considering eliminating introductory computer science courses as part of the core curriculum due to the 120 Hour Rule. The Southern Association of Colleges and Schools (SACS) calls for baccalaureate degrees not to be more than 120 credit hours (THECB, 2009). Schools across the nation are working toward this goal and evaluating course requirements to trim their degree programs. In Texas, 23 out of 34 universities no longer require an introductory computer class as part of the core curriculum (Shannon, 2008), although research has shown an average 15%- 20% gain in both computer concepts and software proficiency after taking an introductory computer course (VanLengen, 2007; Wallace & Clariana, 2005). Other schools are purging introductory courses and favoring the idea of teaching these basic technology skills in an “across the curriculum” approach. This approach integrates the computer basics within each individual course offering (Rafaill & Peach, 2001).

The need for computer skills at the college level has been dutifully noted (Hardy, 2005; Hulick & Valentine, 2008; Wilkinson, 2006), and it would be considered unwise to do away with introductory course offerings based on the assumption that students are arriving on campus possessing these skills. Wallace and Clariana (2005) suggested that introductory computer classes need to continue to be part of college and university course offerings, along with offering proficiency exams as an alternative to taking basic computer literacy courses. Even when students have the choice of taking a computer course or a proficiency exam to meet computer proficiency requirements, the majority of students select to take an introductory computer course over a proficiency test (Coolbaugh, 2004).

A medium-sized university in North Carolina is using TCSE and computer performance assessments to enhance and realign their introductory computer courses. After evaluating the TCSE of 200 business students and finding it a good indicator of word processing and presentation skills, but not for spreadsheet skills, the university decreased the amount of word processing and presentation skills being taught and increased the spreadsheet skills being taught in an effort to align student training to meet student needs (Grant et al., 2009).

One unnamed university is using the scores of student computer self-efficacy assessments to assist in the training of students prior to taking a computer proficiency exam. Incoming business students at the university where the research was conducted are required to pass a computer proficiency exam. Prior to taking the computer proficiency exam, students are assessed using the business computer self-efficacy scale to determine business computer self-efficacy. Students with high scores on the BCSE scale gained access to a website with self-study materials they could use to review prior to taking a proficiency exam. Students with mid-range skills participated in a self-paced, on-line computer course that used self-study materials, assignments, and Q & A sessions prior to taking a computer proficiency exam. Students with low BCSE scores enrolled in a traditional, semester long, lab-based computer course. The same proficiency exam was administered to all students. In addition to addressing individual training needs of students and increasing success on the computer proficiency exam, this process is expected to reduce costs due to the need for fewer instructors and fewer class sections (Stephens, 2006).

Assessment and Training

Computer self-efficacy plays an important role in assessing the effectiveness of computer education programs as well as assessing the computer proficiency of students (Stephens, 2006). Because training increases levels of SE (Bandura, 1986), it is important to find relevant applicable training methods to enhance CSE (Marakas et al., 1998). Self-efficacy levels need to be adequate so that students will decide to take advantage of opportunities to use their ability (Compeau et al., 1999; Stephens, 2006). One of the first things technology instructors need to do is assess the CSE and computer proficiency of incoming students and provide individualized training and assessment in order to provide students with the computing skills they need to be successful in college and to increase levels of computing self-efficacy. Smith (2001) suggested that CSE assessment along with computer performance assessment can aid in identifying academic strengths while offering clues to students’ self-perceived obstacles to learning about computing.

Testing for TCSE is not a common practice on college campuses, but testing for computer proficiency is a growing trend even though it has not reached the levels of other traditional placement or proficiency exams. Ninety percent of colleges offer students the opportunity for advanced placement in math, English, foreign language, and other classes by passing standardized advanced placement tests administered by the College Entrance Examination Board. Additionally, some colleges offer the College Level Examination Program (CLEP). CLEP exams offer end-of-course exams for specified courses. Students passing such exams are rewarded credit hours without having to take the actual course for the subject. The number of advanced placement exams taken has increased 75% between the years of 1999-2005 (Tapscott, 2008). Although none of these programs offers a placement exam for introductory computer skills (College Board, 2009), other commercial testing programs do.

Educational Testing Service (ETS) provides the *iSkills* exam to colleges and universities for a cost of about $22-$33 per students depending on the number of exams ordered. The 75-minute online exam assesses proficiencies in the seven areas of Information Communication Technology (ICT) via 14 short 4-minute tasks and one long 15-minute task. Scores are available within 10 days of taking the test (ETS, 2009). The International Computer Driving License (ICDL), originally designed for corporate training, offers a computer- skill certification program assessing basic concepts, file management, word processing, spreadsheets, database, presentations, communications, and information. Individuals taking the test and passing all seven parts of the exam receive an ICDL certification card to prove achievement in these computer skill areas (ICDL, n.d.). Colorado State University is one of the schools using this product to test their students (Wilkinson, 2006).

Microsoft offers an array of certifications to demonstrate expertise with their products. The Microsoft Certified Application Specialist (MCAS) certifies skills using Office 2007 and Windows Vista. Individuals desiring to take an MCAS certification exam can go online and find an official testing center. Each exam can cost up to $125 (Microsoft, 2009).

In addition to the available commercial testing options, alternatives for testing student proficiency are found in web-based training and assessment products like Triad Interactive's *SimNet* product distributed by McGraw-Hill Higher Education (McGraw-Hill Higher Education, 2007), and Course Technology's *Skill Assessment Management* (SAM) distributed by Cengage Learning (Cengage Learning, 2008). Both products present training and assessment in a simulated computer environment that has the student perform given tasks. These programs are widely used on college campuses in introductory computer classes as a way to assess proficiency as well as to train and remediate students in areas where skill proficiency may be short of the point of mastery. Unlike the commercial certifications mentioned earlier, these products allow instructors or administrators permissions to custom design proficiency exams to meet the needs of computer skills needed at a particular campus or to meet the needs of specific majors. Some schools, like Butler University's College of Business Administration, are using products such as these to move away from an introductory computing course requirement to a proficiency-testing requirement (Templeton et al., 2003). Competency-based training and assessment programs are growing in popularity on college and university campuses because of the product features that create individualized instruction to fill the gap between actual student knowledge and necessary knowledge of computer skills at the postsecondary level (Cengage Learning, 2008; McGraw-Hill Higher Education, 2007). Due to the newness of recently released competency-based products for Office 2007, no literature appears to exist regarding studies conducted to evaluate the effectiveness of the products. As suggested by Smith (2001), using TCSE evaluations along with task-based assessment and training products can assist in recognizing students' strengths and weaknesses and provide students with the individualized training needed to ensure the development of the computer skills required to be successful at the college level.

Summary

In summary, youth of Generation Y are immersed in a digital culture. Technological tasks such as social networking, online gaming and emailing are not transferring to the skills needed in college, but successful completion of and frequent use of such tasks are generating heightened levels of perceived computing ability (Smith, 2001). Research has concluded that basic computer skills involving word processing, spreadsheets, databases, presentation software, and the internet are valued skills at the postsecondary level (Hardy, 2005; Hulick & Valentine, 2008; Wilkinson, 2006; Wolk, 2008)**.** Due to inconsistent technology standards and requirements in secondary education, students are arriving on college campus with a wide range of computing abilities, and colleges and universities need to be able to meet and embrace varying student abilities (Ceccucci, 2006).

Colleges and universities meet computer proficiency requirements in various ways, including credit courses (most frequent), proficiency testing, online help, and noncredit workshops (Wilkinson, 2006). Initially, introductory computer classes focused on teaching basic programming skills; however, as technology changed, introductory computer classes morphed into instructional courses on how to use a computer (Gill & Hu, 1999; Templeton et al., 2003; VanLengen, 2007). As higher education classrooms incorporate more technology into courses, the importance of students possessing essential computer skills becomes more significant (Beard, 1993; Hardy, 2005; Hulick & Valentine, 2008; Wilkinson, 2006). Many schools are using computer competency-based training products, such as Triad Interactive’s SimNet Online for Office 2007, to meet individualized student computer training needs (McGraw-Hill Higher Education, 2007). However, there is little empirical research on the effectiveness of the new product releases for Office 2007.

CHAPTER 3

METHOD

Introduction

Literature strongly supports the idea that students are coming to college without the skills they need to be considered computer proficient (Coolbaugh, 2004; Hardy, 2005; Hulick & Valentine, 2008; Templeton et al., 2003; VanLengen, 2007). The purpose of this study is to explore the relationship between task-specific computer self-efficacy (SCSE) and computer proficiency regarding completion of tasks using the Vista operating system and Office 2007 applications Access, Excel, PowerPoint, and Word. Self-efficacy theory (SET) states that self-efficacy is a reliable indicator of performance (Bandura, 1977), however, recent research assessing computer self-efficacy and computer performance has found that computer self-efficacy ratings are often higher than performance scores (Grant et al., 2009; Smith, 2001). This study examined whether students enrolling in the introductory course were already computer proficient. Additionally, results helped to determine whether computer self-efficacy and performance increase after completing an introductory college-level computer course and whether there appeared to still be a need to offer introductory computer courses at the college level. Discussion of the effectiveness of the task-based training product, SimNet for Office 2007, currently used in the university's introductory computer classes is included in chapter 5.This chapter includes a description of the course environment, how each research question will be addressed, participants involved, the instrumentation used, and how data were collected and analyzed.

Setting

This study took place at a large public 4-year university in the Southeastern United States. The study recruited participants from students enrolled in that college's introductory computer science courses titled CS102, Microcomputer Applications I, offered during the fall 2009 semester. Enrollment at the university for the fall 2009 semester set an enrollment record of 28,807 students. The university where the study took place offers programs of study in 12 academic divisions that lead to degrees at the levels of bachelor's, master's, Education Specialist, and doctoral areas of study.

CS102 (Course Background)

Microcomputer Applications 1 (CS102) is an introductory computer course that provides instruction in Microsoft Office applications (Access, Excel, PowerPoint, & Word), Microsoft Vista, and computer concepts. The course serves as a prerequisite course for other computer classes on the campus, as well as a statistics course offered in the College of Commerce and Business Administration (C&BA). Only Business and Nursing majors are required to take CS102. However, the university accepts two semesters of computer science courses in place of the University's two semesters of foreign language requirement; this is a popular option for students on campus. For students choosing to take two semesters of computer courses instead of two semesters of foreign language, students must take CS102 as a prerequisite prior to enrolling in the two semesters of computer classes. In 2008, over 3,000 students enrolled in CS102 during the spring, summer, and fall semesters.

Prior to fall 2002, CS102 was taught in large lecture halls, and the classes consisted of a lecture, demonstrations, textbook readings, projects, quizzes, three paper-and-pencil multiple-choice exams, and a paper-and-pencil multiple-choice final exam. Topics covered included

Windows 2000, Access, Excel, PowerPoint, and Word and computer concepts. Attendance was poor, scores were low, and course evaluations indicated students wanted computers in the computer class. A proficiency test was available to students that wanted to test out of CS102. The proficiency test was a paper-and-pencil multiple-choice exam consisting of 70 questions regarding Microsoft applications covered in class. Very few students opted to take advantage of this opportunity and of those that did, roughly 11% of students passed the exam (University Testing Services, personal communication, February 23, 2009).

Beginning in fall 2002, CS102 moved instruction into a computer lab consisting of 120 computers. Rather than lecturing, students were required to purchase a textbook for Office 2003, a textbook for Computer Concepts, and a SimNet for Office 2003 CD that contained lessons and practice exams for home use. The computers in the lab had SimNet for Office 2003 installed on all of the computers. Assignments included readings from the textbooks and completion of lessons and practice exams in SimNet 2003. Multiple instructors were assigned across class sections, and the instructors served in supporting roles, as the focus of the class became more student centered. For each topic module, students used the SimNet software to pretest, to practice the material for a week, and to take an exit exam for that module. Students would follow this pattern throughout the semester for each module topic covered. Informal surveying of students at the end of each semester revealed favorable responses to SimNet for Office 2003, but some students believed they were wasting time covering material they already knew. For example, students believed they were proficient in Microsoft Word and, therefore, believed it was a waste of time to sit and read and to practice skills they felt they already had mastered. Many students complained about high textbook costs and the lack of use of the textbooks in class because testable information was available in SimNet for Office 2003 software. Additionally, in attempts to save money, students were not purchasing the SimNet CDs for home use because they had access to SimNet installed on all the CS102 lab machines. Another concern was that SimNet for Office 2003 was not Mac compatible, and some students believed that the compatibility issue put them at a disadvantage for not being able to study and practice the material from home. For students wishing to test out of CS102, University Testing Services continued to use the 70 questions, paper -and- pencil multiple-choice exam used during previous semesters.

Between fall 2003 and spring 2006, many changes were made to the CS102 curriculum to make it more student focused and content relevant. First, removing a wall in the computer lab allowed the addition of 44 computers to help with growing enrollment. Four privacy cubicles (to create a reduced distraction environment) and four more wheel chair accessible stations were added for those needing specific accommodations. Next, textbooks were no longer required or used in class. All content was delivered solely via the SimNet 2003 software. Rather than determined class meeting times during the week, practice weeks became “flex-weeks,” and students were able to come any time during the week that the lab was open to complete required lab time. Required lab time was based on 3 hours (180 minutes) of practice time in the lab. Students were given the opportunity to reduce the amount of practice time they had each week by scoring well on their pretest for each module. Students scoring 90-100% on the pretest were only assigned 60 minutes of practice time in the lab. Those scoring 80%-89% had 120 minutes of required practice, and those scoring 79% or below were required to complete the full 3 hours of lab time. Reducing the amount of time students spent in the lab based on pretest scores accommodated those students with previous skill knowledge. If students made an “A” on a pretest, then it was assumed that they had a good knowledge base of the material and did not need as much practice time learning the material as someone scoring a 60% on the pretest. The more the pretest revealed a student knew, the less time the student had to spend in the lab for that particular module. Once students completed required lab time, they were not required to return to class until their scheduled test date for that particular module. Students were expected to continue practicing and preparing for the exam from home. All skill objectives associated with the Microsoft Office User Specialist certification exam were available in the content of the students' assigned lessons; however, students were able to select and work lessons in the order of their choosing and were able to create custom lessons in SimNet to review only the lessons of the skills missed on the pretest. A comparison of scores revealed an average of a 27% gain between pretest scores and posttest scores on all module topics covered during the semester.

Although a CS102 correspondence class existed at the university, SimNet's release of a Web-CT/Blackboard compatible version of SimNet titled *SimNet Enterprise* enabled the creation of a true online, distance-learning version of the class. A new CS102 placement exam was developed as well. Using screen shots from the SimNet program, students answered 70 multiple-choice questions regarding Office 2003 applications. Very few students opted to take the placement exam, and very few that chose to take the exam passed the exam. The online CS102 course offering became the first class offered as part of the online Computer Technology & Applications minor that was developed for online delivery to go along with the online General Business degree offered by the College of Commerce and Business Administration.

The release of Office 2007 by Microsoft in the spring of 2006 elicited an array of new competency based products to the postsecondary education market. An extensive evaluation of new products was conducted. Instructors looked closely at the new SimNet Online for Office 2007 (McGraw-Hill), SAMs for Office 2007 (Course Technology/Cengage), and MyItLab (Pearson Learning). The decision was made to adopt SimNet Online for Office 2007 based on available content, instructional, practice and evaluation components, the ability to offer a proficiency exam, ease of management, student tech support, student cost, minimum system requirements, PC and Mac capability, total web-based delivery, and scheduled content updates.

Developed by Triad Interactive, Inc. for McGraw-Hill Higher Education Publishing, SimNet Online for Office 2007 is a web-based program designed to teach and assess competency in Microsoft 2007, Microsoft Vista, Windows XP, and computer concepts. The program also includes a complete course management system offering course tools that allow instructors to monitor student usage, evaluate students, communicate with students, minimize preparation time, perform automated grading, generate reports to measure student outcomes, export grades, and keep a grade book. The requirements to run SimNet Online are Windows XP, or Vista, a web browser (IE7 or Firefox 2.x), Adobe Flash 9, Adobe Acrobat Reader, 1GHz+ processor, 512MB RAM (although 1GBz+ is recommended), and a screen resolution of 1024x768px or higher. SimNet Online runs on both PCs and on Macs (McGraw-Hill Higher Education, 2007).

Like SimNet for Office 2003, the instructional premise of SimNet Online utilizes the learning methodology of “Teach Me, Show Me, Let Me Try” (McGraw-Hill Higher Education, 2007). Content validity aligns with Microsoft Certified Application Specialist (MCAS) objectives. The “Teach Me Section” consists of text and graphics explaining the skill to be learned and provides brief step-by -step directions. The “Teach Me Section” also supplies information regarding how to use the skill and when an individual would use the skill. Additional components called “Tips & Tricks,” “Tell Me More,” and “Try This” provide supplementary information about the skill including alternate ways of performing the skill, keyboard shortcuts, and exercises to attempt in the actual application. The “Show Me” element of the product provides an audio and visual component that talks the student through the process of performing a skill while showing a short video demonstrating how to perform the skill. The “Let Me Try” component provides practice for the student to complete a task by breaking it down into simple commands to walk the student through completing the skill topic. SimNet Online also provides instructor control of lessons and exam content. The product provides multiple opportunities for practicing skills in various scenarios. A 2006 study on instructional elements (information, objectives, examples, practice, and review) found that practice was the key component when it came to student achievement and attitudes toward the course (Martin, Klein, & Sullivan, 2007). Furthermore, unlike previous versions of SimNet, SimNet Online for Office 2007 has the capability to create cross-module exams lending to the ability to create a comprehensive proficiency exam (McGraw-Hill Higher Education, 2007).

CS102 began using SimNet Online for Office 2007 in fall 2007. Similar to earlier semesters, no textbooks were required, but all students were required to purchase a SimNet Online for Office 2007 registration code. Registration codes were available at university bookstores, or students could purchase a registration code by using a credit or debit card when first logging into SimNet Online. The e-commerce site was not only convenient, but also helped keep bookstore price mark-ups at a minimum. The format of CS102 continued to use a pretest, practice, and posttest cycle. However, class time requirements were re-examined. Required lab time was reduced for those scoring well on the pretests. Students scoring 90%-100%, had no required lab time assigned. It was determined that these individuals knew the material well enough that they could continue practicing and reviewing on their own as they felt necessary. Students scoring between 80-89% on the pretest were required to spend at least 40 minutes of time practicing in the lab. Students scoring between 65%-79% had to complete 80 minutes of required lab time, and students scoring below 65% and students that did not take the pretest were required to spend 120 minutes of practice time in the lab. Although SimNet Online is a web-based product and accessible from various locations, lab time was still a requirement because CS102 was considered a campus course and campus meetings were required. Additionally, required lab time guaranteed that students lacking certain skill were spending time learning necessary skill content. Favorable informal postcourse evaluations by Computer Science faculty and staff regarding ease of management, perceived student satisfaction, and training effectiveness indicated that the adoption of SimNet Online for Office 2007 for the 2007-2008 academic year was considered a success, and a decision to continue using the product was made.

In spring 2008 instructors from the Computer Science Department and the College of Commerce and Business Administration met to discuss the possibility of testing the computer skills proficiency of incoming business students. Assumptions were made that incoming students should arrive possessing basic computer applications skills and should be able to pass a basic computer application proficiency exam. Further meetings were held to discuss test content and delivery methods. A computer proficiency exam was developed using SimNet Online, consisting of MCAS objectives selected based on CS102 course content and the skills that instructors of other courses that CS102 serves as a prerequisite identified as necessary to perform well in those specific courses. The finished product consisted of 100 weighted tasks to be completed in a simulated environment. Thirty percent of the tasks would require use of Microsoft Word knowledge, 40% utilized Microsoft Excel knowledge, 10% Microsoft PowerPoint, and 20% required knowledge of computer concepts, IE7, and Vista. Instructors from courses that CS102 feeds into insisted on the high percentage of Excel tasks. They did not want students entering their classrooms who could pass the Word, PPT, and other skills sections, but failed the Excel portion and would, then, be able to receive a passing score on the exam. A passing score was set at 380 earned points out of a possible 500 points, or 76%. When developing the proficiency exam, University Testing Services advised that the passing score needed to remain consistent with earlier versions of the exam.

Entering College of Commerce and Business Administration students received advising during orientation during the summer of 2008. Students were informally questioned regarding their computer abilities and were advised either to register for CS102 in the fall of 2008 or to take a proficiency exam during the fall 2008 semester. The majority of students were advised to take the placement exams. All incoming C&BA students enrolled in GBA 145, titled Orientation to Commerce and Business Administration. The Computer Science department prepared to proficiency test approximately 1,200 C&BA students during a 3-week period in the fall of 2008. GBA 145 instructors were provided the dates and times of testing from the Computer Science Department and communicated this information to the students along with registration instructions. Some GBA instructors required their students to take the exam, some only encouraged students to take the exam, and some offered extra credit for taking the exam.

Results from the fall 2008 proficiency testing indicated that only 403 students registered to take the proficiency exam. Even with email reminders sent, only 310 of those 403 showed up to take the proficiency exam. Only 231 of the 310 that showed up to take the exam completed the entire exam. Of the 231 completing the exam, only 33 (14%) passed the exam. An informal questioning of students at check-in revealed that many students showed up to receive credit from their teacher but did not feel that they would pass the exam. Others reported failing the exam on purpose or ending the test early because they actually wanted to take the CS102 course. Many stated that they were proficient in Office 2003, but that Office 2007 was too different and they were unfamiliar with it. The results of this testing proficiency experience were very similar to proficiency testing results reviewed in the literature. Based on the results of this experience, the Computer Science Department concluded that students were not coming to campus with the computer skill set needed to be successful on campus, and that if given the choice, students preferred taking an introductory computer class over taking a computer proficiency exam.

The Study

The purpose of this study was to explore the relationship between task-specific computer self-efficacy (SCSE) and computer proficiency regarding completion of tasks using the Vista operating system and Office 2007 applications Access, Excel, PowerPoint, and Word. Self-efficacy theory (SET) states that self-efficacy is a reliable indicator of performance (Bandura, 1977), however recent research assessing computer self-efficacy and computer performance has found that computer self-efficacy ratings are often higher than performance scores (Grant et al., 2009; Smith, 2001). This study also examined whether students enrolling in the introductory course were already computer proficient. Additionally, results helped to determine whether computer self-efficacy and computer skill performance increased after completing an introductory college-level computer course and whether there appeared to still be a need to offer introductory computer courses at the college level.

The following research questions were addressed:

1. Are general computer self-efficacy (GCSE) ratings higher than task-specific computer self-efficacy (TCSE) ratings?
2. Is there a relationship between the number of computer classes taken in high school and task-specific computer self-efficacy (TCSE) regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word?

3. Is there a relationship between task-specific computer self-efficacy (TCSE) and computer proficiency regarding completing computer tasks using Vista Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word?
4. Does task-specific computer self-efficacy (TCSE) regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word increase after completing an introductory computer class?
5. Does computer proficiency regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word increase after completing an introductory computer class?

Participants

The population for the study was one of convenience and consisted of 2,180 students enrolled in 14 on-campus offerings of an introductory computer science course during the fall 2009 semester. Participants were students in the population that voluntarily agreed to participate in the research study. Participants who chose to complete the precourse survey and the postcourse survey, as well as, the precourse proficiency exams and the postcourse proficiency exams were included in the final analysis.

Instrumentation

Survey Instrument

According to Bandura (2006), there is no all-purpose measure of perceived self-efficacy. Bandura stated that to eliminate generalities and ambiguities, perceived self-efficacy scales must be tailored to the particular field of performance that is being studied. Because self-efficacy is concerned with perceived capability (Bandura, 2006), the survey items have been phrased in terms of “can do” because “can” is a judgment of capability. To ensure the construction of a sound computer self-efficacy scale, an analysis of relevant tasks measured was conducted by cross-referencing skills from the Microsoft Certified Application Specialist (MCAS) exam (Appendix A) and skills taught and assessed in introductory computer courses on campus. Tasks were narrowed down by course instructors to 10 tasks per each Microsoft Office 2007 application being assessed (Vista, Access, Excel, PowerPoint, and Word), totaling 50 tasks (Appendix B). Additionally, as instructed by Bandura's Guide for Constructing Self-Efficacy Scales (2006), and suggested by Gist and Mitchell (1992), survey items included easy, medium, and difficult degrees of computing tasks in each specific computing subdomain. For each of the 50 tasks, students were first asked whether or not they could complete a given task. Students indicated either "no" (*cannot do at all*) or indicated they could complete the task by marking on a scale of 10 to 100 how confident they were that they could complete the given task using a specific Office 2007 application. This survey instrument used a 100-point response format ("No" = *cannot do at all*, 50 = *moderately confident can do*, 100 = *highly confident can do*) because doing so allows a stronger predictor of performance than a 1-5, or 0-10 scale (Pajares, Hartley, & Valiante, 2001), and it is also recommended by Bandura (2006). The instrument instructions asked participants to "*please rate how confident you are that you can complete computer tasks described below using* (specified application)."

In addition to the rating scales for task-specific computing self-efficacy, the precourse survey (Appendix C) was also designed to collect information regarding demographics, technology training, and online computing. The postcourse survey (Appendix D) was a copy of the precourse survey minus the request for demographic, technology training, and online computing information because that information had previously been collected. The purpose of the postcourse survey was to gather student responses in order to analyze whether general computer self-efficacy and task-specific computer self-efficacy changed after completing an introductory computing class.

Face validity of the survey instrument was established by having three instructors that teach introductory computer courses review the instrument prior to implementation. Prior to use in the study, a pilot group of 60 summer school students enrolled in CS102 took the survey to assess the readability of the instruments regarding instructions and survey questions. Based on the feedback and results of the pilot, changes were made to make the instructions easier to understand, and a typing error found was corrected. Construct validation was determined by pretesting students on a task-based performance exam using simulated Office 2007 software.

In order to minimize response bias the survey was coded by number rather than by name. Respondents were informed that their responses would remain confidential and would be identified only with the number codes by the researcher. To encourage honest answers, the importance of the study was explained to students.

Proficiency Assessment

In addition to the pre- and postsurveys, participants were asked to complete a preproficiency assessment, as well as, a postproficiency assessment (Appendix B). The purpose of the precourse proficiency assessment was to evaluate the computer proficiency of students enrolled in CS102 prior to instruction taking place. The postcourse proficiency assessment was used to help determine the amount of growth that took place from the beginning to the end of the computer course. The pre- and postcourse proficiency exams were vital in answering Research Questions 3 and 5. The proficiency test used for the study was not the same instrument that was created and used for testing business students during the fall 2008 and spring 2009 semesters, but it was similar. The actual proficiency exam used at the University for proficiency testing is a

100-question assessment and is given in a 2-hour time frame. The instrument used in this study was only 50 questions in length (10 questions each for Vista, Access, Excel, PowerPoint, and Word) and could easily be completed within a 50-minute class meeting time.

Data Collection

Data were collected from pre- and postcourse survey responses and pre- and postcourse proficiency exams delivered as part of the course content. Student surveys were linked to the Resources page in the student side of SimNet. A link to Survey 1 and the precourse proficiency exam was available to students the first week of class. A link to Survey 2 and the postcourse proficiency exams were available to students the final week of class. Students received a message in their SimNet message center as a reminder of the availability of each survey and pre- and postexam.

Data Analysis

Data from the voluntary precourse and postcourse surveys were collected and stored online. Data collected via the online surveys provided general computer self-efficacy (GCSE) scores, as well as, task-specific self-efficacy (TCSE) scores for completing tasks using the Vista operating system and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word. Additional demographic information collected from the survey and used in data analysis included the number of computer courses taken in high school. All survey responses were exported to Microsoft Excel and then imported to Microsoft Access where they were matched to students' precourse and postcourse proficiency exam scores using campus wide identification numbers. All data were then exported to Microsoft Excel, and campus wide identification numbers were deleted prior to being imported into SPSS 16.01. Each research question was then addressed.

Research Question 1

Are general computer self-efficacy (GCSE) ratings higher than task-specific computer self-efficacy (TCSE) ratings?

Research question 1 was examined by using self-efficacy data collected on the online precourse survey. A repeated measures ANOVA with six levels was used to examine differences between general computer self-efficacy (GCSE) scores and task-specific computer self-efficacy (TCSE) scores. The researcher utilized a Bonferroni post hoc adjustment to control for inflated Type I error rates and investigate specific differences among groups.

Research Question 2

Is there a relationship between number of computer classes taken in high school and general computer self-efficacy (GCSE)?

Research question 2 was examined by conducting a one-way ANOVA utilizing a Tukey post hoc test. The one-way ANOVA was used to determine whether or not one group of students reported higher self-efficacy scores than another group of students based on the number of computer classes taken in high school.

Research Question 3

Is there a relationship between task-specific computer self-efficacy (TCSE) and computer proficiency regarding completing computer tasks using the Vista operating system and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word?

Research question 3 was addressed by conducting the Pearson Correlation Coefficient in SPSS to determine whether there is a linear relationship between task-specific computer self-efficacy and computer proficiency in Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word.

Research Question 4

Does task-specific computer self-efficacy (TCSE) regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint (PPT), and Word increase after completing an introductory computer class?

Research Question 4 was examined by entering collected survey data into SPSS 16.0 and conducting a paired-samples *t* test using the post self-efficacy score as the first variance and the pretest self-efficacy score as the second variance. All students rated themselves regarding task-specific computing self-efficacy before taking an introductory computer class and after taking an introductory computer class. The mean difference between the specific computing self-efficacy ratings before taking an introductory computer class and after taking a introductory computer class were examined for statistically significant gains in confidence levels. This assisted in answering whether or not TCSE regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PPT, and Word increased after completing an introductory computer class.

Research Question 5

Does computer proficiency regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word increase after completing an introductory computer class?

Research Question 5 was addressed by entering collected pretest and posttest proficiency exam scores into SPSS 16.0 and conducting a paired-samples *t* test using posttest score as the first variance and the pretest score as the second variance in order to compare computer proficiency before and after taking an introductory computer course. As part of the course requirements for CS102 courses offered in the fall 2009 semester, all students were assigned to take the precourse proficiency exam the first week of class in an introductory computer class. At the end of the semester, all students were assigned to take the postcourse proficiency exam.

Summary

Data were collected for this study via surveys and exam scores. Students enrolled in introductory computer classes voluntarily completed a survey the first week of class and also completed precourse proficiency exams. Students then completed a semester long computer applications course. Training and assessment was delivered through a competency based training product titled, SimNet for Office 2007. At the end of the semester, students voluntarily completed postcourse surveys and postcourse proficiency exams. Following data collection and analysis, findings were reported in subsequent discussions. Conclusions were drawn, and recommendations for further study were shared in chapters 4 and 5.

CHAPTER 4

RESULTS

Summary of Study

The purpose of this study was to explore the relationship between task-specific computer self-efficacy (TCSE) and computer proficiency regarding completion of tasks using the Vista operating system and Office 2007 applications Access, Excel, PowerPoint, and Word. Self-efficacy theory (SET) states that self-efficacy is a reliable indicator of performance (Bandura,1977), however recent research assessing computer self-efficacy and computer performance has found that computer self-efficacy ratings are often higher than performance scores (Grant et al., 2009; Smith, 2001). This study also examined whether students enrolling in the introductory course CS102 were already computer proficient. Additionally, this study sought to determine whether computer self-efficacy and performance increase after completing an introductory college-level computer course, and whether data indicate that there is still a need to offer introductory computer courses at the college level.

Instrumentation

Survey Instrument

Following Bandura's (2006) guidelines, a pre- and postcourse computer self-efficacy survey was developed to fit the field of performance being studied. Students were asked to rate themselves on a scale ranging from 10 to 100 regarding confidence levels associated with general computer self-efficacy, as well as task-specific computer self-efficacy. In addition to self-efficacy rating scales, the precourse survey (Appendix C) was designed to collect information regarding demographics, technology training, and online computing information. The postcourse survey (Appendix D) was a copy of the precourse survey minus the request for demographic, technology training, and online computing information because that information had previously been collected. The purpose of the postcourse survey was to gather student self-efficacy ratings for general computing and task-specific computing, after completing an introductory computer course, in order to analyze whether general computer self-efficacy and task-specific self-efficacy changed.

Pre- and Postproficiency Exams

During the first week of class meetings, prior to any content instruction but after taking the precourse survey, students were assigned to take five 10-question precourse proficiency exams (Appendix B) using SimNet software. Each exam measured the ability to perform the tasks listed on the precourse surveys. The surveys provided a task-based self-efficacy score, and the precourse proficiency exams provided a task-based proficiency score for comparison. During the final week of class, students were asked to take the postcourse survey and once again provide self-efficacy ratings for both general and task-based computing abilities. After that, students were instructed to complete the same five proficiency exams. Pre- and postproficiency exam scores were used along with the pre- and postcourse self-efficacy ratings to address the research questions in this study.

Sample

The population for this study consisted of college students enrolled in 14 sections of an introductory computer class at one large southeastern university. Course enrollment equaled 2,180 students at the beginning of the semester. The precourse survey was voluntarily attempted by 2,061 students. Some students (n = 70) that began the survey chose the option not to participate in the study. Of those remaining, over 96% (n = 1,984) agreed to complete the survey, but only 90% of those students (*n* = 1,782) completed the survey. At the end of the semester, class enrollment was 2,101. The enrollment decreased because 41 students withdrew from the class, 74 students remained enrolled, but did not finish the class, and 38 enrolled students made no effort to attend or participate in the class. The postcourse survey was attempted by 1,466 students and successfully completed by 97.8% (*n* = 1,434).

Students also took five precourse and five postcourse proficiency exams. Varying numbers of students completed each exam (Table 1).

Table 1

Completed Proficiency Exams

Application	Precourse Exam	Postcourse Exam
Vista	1494	1302
Access	1261	1180
Excel	1250	1204
PowerPoint	1258	1221
Word	1313	1234

Demographic Data

Respondents were asked on the pretest survey (Appendix C) to provide demographic data that included the following: campus wide identification number, gender, student classification, ethnic background, geographical location of the high school attended, number of computer classes taken in high school, what they spend time on the computer doing, and average amount of time spent daily on the computer, as well as, whether or not they attempted a computer proficiency placement exam prior to enrolling in an introductory computer class. No additional demographic information was collected on the postcourse survey (Appendix D).

Responses to the precourse survey totaled 1,782 (53% females, 44.4% males, 2.6% unknown). Because computer use and time spent on a computer have been found to increase one's computer self-efficacy (Hill et al., 1987), as part of the demographic information collected, respondents were asked on average how much time a day was spent on a computer, as well as, what they spent that time on a computer doing. The majority of respondents indicated that they spent 3-4 hours a day on a computer (Table 2). The most popular uses of computer time were visiting social networking sites such as Facebook and MySpace, completing/submitting homework, shopping, and utilizing email.

Table 2

Average Daily Computer Use

Hrs. a Day spent on Computer	*N*	%
0-2 hrs	680	38.2%
3-4 hrs	751	42.1%
5-6 hrs	214	12.0%
7-8 hrs	53	3.1%
9-10 hrs	6	.3%
> 10 hrs	13	.7%
No Response indicated	65	3.6%

In addition to computer use and time spent on a computer, computer training has also been found to increase computer self-efficacy (Bandura, 1986). The majority of survey respondents (75.9%) indicated that they were required to take a computer class in high school, and 80.7% reported that their high school offered computer courses as electives. Data were also collected regarding types of computer instruction students had in high school (Table 3).

Table 3

High School Computer Instruction

Topics	*N*	%
Keyboarding	1356	76.1%
Presentation Software	1304	73.2%
Word Processing	1250	70.1%
Spreadsheets	1039	58.3%
Databases	529	29.7%
Web Design	418	23.5%
Basic Programming	424	23.0%
Networking	208	11.7%

All students enrolled in the 14 sections of the introductory computer class had the opportunity to take a proficiency exam to test out of the introductory computer course. Respondents were asked to indicate whether or not they took the proficiency exam. Only 62 respondents (3.5%) attempted to test out of the course. Respondents who indicated they did not attempt the proficiency exam to place out of the course were then asked to specify whether or not they believed they could have passed the proficiency exam had they chosen to take the exam. Seventy-one percent of students who did not attempt the proficiency exam responded that they believed they could have passed the exam.

Data Analysis

Research Question 1*:* Are general computer self-efficacy (GCSE) ratings higher than task-specific computer self-efficacy (TCSE) ratings?

To address Research Question 1, students voluntarily completed a precourse survey (Appendix C). Item 4 on the precourse survey requested that students rate, on a 10-point scale, how confident they were regarding their personal capabilities (at that time) to use a computer to complete various tasks. These ratings were used to determine general computer self-efficacy. Items 10-14 directed students to ask themselves whether they could complete specific tasks using a given Microsoft Office 2007 application. There were ten tasks of varied difficulty for each of the five applications. Students were to select the option marked “no” if they could not do the task, or to indicate on a 10-point scale how confident they were that they could complete the computer task described. The 10 ratings for each application were averaged and used to establish task-specific computer self-efficacy for each student (Table 4). For data analysis, only surveys without missing responses in sections 10-14 were considered.

Table 4

Descriptive Statistics of Within-Subjects Factors

SE Type	*M*	*SD*	*n*
GCSE	69.46	19.503	1577
TCSE-Word	75.51	20.643	1577
TCSE-Vista	74.68	21.339	1577
TCSE- PPT	70.54	26.011	1577
TCSE-Excel	59.89	27.175	1577
TCSE-Access	43.42	32.259	1577

An ANOVA using a repeated-measures design was used to analyze the data for this question. Mauchly's test indicated that the assumption of sphericity had been violated (χ^2 (14) = 1528.499, p < .05), therefore degrees of freedom were corrected using Huynh-Feldt estimates of sphericity (ε = .698). The results indicated a significant effect between GCSE and TSCE, F(3.492, 5503.565) = 862.897, p = .000). Because a significant difference between GCSE ratings and TCSE ratings was found, the initial analysis was followed up with between-group post hoc tests (Table 5) to examine differences between GCSE and specific task based self-efficacy ratings. The significance values of the between-group post hoc tests indicate that all groups have significant differences between group means except for the task-specific self-efficacy score for PowerPoint and the proficiency scores for PowerPoint.

Table 5

Bonferroni Comparisons of General Computer Self-Efficacy (GCSE) to Task-Specific Computer Self-Efficacy (TCSE)

Comparisons	Mean SE Score Diff.	Std Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
GSCE vs. Word SE	-6.044*	.504	-7.525	-4.563
GSCE vs. Vista OS SE	-5.224*	.490	-6.663	-3.784
GSCE vs. PowerPoint SE	-1.076	.583	-2.791	.639
GSCE vs. Excel SE	9.575*	.615	7.767	11.382
GSCE vs. Access	26.036*	.490	23.704	28.368

*p < 0.05.

Research Question 2**:** Is there a relationship between number of computer classes taken in high school and general computer self-efficacy (GCSE)?

To address Research Question 2, responses to Items 4 and 8 on the precourse survey were used. Item 4 provided the GCSE rating used in Research Question 1. Item 8 on the precourse survey requested that students indicate how many computer classes they had taken in high school. Although survey answer choices were 0, 1, 2, 3, 4, 5, and more than 5, for the purposes of data analysis, responses were coded based on the range of answers as “1” (0 classes), “2” (1-2 classes) and “3” (3-5 classes) (Table 6). Collected data were entered into SPSS and an ANOVA was conducted.

Table 6

Computer Classes Taken in High School

Number of Classes	*n*	%
0	231	13.7
1-2	1,264	75.2
3-5^{+}	186	11.1

The ANOVA found that a significant difference did exist, $F(2, 1677) = 8.973$, $p = .000$ (Table 7). A Tukey post hoc test found that the differences were between those who had taken three or more computer classes in high school, and those who had taken 1 or 2 classes, and those who had not taken any computer classes in high school (Table 8). Students who took three or more computer classes in high school reported higher levels of general computing self-efficacy.

Table 7

Summary of ANOVA

	Sum of Squares	*df*	Mean Squares	*F*
Between Groups	6879.956	2	3439.978	8.973
Within Groups	642876.234	1677	383.349	
Total	649756.190	1679		

*$p < 0.05$

Table 8

Tukey HSD Comparison for Number of Computer Classes Taken in High School and GCSE

Comparisons	Mean GCSE Score	*SD*	95% Confidence Interval	
			Lower	Upper
0 Classes vs. 3 or More	-7.881*	1.929	-12.41	-3.36
1 or 2 Classes vs. 3 or More	-5.604*	1.538	-9.21	-2.00
0 Classes vs. 1 or 2 Classes	-2.277	1.401	-5.56	1.01

*$p < 0.05$.

Research Question 3: Is there a relationship between task-specific computer self-efficacy (TCSE) and computer proficiency regarding completing computer tasks using the Vista operating system and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word?

To address Research Question 3, Items 10-14 on the precourse survey (Appendix C) and scores from the five individual precourse proficiency exams (Appendix B) were utilized. As previously stated, the week prior to the first class meeting of an introductory computer class in the fall of 2009, students enrolled in 14 on-campus sections of the course had the opportunity to voluntarily complete an online survey. One section of the survey was designed to collect students' task-specific self-efficacy levels regarding how confident they were that they would be able to complete task-specific commands using the Vista operating system and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word. Students were asked to indicate whether they could complete the task, and, if so, to what confidence level on a 100-point scale (0 = *cannot do*, 50 = *moderately confident*, and 100 = *highly confident*). Students were asked to rate themselves on 10 Vista tasks, 10 Access tasks, 10 Excel tasks, 10 PowerPoint tasks, and 10 Word tasks.

The first week of class, as part of the course content, students were asked to complete five precourse proficiency assessments, covering the Vista operating system and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word. Each assessment contained 10 tasks to be completed in a simulated computer environment using the competency-based SimNet for Office 2007 software. The 10 tasks on each assessment were the same 10 tasks addressed on the precourse survey.

Students' task-specific self-efficacy scores from the precourse survey and students' precourse proficiency assessment scores were entered into SPSS statistical software, and Pearson Correlations were run for student self-efficacy scores and student proficiency scores for topics Vista, Access, Excel, PowerPoint, and Word. A significant, but weak positive correlation was found in all five instances: task-specific computer self-efficacy and proficiency scores using Vista (r = .216, p = .000), task-specific computer self-efficacy and proficiency scores using Access (r = .008, p = .008), task-specific computer self-efficacy and proficiency using Excel (r =

.173, p = .000), task-specific computer self-efficacy and proficiency scores using PowerPoint (r = .212, p = .000), and task-specific computer self-efficacy and proficiency scores using Word (r = .177, p = .000). Based on these results, there is a weak, positive correlation between TCSE and computer proficiency regarding completing computer tasks using the Vista operating system and Microsoft Office 2007 applications Access, Excel, PPT, and Word. All task-specific self-efficacy scores were higher than actual task-specific proficiency scores. Task-specific computer self-efficacy ratings possess little predictive ability for task-specific computer proficiency scores.

Research Question 4: Does task-specific computer self-efficacy (TCSE) regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word increase after completing an introductory computer class?

To address Research Question 4 data were collected from Items 10-14 on the precourse survey (Appendix C) and Items 4-8 on the postcourse survey (Appendix D). Data were then entered into the SPSS software, and a paired-samples t test, also known as the t test for dependent means or the dependent t test, was run to determine whether the means of each pair of matched scores for precourse GCSE scores and postcourse GCSE significantly differ from each other (Table 79). Strength of the relationship was determined by calculating Cohen's d by dividing the mean difference of each pair by the standard deviation. The GCSE increased from 69.69 (sd = 19.215) on the precourse survey to a mean of 81.91 (sd = 14.702) on the postcourse survey. The difference between the two means was statistically significant at the .05 level, $t(1167) = 22.737$, p = .000, d = .665. General computer self-efficacy increased after completing an introductory computing class. Based on Cohen's criteria, the d value indicates a medium effect size.

Paired samples *t* tests were also run to determine whether the means of each pair of matched scores for precourse TCSE scores and postcourse TCSE scores for computer tasks using the Vista operating system and Microsoft Office 2007 applications Access, Excel, PPT, and Word significantly differ from each other (Table 10). Differences between means are statistically significant at the 0.05 level, and Cohen's *d* was calculated by dividing the mean difference of each pair by the standard deviation of each pair. The mean task-specific self-efficacy score for the Vista operating system increased from 74.36 (*sd* = 21.421) on the precourse survey to a mean of 94.27 (*sd* = 10.141) on the postcourse survey. The difference between the two means was statistically significant, $t(1123) = 31.972$, $p = .000$ $d = .953$. The mean task-specific self-efficacy score for the Microsoft Access increased from 44.12 (*sd* = 32.110) on the precourse survey to 91.06 (*sd* = 14.230) on the postcourse survey. The difference between the two means was statistically significant, $t(1094) = 47.117$, $p = .000$, $d = 1.423$. The mean task-specific self-efficacy score for Microsoft Excel increased from 59.86 (*sd* = 27.277) on the precourse survey to 90.37 (*sd* = 13.141) on the postcourse survey. The difference between the two means was statistically significant, $t(1104) = 37.635$, $p = .000$, $d = 1.13$. The mean task-specific self-efficacy score for Microsoft PPT increased from 71.27 (*sd* = 25.010) on the precourse survey to 96.14 (*sd* = 8.927) on the postcourse survey. The difference between the two means was statistically significant, $t(1080) = 32.621$, $p = .000$, $d = .992$. The mean task-specific self-efficacy score for Microsoft Word increased from 75.57 (*sd* = 20.313) on the precourse survey to 95.17 (*sd* = 9.376) on the postcourse survey. The difference between the two means was statistically significant, $t(1114) = 32.223$, $p = .000$, $d = .938$. Task-specific self-efficacy regarding completing tasks using the Vista operating system and Microsoft Office 2007 applications

Access, Excel, PPT, and Word increased after completing an introductory computing class. The effect size for all pairs was considered to be large, with Cohen's *d* being greater than .8.

Table 9

Paired-Samples Statistics for Pre- and Postcourse Self-Efficacy Scores

Pair	Pre & Post TCSE	*N*	*M*	*SD*	Std. Error Mean
1	Post Access SE	1095	91.06	14.230	.430
	Pre Access SE	1095	44.12	32.110	.970
2	Post Excel SE	1105	90.37	13.141	.395
	Pre Excel SE	1105	59.86	27.277	.560
3	Post PPT SE	1081	96.14	8.927	.272
	Pre PPT SE	1081	71.27	25.010	.761
4	Post Word SE	1115	95.17	9.376	.281
	Pre Word SE	1115	75.57	20.313	.608
5	Post Vista SE.	1124	94.27	10.141	302
	Pre Vista SE	1124	74.36	21.420	.639
6	Post GSCE	1168	81.91	14.702	.430
	Pre GSCE	1168	69.69	19.215	.562

Table 10

Paired-Samples Test for Pre- and Postcourse Self-Efficacy Scores

Paired Samples	*t* value	*df*	2-tailed Sig	Effect Size	SE of Diff	*95% Confidence Interval* Lower Bound	*95% Confidence Interval* Upper Bound
PostAccessSE - PreAccessSE	47.117	1094	.000	1.423	.996	44.981	48.890
PostExcelSE - PreExcelSE	37.635	1104	.000	1.132	.811	28.922	32.104
PostPPTSE - PrePPTSE	32.621	1080	.000	.992	.762	23.373	26.365
PostWordSE - PreWordSE	32.223	1114	.000	.938	.608	18.404	20.791
PostVistaSE - PreVistaSE	31.972	1123	.000	.953	.623	18.687	21.130
PostGCSE – PreGCSE	22.737	1167	.000	.665	.537	11.163	13.272

$p < .05$.

Research Question 5: Does computer proficiency regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word increase after completing an introductory computer class?

Paired samples *t* tests were also run to determine whether the means of each pair of matched scores for precourse task-specific proficiency scores and postcourse proficiency scores for computer tasks using the Vista operating system and Microsoft Office 2007 applications

Access, Excel, PowerPoint, and Word significantly differ from each other (Table 11). Differences between means were statistically significant at the 0.05 level, and Cohen's *d* was calculated by dividing the mean difference of each pair by the standard deviation of each pair. The mean task-specific proficiency score for the Vista operating system increased from 48.35 (sd = 22.625) on the Vista pretest to 68.63 (sd = 17.212) on the Vista posttest. The difference between the two means was statistically significant, $t(1007) = 26.735$, $p = .000$ $d = .842$. The mean task-specific proficiency score for Microsoft Access increased from 35.12 (sd = 24.316) on the Access pretest to a mean of 80.49 (sd = 18.231) on the Access posttest. The difference of the two means was statistically significant, $t(794) = 49.866$, $p = .000$, $d = 1.768$. The mean task-specific proficiency score for Microsoft Excel increased from 27.10 (sd = 15.910) on the Excel pretest to 54.35 (sd = 16.470) on the Excel posttest. The difference between the two means was statistically significant, $t(806) = 41.319$, p = .000, $d = 1.454$. The mean task-specific proficiency score for Microsoft PPT increased from 52.64 (sd = 31.220) on the pretest to 95.17 (sd = 10.659) on the PPT posttest. The difference between the two means was statistically significant, $t(817) = 39.745$, $p = .000$, $d = 1.389$. The mean task-specific proficiency score for Microsoft Word increased from 32.26 (sd = 21.009) on the Word pretest to 69.03 (sd = 17.545) on the Word posttest. The difference between the two means was statistically significant, $t(856) = 49.439$, $p = .000$, $d = 1.688$ (Table 12). Task-specific computer proficiency regarding completing tasks using the Vista operating system and Microsoft Office 2007 applications Access, Excel, PPT, and Word increased after completing an introductory computing class. The effect size for all pairs was considered to be large, with Cohen' s *d* being greater than .8.

Table 11

Paired-Samples Statistics for Pre- and Postcourse Proficiency Scores

Pair	Pre- and Post-Proficiency	*N*	*M*	*SD*	Std. Error Mean
1	Posttest Access	795	80.49	18.231	.647
	Pretest Access	795	35.12	24.316	.862
2	Posttest Excel	807	54.35	16.470	.580
	Pretest Excel	807	27.10	15.910	.560
3	Posttest PPT	818	95.17	10.659	.373
	Pretest PPT	818	52.64	31.220	1.092
4	Posttest Word	857	69.03	17.545	.599
	Pretest Word	857	32.26	21.009	.718
5	Posttest Vista	1008	68.63	17.212	.542
	Pretest Vista	1008	48.35	22.625	.713

Table 12

Paired Samples Test for Pre and Posttest Proficiency Scores

Paired Samples	*t* value	*df*	2-tail Sig	Effect Size	SE of Diff	*95% Confidence Interval* Lower Bound	*95% Confidence Interval* Upper Bound
Posttest Access - Pretest Access	49.866	794	.000	1.768	.910	43.585	47.157
Posttest Excel - Pretest Excel	41.319	806	.000	1.454	.659	25.995	28.544
Posttest PPT - Pretest PPT	39.745	817	.000	1.389	1.070	40.430	44.631
Posttest Word - Pretest Word	49.439	856	.000	1.688	.744	35.308	38.227
Posttest Vista - Pretest Vista	26.735	1007	.000	.842	.758	18.789	21.766

$p < .05$.

Summary

In summary, this chapter presented data analyses and findings for each research question presented in this study. The results provide insight into the relationship between computer self-efficacy and proficiency before and after taking an introductory college-level computing course.

CHAPTER 5

DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

Research has documented the importance of college-bound individuals possessing basic computer skills related to word processing, spreadsheets, presentation software, and computer concepts (Hardy, 2005; Hulick & Valentine, 2008; Wilkinson, 2006; Wolk, 2008). Documentation also exists that indicates that although students should be exposed to and taught these skills during their high school years, computer courses in high school are often only offered as elective courses **(**Ceccucci, 2006**).** Based on proficiency testing scores, the majority of students entering college are not passing skill-based computer literacy exams (Coolbaugh, 2004; Hardy, 2005; Hulick & Valentine, 2008; Rafaill & Peach, 2001; Shannon, 2008; Templeton et al., 2003; VanLengen, 2007; Wallace & Clariana, 2005)**,** although they appear to be self-confident regarding their computer skills. The purpose of this study was to explore the relationship between task-specific computer self-efficacy (TCSE) and computer proficiency regarding completion of tasks using the Vista operating system and Office 2007 applications Access, Excel, PowerPoint, and Word. Additionally, self-efficacy theory (SET) states that self-efficacy is a reliable indicator of performance (Bandura, 1977), however recent research assessing computer self-efficacy and computer performance has found that computer self-efficacy ratings are often higher than performance scores (Grant et al., 2009 ; Shannon, 2008; Smith, 2001). This study also examined whether students enrolling in the introductory course CS102 were already computer proficient. Furthermore, this study sought to determine whether computer self-efficacy and performance increased after completing an introductory college-level computer course, and whether data indicated that there is still a need to offer introductory computer courses at the college level.

Demographic Findings

Demographic information collected from the precourse survey indicated that the majority of students participating in this study spent 3 or more hours a day online. Popular uses of online time included visiting social networking sites, utilizing email, shopping, and completing/ submitting homework. Responses indicated that 75.9% of the participants were required to take a computer class in high school. Computer courses were offered as elective classes in 80.7% of the respondents' high schools. All students enrolled in CS102 had the opportunity to attempt placing out of the course by taking a free proficiency exam. Ninety-six percent of survey respondents indicated they chose not to take the proficiency exam, even though 71% of them indicated they believed they would have been able to pass the exam.

Findings

Research Question 1: Are general computer self-efficacy (GCSE) ratings higher than task-specific computer self-efficacy (TCSE) ratings?

Recent research shows a trend of Generation Y students arriving on campus with high levels of computer self-efficacy (Considine et al., 2009; Imhof et al., 2007; Lahore, 2008; Shannon, 2008; Wilkinson, 2006). GCSE assesses an individual's computer self-efficacy for all computing domains, whereas TCSE assesses individual computer self-efficacy within subdomains (Downey & McMurtrey, 2007; Marakas et al., 1998; Stephens, 2006). Because general self-efficacy develops over time and is a collection of experiences (Bandura, 1977), it would be reasonable to think that GCSE ratings would be higher than TCSE ratings for Generation Y students based on the idea they have been raised in a "digital world."

During the first week of an introductory computing course, students were asked to complete a precourse survey to gather GCSE ratings, as well as TCSE ratings for completing tasks using the Vista operating system, Access, Excel, PPT, and Word. The mean GCSE score (M = 69.46) was compared to the mean TCSE score (M = 64.808). Initial tests of within-subjects found a significant difference between GSCE and TCSE ratings. Because the main effect was significant, pairwise comparisons were made to analyze the differences of means of GCSE ratings and task-specific computer self-efficacy ratings by topic (Vista operating system, Access, Excel, PPT, and Word). Significant differences were found in all pairwise comparisons except GCSE ratings and TSCE rating for using Microsoft PowerPoint (M = 70.54).

GCSE ratings were significantly higher than TCSE ratings for Access (M = 43.42) and Excel (M = 59.89), implying that students were less confident about their ability to complete computing tasks using Microsoft Access and Excel. This is reasonable based on the demographics of this group of participants. Only 58.3% had indicated they had taken computer classes that taught spreadsheets, and an even lower number (29.7%) acknowledged taking a class that taught databases. On the other hand, 70.1% (n = 1,250) of the participants had taken classes in which word processing was taught, and TSCE ratings for completing tasks using the Vista operating system Microsoft Word were significantly higher than GCSE ratings. Results from this study indicated that students are confident in their skills using the Vista operating system and Microsoft Word. No significant differences between GCSE and TSCE for PowerPoint were found.

Research Question 2: Is there a relationship between number of computer classes taken in high school and general computer self-efficacy (GCSE)?

The third question in section 8 of the precourse survey asked students, “How many computer classes did you take in High School?” Answer choices included 0, 1, 2, 3, 4, 5, and more than 5. For the purposes of data analysis, responses were coded based on the range of answers as “1” (0 classes), “2” (1-2 classes) and “3” (3-5 classes). To test whether a relationship existed between the number of computer classes taken in high school and GCSE scores, an ANOVA was conducted. No significant difference was found between students that did not take any computer classes in high school and those that took one or two classes. There was a significant difference between GCSE ratings of those taking three or more computer classes and those that took one or two, or no computer courses in high school. These findings are consistent with Havelka’s (2003) findings. Havelka stated that the number of computer courses taken in high school appeared to have a relationship with computer self-efficacy. He found significant differences between those with greater than three computer courses and those students with only one or two courses.

These finding are important because although many high schools offer some type of computer application class, only about 13% of high schools require students to take a semester or more of computer applications courses (Ceccucci, 2006). Only 11.1% of students participating in this study reported taking three or more computing classes in high school. If computer self-efficacy does not significantly increase until after three or more computing classes (Havelka, 2003), then secondary schools should be persuaded to re-evaluate technology standards and be encouraged to incorporate more technology skills across the curriculum.

Research Question 3: Is there a relationship between task-specific computer self-efficacy (TCSE) and computer proficiency regarding completing computer tasks using the Vista operating system and Microsoft Office applications Access, Excel, PowerPoint, and Word?

Self-efficacy theory (Bandura, 1977) states, and multiple research studies have concluded, that self-efficacy is a significant predictor of subsequent task-specific performance (Marakas et al., 1998). To test whether a relationship exists between TCSE and computer proficiency, students completed the TCSE rating scale on the precourse survey. The scale was designed to collect students' task-specific computer self-efficacy ratings for 50 specific computing tasks (10 each for Vista, Access, Excel, PowerPoint, and Word). During the first week of the introductory computing course, students were assigned to complete a precourse proficiency assessment instructing students to perform the same 50 tasks as listed on the precourse survey. The Pearson Correlation results indicate that the answer to this research question was "yes," there was a positive, but very weak relationship between TCSE and computer proficiency regarding completing computer tasks using the Vista operating system and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word. Although relationships were significant, *r* values were much closer to 0 than 1, suggesting that higher TCSE ratings did not translate into higher proficiency scores and lower TCSE ratings did not render lower proficiency scores.

It was not surprising to see that average TCSE ratings were higher than average proficiency scores. These findings were consistent with Smith's (2001) conclusion that students' perceived ability to complete computing tasks surpassed performance. Findings differed slightly from those of Grant et al. (2009) that similarly found significant differences between CSE and spreadsheet and database performance, but not much difference in word processing and presentation performance.

Research Question 4: Does task-specific computer self-efficacy (TCSE) regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word increase after completing an introductory computer class?

Self-efficacy theorist Albert Bandura stated that training increases levels of self-efficacy (Bandura, 1986). To address Research Question 4, students enrolled in introductory computer classes completed TCSE surveys both at the beginning and end of the semester. Approximately 2 weeks were spent in training for each application using SimNet for Office 2007 software between surveys. Pre- and postcourse ratings were used for paired-sample tests. Results from this study found significant differences between pre- and postcourse TCSE ratings. TCSE increased by an average of 50% after training took place. The largest gains were seen in Access and Excel ratings.

Research Question 5: Does computer proficiency regarding completing computer tasks using Vista and Microsoft Office 2007 applications Access, Excel, PowerPoint, and Word increase after completing an introductory computer class?

To address Research Question number 5, precourse proficiency assessment scores obtained at the beginning of the semester and the postcourse proficiency scores gathered at the end of the semester were used to run paired-samples correlations. Significant gains were made in all task-specific areas. Completing an introductory computer class does increase computer proficiency. The largest gains were made in the areas of Access, Excel, and Word, where the mean class average more than doubled. It is important to remember the training and postcourse proficiency exam took place within a 3-month period. It may be easier to remember information soon after instruction has taken place. It would be interesting to follow up with the proficiency exam a full year or more later to make sure the skills had been retained.

Discussion

There is no doubt that today's youth are being raised in a world immersed in various technologies. It is understandable that many would assume that today's youth are computer proficient and possess the computer skills necessary to be successful in college. Skills involving word processing, spreadsheet, database, and presentation software are skills that research has documented as being important for college-bound students to possess (Hardy, 2005; Hulick & Valentine, 2008; Wilkinson, 2006; Wolk, 2008). However, the reality is that research indicates that the majority of incoming college students are unable to pass basic computer proficiency exams (Coolbaugh, 2004; Hardy, 2005; Hulick & Valentine, 2008; Rafaill & Peach, 2001; Shannon, 2008; Templeton et al., 2003; VanLengen, 2007; Wallace & Clariana, 2005).

Today's students do spend a lot of time using a computer. Fifty-eight percent of students in this study reported spending 3 of more hours a day on a computer engaged in some activity. Social networking sites such as Facebook and MySpace top the list of online use, with 91.6% of the respondents reporting they visit such sites while online. Other popular responses included downloading music (78%), editing and uploading photos (68.5%), and shopping (66%). Shannon (2008) pointed out that these are not the types of skills required in college or the business setting; however, such use of technology can lead to increased levels of self-efficacy regarding one's own computing abilities (Considine et al., 2009; Imhof et al., 2007; Wilkinson, 2006). In addition to personal use, 76% of the students in this study reported taking at least one computer course in high school. All computer use, personal and instructional, combined with the number of years of experience using a computer may increase a student's confidence level (or self-efficacy) regarding completing basic computer tasks.

In order to assess GCSE and TCSE for the Vista operating system, Access, Excel, PowerPoint, and Word, students in this study took a precourse survey that asked students to rate their confidence level on a 100-point scale regarding using a computer in general and regarding their ability to complete specific given tasks using Office 2007 applications. Students then completed a precourse proficiency exam where they actually had to perform the skills they rated themselves on when taking the precourse survey. Similar to the findings of Grant et al. (2009) and Smith (2001), computer self-efficacy ratings, both general and task specific, were significantly higher than performance scores. Multiple research studies have concluded that self-efficacy is a significant predictor of subsequent task-specific performance (Marakas et al., 1998); however, this study found no predictive ability between GSCE or TCSE ratings and task-specific performance. Perhaps the discrepancies in the findings were partly due to the fact that much of the research conducted on self-efficacy and academic performance were done in the areas of science and mathematics (Pajares, 1996). Self-efficacy studies regarding computer self-efficacy and performance seem to be the topic of more recent studies, and findings do not seem to follow the traditional self-efficacy theory. Current studies, including this one, do follow traditional self-efficacy theory in the sense that exposure to and successful use of computers does appear to increase computer self-efficacy. Results from this study show that both GCSE and TCSE significantly increased after completing an introductory computer class. The differences between earlier and later self-efficacy research lie in actual performance outcomes as evident by the current study. According to the findings in this study, computer performance results cannot be predicted by computer self-efficacy ratings.

In regard to training, findings from this study showed that computer training increased both GCSE and TCSE ratings. This was consistent with the findings of Gist et al. (1989) that training increases computer self-efficacy. Additionally, findings from this study indicate that training also increased proficiency scores. Results show significant gains between precourse proficiency exam scores and postcourse proficiency exam scores. These findings support earlier findings by VanLengen (2007) and Wallace and Clariana (2005), who reported increased computer proficiency after completing an introductory computing class.

Results from this study indicate that training is an intricate part of increasing computer self-efficacy and computer proficiency. Perhaps students are not passing proficiency exams because they have not had the proper training. In Ceccucci's 2006 review of secondary technology standards at more than 100 high schools across the country, many discrepancies in secondary technology education were identified. Ceccucci reported that only 13% of the schools she studied required students to take a semester or more of computing classes. Almost 76% of students participating in this study indicated that they were required to complete a computer course in high school. Students in this study also indicated that computer courses were offered as electives at 80.7% of their schools. This finding is slightly lower than the 99% indicated in Ceccucci's report. It is important to keep in mind that Havelka (2003) reported that it took completing three computer courses to achieve effective levels of computer self-efficacy. Results from this study support Havelka's findings that there is a significant relationship between the number of computer classes taken in high school and GCSE ratings. Students in this study that had completed three or more computing classes in high school had significantly different GCSE ratings when compared to students only completing one or two computing classes or those students who did not take a computer class. Since it may be unreasonable to recommend all students take three semesters of computer classes while in high school; it is suggested that high schools work on integrating technology instruction across the curriculum to help ensure higher levels of computer self-efficacy.

Although training has been established as essential, it is important to remember that what is taught during training is also vital. The majority of students in this study, 73.2% and 70%, respectively, replied that they had prior training in presentation software and word processing skills. Fewer students had instruction in spreadsheets (58.3%) and databases (29.7%). These findings mirror those of Grant et al. (2009) who found that few students were proficient in spreadsheets and databases, two of the skills identified as being indispensable to be successful in the college and business environment (Hardy, 2005; Wolk, 2008). Bartholomew's 2004 faculty survey (as cited in Wolk, 2008) indicated that use of spreadsheets and databases were not highly reinforced at the post-secondary level. However, if working knowledge of spreadsheets and databases are desired in the workforce, then it is the responsibility of instructors to make sure these are the skills being taught in the classroom.

In addition to what is being taught, how the material is taught is pertinent as well. Marakas et al. (1998) emphasized the importance of finding a relevant applicable training method regarding computer use. Students participating in this study were enrolled in a lab-based introductory computer class that utilized the competency-based training product SimNet for Office 2007. SimNet for Office 2007 and other products like it offer individualized competency-based training and assessment for Office applications and computer concepts. After training with SimNet software for one semester, computer self-efficacy ratings and computer proficiency scores of students in the study increased by an average of 44% and 93.3%, respectively. Proficiency scores for Access, Excel, and Word more than doubled after a semester of training took place. Currently, not much empirical evidence exists regarding the effectiveness of competency-based training products such as SimNet for Office 2007. Studies researching the effectiveness and uses of competency-based training and assessment products are needed.

Evidence gathered from this study reaffirms the declarations of VanLengen (2007) and Ceccucci (2006), who stated how important and necessary introductory computer course offerings are at the postsecondary level. Many studies have identified that college-age students are unable to pass basic computer proficiency assessments (Coolbaugh, 2004; Hardy, 2005; Hulick & Valentine, 2008; Rafaill & Peach, 2001; Shannon, 2008; Templeton et al., 2003; VanLengen, 2007; Wallace & Clariana, 2005). Every student in the current study had the opportunity to take a computer proficiency exam to test out of the introductory class and enroll in the next level computer class. Only 62 students (3.5%) attempted the proficiency exam. This statistic supports Coolbaugh's (2004) conclusion that even when students have the choice of taking a computer exam to meet computer proficiency requirements, the majority of students select to take an introductory computer course instead. Of the 96.5% (n = 1,720) in this study who chose not to take the CS102 proficiency exam, 71.7% (n = 1,681) of the students indicated that they believed they could have passed the exam. Based on results of the precourse proficiency exams, only 1% (n = 18) would have actually been able to pass the University's official microcomputers placement exam with a score of 76% or above. These findings come at a time when many colleges are considering or have already eliminated introductory courses due to the 120-Hour Rule and the assumption that Net Generation youth already possess these skills (Shannon, 2008; Templeton et al., 2003). Data from this study should be used as an incentive for colleges and universities to reconsider decisions regarding discontinuing introductory computer offerings.

Implications

Results from this study imply that college administrators need to recognize the need for introductory computer classes. With so many students unable to pass basic proficiency exams, now is not the time to eliminate introductory computer course offerings. Additionally, college administrators should communicate with their business partners and/or businesses that recruit on their campuses and identify the computer skills most desired in the work force. Administrators then need to communicate such information to instructors on campus who are responsible for course content and instruction of computer applications courses. Administrators also need to provide the necessary support and resources needed by instructors to prepare students for the computer skills they will need to be successful at the college level and beyond.

Implications for instructors include the importance of assessing the proficiency of incoming students and finding the best way to address individualized needs of students. Students are arriving on campuses with varied levels of computer proficiency. It is the responsibility of instructors to know what skills are necessary for future college and job success and to provide instruction to all students. Based on the number of students and the availability of resources, instructors should consider various ways of providing instruction and tailor instruction to meet students' needs. The literature review in this study covered various ways of addressing students' computer training needs: self-paced online learning, semester-based online courses, lab-based instruction, traditional instructor-led classes, and computer placement exams. Instructors need to work closely with administrators to provide a successful learning environment for all students.

Additionally, findings from this study can be used to encourage colleges and universities to assess computer proficiency of students prior to graduation to ensure students have the necessary computing skills to be successful in the business environment. This could be accomplished by providing, or requiring, computer certification opportunities to students about to graduate and enter the workforce. Certifications such as the Microsoft Certified Application Specialist (MCAS) or the International Computer Driving License (ICDL) may work well for such a situation. By certifying students just before entering the work force, students can be certified in the most up-to-date applications and be able to add the certifications to their resumes, which may help make them more marketable as they enter the job market.

It is important for instructors to remember that even though computer self-efficacy did not predict computer performance in this study, computer self-efficacy is still an important factor to consider when assessing students. The current study only looked at computer self-efficacy in relation to performance; however, computer self-efficacy may be related to motivation to want to use a computer and to one's willingness to choose to use technology, as other studies have suggested. These may be beneficial things to consider during the instructional process.

Findings from this study challenge administrators in secondary education to unify and to begin eliminating discrepancies in technology instruction. Ideally, technology curriculum, technology course requirements, and technology graduation requirements should be consistent for all high schools nationally. Additionally, administrators need to continually assess the computing needs at the college level and in the work force and strive to change curriculum at the secondary level as computing needs change.

Limitations

Although some findings in this study may be easily generalized, no study is without its limitations. The following were identifiable limitations of this study:

1. The study was limited to multiple sections of one course, at one university.

2. The pre- and postcourse surveys were original surveys designed according to specific course curriculum and proficiency definitions of one introductory computer course at one university.
3. All participants did not complete all pre- and postcourse proficiency exams, so pairwise numbers are not equal across topic areas.
4. Only one type of training and assessment, which was a competency-based training product, was used in the courses for this study. Alternate methods of instruction and assessment may have produced other results.
5. Students previously trained in Office 2003 applications may have overrated their ability to complete tasks using Office 2007 software. The user interface of Office 2007 is quite different from that of Office 2003. New learning needs to take place in the transition from Office 2003 to Office 2007, and some participants may not have been aware of the differences.

Recommendations for Future Research

Technology lends itself to many areas of future research studies. However, based on information presented in this study, recommendations for future research are as follow:

1. A competency-based training product was used for training and assessment in the courses utilized in this study. Because competency-based training products for Office applications are being used on many college campuses still offering introductory computer courses (Cengage Learning, 2008; McGraw-Hill Higher Education, 2007), it would be valuable to gather research comparing the various training products for computer self-efficacy and computer proficiency gains to determine which of these products is the most effective.

2. Due to the 120-Hour rule (THECB, 2009), some colleges and universities have done away with introductory computer course requirements. Future research should study the computer self-efficacy and computer proficiency of students at institutions that have discontinued introductory computer courses to see if ratings and scores differ from those of students who attended an institution that still offered introductory computer courses.
3. Findings from this study indicated that taking an introductory computer course increased both TSCE and computer proficiency. Future research could compare computer self-efficacy and proficiency gains of students who test out of introductory computer classes to those of students who take introductory computer classes.
4. Preparation for one's future profession is one of the main purposes of higher education. Surveying recent college graduates, new to the workforce, to collect their opinions regarding their preparedness for the computing demands of their workplace also warrants further study. Information collected could be used to support changes to both college and secondary technology instruction.
5. Many discrepancies exist when it comes to mandatory technology training in our nation's secondary schools (Ceccucci, 2006; Henke, 2007). Research needs to continue to follow changing technology standards and policies at the national, state, and local level.

Conclusions

Although numerous students are arriving on campus with heightened levels of computer self-efficacy, confidence in computing abilities is not transferring to computing proficiency. Some students are not computer proficient when they arrive on campus, despite previous cultural technology use and exposure. Results from this study indicate college-age students lack many computing skills identified as essential at the college level. Data analysis shows that computer self-efficacy ratings and proficiency scores increased after completing an introductory computer class. Findings should be used to support the necessity of introductory computer course offerings at the post-secondary level. Additionally, technology instructors at both the secondary and postsecondary level need to assess the proficiency of incoming students and provide individualized training and assessment to provide students with the computing skills identified as essential to be successful in college and beyond.

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APPENDIX A

MICROSOFT CERTIFIED APPLICATION SPECIALIST SKILLS

MCAS Vista Skills

Protecting Your Computer

- Manage Windows Firewall.
- Manage malicious software (also called malware) protection.
- Configure Windows Update settings.
- Lock a computer.
- Mange Window Internet Explorer security.
- Configure local user accounts

Managing Mobile and Remote Computing

- Mange the computer power state.
- Manage network connections.
- Manage remote access to your computer.
- Connect to another computer.
- Access files stored in shared network folders when your computer is offline.

Managing Software, Disks, and Devices

- Manage software.
- Mange disks
- Manage devices and drivers.
- Mange display settings.
- Configure multiple monitors.
- Install and configure a printer

Managing Files and Folders

- Manage Windows Explorer settings.
- Manage and secure folders.
- Share folders.
- Search for files and folders.

Collaborating with Other People

- Collaborate in real time.
- Present information to an audience.

Customizing Your Windows Vista Experience

- Customize and modify the Start menu.
- Customize the taskbar.
- Personalize the appearance and sound of a computer.
- Manage the Windows Sidebar.

Optimizing and Troubleshooting Your Computer

- Increase processing speed.
- Locate troubleshooting information.
- Locate troubleshooting information.
- Repair a network connection.
- Recover from software errors.
- Troubleshoot printing errors.
- Recover the operating system from a problem
- Request and manage Remote Assistance.

MCAS Access Skills

Structuring a Database

- Define data needs and types.
- Define and print table relationships.
- Add, set, change, or remove primary keys.
- Split databases.

Creating and Formatting Database Elements

- Create databases.
- Create tables.
- Modify tables.
- Create fields and modify field properties.
- Create forms.
- Create reports.
- Modify the design of reports and forms.

Entering and Modifying Data

- Enter, edit, and delete records.
- Navigate among records.
- Find and replace data.
- Attach documents to and detach from records.
- Import data.

Creating and Modifying Queries

- Create queries.
- Modify queries.

Presenting and Sharing Data

- Sort data.
- Filter data.
- Create and modify charts.
- Export data.
- Save database objects as other file types.
- Print database objects.

Managing and Maintaining Databases

- Perform routine database operations.
- Manage databases.

MCAS Excel Skills

Creating and Manipulating Data

- Insert data by using AutoFill.
- Ensure data integrity.
- Modify cell contents and formats.
- Change worksheet views.
- Manage worksheets.

Formatting Data and Content

- Format worksheets.
- Insert and modify rows and columns.
- Format cells and cell content.
- Format data as a table.

Creating and Modifying Formulas

- Reference data in formulas.
- Summarize data by using a formula.
- Summarize data by using subtotals.
- Conditionally summarize data by using a formula.
- Look up data by using a formula.
- Use conditional logic in a formula.
- Format or modify text by using formulas.
- Display and print formulas.

Presenting Data Visually

- Create and format charts.
- Modify charts.
- Apply conditional formatting.
- Insert and modify illustrations.
- Outline data
- Sort and filter data.

Collaborating on and Securing Data

- Manage changes to workbooks.
- Protect and share workbooks.
- Prepare workbooks for distribution.
- Save workbooks.
- Set print options for printing data, worksheets, and workbooks.

MCAS PowerPoint Skills

Creating and Formatting Presentations

- Create new presentations.
- Customize slide masters.
- Add elements to slide masters.
- Create and change presentation elements.
- Arrange slides.

Creating and Formatting Slide Content

- Insert and format text boxes
- Manipulate text
- Add and link existing content to presentations.
- Apply, customize, modify, and remove animations.

Working with Visual Content

- Create SmartArt diagrams
- Modify SmartArt diagrams.
- Insert illustrations and shapes.
- Modify illustrations.
- Arrange illustrations and other content.
- Insert and modify charts.
- Insert and modify tables.

Collaborating on and Delivering Presentations

- Review presentations.
- Protect presentations.
- Secure and share presentations.
- Prepare printed materials.
- Prepare for and rehearse presentation delivery.

MCAS Word Skills

Creating and Customizing Documents

- Create and format documents.
- Lay out documents.
- Make documents and content easier to find.
- Personalize Office Word 2007.

Formatting Content

- Format text and paragraphs.
- Manipulate text.
- Control pagination.

Working with Visual Content

- Insert illustrations.
- Format illustrations.
- Format text graphically.
- Insert and modify text boxes.

Organizing Content

- Structure content by using Quick Parts.
- Use tables and lists to organize content.
- Modify tables.
- Insert and format references and captions.
- Merge documents and data sources.

Reviewing Documents

- Navigate documents.
- Compare and merge document versions.
- Manage tracked changes.
- Insert, modify, and delete comments.

Sharing and Securing Content

- Prepare documents for sharing.
- Control document access.
- Attach digital signatures.

APPENDIX B

PRE- & POSTCOURSE PROFICIENCY EXAM

Windows Vista	Display the Sidebar.	Click the **Start** button and select **All Programs**. Click **Accessories** and select **Windows Sidebar**.
Windows Vista	Launch the program that will let you connect to another computer remotely.	Click the **Start** button. Click **All Programs**. Click **Accessories**. Click **Remote Desktop Connection**.
Windows Vista	Open the **Backup Status and Configuration** window and scan for new or updated files to add to the backup for this computer.	Click the **Start** button. Click **All Programs**. Click **Accessories**. Click **System Tools**, and select **Backup Status and Configuration** . Click the **Back up now** .
Windows Vista	Create a new folder named **Letters** in the current location.	Click the **Organize** button on the Command Bar. Click **New Folder**. Type **Letters**. Press Enter.
Windows Vista	Open the **Help and Support Center**.	Click the **Start** menu and select **Help and Support**.
Windows Vista	Create a new standard user account with the name **Ben Delbow**.	Click the **Start** button and select **Control Panel**. Under the User Accounts category, click the **Add or remove user accounts link**. Click **Continue**. Click **Create a new account**. Type **Ben Delbow**. Click **Create Account**.
Windows Vista	Change the screen resolution to be **1280 by 1024 pixels**.	Click the **Start** button and select **Control Panel**. Click the **Adjust screen resolution** link. Click the **Screen resolution slider** and drag towards high until it reads **1280 by 1024 pixels**. Click OK.
Windows Vista	Change the status of the **Windows Firewall** to the recommended setting.	Click the **Start** button and select **Control Panel**. Click the **Security** category. Click the **Turn Windows Firewall on or off** link under the *Windows Firewall* category. Click **Continue** in the *User Account Control* dialog box to continue. In the *Windows Firewall Settings* dialog box, click the **On (recommended)** radio button. Click OK.

Windows Vista	Disconnect from the wireless network you are connected to.	Click the **Windows Start** button, and click **Connect To**. Click the **Disconnect** button. Click the large **Disconnect** button to confirm that you want to disconnect from this network. Click **Close**.
Windows Vista	Change the desktop background to use the dark blue solid color (the first image in the second row of the Solid Colors location).	Click the **Start** button and select **Control Panel**. Click the **Change desktop background** link. Open the **Picture Location** menu and select **Solid Colors**. Click the **dark blue square** (the first image in the second row) image to select it. Click OK.
Access 2007	Create a new blank database named **Accounting**.	Click the **Office Button**. Click **New**. Type Accounting in the *File Name:* box. Click **Create**.
Access 2007	Create a new table in Design view.	Click the **Table Design** button in the *Tables* group on the *Create* tab.
Access 2007	Create a new blank form directly in Design view.	Click the **Create** tab. Click the **Form Design** button in the *Forms* group.
Access 2007	Create a back up copy of this database. Accept the suggested filename, and do not change the file location.	Click the **Office Button**. Point to **Manage**, and click **Back Up Database**. Click the **Save** button.
Access 2007	Create an automatic basic report based on the Employees table.	Click the **Create** tab. Click the **Report** button in the *Reports* group.
Access 2007	Export the **Vendors** table as a Text document named **vendors.txt**. Do not export the layout and format. Do not save the export.	Click the **External Data** tab. Click **Text** in the *Export* group. Click **OK**. Click **Close**.
Access 2007	From Layout view, change the orientation of the printed report so it is wider than it is tall.	Click the **Page Setup** tab. Click the **Landscape** button.
Access 2007	Enforce referential integrity between the **Deliverables** and **Vendors** tables.	Click the **Relationships** button in the *Show/Hide* group on the *Database Tools* tab. Double-click the line connecting the **Deliverables** and **Vendors** tables. Click the **Enforce Referential Integrity** check box. Click **OK**.

Access 2007	Create a new query in Design view. Add the tables **Deliverables** and **Employees**. Add these fields in order: **Deliverable, Status**, and **Last Name**. Run the query.	Click the **Create** tab. Click the **Query Design** button in the *Other* group. Double-click **Deliverables**. Double-click **Employees**. Click **Close**. Double-click **Deliverable**. Double-click **Status**. Double-click **Last Name**. Click the **Run** button in the *Results* group on the *Query Tools Design tab.*
Access 2007	Add the image file **Chur.png** to the record. The attachment field shows a placeholder image.	Double-click the placeholder image. Click **Add...** Click **Chur.png**, and click **Open**. Click OK.
Excel 2007	Enter the number **0.0** in cell **D9**.	Click the cell in the fourth column, ninth row and type **0.0**. Press Enter.
Excel 2007	Without using Print Preview, print the selected sheet, ignoring the defined print area.	Click the **Office Button**. Point to **Print**, and then click the **Print** option. Click the **Active sheet(s)** radio button. Click the **Ignore print area** check box. Click the **OK** button.
Excel 2007	Enter a formula in cell **A11** to display the text from cell **A2** with only the first letter of each word in upper case.	Click the **Text** button in the *Function Library* group on the *Formulas* tab. Select **PROPER** from the list. Type **A2** in the *Text* box, and click OK.
Excel 2007	Create a 3-D Clustered Column chart from the selected data. (Use the first 3-D column option.)	Click the **Column** button in the *Charts* group on the *Insert* tab. Click the first chart type under **3-D Column**.
Excel 2007	Switch to the normal Excel view.	Click the **View** tab, then click the **Normal** button.
Excel 2007	Display the formulas in this worksheet. Do not change the sheet options.	Click the **Show Formulas** button from the *Formula Auditing* group in the *Formulas* tab.
Excel 2007	Save this worksheet in a text format using tabs to separate columns.	Open the **Office** Button menu. Point to **Save As**, and click **Other Formats**. Click the **Save as type:** arrow and select **Text (Tab delimited)**. Click **Save**.
Excel 2007	Filter the table by the **Cost** column, so only cells formatted with blue text appear.	Click the **AutoFilter arrow** at the top of the **Cost** column, point to **Filter by Color**, and click the blue option under **Filter by Font Color**.
Excel 2007	Change the orientation of cell **B5** so it is rotated 45 degrees counterclockwise (so the cell data slants upwards from left to right).	Click cell **B5**. In the *Alignment* group on the *Home* tab, click the **Orientation** button and select **Angle Counterclockwise**.

Excel 2007	Create a new scenario to reflect a change in cell **B6** to a value of **400,000** Name the scenario **Max Salaries**. Show the scenario, and close the Scenario Manager.	Click the **What-If Analysis** button in the *Data Tools* group on the *Data* tab, and click **Scenario Manager...** Click the **Add...** button. Type **Max Salaries** in the *Scenario name:* box. Type **B6** in the *Changing cells:* box. Click OK. Type **400000** in the text box. Click OK. Click **Show**. Click Close.
PowerPoint 2007	Move the fourth slide so it appears above the third slide in the presentation.	Click and drag the fourth slide. When the cursor is above the third slide, release the mouse button.
PowerPoint 2007	Copy the presentation to a CD named **Clothing Presentation**.	Click the **Office Button**. Point to **Publish** and select **Package for CD**. Type **Clothing Presentation** in the *Name the CD:* box. Click **Copy to CD.**
PowerPoint 2007	Add a custom animation to the image. Have the object fly out to the right.	Click the **Animations** tab. Click the **Custom Animation** button. Click the **Add Effects** button, point to **Exit**, and click **Fly Out**. Click the **Direction:** drop-down arrow and select **To Right**.
PowerPoint 2007	Add the **introduction.mp3** file to the slide. Have the audio play when the slide is clicked.	Click the **Insert** tab. In the *Media Clips* group, click the **Sound from File** button. In the *Insert Sound* dialog box, click the file to select it. Click the OK button. Click the **When Clicked** button.
PowerPoint 2007	Switch to the view where you can make changes to a master slide that will affect slides in the entire presentation.	Click the **View** tab on the Ribbon. Click the **Slide Master View** button.
PowerPoint 2007	Preview the presentation for printing, changing the option to display three slides per page.	Click the **Office Button**, point to **Print**, and select **Print Preview**. Click the **Print What:** drop-down list and select **Handouts (3 Slides Per Page)**.
PowerPoint 2007	Adjust the image so it had 10% more contrast.	Click the Format tab under *Picture Tools*. In the *Adjust* group, click the **Contrast** button and select **+10 %**.
PowerPoint 2007	From the Ribbon, change the image so it appears behind all the other objects on the slide. Do not use the *Selection Pane*.	Click the **Picture Tools** Format tab. In the **Arrange** group, click the **Send to Back** button.

PowerPoint 2007	Add a **Continuous Picture List** SmartArt graphic to the slide. It is the fourth option in the third row in the *Choose a SmartArt Graphic* dialog box.	Click the **Insert** tab. Click the **Insert SmartArt Graphic** button. Click the image with the three vertical boxes with circles in the third row. Click OK.
PowerPoint 2007	Start the feature where you can practice the timing of your presentation and save the settings for playback.	Click the **Slide Show** tab. In the *Set Up* group, click the **Rehearse Timings** button.
Word 2007	Use the Document Map to navigate to the **Management Team** section of the document.	Click the **View** tab. Click the **Show/Hide** button. Click the **Document Map** check box. Click the **Management Team** heading in the Document Map.
Word 2007	Add the book **Healing Through Pressure** as a new source for a bibliography. The author is **Sue Chur** and the book was published in **2004.**	Click the **References** tab. In the *Citations & Bibliography* group, click the **Insert Citation** button and select **Add New Source...** Click the *Type of Source* arrow and select **Book**. Type **Sue Chur** in the *Author* box. Type **Healing Through Pressure** in the *Title* box. Type **2004** in the *Year* box. Click **OK.**
Word 2007	Hide the formatting changes in the document.	Click the **Review** tab. Click the **Show Markup** button and select **Formatting.**
Word 2007	Create a new blank document.	Click the **Office** button and select **New**. Verify that **Blank document** is selected and click the **Create** button.
Word 2007	Insert the **rehabilitation.jpg** file into the document.	Click the **Insert** tab. Click the **Picture** button. Click the **rehabilitation.jpg** file to select it. Click the **Insert** button.
Word 2007	Change the bulleted list so it uses the open circle style.	Click the **Bullets** button arrow and select the third style in the first row of the Bullet Library.
Word 2007	Change Word's color scheme to silver.	Click the **Office** button. Click the **Word Options** button. Click the **Color scheme: arrow** and select **Silver**. Click **OK** in the *Word Options* dialog box.
Word 2007	Hide the tracking for the document, showing the final version of the document.	Click the **Review** tab. In the *Tracking* group, click the **Display For Review** drop-down arrow and select **Final**.
Word 2007	Change the line spacing to one and half lines.	In the *Paragraph* group on the *Home* tab, click the **Line Spacing button arrow** and select **1.5**.
Word 2007	Sort the list from **A to Z**.	In the *Paragraph* group on the *Home* tab of the Ribbon, click the **Sort** button. Click OK.

APPENDIX C

PRECOURSE SURVEY

#2 CS102 Pre-Course Survey (CSE)

1. Participant Information

The student is responsible for choosing to participate in this study. Agreement to participate is given by voluntarily participating in this online survey.

A printable copy of the Participant Information Sheet is available on the class website.

Grades will not be affected by participation/non-participation in this study.

*** 1. Please enter your campus wide ID(CWID)in the box below.**

2. I have read and printed a copy of the "Participant Information Sheet" on the class website and understand what I have been asked to do. I also understand that participation in this study is completely voluntary and I understand participation/non-participation will not affect my grade.

- I freely agree to take part in this study.
- I choose not to particpate in this study.

2. Student Confirmation

1. Please confirm that you are a UA student currently enrolled in CS102: Micro-Computer Applications.

- Yes, I am a UA student currently enrolled in CS102.
- No, I am not currently enrolled in CS102.

3. Initial Question

*** 1. How confident are you regarding your personal capabilities (as of right now) to use a computer to complete various tasks?**

	not at all confident	10	20	30	40	50 moderately confident	60	70	80	90	100 totally confident
personal computing ability											

4. Placement Assessment for CS102

1. Did you take the CS102 Proficiency exam to test out of CS102?

- Yes
- No

#2 CS102 Pre-Course Survey (CSE)

5. Placement Exam for CS102 (cont.)

1. You indicated that you DID NOT take the CS102 Placement Assessment to place out of CS102.

Do you think you would have been able to pass it with a score of 75% of better if you had taken it?

- Yes
- No

6. Demographic Information

*** 1. What is your gender?**

- Female
- Male

2. Please indicate your ethnic background:

- African American
- Arab
- Asian/Pacific Islander
- Causasian/White
- Hispanic
- Latino
- Multi-racial
- Would prefer not to say

3. Which best describes the geographical location of the high school from which your graduated?

- Urban (city or densely populated area)
- Rural (area of low population density)
- Suburban (near a city)
- Not sure

7. Technology Training

#2 CS102 Pre-Course Survey (CSE)

1. Were you required to take a computer course in High School?

- Yes
- No
- Don't know

2. Were computer courses offered as elective classes at your high school?

- Yes
- No
- Don't know

3. How many computer classes did YOU take in High School?

- 0
- 1
- 2
- 3
- 4
- 5
- more than 5

4. Thinking back to the computer courses you took in high school, which of the following topics were covered?
(Select all that apply)

- keyboarding
- word processing
- spreadsheets
- databases
- PowerPoint/presentation software
- web page design
- networking
- basic programming

Other (please specify)

8. Time Online

#2 CS102 Pre-Course Survey (CSE)

1. On average, how much of your day is spent on the computer for academic or personal reasons?

- 0-2 hrs
- 3-4 hrs
- 5-6 hrs
- 7-8 hrs
- 9-10 hrs
- > 10hrs

2. Please indicate which of the following you do (or have done) during your computing time online:

- social networking (Facebook/MySpace)
- downloading music
- uploading/editing/sharing photos
- emailing
- online gaming
- virtual worlds (Second Life, World of Warcraft, etc)
- homework (completing/submittin)
- research
- shopping
- banking
- blogging
- twittering

9. Application Skills-Microsoft Vista

1. Please select "No" if you can NOT perform the given task described using Office 2007 and the Vista Operating system.

2)If you believe you CAN complete the skill,please rate how confident you are that you can complete the computer task described using Office 2007 and the Vista Operating system.

	No	10 (not very confident)	20	30	40	50 (moderately confident)	60	70	80	90	100 (very confident)
Create and name a new folder											
Open the Help and Support Center											
Add a new user account											
Change Firewall Settings											
Connect or Disconnect from a wireless network											
Change desktop background											
Change screen resolution											
Display the Windows Sidebar											
Launch/Connect to a Remote Desktop											
Back up your computer											

10. Application Skills -Microsoft Word

1. Please select "No" if you can NOT perform the given task described using Microsoft Word 2007.

For each skill you can do please rate how confident you are that you can complete the computer task using Microsoft Word 2007.

	no	10 (not very confident)	20	30	40	50 (moderately confident)	60	70	80	90	100 (very confident)
Create a new blank document											
Insert a JPEG file (picture) to a document											
Change bullet types											
Change Word's color scheme											
Show/Hide tracked changes											
Change line spacing in a paragraph											
Sort lists alphabetically											
Navigate a document using a document map											
Add a new source for a bibliography											
Hide/Show formatting changes in a document											

11. Application Skills-Microsoft Excel

1. Please select "No" if you can NOT perform the given task described using Microsoft EXCEL 2007.

For each skill you can do, please rate how confident you are that you can complete the task below using Microsoft EXCEL 2007.

	No	10 (not very confident)	20	30	40	50 (moderately confident)	60	70	80	90	100 (very confident)
Enter data into a cell											
Create a chart or graph											
Switch to a different view											
Display/Hide formulas											
Save a worksheet in different formats											
Filter column information											
Change text direction in a cell											
Use a "What-If Analysis"											
Set print options											
Format or modify text by using formulas											

12. Application Skills -Microsoft Access

1. Please select "No" if you can NOT perform the given task described using Microsoft ACCESS 2007.

For each skill that you can do, please rate how confident you are that you can complete the computer task using Microsoft ACCESS 2007.

	No	10 (not very confident)	20	30	40	50 (moderately confident)	60	70	80	90	100 (very confident)
Create a new database											
Create reports											
Create forms											
Create tables											
Import documents from Excel											
Export documents to Excel											
Change page orientation (portrait to landscape)											
Add attachments to records											
Create relationships between tables											
Create a back up copy of a database											

13. Application Skills - Microsoft PowerPoint

1. Please select "No" if you can NOT perform the given task described using PowerPoint (PPT) 2007.

For each item you can do (selected "yes"),please rate how certain you are that you can complete the computer task using Microsoft POWERPOINT 2007.

	No	10 (not very confident)	20	30	40	50 (moderately confident)	60	70	80	90	100 (very confident)
Adjust the contrast of an image											
Preview a presentation for printing											
Arrange images on a slide											
Create SmartArt diagrams											
Arrange the order of slides											
Rehearse presentation timing											
Package a presentation for a CD											
Add custom animation to an image											
Add sound files to a presentation											
Customize the slide master											

14. You selected that you are NOT currently enrolled in CS102

Since you have indicated that you are currently not enrolled in CS102, then you have completed the survey to our satisfaction. Thank you for your time.

15.

Thank you, you have now completed the survey.

16. Questions

[redacted] have questions about this study later on, please call the investigator Kathleen Morris at [redacted]

If you have questions about your rights as a research participant you may contact [redacted], The University [redacted] Research Compliance Officer, at [redacted]

APPENDIX D

POSTCOURSE SURVEY

CS102 Post-Course Survey (CSE)

1. Participant Information

The student is responsible for choosing to participate in this study. Agreement to participate is given by voluntarily participating in this online survey.

A printable copy of the Participant Information Sheet is available on the class website.

Grades will not be affected by participation/non-participation in this study.

*** 1. Please enter your campus wide ID(CWID)in the box below.**

2. I have read and printed a copy of the "Participant Information Sheet" on the class website and understand what I have been asked to do. I also understand that participation in this study is completely voluntary and I understand participation/non-participation will not affect my grade.

- I freely agree to take part in this study.
- I choose not to particpate in this study.

2. Student Confirmation

1. Please confirm that you are a UA student currently enrolled in CS102: Micro-Computer Applications.

- Yes, I am a UA student currently enrolled in CS102.
- No, I am not currently enrolled in CS102.

3. Initial Question

*** 1. How confident are you regarding your personal capabilities (as of right now) to use a computer to complete various tasks?**

	0 (not at all confident)	10	20	30	moderately confident	50 (moderately confident)	60	70	80	90	100 (totally conident)
personal computing ability											

4. Application Skills-Microsoft Vista

*** 1. Please select "No" is you can NOT perform the given task described using Office 2007 and the Vista Operating system.**

If you believe you CAN perform the given task described using Office 2007 and the Vista Operating system,please rate how confident you are that you can complete the computer task described.

	No	10 (not confident)	20	30	40	50 (moderately confident)	60	70	80	90	100 (highly confident)
Create and name a new folder											
Open the Help and Support Center											
Add a new user account											
Change Firewall Settings											
Connect or Disconnect from a wireless network											
Change desktop background											
Change screen resolution											
Display the Windows Sidebar											
Launch/Connect to a Remote Desktop											
Back up your computer											

5. Application Skills -Microsoft Word

*** 1. Please select "No" if you ca NOT perform the given task describe using Microsoft Office 2007.**

If you believe you CAN complete the given task using Microsoft Word 2007, please rate how certain you are that you can complete the task.

	no	10 (not confident)	20	30	40	50 (moderately confident)	60	70	80	90	100 (highly confident)
Create a new blank document											
Insert a JPEG file (picture) to a document											
Change bullet types											
Change Word's color scheme											
Show/Hide tracked changes											
Change line spacing in a paragraph											
Sort lists alphabetically											
Navigate a document using a document map											
Add a new source for a bibliography											
Hide/Show formatting changes in a document											

6. Application Skills-Microsoft Excel

*** 1. Please select "No" if you can NOT perform the given task described using Microsoft Excel 2007.**

If you believe you CAN complete the task described, please rate how confident you are that you can complete the task using Microsoft Excel 2007.

	No	10 (not confident)	20	30	40	50 (moderately confident)	60	70	80	90	100 (highly confident)
Enter data into a cell											
Create a chart or graph											
Switch to a different view											
Display/Hide formulas											
Save a worksheet in different formats											
Filter column information											
Change text direction in a cell											
Use a "What-If Analysis"											
Set print options											
Format or modify text by using formulas											

7. Application Skills -Microsoft Access

*** 1. Please select "No" if you can NOT perform the given task described using Microsoft Access 2007.**

If you believe you CAN complete the task described, please rate how confident you are that you can complete the task using Microsoft Office 2007.

	No	10 (not confident)	20	30	40	50 (moderately confident)	60	70	80	90	100 (highly confident)
Create a new database											
Create reports											
Create forms											
Create tables											
Import documents from Excel											
Export documents to Excel											
Change page orientation (portrait to landscape)											
Add attachments to records											
Create relationships between tables											
Create a back up copy of a database											

8. Application Skills - Microsoft PowerPoint

1. Please select "No" if you can NOT perform the given task described below using Microsoft PowerPoint 2007.

If you believe you CAN complete the task described, please rate how confident you are that you can complete the task using Microsoft Office 2007.

	No	10 (not confident)	20	30	40	50 (moderately confident)	60	70	80	90	100 (highly confident)
Adjust the contrast of an image											
Preview a presentation for printing											
Arrange images on a slide											
Create SmartArt diagrams											
Arrange the order of slides											
Rehearse presentation timing											
Package a presentation for a CD											
Add custom animation to an image											
Add sound files to a presentation											
Customize the slide master											

9.

Thank you, you have now completed the survey.

10. Questions

If you have questions about this study later on, please call the investigator Kathleen Morris at [redacted]

If you have questions about your rights as a research participant you may contact [redacted] The University [redacted] Research Compliance Officer, at [redacted]

APPENDIX E

IRB APPROVAL

Office for Research

Institutional Review Board for the
Protection of Human Subjects

THE UNIVERSITY OF
ALABAMA
RESEARCH

August 10, 2009

Kathleen Morris
Department of ELPTS
College of Education
Box 870290

Re: IRB#: 09-OR-232, College and the Digital Generation: Assessing and Training Students for the Technological Demands of College by Exploring Relationships between Computer Self-Efficacy and Computer Proficiency

Dear Ms. Morris:

The University of Alabama Institutional Review Board has granted approval for your proposed research

Your application has been given expedited approval according to 45 CFR part 46. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies

Your application will expire on August 10, 2010. If your research will continue beyond this date, complete the relevant portions of Continuing Review and Closure Form. If you wish to modify the application, complete the Modification of an Approved Protocol. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, complete the appropriate portions of the Continuing Review and Closure Form.

Please use reproductions of the IRB approved stamped participant information sheet to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sin[redacted]

Car[redacted]
Director & Research Compliance Officer
Office of Research Compliance
The University of Alabama

152 Rose Administration Building
Box 870117
Tuscaloosa, Alabama 35487-0117
(205) 348-5152
FAX (205) 348-8882

APPENDIX F

PARTICIPANT INFORMATION SHEET

UNIVERSITY OF ALABAMA

Participant Information Sheet for a Research Study

You are being asked to take part in a research study. This study is called *College and the digital gereration: Assessing and training students for the technological demands of college by exploring relationships between computer self-efficacy and computer proficiency.* Kathleen M. Morris, a doctoral student at the University, is conducting this study. Dr. Vivian Wright, who is an associate professor in Curriculum Studies at the University of Alabama, is supervising Ms. Morris.

What is this study about?

The purpose of this study is to explore the relationship between task specific computer self-efficacy (TCSE/SCSE) and computer proficiency regarding completion of tasks using the Vista operating system and Office 2007 applications: Word, Excel, Access and PowerPoint (PPT). This study also examines whether students enrolling in the introductory course are already computer proficient. Additionally, results will determine whether computer self-efficacy and performance increase after completing an introductory college-level computer course and whether there appears to still be a need to offer introductory computer courses at the college level. Assessment of the effectiveness of the task-based training product, SimNet for Office 2007, currently used in the University's introductory computer classes will also be addressed.

Why is this study important ---What good will the results do?

This study is significant because there is a growing interest and need for empirical studies regarding computer self-efficacy and computer performance especially as it pertains to proficiency testing at the post-secondary level. Many colleges and universities are eliminating introductory computer course requirements in favor of moving to a required computer-proficiency exam requirement. However, studies report that students are coming to college without the necessary computer applications skills they need to be successful in college and are not passing computer-proficiency exams despite students indicating high levels of computer self-efficacy. Findings from this study will add to the general literature base on the topics of basic computer proficiency skills needed by college students, computer self-efficacy and computer-proficiency, as well as, computer proficiency assessments and training. Additionally, the study will contribute data to the current debate regarding the need for introductory computer courses and/or proficiency testing at the post-secondary level.

Why have I been asked to take part in this study?

You have been asked to be in this study because you are at least 18 years of age and are currently enrolled in a CS102 course at the University of Alabama.

How many people besides me will be in this study?

UA IRB Approved Document
Approval date: 8/10/09
Expiration date: 8/9/2010

There are no foreseen risks to participating in this study.

How will my confidentiality (privacy) be protected? What will happen to the information the study keeps on me?

Your identity, pre-test/post-test proficiency scores, and survey responses will be confidential. Your CWID numbers (already used in the course) will be used in place of names on all documents. In addition, all files will remain password protected and available to the investigator only.

The reason for using your CWID on survey responses and to access course exam grades is as follows:

1) CWIDs are unique and there are no possibilities of duplication
2) CWIDs are already utilized in CS102 for logging into the CS102 lab and using the SimNet software. CWIDs can be used to authenticate your enrollment in CS102, eliminate use of data collected by students previously enrolled in CS102 that are attempting it a second time, and can easily be used for cross-referencing pre & post survey responses with proficiency exam scores which is essential to be able to do for the purposes of this study.

What are the alternatives to being in this study? Do I have other choices?

The alternative/other choice is not to participate.

What are my rights as a participant?

Taking part in this study is voluntary- it is your free choice. You may choose not to take part at all. If you start the survey/study, you can stop at any time. Leaving the survey/study will not result in any penalty or loss of any benefits you would otherwise receive.

The University of Alabama Institutional Review Board (IRB) is the committee that protects the rights of people in research studies. The IRB may review study records from time to time to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.

Who do I call if I have questions or problems?

If you have questions about the study right now, please ask them. If you have questions about the study later on, please call the investigator Kathleen Morris at (205)348-6363. If you have any questions about your rights as a research participant, you may contact Ms. Tanta Myles, The University of Alabama Research Compliance Officer, at (205)348-5152.

I have read this Agreement form. The study has been explained to me. I understand what I will be asked to do. I will print a copy of this participation form to keep. Agreement to participate is given by voluntarily completing the online survey for this particular study.

(A link to the survey will be placed here)

UA IRB Approved Document
Approval date: 8/10/09
Expiration date: 8/9/2010

Everyone currently enrolled in CS102 will have the opportunity to participate in this research. There are approximately 80 students enrolled in the summer term section of CS102 and approximately 2100 students are enrolled in CS102 for the fall 2009 term.

What will I be asked to do in this study?

If you decide to be in this study, you will be asked to do these things:

- You will be asked to take an online survey regarding your perceived abilities to completed stated computer tasks using Office 2007 Applications. You will also be asked to provide some basic demographic information as well as information regarding previous computer classes and use (on initial survey only).
- You will be asked to take the online survey again at the end of the semester.
- By taking the survey(s), you agree to allow the researcher access to your pretest & post test proficiency score from your course work for research purposes. Your identity, survey responses, and pretest/post-test scores will be kept anonymous. Confidentiality of participants will be maintained by restricting data access to the researcher. This will ensure that information remains confidential. Any sensitive data will be destroyed one year after the completion of the research study.

How much time will I spend being in this study?

Being in this study will take about 10-20 minutes of your time at the beginning and end of the semester to complete an online survey.

Will I be paid for being in this study?

You will not be paid for being in this study.

Will being in this study cost me anything?

There will be no cost to you except for you time in completing the online survey.

What are the benefits (good things) that may happen to me if I am in this study?

There are no direct benefits to you from being in this study other than a possible feeling of satisfaction knowing that you helped contribute to ongoing research to improve computer proficiency at the college level.

What are the benefits to educators?

This study will help educators/administrators learn more about student self-efficacy regarding the use of Office 2007 to complete tasks, student computer proficiency prior to taking an introductory computer course, and growth in student computer proficiency after completing an introductory computer course.

What are the risks (dangers or harm) to me if I am in this study?

UA IRB Approved Document
Approval date: 8/10/09
Expiration date: 8/9/2010