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The Impact of Computer Efficacy on the Success of the Nontraditional Community College Student

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THE IMPACT OF COMPUTER EFFICACY ON THE SUCCESS OF NONTRADITIONAL COMMUNITY COLLEGE STUDENTS

by

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Abstract

The purpose of this research was to determine the extent that computer-related factors affect the success of nontraditional college students. Since nontraditional students typically have fewer skills than traditionally-aged students, they may be less efficacious regarding their ability to use technology. Unfortunately, such reduced confidence may adversely affect the entire college experience for students, and ultimately, successful employment. The simple process of obtaining information on campus websites may be daunting enough; however, when students enter the classroom, they often find that course requirements include considerable amounts of computer use. Therefore, in addition to learning specific course content, nontraditional students must also learn how to operate computers and conduct Internet research. Such expectations may reduce the potential for college success.

To conduct the research, surveys were administered to students attending two Midwestern community colleges. Using the resultant data, various analyses were conducted to examine interactions between computer-related variables and course grades and completion rates. Results indicated that high school access was the most significant factor in determining computer efficacy in college students. The second most successful method of obtaining confidence was found among students who used computers for work. Students employed with computers also enrolled in more online courses than students who were unemployed or who worked in non-technical positions. Additional factors that correlated to efficacy were high-bandwidth Internet access and the availability of computer-related devices.

Although more nontraditional than traditional students withdrew from college classes in general, nontraditional students were not more likely to withdraw from computer literacy or online courses. Therefore, adult students seemed to compensate for their reduced proficiency by persisting in the classes necessary to improve skills. Computer efficacy appeared to be more critical than computer skills in online course enrollment. Students with greater confidence in their abilities enrolled in more online courses, even if their actual skills were lower than other students. Additional relationships between computer skills and efficacy and college success factors such as persistance and improved grades are also discussed.

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Chapter 1: Introduction

Computers and Internet technologies have penetrated and transformed nearly every facet of modern society. In fact, in many work, educational, and social situations, people are expected to have a certain level of computer skills and Internet access. Organizational leaders commonly enhance and often replace traditional transactions with electronic methods of performing business functions. Teachers give assignments to students that assume an ability to find and exchange information electronically. Marketing and promotional information includes web site addresses and online forms for numerous activities such as placing orders, submitting rebates, paying bills, posting reviews, and making contacts.

Colleges and universities and the students who attend them are no exception to this transformation. Over two decades ago, Edward Reingold of *Time* magazine conducted an interview with management consultant and writer, Peter Drucker. During the interview, Drucker's visionary comments predicted significant changes in education, resulting predominantly from advanced technology. He states:

> The printed book is primarily a tool for adults. The new tools are for children; they fit the way children learn best. We now know how to make the accumulated wisdom of the human race relevant again. We should know that the old approach to education is theoretical and unsound. We still believe that teaching and learning are two sides of the same coin, but we ought to realize that they are not: one learns a subject, and one teaches a person. The process is increasingly going to shift to self-teaching on the basis of new technology because we now have these self-teaching tools. (Reingold & Drucker, 1990, para. 3)

At the time of Drucker's interview, computer usage in higher education was expected only in the newly developing courses that specifically taught computer skills. Since that time, expectation has grown to include a certain level of computer mastery in almost all courses. The children of whom Drucker spoke are today's college students, and only twenty years after Drucker's prediction, computer skills are assumed in higher education as students are often required to write papers and perform other homework using word processing software, retrieve assignments and grades, register for classes, and communicate with the instructor and other students while online.

As a result, computer skills for higher education are almost necessary *before* entering college. According to Helium.com[1], one of the most commonly reported skills necessary for college is proficiency with computers. For most colleges, the majority of campus information is published online and prospective students are directed toward web sites for degree plans, course schedules, and online applications. Consequently, pre-existing skills and computer access are often expected as individuals proceed through the admissions process to obtain campus information and enroll for classes.

Ironically, some university administrators feel that students obtain such a high level of computer literacy between kindergarten and high school, that over a decade ago, teaching computer skill courses in college was no longer considered necessary (Kieffer, 1995). Since today's traditional college students have matured during the digital age and its proliferation of information technology, college officials believe that students will arrive at college technologically ready for the demands of higher education. However, one of the fastest growing segments of the student body may not be considered in this scenario: the group often referred to as the nontraditional student.

Typically, nontraditional students are classified as those over the age of 24 who enroll in college after several years away from education. However, the Department of

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[1] www.helium.com is a peer reviewed, user generated web site where active members post responses to titles. Poorly written or plagiarized articles are reported by other contributors.

Education, Institute of Education Sciences, extends the definition of nontraditional students. Delayed enrollment beyond high school graduation, family responsibilities, financial independence, and employment are considered in addition to age. The extent to which a student is nontraditional is determined by the number of these characteristics that a student possesses. If he has only one or two characteristics, he is minimally nontraditional; if she has many characteristics, she is highly nontraditional. Traditional students possess none of these characteristics. Research indicates that these attributes may be considered risk factors that can reduce the likelihood that a student will persist to graduation. According to a 2002 study by the National Center for Education Statistics (NCES), almost three quarters of all undergraduates meet at least one of these characteristics. Therefore, only one fourth of all undergraduates are completely traditional. A 2008 report by the Western Interstate Commission for Higher Education (WICHE) in conjunction with ACT and CollegeBoard raises another concern about how nontraditional students will impact higher education. According to that study, the number of high school graduates will decline between 2008 and 2015, suggesting that the number of traditional college students will further decline during those years (WICHE, 2008). Similarly, the U.S. Department of Education (2011) predicts that college enrollment among traditionally-aged students between 18 and 24 will increase a mere 12% between 2008 and 2019. However, enrollment among 25 to 34 year old students will increase 28% and enrollment among students over the age of 34 will increase 22%. Clearly, if this trend is realized, nontraditional students will represent increasing percentages of total college enrollment. In fact, nontraditional students are actually becoming the majority, or in effect, the traditional student. This group of students will have a significant impact on higher education, graduation rates, and the job market. It therefore becomes critical for teachers and administrators in higher education to understand and accommodate the specific needs of this student population (Copper, 2009). If we consider that the 34 and older age group was either well into or beyond compulsory education when Drucker predicted a shift in technology, one of these needs may well be skill development with information technology.

These students often lack the most basic computer skills. With older students, computers may not have existed during their high school years or the skills that they did obtain have become outdated. Unlike younger student peers, they lack the advantages that childhood familiarity with technology brings. Perhaps they gained computer skills in previous employment, but often those skills are specific to a particular position or industry. Although they may have become quite proficient with specific job responsibilities, they are unable to generalize those skills toward competently and comfortably performing other computer-related tasks. In any case, this group of students often enters the college environment unprepared for the demands of the new technological environment. Similarly, younger students who are financially disadvantaged may lack sufficient computer skills. Computer technology changes rapidly; therefore, people who cannot afford updated equipment and broadband Internet services often have less proficiency because of limited access to technology.

In addition to computer skills and access, students' personal beliefs in their abilities to complete computer-related tasks may affect what is often referred to as self-efficacy. "Self-efficacy" refers to a person's confidence in his or her ability to perform a specific act. Individuals with low self-efficacy are more inclined to abandon a task after less effort; those with high self-efficacy are more inclined to persist until completion. Strong beliefs in their abilities create the expectation that they can accomplish their goals; therefore, they will exert more effort toward them. The term “computer efficacy” refers to a person’s belief in his or her computer skills. If low self-efficacy negatively impacts persistence, then low computer efficacy among college students may cause them to avoid higher level technical courses or abandon college before earning a degree or accomplishing other educational goals.

The purpose of this study was to examine the effect that computer skills and computer efficacy have on the success of nontraditional community college students as they pursue their educational goals. Additionally, the extent of nontraditional characteristics that students’ possess were examined to determine if highly nontraditional students can be expected to successfully complete classes and persist toward graduation.

Background of the Study

The traditional college student who entered the halls of higher learning in the fall of 2012 was born in 1994. In that year, public access of the Internet had just begun, but increased dramatically throughout the decade. According to the U.S. Census Bureau, in 1993 only 22.8% of individuals had computers at home and 53.8% of children had access to a computer at school. By 2000, 65% of children had access to a computer at home and 30% of American families with children had access to the Internet at home (Newburger, 2001). In 2009, computer ownership and Internet access at home had increased to 76.6% of all children between the ages of 3 and 17 (United States Department of Labor, 2010).

The proliferation of technology during this time has had a significant effect on students and their ways of learning. Traditional college students, often called millennial students, the Y generation, net generation, or digital natives, have been exposed to computers all of their lives (Kennedy, Judd, Churchward, Gray, & Kraus, 2008). According to Prensky (2001a):

> Today's students – K through college – represent the first generations to grow up with this new technology. They have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age. Today's average college grads have spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games (not to mention 20,000 hours watching TV). Computer games, email, the Internet, cell phones and instant messaging are integral parts of their lives. (p. 1)

As a result of this digital exposure, these students have developed a certain level of ease when using information technologies. They are not intimidated by the constant barrage of innovative devices and applications to which they have become accustomed. Since computer technology becomes outdated and is replaced so frequently, millennial students can quickly apply their existing computer skills to new innovations. This adaptive capability among youth dramatically reduces or even eliminates apprehension toward new digital devices and applications. Older individuals often lack this ability and consequently approach new technology with greater trepidation.

In 2011 Alan Tripp, CEO of Inside Track, posted the following on the *Washington Post*, College Inc. blog: "Roughly 40 percent of America's college students are nontraditional students. They are workers who've gone back to school, former members of the military embarking on new careers and single parents wanting to do better for their families" (para. 1). College enrollment of nontraditional students is normally preceded by a change in family or employment circumstances. They have lost their jobs, finished military service, become widowed or divorced, or simply seek a career change; therefore, they return to college for training to sharpen skills in an existing job, to prepare for new employment, or because life's circumstances have allowed them to pursue a path that wasn't an option when they completed high school.

In spite of such increased collegiate opportunities, nontraditional students often fail to accomplish their educational goals. Tripp (2011. para. 4) indicates that nearly two-thirds of nontraditional students drop out of college before earning a degree. He cites data that reveal several factors for this problem among adult students:

- balancing work, family and school;
- managing finances;
- effectively completing complex projects;
- lack of commitment to graduation;
- health problems; and
- lack of support (para. 5).

Two of these concerns, the ability to effectively complete complex projects and lack of support, may relate to the level of technological preparation of the entering student.

Unfortunately, the proliferation of computer technologies may be a double-edged sword for some returning students. They often turn to college to gain the experience that will prepare them for the workforce, with computer-related skills a significant component of the new skill sets expected, if not required, in the new job market. However, colleges and universities also expect a certain level of computer skills, even before classes begin. Students who are already anxious because of a major lifestyle change may encounter additional stress and intimidation if they feel underprepared for the very classroom that is intended to train them for future employment and ultimately, a better lifestyle. According to Saadé and Kira (2009), individuals who suffer from technological anxiety may feel stress before they actually interact with computers: "Frustration, confusion, anger, anxiety and similar emotional states can affect not only the interaction itself, but also productivity, learning, social relationships and overall well-being" (p. 179). Consequently, potential students who already feel pressure to succeed in college become even more anxious when facing unfamiliar computer technology.

Purpose of the Study

Typically, nontraditional students enter college with discernibly lower levels of computer skills than their younger, traditional classmates. Although the lack of skills alone may decrease the chance for success in college, a negative perception of one's computer skills (computer efficacy) may further increase the likelihood of academic failure. The purpose of this study is to determine the extent that college success, as measured by course grade, course completion, and cumulative grade point average (GPA), is affected by a student's computer efficacy, computer skills, and computer and Internet access. If relationships exist between these factors, it may be necessary for leaders in higher education to increase efforts to remediate computer skills early in the college experience. If skills and consequently, computer efficacy are improved, students may have greater persistence in college and success in future employment.

The research questions examined in this study were:

- Do factors such as gender, age, computer experience, computer access, and amount of computer use affect computer efficacy?

- Does a student's level of computer efficacy affect his or her success in college?

Two hypotheses were tested:

- There is a positive relationship between gender, age, computer experience, computer access, amount of computer use and computer efficacy.

- Students with diminished levels of computer efficacy are less successful in college.

Theoretical Framework

The theoretical framework underpinning this study comes primarily from Albert Bandura's work involving self-efficacy. Self-efficacy refers to an individual's judgments of personal capability; it reflects a person's belief about whether he or she can succeed in a particular situation. Bandura progressively developed this line of reasoning through years of research. When he began his studies in psychology, social learning theory was the dominant theoretical approach. Most experiments were conducted in an attempt to explain how learning was impacted by Freudian and Skinnerian social development concepts, which primarily focused on learning as a result of direct reinforcement. However, Bandura believed that people could also learn as a result of vicarious modeling through observation and imitation. Social learning theory was a broad paradigm that encompassed work from a variety of distinct views. Bandura's focus on social modeling led to a specific approach regarding motivation, thought, and action. He labeled this approach social cognitive theory. (Pajares, 2004)

With social cognitive theory of human functioning, Bandura describes a model of triadic reciprocal causation in which human actions are influenced by three determinants: internal personal factors, individual behavior, and the environment (Bandura, 1997). As a result of these forces, people can actively participate in their environments rather than merely exist as products of their environments. In other words, people have the ability to proactively influence and change their own lives.

Ultimately, Bandura's theory of self-efficacy evolved from social cognitive theory. People plan and set goals according to expected consequences. When people believe they are unable to affect the adversities in their lives, they may experience stress, a sense of hopelessness or indifference. These individuals have a low level of efficacy and are less inclined to make any outcome-altering changes because they believe that such effort is futile. However, a belief in one’s ability to create change can become a powerful incentive. According to Bandura (1997), an individual’s belief in self-efficacy influences his or her actions. A high level of self-efficacy will increase an individual’s tenacity and resilience to adversity and the person will exert more effort and spend more time on challenging tasks. Conversely, inefficacious individuals may become discouraged and give up with a minimal amount of effort. As a result, they feel they don’t have the power to achieve and don’t exert much energy toward accomplishing goals. Thus, the amount of effort that people expend depends on their perceived ability to succeed. They perform better simply because they have confidence in their ability to do so. (Bandura, 1997)

To some degree, self-efficacy is situational in that a person can feel quite confident about certain skills and abilities, but much less capable in others. An older adult student may be a capable mother and automobile driver, for example, and feel comfortable nurturing her children or navigating the city in which she lives. But placed in a classroom where it immediately becomes evident that computer skills are expected, the same woman feels completely inadequate. Since students over the age of 30 reached adulthood before the popularity of computer and Internet use, Bandura’s theory suggests that they might feel a lack of self-efficacy when faced with expectations of computer usage in a new, educational setting.

Methodology

A survey instrument was developed to collect data regarding community college students' technical skills and computer efficacy. It was administered at the beginning of the fall 2012 semester to students in various classes at two community colleges. In addition to demographic information, the survey included questions that assess the individual's access and use of Internet technologies and computer-related devices as well as their perceived level of aptitude (computer efficacy). At the end of the semester, course grades, completion rates and cumulative grade point averages (GPA) of participating students were collected.

Various multiple regression, independent-samples t-tests, and Pearson correlation analyses were conducted using SPSS version 20 to determine relationships between variables. Initially, Pearson correlation coefficients were calculated for each variable to determine the strength and the direction of the individual relationships to the dependent variables. These results indicated if the correlations were statistically significant. Additionally, a level of significance (p value) of less than .05 was used. Thus, there was no more than a five percent chance that differences between the participants in the study were due to reasons other than computer literacy.

Definition of Terms

For the purpose of this study, the following definitions will be used for key terms and phrases:

- ***Traditional student*** refers to a college student who enters college in the semester following completion of high school. He or she is typically between the ages of 18 and 24 and completes matriculation by taking courses consecutively. This student enrolls full time (at least 12 credit hours per semester), is neither part- or full-time employed, and is financially dependent.

- ***Nontraditional student*** refers to a college student who has delayed entering college. He or she is over the age of 24 and may or may not have attended college previously. In addition to age, this student typically exhibits other characteristics such as family responsibilities, financial independence, and employment obligations.
- ***Nontraditionality*** refers to the degree of nontraditional characteristics that students possess. These characteristics include age, employment status, marital status, the presence of children, full- or part-time status in college, and financial independence. Students with higher levels of nontraditionality exhibit more characteristics than those with lower levels.
- ***Part-time students*** are enrolled in 11 or fewer credit hours.
- ***Full-time students*** are enrolled in 12 or more credit hours.
- ***College success*** is measured by the completion of the course in which the student was surveyed; an unsuccessful student either withdrew from the class or finished with a grade of F.
- ***Information technology (IT)*** refers to the use of information utilizing computer systems and the Internet.
- ***Self-efficacy*** refers to a person's belief in his or her ability to succeed in a particular situation.
- ***Computer aptitude*** refers to an individual's ability, talent or capacity for learning how to use a computer and other related technologies.
- ***Computer efficacy*** refers to an individual's belief in his or her ability, talent or capacity to use or learn how to use a computer and other related technologies.
- ***Course management system (CMS)*** refers to an online system of software that is specific to college level coursework. It may be used in the traditional or online classroom environment. Instructors may upload assignments and other course-related materials for students to retrieve

through a web browser. Grades may be posted, multimedia objects presented, and discussions and chats may be conducted.

- ***College Division*** refers to one or the other of the two main community college divisions: Career and Technical Education (CTE) or Arts and Sciences (AS). CTE courses are designed for terminal, two year Associate of Science or Applied Science degrees, and AS courses are designed to transfer to four-year institutions as Associate of Arts degrees.
- ***Course delivery method*** refers to the method used to conduct the course; i.e.: online courses, traditional in-class courses, or hybrid courses (a combination of both methods).
- ***Traditional*** or ***face-to-face course*** or ***classroom*** refers to a physical classroom setting in which the instructor and students participate synchronously.
- ***On-line course*** refers to a virtual classroom setting in which the instructor and students contribute asynchronously using computer and Internet technologies.

Delimitations

Students at two community colleges were surveyed for this study. Both colleges are rural. They are public institutions that are supported by tuition, local tax dollars, and state funding. High percentages of nontraditional students enroll in both of these community colleges. The majority of students in both colleges utilize grants and other forms of financial aid to cover their tuition and other expenses.

To reduce possible bias in the research, printed surveys were used in the traditional classroom, but web-based surveys were used in the on-line courses. If computerized surveys were used in the traditional classroom setting, students who have low levels of skills or computer efficacy may not have participated.

Limitations

A significant limitation to this study was that students from only two community colleges were surveyed. Additionally, these colleges were proximally located within 35 miles of each other. The colleges were Midwestern; therefore, results may not generalize to different geographical locations, such as the northeastern or western parts of the country. Both colleges were considered rural, but the larger of the two was within 40 miles of a large, metropolitan area and drew many students from that city. Consequently, economic variances between the two could have a significant impact on accessibility of computer and Internet technology, which may affect computer efficacy. To compensate for this limitation, results from each community college were compared to identify any differences among the colleges. Additionally, the courses selected for the survey were expected to have different results. For example, students enrolled in online courses may have had higher levels of computer efficacy than those enrolled in traditional courses.

A number of factors influence self-efficacy. Nontraditional students face many challenges when returning to college, any of which may negatively impact their perceived level of success. Deficient computer skills are only one of those factors. Therefore, other factors such as work and family obligations must also be considered when a nontraditional student struggles or ultimately drops out of college.

A section of the survey included questions that convey the individual's perception of his or her aptitude in using computers and Internet technologies. These questions were independently subjective and did not provide a perfectly accurate comparison across all participants. Previous research indicated that males may have higher perceptions of their capabilities than females even when skills are demonstrably similar. Likewise, nontraditional students may have a self-perception that is understated when compared to traditional students with equivalent skills.

Because of the subjective nature of some open-ended questions (number of hours spent on a computer per week, percentage of college classes using email, etc.), responses that were more than two standard deviations from the mean were eliminated as outliers.

This research focused primarily on the differences between traditional and nontraditional students, as well as the extent of nontraditional characteristics (nontraditionality) exhibited by students who were traditionally-aged. Results were expected to indicate that traditional students have some of the same issues as nontraditional students. An assumption was that traditional students have greater access and increased computer efficacy due to access at a younger age. This may not be the case.

Several of the predictor variables were closely related: experience with computer technology, access to computers and Internet technology, amount of computer and Internet use, and computer efficacy, thereby producing the possibility of multicollinearity. These similarities created some difficulty in identifying unique relations between each predictor variable and the dependent variable.

Both colleges used adjunct instructors for many evening and weekend courses. Because of the poor response rate from adjunct instructors at College B, the classes surveyed were either traditional day courses or online courses. If higher numbers of nontraditional part-time students attend during the evening, this population of students may have been under-represented at this college.

A large percentage of the nontraditional sector of the sample was female. Consequently, women and nontraditional students appeared to share many of the same characteristics. As a result, it was difficult to determine if certain outcomes were the result of gender or age.

Finally, increasing numbers of foreign-born individuals reside in the United States. It is expected that these populations will soon comprise a significant portion of the workforce. To properly maintain a competitive workforce, it will be critical for these groups to be educated, particularly in science, math, and technology. Although very few of the participating students in the study were foreign-born or minority students, they may be expected to have many of the same issues as the nontraditional students in the study. If this is the case, the importance of recognizing and addressing problems related to low computer efficacy is even more critical.

Significance of the Study

Nontraditional students often return to college to gain the skills that they lack for a new career or for advancement in current employment. They may have lost their jobs to outsourcing or some other economic hardship or simply wish to improve their standards of living. Frequently, these individuals are experiencing other life-changing circumstances as they return to the classroom. They feel pressure to succeed in college because they recognize the benefits that a degree can offer them and their families.

These students may not have been exposed to computers during their youth and therefore may lack the second-nature efficacy with digital technology that younger generations possess. All of these factors can create a frustrating environment for nontraditional students. They feel vulnerable and intimidated by the very environment that they rely on to increase their opportunities for an improved lifestyle.

Rosenfeld (1978) observed that the success of college students is impacted by their perceived level of anxiety. Students who feel anxious about events in the classroom may not have positive learning outcomes. Since anxiety interferes with learning, then it becomes a teaching problem. Therefore, "effective teaching ought to incorporate efforts to handle the problem of anxiety associated with learning" (Rosenfeld, 1978, p. 151). Although a survey of instructors indicated that anxiety in the classroom was a teacher's responsibility, problems arise when the anxiety is not noticeably prevalent among many students in the classroom. If only a fraction of the students are experiencing anxiety, the teacher may not be aware that it exists and therefore cannot effectively address it. This particularly may be true with a number of nontraditional students who share a classroom with younger, traditional students. They assume that their classmates are experienced with computers and don't share the same problems. Consequently, the older students may be reluctant to voice their concerns, either because they are embarrassed about their lack of skills or because they are concerned about reducing the pace of instruction.

If a lack of computer skills adversely affects the efficacy of nontraditional college students, their educational goals may not be realized. Increased stress that results from a lack of skills or a perceived lack of skills may induce students to avoid classes that require a significant level of computer usage. Therefore, frustration may prevent these students from taking advantage of opportunities such as online or high-level computer courses, or it may prevent them from reaching their fullest potential in such courses. Often, these types of courses are the key to future employment success. In the worst case, students may become discouraged to the point that they drop out of school, never realizing their goals and dreams. Unfortunately, this may negatively impact future employment opportunities and levels of affluence for generations to come. It is critical for educators to recognize and address computer-related anxiety so that specific training in basic computer and Internet skills may be provided early and in a non-threatening environment. Ideally, such efforts will improve computer-related efficacy and ultimately, reduce frustration and stress caused by college expectations.

Organization of the Study

The remainder of the study is organized into four succeeding chapters and a bibliography. Chapter Two presents a review of existing literature that portrays the current status of nontraditional students in the educational setting as well as workforce trends. Significantly, the chapter will demonstrate the need for this study by revealing the lack of previous research. Chapter Three describes the research design, instrumentation, methodology, and sampling procedures undertaken for this study. Presentation of the collected data will be undertaken in Chapter 4, and Chapter 5 will contain an analysis of that data, a review of its significance to self-efficacy theory and learning practice, a summary, conclusions, and recommendations for further research. The study concludes with a bibliography.

Chapter 2: Literature Review

Computer and Internet skills have become a practical necessity in today's business and education world. A mere two decades ago, the Internet was an extravagance that allowed academics to perform research and for those fortunate enough to have access, convenient ways to make hotel and airline reservations. Today, most business and organizational leaders assume that people have access to computers and the Internet and they expect that access to be a primary interface with customers. As a result, proficiency with computers has become indispensable for performing many daily activities. People who lack these critical skills and adequate access to computers and the Internet are becoming increasingly disadvantaged. They have limited methods of communication, very few avenues for managing financial transactions, less access to important information, and fewer job opportunities.

The Changing Workplace

Just as computer skills are expected among consumers, increasing numbers of occupations require a certain level of computer literacy. In addition to general computer proficiency, individuals who are employed in computer-enabled industries must have the skills to competently utilize computer-generated results for solving business problems (Hindi, Miller, & Wenger, n.d.). Unfortunately, a significant gap, or "digital divide" exists between skilled and unskilled individuals, creating a distinct vocational disadvantage for the less proficient. Furthermore, according to a U. S. Census Bureau report by Julian and Kominski (2011), individuals with higher levels of education are expected to earn greater salaries. Median annual earnings for those with less than a high school diploma are below $11,000. While a high school diploma significantly increases annual earnings to $21,500, an associate degree increases earnings to $32,600. Likewise, a bachelor degree provides approximately $42,700 in yearly income. Additional advantages of college degrees are greater likelihood of full-time employment and less probability of unemployment during economic downturns. According to Julian and Kominski (2011), only 38% of those with less than a high school diploma are employed full-time, while 62% of those who possess college degrees work full-time. Clearly, those with full-time employment typically earn higher salaries and have additional benefits such as health insurance and retirement benefits. Evidence also indicates that the most recent economic downturn was an “education” recession. Unemployment rates that are delineated by academic achievement reveal a distinct disadvantage to the less educated.

According to Bureau of Labor Statistics for December 2009, which was among the lowest points in the recession, 15.7% of those with less than a high school education were unemployed, while only 4.7% of those with a bachelor degree held the same status. The average unemployment rate for all workers that same month was 10%. These differences in wages and employability indicate that the workforce favors employees with greater skills. Jobs are becoming increasingly technical; many of the low-skilled jobs that were lost during the recession will not return, at least not in their previous conditions. The success of the future economy will depend on a workforce with greater technical skills and higher levels of education.

A longitudinal study conducted by Arum, Cho, Kim, and Roksa (2012), indicates that beyond earning a college degree, critical thinking skills are highly desired in the workforce. The study correlated post-graduate accomplishments of students with their academic performance. Students with the lowest levels of performance as measured by Collegiate Learning Assessment (CLA) scores, who spent the least amount of time studying, and who took classes with fewer reading/writing requirements, ultimately fared worse when entering the job market. Graduates who scored in the bottom 20% of the CLA were three times more likely to be unemployed than those who scored in the top 20%. Similarly, 80% of employers expect college graduates to enter the workforce with a significant level of computer-related skills, and they rate this skill level as an important or very important factor when making hiring decisions (Johnson & Wardlow, 2004). They not only expect basic computer application experience, but also expect potential employees to have expert thinking and communication skills that stem from an extensive background in technology (Levy & Murnane, 2004). These results indicate that poorer educational experiences, even when degrees are earned, can be debilitating long beyond graduation.

Consequently, colleges and universities must not only consider graduation rates, but should also develop standards that will improve the quality of education, particularly in areas related to technology. Likewise, students must be sufficiently qualified and motivated to pursue rigorous courses that will provide them with technical and critical thinking skills necessary to succeed in the 21st century workforce.

The technological and economic environments in the market have created incredible industrial changes. Corporations have become dynamic institutions that must continually transform just to remain competitive; likewise, employees must persistently upgrade skills to maintain job marketability. In previous generations, workers commonly remained with the same company from high school or college graduation until retirement.

Today, employees commonly change jobs several times throughout their careers. Sometimes these transitions are voluntary, but often they are required as companies merge and downsize. Either way, prudent individuals must take advantage of lifetime-learning opportunities to prepare for changes in the future job market. (Miller-Brown, 2002)

Nearly every facet of employment has been affected by computerization, either positively or negatively. Many low-skilled and repetitive jobs have been eliminated by technology as computer programs are developed to replace them. By the same token, a new technology-driven environment has emerged, producing exciting, high-salaried jobs for properly skilled individuals. The resulting employment opportunities can be bilaterally divided into lucrative professional careers and unskilled jobs for the working poor. The advent of computers is ultimately responsible for both situations.

In 2004, Levy and Murnane stated that “computers have become the infrastructure of the global economy” (p. 2). As they create excellent job opportunities in fields that rely on knowledge and increased productivity, they also assist industries in outsourcing routine manufacturing jobs to countries with cheaper labor. Those who once held the eliminated positions must either be retrained for technology-related professions or accept low paying jobs. Thus, the dichotomy allows the skilled to become wealthier and pushes the unskilled farther down the economic ladder. Recent statistics support this claim: Levy and Murnane (2004) found that in 1979, college graduates only earned an average of 17% more than their high school counterparts. Today, the same data reveal that the difference in income between the groups has jumped to 50%.

With the decrease in the blue-collar economy, college degrees are pivotal in reaching middle class. According to Carnevale, Smith, and Strohl (2010), a college degree now is necessary simply to maintain a middle-class lifestyle. Currently, the middle-class is declining; those with bachelor degrees and higher have either remained in the middle class or ascended into the upper class. Those who have a high school diploma or less, or earned some college credits without earning a degree are moving downward in the socio-economic rankings. These statistics are drastically different from the 1970's, when 60% of high school graduates earned a middle-class income. In 2007, only 45% of high school graduates were in the same socio-economic class. Clearly, without increases in technical skills and college degrees, greater numbers of American families fall into poverty.

Changing Demographics

According to the Bureau of Labor Statistics (2011), the number of foreign-born workers in the United States increased in 2010 while the number of native born workers declined. Nearly half of all foreign-born workers are Hispanic. A significant percentage (26%) of foreign-born participants in the labor force have not finished high school, compared to 5.4% of U.S. born individuals who are actively employed. However, similar percentages between the groups have earned a bachelor degree or higher (31.1% of foreign-born and 35.3% of natural born). Not surprisingly, foreign-born individuals tend to earn less compared to those born in the United States, but a college degree equalizes earning power between the two populations. Interestingly, although the likelihood of earning a four-year degree is comparable, foreign-born workers are considerably less apt to have earned an associate degree or to have received some college credits without earning a complete degree (17.1% of foreign-born and 29.9% of natural born).

The U.S. Department of Commerce Current Population Survey (2010) reports that a significant disparity exists between ethnic groups regarding Internet access in the home. While 71.36% of all whites had access at home at the time of the 2010 survey, only 52.52% of blacks and 47.48% of Hispanics had the same level of access. Level of income also accounts for disparities in home-based access. Over 91% of households with an annual income of $150,000 or more reported Internet access, while only 46.91% of households with annual incomes of $20,000 to $24,000 had access. A third factor that affects access is education. Over 87% of individuals with a bachelor degree or higher had home access to the Internet, while less than 57% of those with a high school diploma or a GED had the same access.

These statistics indicate an alarming trend. Greater proportions of minorities are entering the U.S. workforce with lower educational levels and less access to computers and the Internet. Generally, those who do not have a computer and Internet access in the home will not develop and use technical skills. Therefore, it will be more difficult for minorities to qualify for higher salaried technical positions. Additionally, if the percentage of skilled individuals decreases, increasing numbers of high-tech jobs will not be adequately filled and may move abroad.

According to an msnbc.com article by Johnson (2010, para. 6), there are millions of Americans who are challenged by a lack of adequate computer skills. For these individuals, finding a job can be difficult. Johnson reflects on the lack of available research regarding the computer skills of Americans, which makes it impossible to determine the impact that computer illiteracy has on unemployment.

Johnson also refers to U.S. Bureau of Labor Statistics data that reveal that the most rapidly growing group of unemployed individuals is Americans who are older, less educated, and who lack Internet access at home (Johnson, 2010, para. 9). To further compound the problem, many unemployed individuals are directed to online portals to apply for potential jobs. Johnson cites officials from an Oahu, Hawaii online job service who stated that 60% of their applicants had insufficient computer and Internet skills to navigate the online jobs network. Johnson also cites an Ohio report which observed that “many job seekers’ computer literacy fell short of what government agencies assumed when they tried to direct users to online systems” (Johnson, 2010, para. 19). This researcher recently discussed an identical issue with an unemployed Missouri father of eleven. In his late fifties, he had never had a job that required the use of a computer. When he became unemployed, he required assistance in turning on a computer and completing online applications at a local job service office.

Although the current job shortage continues, some paradoxically predict that labor shortages may eventually dominate. Historically, when recessions end, the economy expands significantly and new jobs are abundant. As the baby boomer population reaches retirement age, the U.S. will experience a shift in the age population. Census Bureau data predictions indicate that between 2015 and 2030, the increase in individuals aged 55 and over will be over twice the increase of individuals between 20 and 54. If older people retire at the same rate as they have in the past, labor shortages will proliferate as a result of reduced participation in the labor force. There won’t be enough workers to meet employment demands (Bluestone and Melnik, 2010, p. 6). An additional study conducted by the Georgetown University Center on Education and the Workforce indicates that 46.8 million job openings will exist in 2018. Of these, 63% will require workers with at least some post-secondary education. Over one third will require a minimal of a bachelor degree. A significant factor in this demand for higher education is the growth of the computer technology industry.

However, many Americans now work beyond retirement age. With increasing lifespans, some choose to remain active by working longer, while others work out of necessity because of poor health care options or insufficient retirement funds. Although the delayed retirement of baby boomers seems promising for labor shortages, the primary problem facing the labor force is a lack of the skills necessary to perform available jobs.

Ironically, even as many people lost jobs during the most recent recession, thousands of high-salary technical jobs were unfilled due to a lack of available talent. These vacant positions create a double-edged sword; in addition to lost income for the unemployed, these high-tech jobs typically create the innovative products that are necessary for a growing economy. The skill deficiencies are in the areas of science, technology, engineering, and mathematics (STEM). Projections indicate that approximately 800,000 new engineers will be needed by 2018; however, the U.S. currently graduates only one fourth of that number. Women and minorities are potential prospects for meeting this need because they are projected to fill approximately 70 percent of the job market at that time. However, they currently compose only 20 percent of the existing STEM-related job market. Consequently, it is critical for the American higher education system to provide sufficient training to fill technical skills gaps in all students, particularly those within the growing populations of minority and older workers. (Elias, 2011)

Computer and Internet Technology in Higher Education

Just as technology has transformed the workplace, it has impacted higher education. When computer technology was introduced in the educational environment, it initially was used as a research and data analysis tool by a very limited group of academics. As computer use became more common in other parts of the academic and business world, computers were used to teach basic information literacy and application skills to students. Administratively, computer systems ultimately replaced all forms of records management, from student registration to student and employee accounting. Eventually, that mix included electronic forms of communication, specifically via email and web sites, as well as online platforms for delivering web-based instruction.

Today, colleges frequently implement popular social networking sites, such as Facebook, Twitter, and text messaging for sharing important campus news. Computer and Internet technology use is also increasing in the traditional, face-to-face classroom. At one time, the use of computers was only expected in classes that specifically taught computer skills or for online courses. However, today most courses are developed with the expectation that computers will be used in some capacity. Selwyn (2007) suggests that universities are moving from a "bricks and mortar" environment to one of "clicks and mortar" as institutions attempt to blend technology into all areas of instruction: face-to-face and independent study as well as the typical online format. Course management systems such as Blackboard and Moodle, which were originally developed for web-based instruction, are now proliferating as supplements in traditional classes. The University at which this research is being done, for example, now provides a Blackboard site for every course, with an expectation that every student will be able to access it and use its tools. These technological tools can greatly enhance and accelerate all forms of teaching and learning. Assignments can be posted by instructors and then submitted by students, resulting in improved efficiency since the process is not restricted to class time. Students can obtain more timely and comprehensive results since class grades can be automatically calculated and displayed as soon as assignments have been scored. Tests can be created and delivered via the computer, resulting in the benefits of more efficient assessment design, less paper usage and automatic scoring.

Perhaps one of the most valuable benefits is improved communication between students for group work, and especially between the instructor and students. Often, students are more comfortable with sending questions through email messages to the instructor rather than asking them during class (Johnston & Oomen, 2005). Online discussion boards, chats and announcements are also beneficial in sharing information. An added benefit is that communication and assignment retrieval and submission can occur at any location and any time, rather than within a few isolated hours per week.

Internet access also increases research opportunities for students and professors since the most current and comprehensive studies are available online and state libraries often are networked, allowing students and scholars to search records that previously were unavailable. An effective educational experience increasingly depends on a student’s ability to find relevant information online and synthesize the results.

College and university administrators recognize the significance of maintaining and promoting state of the art technology in and out of the classroom. This position is reflected in the proportions of campus budgets that are allocated to technology (Selwyn, 2007). In addition to educational benefits, many higher education administrators discover that information technology may help reduce academic costs during periods of increased enrollment and decreased funding (Eynon, 2008). Increased web and hybrid courses don't require physical locations, so classroom spaces are used more efficiently. A significant benefit of online learning is the flexibility of course delivery. Many students have family and work obligations that prevent them from attending classes during traditional class periods, so web-based courses allow them to obtain an education and keep their other obligations intact. Online communications, announcements and assignments also reduce paper costs.

In addition to the benefits of technology for improving efficiencies in the teaching and learning environment, computer training is necessary for producing graduates who are capable of meeting current and predicted employment demands and ultimately, for economic advancement. Skills needed to meet the needs of technology driven industries are in high demand (Hindi, Miller, & Wenger, n.d.).

Colleges and universities are typically the best option for obtaining skills if a student has not acquired them at home or during elementary and secondary schooling; however, the gap continues to widen between the predicted needs in the job market and sufficiently trained college graduates (Missouri Department of Higher Education, 2008). Colleges and universities are not producing enough highly skilled graduates to meet industrial demands, which is critical for economic improvement. With so many displaced workers resulting from technological and economic forces, it is essential for them to adequately prepare for the new economy rather than settle for low-skilled positions that do nothing to advance the family home or society in general. According to a Higher Education Funding (HEF) Task Force report by the Missouri Department of Higher Education (2008),

> The ability of the state to attract new businesses and support entrepreneurial ventures is dependent on the availability of a highly educated workforce equipped with technology expertise and skills that enable them to be productive in a fast-paced knowledge oriented economy. (p. 27)

Computer literacy courses were once common on the college campus; however, Kieffer (1995) recognized over a decade ago that many universities were beginning to eliminate these courses. Higher education administrators believed that courses of this type were becoming obsolete. They considered most students entering college to have sufficient levels of computer skills, which had been obtained between kindergarten and high school. The problem with this belief is that computer literacy is not a static skill set; it constantly evolves with every system upgrade and Internet application development (Hindi, Miller, & Wenger, n.d.). Additionally, more and more students are returning to school many years after high school graduation. Often, their K-12 educations did not include computer literacy.

If removed from academia and a technical career for five years, a highly skilled individual's training will become obsolete, and the individual will be difficult to employ. Rugaber (2010) quotes David Altig, research director at the Federal Reserve Bank of Atlanta in an October 2010 Associated Press article:

> …Workers aren't just being asked to increase their output, Altig says. They're being asked to broaden it, too. (para. 10)
>
> A company might have had three back-office jobs before the recession, Altig said. Only one of those jobs might have required computer skills. Now, he said, "one person is doing all three of those jobs – and every job you fill has to have computer skills." (para. 11)

Rugaber notes that this trend is creating more difficulties for the unemployed in finding jobs. Those who have lost jobs in manufacturing and construction fields don't qualify for jobs in growing sectors that require specific skills; however some of the unemployed don't even qualify for their old positions. According to Rugaber (2010), "Frustrated in their efforts to find qualified applicants among the jobless, employers are turning to those who are already employed". Consequently, the need for both introductory and advanced computer courses in the college environment is essential for meeting the needs of the workforce. Community colleges, in particular, are ideal for training unemployed adults.

According to the U.S. Department of Education, as cited in Kaminski, Seel, & Cullen (2003, p. 35), information literacy can be defined as "computer skills and the ability to use computers and other technology to improve learning, productivity, and performance". In 1999, the National Research Council (NRC) and the Computer Science and Telecommunications Board collaborated with college and university faculty and staff to provide a more profound definition. This consortium defined information fluency as a combination of three discreet concepts: information literacy, computer literacy and critical thinking skills. These three components are equally significant in developing a comprehensive understanding of information technology.

- Information literacy includes a general understanding of computers and networks.
- Computer literacy includes skills with general computer applications.
- Critical thinking skills include the ability to apply technology to solve complex problems.

Consequently, students should be able to use a word processor, email and spreadsheets. They should also understand basic computer operations so they can troubleshoot problems, install software and printers, and sufficiently maintain a healthy computer system, and they should be able to select and apply information to solve a wide range of complex issues (Fass-McEuen, 2001). Knowledge of computer applications and basic computer operations, as well as the ability to apply knowledge, provides a solid baseline for establishing computer fluency. However, computer software and hardware become obsolete within eighteen months of implementation; therefore, specific guidelines pertaining to a particular type of software become obsolete as soon as the software becomes outdated. Consequently, the fluency guidelines enlisted by the NRC are designed to demonstrate an aptitude for learning new software and hardware based on comprehensive skills previously attained. Proficiency with a particular version of software does not adequately demonstrate fluency. To be considered successfully fluent with technology, individuals must go beyond specific skills and exhibit the ability to critically apply previous knowledge to new situations.

A 2004 study by the EDUCAUSE Center for Applied Research exposed the primary use of technology among a group of 4,374 traditional college students from 13 postsecondary institutions in five states. The highest amount of computer use was for classroom activities and studying (Kvavic, n.d.). These findings revealed a significant need for technology in accomplishing coursework. Students who are not fluent in using the technology have a severe disadvantage if they are unable to perform expected tasks such as using required software, researching expected information, and critically applying information to solve problems. Many instructors rely on digital communications for dispersing assignments and crucial course information. Furthermore, campus announcements and events are often posted exclusively on campus web sites. Students without proper skills or regular access may miss important details about grading, assignments, class cancellations, and registration.

Digital Natives versus Digital Immigrants

Computer and Internet technology began to flourish in the mid 1990's. Children born and raised since then have never known life without it. They are comfortable using it, particularly for communicating with their peers, and they implement various digital methods while doing so. They text message on their cell phones, post pictures on Flickr, movies on YouTube, and daily activities on social networking sites. They instant message, wiki, blog, tweet, and Google. For these individuals, traditional asynchronous email is a thing of the past as they opt for real time communications with everyone on their "friends" lists.

In 2001, Prensky stated (p. 1), "today's students *think and process information fundamentally differently* [*sic*] than their predecessors". Their colossal use of video games and other electronic gadgets has led them to focus more on graphics than text. They randomly search for highlights and summarizations in books and on the screen, rather than read from top to bottom and left to right. As a result, many educators believe that instructors should change their methods of course delivery to include iPods, video games, and other forms of digital technology (Carlson, 2005).

Members of this group are often referred to as "digital natives" or "the Net generation", while the baby boomer generation and others in between are referred to as "digital immigrants" (Kvavic, n.d.). For digital natives, technological and computer-related products have existed throughout their lives and they are comfortable with them. Even newly released products are not intimidating because they are accustomed to a dynamic, high-tech environment. Since they were “born” into this environment, they are native to the technology. “Digital immigrants”, on the other hand, typically are not innately familiar with computer technology, which was not introduced until they had reached adulthood. By then, norms are already established and new methodologies can be difficult to adopt. Because of this, older individuals have “immigrated” into the world of computer and Internet technologies and they typically have a more difficult time accepting and implementing them. Computers hold a certain level of mystery that tends to produce trepidation among older users. Although these individuals often become accustomed to using them for work and school, they may not go beyond email for digital communication purposes. Some digital immigrants adapt to the new technology better than others, but they always keep some of their “accent” [*sic*] (Prensky, 2001). In other words, they retain a great deal of their former, familiar methods of communication and information retrieval.

Since these students process information in the traditional manner, they may be disadvantaged if instruction is altered to meet the needs of the younger generation. As increasing numbers of older individuals return to college, challenges arise in addressing the needs of a diverse student population. An instructor may have 18 year old digital natives and 45 year old digital immigrants in the same classroom, each with his or her own level of computer experience and technological comfort level (Oblinger, 2003).

The Nontraditional Student

Typically, some form of catalyst drives an adult back into the college environment (Stone, 2008). Unemployment, divorce, or career changes are the most common reasons for educational re-entry. The changing workforce has eliminated many manufacturing and other blue collar jobs that have typically employed middle-aged to older adults. These positions once were capable of providing decent incomes for high school graduates. The resulting displaced workers must find other positions that typically pay lower wages or learn the technical skills necessary to obtain a professional job (Horn & Carroll, 1996). Regardless of the reason for going back to school, a new paradigm in higher education includes the pursuit of lifelong learning.

The nontraditional population has unique qualities. Most nontraditional students describe their primary role as employees, while traditional students describe their primary role as students (National Center for Educational Statistics, 2002). Another common role for nontraditional students is that of parent. Employment and family obligations create a significant level of risk that can make persistence through graduation a challenge for these students (Horn & Carroll, 1996). They must balance their responsibilities as employee, parent, spouse, and student. Because of competing priorities, they are more inclined than traditional students to drop out before degree attainment, particularly if their circumstances deteriorate (Choy, 2002). Ironically, these students also have greater pressure to succeed in college because of their family responsibilities. The well-being of their familes often depends on college success and better employment opportunities. However, it must be noted that not all nontraditional students are working toward a degree; some attend to improve skills for a better job. If a better job opportunity arises before a degree is earned, these students may drop out before degree completion because their personal goal of improved employment was achieved.

Higher education can provide a second chance for nontraditional students who are in need of re-training. Perhaps these adults had no financing to attend college immediately after high school, or jobs and family obligations may have interfered. Often, there are no other family members with postsecondary degrees. Without a role model to provide encouragement, they may not consider college as an option. They may have come from an environment that did not understand the benefits of higher education or perhaps they felt inadequate regarding college. If they are children of the pre-digital age, they simply may not have needed a college degree to obtain adequate employment.

Knightly (2007) includes "social exclusion" as a reason for students not attending a postsecondary institution immediately after high school. She cites Warschauer (2003) when she defines social exclusion as "the extent to which individuals, families and communities are able to fully participate in society and control their own destinies, taking into account a variety of factors related to economic resources, employment, health, housing, recreation, culture, and civic engagement" (p.8). Haisken-DeNew (2003) indicates that the absence of information technology skills may be a significant factor in creating social exclusion. Information technology has become so integrated into today's culture, that a lack of skills may inhibit one's ability to successfully function in society. Without sufficient skills and access, people are unable to take advantage of many of the opportunities that others take for granted. For example, conveniences such as online banking, shopping, making reservations for hotels and airlines, and accessing current news and information are beyond their reach.

Four areas of Information and Communication Technology (ICT) may be identified when defining social exclusion: access to a home computer, use of a computer at work, access to the Internet at home, and access to a cell phone. Two primary reasons exist for people who do not have a home computer: they are unable to afford one and/or unable to use one. Further analysis indicates that individuals who exhibit an increase in any of the factors of social exclusion will have a decrease in ICT participation regarding computer ownership, home internet access, computers on the job, and mobile phones (Haisken-DeNew, 2003). Thus, there is a negative relationship between use of information technology and social exclusion. Individuals who use computers and the Internet tend to have better social and economic opportunities. Computer-related skills are responsible for up to one half of the increase in wages earned after higher education attainment. A college degree increases earning potential up to 50% above a high school diploma (Levy & Murnane, 2004); having computer-related skills can increase that percentage considerably (Haisken-DeNew, 2003).

A significant issue with nontraditional students is in their retention. They tend to drop out of college during their first year at twice the rate of the traditional student. Personal barriers that adversely affect persistence include a lack of finances, family obligations, a lack of time, insecurity, and identity issues resulting from divorce (Miller-Brown, 2002). The first six weeks of the first semester may be the most critical regarding student persistence. According to Tinto (1988), to persist until graduation, students must successfully pass through three distinct stages during their college career. During the first stage, students must disconnect from previous patterns and associations to attend college. This typically involves moving from a familiar setting to an unfamiliar one. Students may feel isolated, stressed, and disoriented. Depending on the student’s ability to cope, various problems may create significant levels of anxiety. Without appropriate intervention, students may have difficulty in assimilating into the college environment and ultimately drop out. Those students who experience problems but successfully persist to graduation have typically received some form of assistance by faculty and staff. The most successful interventions occur at the beginning of the college career.

The second and third stages include transition and incorporation. During the transitional stage, students adopt behaviors that are appropriate for the college environment. They learn the skills that are required to adequately perform their new roles. During incorporation, individuals competently interact with other members of the new group. Although attrition is possible in any of these stages, it is more common during the first stage when anxiety is at its peak. (Tinto, 1988)

To improve academic persistence among nontraditional students, college faculty and administrators must understand the students' contextual situations regarding work and family roles. Adult students experience conflict as a result of the various roles in which they serve. Most nontraditional students attempt to balance family and work obligations with academia. Consequently, high levels of stress become a factor in coping with college. Without the proper tools to deal with this stress, students tend to be unsuccessful in coursework and/or drop out of college. College leaders are obligated to examine the effects of stress and help adult students as they transition back to college. According to a study by Giancola, Grawitch, and Borchert (2009), between family, work, and school, work related issues create the highest level of stress. This is due to the importance of income in students' lives. If academic anxiety or responsibilities create additional conflict by interfering with work obligations, the student may drop out of college to preserve the role as employee.

Higher education leaders should carefully examine the causes of stress among nontraditional students to attempt to alleviate them. Copper (2009) suggests consideration of the following factors when developing services to support nontraditional students:

- discuss cost payment plans
- ease transfer credit process
- offer credit for prior learning
- offer evening, weekend and online courses
- connect faculty and curriculum to the workplace
- offer career counseling services
- offer orientation and community building
- adopt flexible leave policies
- schedule regular advising sessions
- recruit in businesses and community
- include nontraditional students in university mission. (para. 6-16)

It is worth noting that unless included in “orientation and community building,” assistance in the development of computer literacy is absent from this list. Miller-Brown (2002) indicates that emphasis should be placed on comprehensive first year orientation sessions and workshops for nontraditional students.

Because of their greater likelihood of dropping out during their first year, a proactive intervention may help them deal with the many issues that cause anxiety when they return to school. Without question, addressing these needs should improve the college experience of nontraditional students. However, there is no suggestion of the importance of meeting information technology needs. Educational success can be attributed partially to a student’s readiness for college level work. Basic computer skills are often overlooked when assessing preparation for academia. According to Palmieri (2008), basic computer skills are recommended *before* one goes back to college. At one time, those skills were acquired in college; today, they are almost a pre-requisite for beginning college. Since many students still enter college deficient in these areas, however, part of the new student orientation for nontraditional students still may require work on computer literacy.

The Nontraditional Student in the Community College

Community colleges often provide the best academic option for returning adult learners. This is evidenced by the higher average student age of two-year colleges. The mean age of community college students is 29 and the median is 24 (Eriksson, Vuojärvi, & Ruokamo, 2009). However, the median age of university students is 21 (Provasnik & Planty, 2008). There are several reasons for the popularity of two-year schools for adults. They are often the least expensive solution for students who often have financial concerns. According to Provasnik and Planty (2008), 26% of community college students are in the lowest income bracket, while only 20% of the four-year university students are in the lowest income bracket. Additionally, 1200 accredited community colleges in the United States are within driving distance of 90% of the national population, making them easily accessible to working adults who must also maintain a family life (National Commission on Community Colleges, 2008). Cohen and Brawer (2003) recognize the significance of community colleges in educating nontraditional students. As a result of the many issues addressed by community colleges, they state that “For most students in two-year institutions, *the choice is not between the community college and a senior residential institution; it is between the community college and nothing [sic]*” (p. 53).

Benefits of Online Courses

In many ways, nontraditional students are in the midst of a perfect storm. Increasing numbers of adults are in need of training, yet their current responsibilities negate the option of attending college classes regularly during the day. Additionally, they may not have the basic computers skills required for college success. Ironically, these adults often have been displaced from decades of work in manufacturing jobs that may have been eliminated directly or indirectly because of computer technology.

Because of employment and family obligations, online courses may be particularly attractive for students. The flexibility of this method of course delivery removes barriers of time and distance, allowing students to maintain employment and complete classes on their own schedules. According to research conducted by Dutton, Dutton, & Perry (2002), students who choose this format tend to have extracurricular obligations; predominantly work and children. Over 84% of online students work as compared to approximately 55% of students who do not take online courses. Additionally, online students typically work more hours per week than those enrolled exclusively in face-to-face courses [21 hours on average for face-to-face students and 38 hours on average for online students] (Dutton et al., 2002).

According to the EDUCAUSE Center for Applied Research (ECAR) Study of Undergraduate Students and Information Technology by Smith and Borreson (2010), community college students tend to take some, if not all, of their courses online. The study reports that 38.6% of community college students take online courses compared to 17.9% of students from other institutions. The report also indicates that the online students surveyed revealed that they don’t learn as much from online courses as face-to-face courses. If these students have decreased computer skills and access as previously indicated, the online format may be restricting their learning potential and adversely affecting course outcomes.

Online courses offer benefits that may appeal to older students. Students who participate in web based instruction may find that the coursework is less intimidating than sitting in a class with younger students. Online conversations are egalitarian; there is no evidence of social status or age. They may also appeal to students with disabilities since transportation problems are eliminated, as is the potential for prejudicial issues. Other benefits include self-paced study and ample time for reflective responses to discussion boards and online chats. Clearly, online courses provide opportunities to nontraditional students that may not otherwise exist. (Knightley, 2007)

Harrell (2008) suggests that learning styles, individual locus of control, computer skills and self-efficacy are particularly significant for success in online coursework. The increased use of information technology in face-to-face courses creates a need for technological self-efficacy in overall college success. Students may be able to avoid online courses; however, they can’t always avoid traditional courses that require computer technology. An additional concern is that students may eventually be required to take a course that is only offered online. A noteworthy trend in higher education is the proliferation of online and other distance learning courses and programs. According to the 2008 Distance Education Survey Results (Instructional Technology Council, 2009), campuses reported an 11.3 percent increase in distance education enrollments between fall 2006 and fall 2007. Overall campus enrollments were less than two percent higher during the same period. This statistic reveals how distance education courses, especially those offered online, are gaining momentum in higher education.

According to Instructional Technology Council (ITC) findings (2009), the proportion of nontraditional participation rates in distance education decreased when compared to traditional students. However, this statistic is based solely on age. In 2007, 52% of distance learning students were classified as nontraditional and in 2008, that statistic decreased to 46%. ITC used the age of 26 to distinguish between traditional and nontraditional; therefore, the percentages would actually be higher if the age of 24 had been used. This statistic indicates that the average age of distance students is decreasing. However, since the survey appears to consider only age when qualifying nontraditional students, it's possible that the younger distance learning students exhibit other nontraditional traits. It is also possible that during this time period, the number of traditional students increased overall, in which case the change in percentage would not necessarily mean a decline in nontraditional enrollment. Nonetheless, a potential concern is that older nontraditional students, who are less inclined to have sufficient computer skills, are more disenfranchised as a result of technological deficiencies.

Research confirms that distance education courses typically have higher drop rates than the traditional classroom environment. The Instructional Technology Council (2009) reported that the average retention rate in distance courses was 65% in 2008. During the same period, face-to-face course completion rates were 72%.

Unfortunately for many nontraditional students, information technology in the classroom and online can be a significant hindrance. A considerable number of these students have not had enough computer and Internet training to adequately participate online. They also have difficulties in face-to-face courses that require some form of information technology, such as conducting research and writing essays with word processing software. Overall academic stress is amplified for students who lack computer experience because they must learn the technology in addition to the course content

(Huang, 2002). A lack of prior exposure to computers, inability to afford modern computers and Internet access are just a few of the key elements in this digital divide between the "have's" and the "have-nots" (Hawkins & Oblinger, 2006). The problem is augmented for rural students who may not have an affordable option for high speed Internet access.

According to Galusha (1998), adult students may lack the self confidence that is necessary to successfully participate in online courses. If technical support or direct contact with the instructor is not available, frustration can mount and the temptation to drop out increases. At a minimum, students should have basic operating system skills so they can save and locate files, search the Internet and send email messages with file attachments. These types of technical problems are more prevalent in women (Fass-McEuen, 2001), yet women now constitute a larger portion (56%) of college enrollment in the nontraditional population (Choy, 2002). Women should be more attracted to online learning opportunities as they balance a job, a family, and community involvement. The flexibility of web based coursework may be their only option for higher education (Kramarae, 2001).

The Nontraditional Student and Self-Efficacy

According to Webster's Online Dictionary (www.websters-online-dictionary.org), the term self-efficacy refers to "people's perception of their ability to plan and take action to reach a particular goal". Psychologist Albert Bandura is credited with much of the foundational research regarding the construct of self-efficacy. He suggests that people want to control their lives, but they must believe in their power and ability to do so or else they will avoid negative situations that adversely impact them. Individual beliefs in self-efficacy influence courses of action. If people believe they have the ability to make changes, they will persevere and demonstrate greater levels of resilience to adversity. They will perform better just because they have the confidence in their ability to do so. If they lack this personal perception, they will give up much more readily (Bandura, 1997).

Bandura suggests that individuals with higher levels of self-efficacy lead to greater performance and lower “emotional arousal”. Since anxiety is an emotional state, the decrease of such feelings should lead to clearer thinking and better results. The methods of coping with stressful situations are also improved. Highly efficacious people tend to persist when they encounter unfamiliar, challenging situations, while inefficacious people will avoid situations that may cause stress. Self-judgment regarding an individual’s aptitude and level of skills affects his or her incentive to work through problems. (Bandura, 1982)

Research reveals that a negative correlation exists between anxiety and academic achievement in college students. The most common cause of anxiety in the classroom is in testing; however, any ambiguity may create a stressful situation. If instructions are unclear and assignments are vague, or if a student feels underprepared, the level of anxiety is expected to increase. Effective teaching depends on the recognition of anxietal triggers and sufficient attempts to reduce or eliminate feelings of stress among students. This can be challenging since students come from different environments with different experiences. Therefore, what causes stress for one student may not have any significance for another. When students feel anxious, particularly if they feel that it’s caused by personal inadequacy, they may also be embarrassed and reluctant to bring any attention to the problem. Consequently, anxiety may not be readily identifiable by instructors, particularly if only a few students experience it. They may only reveal their anxiety if they know that others share the experience. (Rosenfeld, 1978)

Nontraditional students often have less confidence in their own level of skills and educational aptitude because they have been out of school for so long. These feelings are prevalent if they perceive that they have inadequate technical skills in a world that changes so rapidly. The term “computer efficacy” has been coined to reflect an individual’s perception of his or her computer skills. Computers can be mysterious machines to those who lack a basic understanding of their operations. According to Havelka, Beasley, & Broome (2004), stressful computer-related triggers may include “assignments that require use of the computer, the computer being “down”, slow computer response, lost data, or incomprehensible instructions”. Several personal factors also affect anxiety and the extent of severity. They are: “learning style, personality type, cultural background, intellectual aptitude, gender, coursework, experience and academic major”. (Havelka et al., 2004)

Just as Bandura suggests that low self-efficacy will result in avoidance, theory posits that low computer efficacy will result in individuals who avoid using the computer. When that use involves academia, low efficacious students may actually avoid classes where computer use is expected or academic majors that include a significant level of computer use. Undoubtedly, they will avoid online courses, which are often ideal options for working nontraditional students. If required courses for degrees are only offered online, it may be difficult to find substitutes; therefore, degree options may be limited.

In addition to simply avoiding computers, those with low computer efficacy give up when difficulties arise (Johnson & Wardlow, 2004). Ironically, when technical support is pursued, efficacy may further decline. A possible explanation for this paradox lies in how the technical support is provided. If a technician hurriedly sits at the computer, fixes the problem by pressing a few keys and leaves without explanation, the student may feel even less competent than before (Compeau & Higgins, 1995).

A study that compared the technological self-efficacy of nine-year-old children to university students revealed that the children had greater confidence and subsequent comfort level when using computers. This may be a reflection of the reality that the children began using computers at a younger age and for more relaxing activities, such as games and entertainment; therefore they are more comfortable with them. It appears that as successive interactions are problem- and stress-free, higher self-efficacy will develop (Todman & Lawrenson, 1992). The college students in the study may have had more stressful exposure because they had to use computers for specific purposes rather than just for leisure. Although the research may suggest that increased computer usage at younger ages may reduce or even eliminate anxiety, the type of experience may not always be positive. Therefore, if the incident is stressful for any reason, anxiety may be a potential problem for any age. (Saadé & Kira, 2009)

Perhaps a more significant concern is in the reduced employment opportunities that result from avoiding computer courses. Very few jobs do not require or expect some type of computer skills and those who possess such skills tend to be hired over those who do not (Johnson & Wardlow, 2004). Therefore, applicants who lack skills will be further misplaced in the job market. Research indicates that if low computer efficacy predicts that students will avoid future computer use, the very skills that they returned to college to obtain may be in jeopardy as well as their future employment opportunities. Therefore, they are relegated to a lifetime of decreased earnings and lower standards of living.

Computer Access and Academic Achievement

Computer skills typically increase exponentially for those who have unlimited personal access to the technology. Individuals who must share a computer with others or who must leave their home to use a public computer spend less time working with them and, consequently, obtain fewer skills. Therefore, individuals with constant access have significant educational and occupational advantages over those who don’t own a computer.

Research conducted by Korgen, Odell, & Schumacher (2001) revealed a direct connection between computer ownership and Internet use and subsequently between Internet use and study habits among college students. Students who have computer and Internet access available in the home spend more time online with the majority of that time reportedly used for coursework. Additionally, the length of time that a computer was in the home also had a positive influence on study habits. Likewise, Schmitt and Wadsworth (2004) report a direct relationship between computer ownership in the home and educational success among 15 to 17 year old students. No relationships were found between ownership of other household assets that signify wealth (cars, dishwashers, dryers, etc.) and test scores.

Generally, the most significant barrier to computer ownership is family income. While some reports indicate that the gap between those who have access and those who don’t is diminishing, the results can be misleading. Existing data indicate that most households with a higher income own a computer and have access to high-speed Internet.

The 2008 U.S. Bureau of Labor Statistics report indicates that over 75% of U.S. households own computers, but that ownership is not equally divided across all income levels. Nearly all wealthy individuals own computers; however, only 33% of the poorest families have a computer in the home (Kaiser, 2005). Additionally, a 2008 survey by the Nielsen Company reveals that 56% of those in the "below $40,000 income" bracket do not have any Internet access while only 4% of those in the "over $100,000 income" bracket lack access (Nielsen Company, 2008). This statistic indicates that a significant barrier prevents the less affluent from acquiring Internet access. Even more significantly, research supports the expectation that use of information technology has a positive effect on many academic outcomes (Eamon, 2004). Consequently, the lack of information technology becomes an educational hindrance, which ultimately leads to fewer occupational opportunities and continues the gap between the rich and poor.

According to Hawkins and Oblinger (2006), several other factors contribute to the "digital divide", which refers to the differences in computer skills between those with and those without computer skills. Although computer ownership is the primary factor that improves the divide, Hawkins and Oblinger state that:

> Defining the digital divide according to the haves and have-nots of computer ownership is only a starting point. Beyond computer ownership, colleges and universities should explore the second-level digital divide, [3] [Hawkins and Oblinger refer to a 2002 article published by Hargittai in which a second-level digital divide indicates that a person owns a computer but lacks sufficient online skills] which can be caused by several factors: machine vintage; connectivity; online skills; autonomy and freedom of access; and computer-use support. The definition of *digital divide* must include all of these other factors. (para. 4)

The top three factors suggested: ownership, age of computer, and connectivity, are typically financially related. Greater levels of family income normally result in increased ownership, ownership of newer, state of the art computers, and higher quality bandwidth.

A 2008 EDUCAUSE Center for Applied Research (ECAR) study compared the ownership and use of computers among three student groups: freshmen, seniors, and community college students. The study revealed that 40.4% of community college students didn’t own a computer compared to 8.8% of university freshmen and 21.8% of university seniors. Additionally, the community college students spent the least amount of time performing online activities. Clearly, students who attend community colleges are disadvantaged when using computers.

A study by Hargittai (2002) compared the age of participants and their ability to complete various online tasks. Results indicated noticeable generational differences. On average, older individuals take longer to complete tasks than younger ones, and those in their teens and twenties perform the most efficiently. In essence, many nontraditional students at community colleges typify the person who may have the lowest computer efficacy. They are older, poorer, and were not raised with a computer in the home. Yet little research has been done to examine the influence of these disadvantages on their academic opportunities or success. This study is designed to address, in part, that shortcoming in the literature.

Summary

Previous studies suggest two factors: 1) that a lack of computer skills decreases the level of computer efficacy in individuals and 2) that instructors and administrators in higher education have increased expectations regarding computer usage in college classes. Since nontraditional college students typically don’t have the same level of skills as younger, traditionally aged students who matured using the technology, they may be less efficacious regarding their skills and ability to use computer-related technology. Consequently, these students may be significantly disadvantaged when they return to college. This problem may be intensified if predicted enrollment trends prove to be true and nontraditional students become a significant percentage of the total student population. Larger numbers of students may have more difficulty in successfully completing college level work and consequently, may be less inclined to persist. Without adequate technical skills or a college degree, these adult learners may not realize their employment goals. The chapter which follows outlines in detail the framework and methodology utilized in this study to determine how computer efficacy impacts the success of community college students at two selected institutions.

Chapter 3: Methodology

This chapter includes a summary of the problem and research questions followed by the research design, a description of the population, and the sampling procedures that will be utilized in collecting data. The survey instrument is explained as well as data collection procedures and data analysis.

The primary purpose of this research was to identify and describe the relationships between nontraditional community college students' actual computer skills, computer and Internet access, computer usage, and perceived level of computer skills (computer efficacy), and their success in the community college environment. Because of the increased use of computers in college, it was expected that in addition to insufficient tangible computer skills and access, a perceived lack of proficiency by students would negatively impact the completion of coursework and ultimately, degree attainment and potential employment opportunities. Additional analyses were conducted to determine the extent to which factors such as gender, computer access, and computer experience affect success in college.

The researcher hypothesized that the degree to which a nontraditional community college student succeeds in college is influenced by the following factors: age, gender, computer experience, computer access, level of computer use, and ultimately, computer efficacy. To determine this, a survey instrument which measured these factors was administered to students at two Midwestern community college campuses. A combination of multiple regression, Pearson correlation, and bivariate correlation analyses were utilized to determine the relationships between the criterion variables (course grade, cumulative GPA, and course completion) and various predictor variables, as well as the extent of the relationships between the variables.

Two hypotheses were tested through this research:

- There is a positive relationship between gender, age, computer experience, computer access, amount of computer use and computer efficacy.
- Students with diminished levels of computer efficacy are less successful in college.

The overarching research concern was that if students are adversely affected by computer-related technology, they may be missing educational opportunities that could affect their success in college and, ultimately, employability. Students with low computer skills or with a low sense of computer efficacy may become intimidated and stressed to the point of dropping classes and/or completely withdrawing from college. Results were compared between traditional and nontraditional students to determine if special interventions may be necessary for certain student populations.

Research Design

The researcher hypothesized that computer efficacy, access to computer-related devices, access to the Internet, and amount of computer use are instrumental in contributing to success in community colleges. The researcher also suggested that age and other nontraditional factors (marital status, parenthood, employment, and financial independence) are significant in predicting computer efficacy. Factors expected to increase computer efficacy (such as participation in computer literacy courses and access to computer-related devices and the Internet) were included to evaluate possible interaction effects between these variables and those that may negatively correlate to success. Expectations were that students with factors that might otherwise lead to low computer efficacy but who had taken computer literacy courses have improved confidence in their computer-related skills.

A quantitative study using a combination of regression and correlational analyses was selected to test the hypotheses. Regression research is useful in determining correlations between a criterion, or dependent variable, and two or more predictor, or independent variables (Urdan, 2001, p. 117). This method effectively analyzes correlational data by estimating the degree and statistical significance of the relationships between independent and dependent variables as well as the strength and overall impact of a combination of multiple independent variables.

Initially, Pearson correlation coefficients were calculated for each variable to determine the strength and the direction of the individual relationships to the dependent variable. These results indicated if the correlations were statistically significant. Results included the multiple correlation coefficients (R), which measured the strength of the relationships between the combined variables and the dependent variables. It also provided the coefficient of determination (r^2). The coefficient of determination explained how much of the variance was predicted by the combination of the variables. Both values were examined, with greater emphasis on the r^2 value. The higher this value is, the less likelihood there is that other variables affect the dependent variable. Additionally, independent-samples t-tests were used to compare variables between dichotomous groups. Significance (p value) of less than .05 was used in all correlations, however, many tests revealed significance levels that were less than .01.

The Setting, Population, and Sample

Because of the large percentage of nontraditional students enrolled in community colleges, students in two-year public institutions were the focus of this survey. Two rural colleges were the sites of this research. They were chosen because of their close proximity and access to the researcher. The smaller of the two colleges (College A) is located approximately 80 miles south of the state’s major metropolitan area. The researcher is employed at College A, so access to campus data and the representative sample from that college was readily available.

The larger of the two colleges draws students from the nearby metropolitan area. A branch campus is located in the metropolitan suburbs and the main campus is within twenty miles of the city center. Because of denser populations and a more highly developed infrastructure, residents in the college district that is closer to a large city may have greater opportunities for Internet access. Since computer and Internet access may be significant factors in developing computer skills, students from the two colleges may have different degrees of skills and computer efficacy. Therefore, one component of the research included the comparison of students from geographically different locations.

The population for this research consisted of total enrollment for the fall 2012 semester at each campus. According to Urdan (2001, p. 125) an appropriate sample size for multiple regression is at least 30 cases plus 10 cases for each predictor variable. Since 28 predictor variables were included in this study, a minimum sample of 310 was desired.

The ideal sample resembles the population as closely as possible. Although random sampling of students may have adequately matched the population, it was not chosen because of the lack of direct access to 310 individual students and the difficulty in collecting random responses. Therefore, specific courses were selected for participation and enrolled students were surveyed during class. The researcher visited each class, with the exception of the online classes, and participating students completed the surveys and returned them to the researcher at that time.

Courses were selected based on three conditions: course diversity, number of students enrolled, and instructor approval. The initial condition was to obtain a variety of courses in the sample. To accomplish this, courses from different divisions (Arts and Sciences, Career and Technical), disciplines (English, History, Business, etc.), and class formats (online, day, evening, hybrid) were chosen. Selectively choosing courses from different disciplines and formats reduced the possibility of surveying students with analogous computer skills.

The second condition for course selection was to choose courses with the most students to maximize participation. Course enrollment numbers were available on both college websites, so courses with the highest number of enrolled students were preferred over those with lower numbers. Lastly, instructors of the chosen courses were contacted via email to determine the feasibility of participation in the study. If an instructor declined or did not respond, a similar course was chosen to replace it until an adequate number of participating students was attained.

Twenty-two courses with a total enrollment of 455 students were involved. Among these courses, 339 students submitted surveys. The surveys were voluntary, so students had the option of not participating. Some participants were enrolled in multiple courses surveyed and were counted as members of each course; however, they only submitted one survey. Additionally, the researcher disseminated the surveys during class and then retrieved the paperwork immediately afterward; therefore, only students who were in attendance on the day of the survey participated. Otherwise, return visits would have been required for each class or the instructors would have to distribute the surveys, explain the research, and collect the results from students who were absent. The researcher did not wish to consume more class time or require instructors to extend additional effort; therefore, students who were not present during the initial contact did not participate.

Tables 1 and 2 describe the participating courses at College A and College B.

Table 1: Courses Surveyed at College A

Arts and Sciences Courses	**Class Format**	**Number of Students**
Business Ethics	Traditional/day	8
Introduction to Computers	Traditional/day	20
Micro Computer Applications	Traditional/day	17
Micro Computer Applications	Evening	10
Micro Computer Applications	Online	18
Technology for Teachers	Hybrid	17
English Composition I	Traditional/day	23
Arithmetic	Traditional/day	19
Elementary Algebra	Evening	16
	Total A&S:	148
Career and Technical Courses	**Class Format**	**Number of Students**
Human Resource Management	Traditional/day	11
Human Resource Management	Evening	10
Supervision in Middle Management	Online	15
Keyboarding I	Evening	9
Applied Accounting I	Traditional/day	27
	Total C&T:	72
Total Students from College A:		**220**

Table 2: Courses Surveyed at College B

Arts and Sciences Courses	Class Format	Number of Students
Basic Writing Skills II	Traditional/day	16
English Composition I	Traditional/day	15
English Composition II	Online	15
U.S. History	Online	15
General Psychology	Online	7
Beginning Algebra	Traditional/day	20
	Total A&S:	88

Career and Technical Courses	Class Format	Number of Students
Voice Technology	Hybrid	15
Micro Computer Software Applications	Traditional/day	16
	Total C&T:	31
	Total Students from College B:	**119**
	Total Students, Both Colleges:	**339**

Demographic data regarding the fall 2012 populations and samples from both campuses are represented in Tables 3 and 4.

Table 3: Demographical Data from College A

	Fall 2012 Population		Fall 2012 Sample	
	Number of Students	Percentage of Population	Number of Students	Percentage of Sample
Total Enrollment	3,775		220	
Average credits per student	10.93		12.19	
Average age	25.8		24.9	
Average female age	26.5		25.5	
Average male age	24.6		23.7	
Part-time students	1,452	38%	22	10%
Female students	2,356	62%	141	64%
Nontraditional students	1,248	33%	71	32%
Non-white students	323	9%	9	4%

Note. Obtained from College A, Institutional Research Office (March, 2013)

Table 4: Demographical Data from College B

	Fall 2012 Population		Fall 2012 Sample	
	Number of Students	Percentage of Population	Number of Students	Percentage of Sample
Total Enrollment	5,523		119	
Average credits per student	10.26		11.26	
Average age	26.2		25.7	
Average female age	27.3		27.0	
Average male age	24.8		23.2	
Part-time students	2,579	47%	15	13%
Female students	3,226	58%	78	66%
Nontraditional students	2,028	37%	43	36%
Non-white students	454	8%	9	8%

Note. Retrieved from College B Office of Research and Planning (2012)

Sampling Procedures

Within each institution, students were selected using cluster sampling by distributing surveys to all students enrolled in specific courses in which some degree of computer or technical skill might be expected. Community colleges offer courses primarily from two divisions. In the Arts and Sciences division, successful students earn an Associate of Art's degree which will allow them to easily transfer to a four-year college or university. The Career and Technical Education division offers Associate of Science and Associate of Applied Science degrees. These vocational degrees are intended to prepare students for the workforce in just two years. To reduce any bias that may exist within a particular division, sample courses were selected from both divisions. Additionally, courses were selected from online and traditional delivery methods. However, significantly fewer online courses were used because of the potential bias for excessively greater skills among students who choose that format. A variety of courses were chosen because students with different characteristics may enroll in different types of programs and courses and during different times of day. Nontraditional students may enroll in greater numbers in afternoon or evening courses, so samples drawn from various time categories were expected to reveal potential differences between the groups.

Administration of the surveys was preceded by receiving IRB approval from the University at which the researcher was enrolled and administrative approval for the research from each community college campus. Neither community college had a formal IRB process, but recognized the university's process as sufficient to ensure appropriate protection of human subjects.

Instructors at College A were contacted directly by the researcher via email. Participation rates at this college were high, probably due to the researcher's professional association with faculty. Professors at College B were contacted through that campus' registrar on behalf of the researcher. Responses from College B were fewer; however, those who agreed to participate contacted the researcher directly and times were scheduled for visits. The majority of the responding instructors from both campuses represented traditional day-time classes. As a result, the majority of students surveyed were traditional regarding class format. Sixty-one percent (61%) of students were enrolled in day courses, 21% were enrolled in online courses, and 18% were enrolled in evening courses.

Many colleges rely on adjunct instructors for evening and weekend classes. These part-time instructors often are employed elsewhere during regular working hours and are less involved with campus activities. This possibly explains why participation from adjunct instructors at both colleges was very low, which also resulted in lower participation rates from evening and weekend courses.

Sixteen requests for participation were emailed to College A instructors. In total, these instructors taught eight day courses, six evening courses, and two online courses. Two of the evening instructors did not respond; therefore, a total of 14 participated: two online, four evening, and eight day courses. Of those, 12 were conducted during class and with printed survey forms. The remaining two classes were online and the instructors emailed a link to an online survey to the students. Four of the classes that were surveyed in person were evening classes. Among the 271 students enrolled in the College A courses surveyed, 220 students participated.

Initially, College B received 10 requests to participate. Instructors from six traditional day courses, two online courses, and two weekend courses were contacted. Three of those instructors (one weekend and two day classes) did not respond. An additional day instructor was then contacted and agreed to participate. This resulted in a total of eight participating classes. The researcher visited five classrooms in-person while the students in the three online classes received email links to the web-based survey. Because of limited face-to-face time with students in the weekend class, that instructor preferred using the online survey rather than conducting the survey during class. At College B, 119 of the 184 enrolled students participated.

Instrumentation

Before the formal survey was conducted, a copy of the instrument was shared with two information technology professionals for review: the Director of Computer Resources and a computer networking professor at College A. They approved of the format and agreed that the questions aligned with the research. Additionally, the professor distributed the survey to a small class as a pilot study. This pilot revealed some flaws in student interpretations of certain questions, which were then clarified for the final survey.

A printed version of the instrument was used in the traditional classes for the study. This was expected to reduce potential “computer efficacy” bias that could have resulted if the surveys were distributed online. Since the purpose of the study was to identify reduced efficacious behavior resulting from a lack of perceived computer skills, students who were at the most risk may not have participated in an online, computer-based questionnaire. An online version of the survey was developed for the web-based classes using Google’s Drive form development application. The online version was identical to the printed version.

The survey was comprised of a combination of open-ended, dichotomous, and Likert-scale questions. It was divided into sections with multiple questions per section. (See the Appendix for the complete survey). The first page contained a brief explanation of the study and provided instructions on how to complete the survey. The initial section “Background/Demographic Information” included questions regarding gender, age, ethnicity, academic level (first-semester freshman, second-semester freshman, sophomore, over 65 hours earned), academic intention (associate degree seeking, bachelor degree seeking, graduate degree seeking, non-degree seeking), full- or part-time status, and an open ended question regarding major. Finally, questions regarding employment, marital status, parental status, and financial independence were presented to determine the students’ level of traditional or nontraditional standing. The survey questions from this section are displayed in Table 5.

Table 5: Background/Demographic Information Variables

Variables	Description of Responses
College	College A or College B
Gender	Male or Female
Age[a]	In Years
Ethnicity	African-American, Asian, Caucasian/White, Hispanic, Other
Academic Level	Student selects one from the following: First-semester Freshman (0-15 hours earned) Second-semester Freshman (16-30 hours earned) Sophomore (31-65 hours earned) Over 65 hours earned
Academic Intention	Student selects one from the following: Seeking a certificate (1 year or less) Seeking an associate degree (2 years) Seeking a bachelor degree (4 years) Seeking a graduate degree (Master's or Doctoral) Upgrading job skills Personal satisfaction
Credits enrolled[b]	Student enters the number of credits currently enrolled
Employment[c]	Yes indicates that the student is currently employed
Marital Status[d]	Yes indicates that the student is married
Children[e]	Yes indicates that the student has children
Financial independence	Yes indicates that the student does not rely on others for financial support
College after high school	Yes indicates that the student attended college immediately after high school

[a-e] Variables also were combined to create a new variable: "level of nontraditionality"

The next section was titled "Experience with Computer Technology". The first question was dichotomous and asked if computers were used in school (kindergarten through twelfth grade). Various checkbox questions were presented to gather information pertaining to the skills acquired during these formative years. These responses were accumulated to create a single predictor variable regarding the amount of computer-related experience gained in school. A question was then presented regarding the availability of an introductory computer course in either high school or college. If such a course existed, the participant was asked if he or she completed it. Participants were then asked how they received the majority of their computer skills (formal class, on their own, help from a friend or family member, for employment, etc.). The final question in this section asked for the approximate age of the respondent when first introduced to computers. It was predicted that the primary method of computer experience as well as the age of initial use of computers would correlate to criterion variables. The variables in this section are displayed in Table 6.

Table 6: Experience with Computer Technology Variables

Variables	Description
Computer Use in High School	Were computers used in high school? Yes or no response
Experience Obtained in High School[a]	Which experiences were obtained in high school? Students checked all that apply: Word processing, spreadsheets, presentations, database, programming, web page development, networking, email, Internet searching, video/audio editing, other
Introductory Computer Course Taken	Yes or no response
Computer Experience Obtained	How was computer experience obtained? On your own, taught by family/friends, for employment, in a class, other
Age of first computer use	At what age did computer use begin? Students entered age in years

[a]Selections were aggregated to create a new variable “amount of high school use”

The next section, “Access to Computers and Internet Technology”, inquired about technological devices (cell phone, smart phone, desktop computer, notebook computer, tablet, eReader) that were owned and used by the participant. The age of computers in use was also collected. The selected devices were summed to create a single predictor variable regarding the number of devices owned. The type of Internet access, if it existed, was requested, as well as any use of public Internet access. It was predicted that the quantity of devices and the quality of Internet access would positively correlate to computer efficacy as well as computer-related behavior and participation in college. These variables are presented in Table 7.

Table 7: Access to Computers and Internet Technology Variables

Variables	Description
Devices Owned[a]	Which of the following devices are owned? Students checked all that apply: Mobile cell phone, smart phone, desktop computer, laptop computer, tablet/mobile device, eReader
Internet Access at Home	Yes or no response
Type of Internet Connection/Home	Students selected one from the following options: Dial-up, DSL, satellite, cable, wireless, other
Public Internet Use	Yes or no response
Public Internet Locations	If public access is used, which locations are used? Students checked all that apply: public library, restaurants, college campus, work, other

[a] Selections were aggregated to create a new variable: "total devices owned"

In the section labeled "Level of Computer and Internet Use", participants were asked various questions regarding the number of hours that they used computers each week for any purpose, specifically for academic purposes, and/or specifically for employment purposes. Additionally, participants selected which computer- and online-related activities they utilized, such as banking, email, research, social networking, blogs, etc. These activities were aggregated to create predictor variables regarding the extent of both online and off-line computer usage. Students also were asked to estimate the percentage of their classes that required the use of computers for communication (email), obtaining and submitting homework (course management systems), and using word processors for writing papers, etc. Table 8 depicts these variables.

Table 8: Level of Computer and Internet Use Variables

Variables	Description
Number of hours computers are used each week	Total number of hours spent on the computer each week
Number of hours computers are used for academia each week	Total number of hours spent on the computer for college-related work each week
Number of hours computers are used for employment each week	Total number of hours spent on the computer for work-related purposes each week
Regular online activities[a] (Continued on next page)	Online activities are presented. Students checked all that apply: email, research, banking, shopping, social networking, selling, college

	portal, YouTube, reading books/news, forums, phone calls, downloading music, chatting, blogging, wikis, sharing photos/videos, conferencing, gaming
Regular offline activities[b]	Offline activities are presented. Students checked all that apply: creating documents, homework, listening to music, editing photos/audio/video/graphics, playing games, web design
Amount of computer use in classes[c]	Enter percentage of classes that use the following: email, course management system, Internet research, word processing, specialized software

[a] Selections were aggregated to create a new variable: "total online activities"
[b] Selections were aggregated to create a new variable: "total offline activities"
[c] Selections were averaged to create a new variable: "average computer use in classes"

The final section, "Perceived Level of Computer Skills (Computer Efficacy)", asked an assortment of Likert-scale questions in which the participant rated his or her level of computer skills, computer preferences, and confidence in working with computers. The first question asked the participant to rate his or her general computer skills (1 = poor to 5 = excellent). For internal consistency, results from this question were compared to a new variable that averaged responses from several questions related to various computer skills (displayed in Table 10). The next question asked students to rate their level of comfort with technology (1 = not comfortable to 4 = very comfortable). Then, students were asked if they had enough technical and computer skills to complete their assignments (1 = no, 2 = sometimes, 3 = yes). These three questions are displayed in Table 9.

Table 9: Perceived Level of General Computer Skills and Comfort Variables

Variables	Description
Describe computer skills	1 = poor, 2 = below average, 3 = average, 4 = above average, 5 = excellent
Comfort with using technology	1 = not comfortable, 2 = somewhat comfortable, 3 = comfortable, 4 = very comfortable
Enough skills for assignments	1 = no, 2 = sometimes, 3 = yes

A series of questions allowed students to rate their level of skill using a variety of applications such as spreadsheets, word processors, video/audio software, graphics software, presentation software, course management systems, etc. These Likert options were 1 = don't use, 2 = poor, 3 = average, 4 = good, and 5 = excellent. Responses were averaged to create a single predictor variable related to total computer skills. Table 10 displays these variables.

Table 10: Perceived Level of Computer Skills with Various Technologies Variables

Variables	Description
Word processing	Word, etc.
Presentations	PowerPoint, etc.
Spreadsheets	Excel, etc.
Editing graphic/photo files	
Online library resources	
Computer maintenance tasks	Installing updates, extra memory, etc.
Organizing files and folders	
Working with files and folders	Creating, saving, deleting, moving, copying
Course management systems	Such as Blackboard, Moodle, etc.
Social networking	Such as Facebook, MySpace, etc.
Email	Sending/receiving, attaching files, organizing
Searching for information online	

Note. Variables also were aggregated to create a new variable: "total computer skills"

A single question allowed students to share their general preference for using computers for coursework or using traditional methods such as pen and paper or printed paper copies (Table 11).

Table 11: Preference for using Computers Variable

Questions	**Response Options**
Preference for using computers or traditional methods	1 = use the computer 2 = do not use the computer

Note. Question was reverse scored so all responses that were favorable to computers received higher rankings.

To measure internal consistency, this particular question was compared to a single new variable that averaged a series of existing variables regarding specific computer versus traditional methods. This series of questions is portrayed in Table 12. Possible responses to these questions were 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. Responses were averaged to create a new variable: "total computer preferences".

Table 12: Level of Computer Preference Variables

Questions
Web based instruction intimidates me.[a]
I am comfortable when communicating online.
I prefer talking to people in person rather than communicating on the web.[b]
I would rather answer questions in class than with an online discussion board.[c]
I would rather get class notes and materials as handouts than have to retrieve them on the web.[d]
I would rather not have to use computers in any of my classes.[e]
I would rather get my grades from the instructor and register for classes in person than have to use the Internet.[f]

[a-f] Questions were reverse scored so all responses that were favorable to computers received higher rankings.

Completing this section was a series of Likert questions regarding the students' confidence in performing common computer maintenance tasks. Rankings were from 1 = strongly disagree to 5 = strongly agree. These responses were averaged to create a single variable: "total computer confidence". The specific questions are displayed in Table 13.

Table 13: Level of Computer Confidence Variables

Questions
I feel confident when creating word processing files such as letters or reports.
I feel confident when locating, copying, moving, and deleting files.
I feel confident when learning about new software and applications.
I feel confident when troubleshooting minor computer problems.
I feel confident in organizing, managing, and moving files in folders.
I feel confident in understanding most words and terms about computers and technology.
It scares me to think that I could destroy large amounts of important information by pressing the wrong key.[a]
I am reluctant to use a computer because I am afraid that I will make a mistake that I cannot correct.[b]

[a-b] Questions were reverse scored so all responses that were favorable to computers received higher rankings.

All Likert questions were coded so that the higher number (from 1 = Strongly Disagree to 5 = Strongly Agree) was coded for more experience/efficacy/skills and lower numbers are coded for less experience/efficacy/skills. Consequently, the average values of the predictor variables indicate a higher number for greater overall skill and efficacy and a lower number for less overall skill and efficacy. To discourage students from making assumptions about questions and responses, eight of the questions were phrased so that a lower-level response indicated greater skills or efficacy, and higher level responses indicated fewer skills. These responses were carefully reversed scored when coded into the statistical software to ensure that all responses consistently measured from least skill to most skill for correlation purposes.

A variable depicting computer experience was created by aggregating existing variables regarding the diverse methods by which students obtain computer experience. The variables used to define computer experience were whether the student had taken an introductory computer course, the extent of computer use in high school, how students obtained their computer experience, and how many hours students spend per week using a computer for work.

In addition to various correlational analyses that were conducted to measure relationships between significant variables, multiple regression analyses were conducted between independent predictor variables and dependent criterion variables that indicated college success.

College success was measured by completing the course with a passing final grade (A, B, C, or D). Students who received a failing grade (F) or who withdrew from the class (designated by a final grade of W) were considered to be unsuccessful. Cumulative grade point averages (GPA's) also were examined. Correlational and multiple regression analyses were used to determine which of the independent variables or combination of those variables had the greatest influence on computer efficacy and college success. Additionally, it predicted the power of the combined independent variables on efficacy and success.

Reliability

Cronbach's alpha was used to measure the internal consistency of the variances among each student's response to the survey questions. Ideally, if one student scores high on a particular question and another student scores lower, the differences between these scores will be similar to the same students' differences, or variance, on other questions. The resulting value of Cronbach's alpha was .831 which depicted high reliability that this instrument consistently measured the same construct.

Internal consistency was also measured by creating a variety of mean variables by averaging responses in groups of similar questions, then conducting a Pearson correlational analysis between the mean variable and related individual responses. For example, students were asked to rate their level of general computer skills on a scale of 1 to 5 (poor to excellent). They were also asked a series of questions that asked them to rate their level of skills for various computer-related activities (using word processors, researching on the Internet, using online library resources, etc.). The series of questions regarding individual skills were averaged into a new variable (average computer skills). The averaged variable was correlated with the results from the individual question regarding general computer skills. Since the correlation between the two variables was high, internal consistency had been achieved. Similar constructs were created to test the students' preference for using computers, confidence when using computers, and perceived level of computer efficacy.

Multicollinearity was a concern because of the close relationships between some variables that were used simultaneously as independent variables. Multicollinearity occurs when multiple predictor variables are highly correlated. The individual predictive power of each independent variable may be reduced in this situation. To eliminate this possibility, collinearity diagnostics were calculated and analyzed for each multiple regression.

Validity

Much of this instrument was created specifically for this research. However, some questions were modeled after an existing instrument: "The Computer Anxiety Rating Scale" by Heinssen, Glass, and Knight (1987). This scale has been previously tested and used quite extensively.

In addition, after the instrument was modified to fit this particular research, it was shared with two information technology professionals in higher education: a computer networking professor and the Director of Information Technology at College A. Both concurred that the instrument would measure the intended constructs.

Procedure

After the classroom instructors contacted the researcher with their agreement to participate, they were asked if they preferred the researcher to visit the class and conduct the survey or if they would rather administer the survey themselves and return the completed surveys later. All of the instructors preferred that the researcher conduct the surveys in person.

The surveys given to traditional classes were administered during previously scheduled class visits and were immediately collected by the researcher. This method significantly increased response rates as compared to allowing students to remove the surveys from class and return them later. Participants were instructed vocally and in writing of the purpose of the research, its voluntary nature, and the right to withdraw from the survey at any time, even if they had already begun. Students included only their student ID numbers on the survey for correlation with end-of-semester grades and grade point averages. The researcher did not have access to any personally identifiable information, nor was she able to associate results with any specific individual and no individually specific information was or will be published. In addition to the printed survey, students received two copies of the “Informed Consent for Participation in Research Activities” form: one copy to keep, the other to sign and return with the completed survey. The consent form provided information regarding the privacy of the participant's responses and described the option of quitting at any time without penalty. The researcher's and her advisor's contact information was included if a participant had any questions or concerns regarding the study. The survey results were manually entered into IBM SPSS Statistics, version 20.0.

The researcher sent survey links to the online instructors and the weekend course at College B. The instructors then forwarded them to the students. A copy of the consent form was appended to the message. As students completed the survey and submitted the form, the results were automatically aggregated in a Google Drive spreadsheet and sent to the researcher's email account. After a designated cut-off date, the online results were exported from Google Drive into Microsoft Excel 2010, and then imported into the SPSS dataset that contained the traditional classroom results.

Plan and Methods of Data Analysis

All quantitative data were analyzed using IBM SPSS Statistics software for statistical data analysis. Descriptive statistics (sample sizes, means, and standard deviations) were calculated for comparisons between groups, and multiple regression analyses with significance levels set at $p<.05$ were performed to test the interactions and main effects. The analyses explored and identified differential effects of the variables with a specific focus on determining the effects of nontraditional variables on computer efficacy and computer efficacy on course success.

In addition to age (students over the age of 24 were considered nontraditional), traditional/nontraditional characteristics were scaled to determine the degree of traditional or nontraditional characteristics that students possess. The most critical variable in determining the degree of nontraditionality was the student's age. To determine the level of "nontraditionality", students over the age of 24 were coded with one "point" toward their degree of nontraditionality. They accumulated additional points if they were enrolled part-time, employed full-time, were married, and/or with children. Data were compared for statistical significance to determine if students who were more highly nontraditional had lower computer efficacy and if course completion rates, course final grades, and cumulative grade point averages were significantly affected by computer skills and access.

Summary

The purpose of this study was to identify relationships between demographical and technological characteristics of community college students, particularly nontraditional students, and success in college. Various correlational and regression analyses were conducted to examine interactions between many critical variables. If a lack of computer efficacy relates to drop-out rates, these students may not maximimize their potential in college; ultimately, they may not persist toward their educational goals, which may limit their employment opportunities. Some form of academic intervention may become necessary to assists at-risk students before and during their collegiate experience.

Chapter 4: Results

The purpose of this research was to determine the significance of relationships between various groups of students and a number of computer and technology factors related to access and use, as well as the effect of those factors on students' success in college. While some results were anticipated (ie. students who owned more technology-related devices were more comfortable using them), other results were surprising. This chapter displays the results of the various analyses conducted with the data. The chapter is organized in terms of the two hypotheses. Because of potential technological variations between the two colleges used as site locations in the study, an additional section outlines their significant differences.

Hypothesis 1: There is a positive relationship between gender, age, computer experience, computer access, amount of computer use and computer efficacy.

The Impact of Gender Differences on Computer Efficacy

There were significant differences between male and female students in the study on several of the variables analyzed. Women proved to be "more nontraditional" using the definitions applied in the study and in some ways, indicated greater levels of trepidation regarding computers. However, female students appeared to compensate by owning more computer-related devices and opting to use computers when given a choice between computerized or traditional pen and paper methods. Additionally, women were more inclined to use computers for practical or academic purposes rather than for gaming and entertainment.

Compared to surveyed men, female students were significantly older, had more children, were financially more independent, and enrolled in fewer credit hours. Since all of these factors are indicators of "nontraditional" status, similar analyses that were conducted among women and nontraditional groups often bore comparable results, which created some challenges in differentiating between outcomes based on gender and outcomes based on age.

An independent-samples t-test was conducted to compare demographic factors between male and female students (Table 14). There were significant differences in age [t(283) = 2.4, p=.016], the presence of children [t(273) = 3.3, p=.001], financial independence [t(239) = 2.6, p=.011], and credits enrolled [t(289) = -3.1, p=.002]. There were no significant differences between the genders regarding marital status and employment; however, 15% of women were enrolled in college part-time (fewer than 12 credit hours) when compared to four percent of men.

Table 14: Demographic Differences between Men and Women

	Women (n = 219, 64.8%)		Men (n = 119, 35.2%)	
	M	*SD*	*M*	*SD*
Age	26.0	10.17	23.6	8.41
Children	40%	.492	24%	.426
Financial independence	54%	.499	40%	.491
Number of credits enrolled	12.5	.375	13.7	.262

p<.05.

The majority of students in the study were women; however, the nontraditional sector was comprised of a larger percentage of women than the traditional sector. Numbers and percentages of women in both groups are displayed in Table 15.

Table 15: Gender Distribution by Traditional/Nontraditional Status

	Traditional Students		Nontraditional Students	
	Men	Women	Men	Women
By percentage	38.5%	61.1%	28.3	71.7%
By number	87	138	32	81

Although women and men generally had no significant differences regarding computer skills and efficacy, women felt less confident regarding computer maintenance, troubleshooting skills, and understanding computer terms. (Table 16).

Table 16: Computer/Technical Differences between Men and Women: Women Disadvantages

	Women		Men	
	M	*SD*	*M*	*SD*
Computer maintenance**	2.79	1.240	3.06	1.315
Troubleshooting skills*	3.07	1.152	3.43	1.133
Understanding terms**	3.31	.971	3.55	.984

*p<.05. **p<.01.

However, women in the study tended to prefer using computers over traditional methods, were less fearful of making mistakes with a computer, and owned more computer-related devices than did men (Table 17).

Table 17: Computer/Technical Differences between Men and Women: Women Advantages

	Women		Men	
	M	*SD*	*M*	*SD*
Prefer computers**	3.14	.739	2.85	.780
Not afraid of mistakes*	3.94	.998	3.66	1.15
Number of devices owned**	3.12	.998	2.85	.971
Own a laptop*	91%	.290	83%	.380
Own an eReader**	24%	.430	9%	.290

*p<.05. **p<.01.

Additionally, women appeared to use computers in different ways when compared to the men in the study. Women spent significantly greater amounts of time each week using computers for academic purposes. This included conducting research for classes and using a course management system. Other activities in which women differed significantly from their male counterparts were paying bills online, social networking, reading online, editing and sharing photos, and instant messaging (Table 18). The activities that men reported that were significantly higher than women were accessing YouTube, playing games, and editing audio files (Table 19).

Table 18: Computer/Technical Differences between Men and Women How Women Use Computers

	Women		Men	
	M	*SD*	*M*	*SD*
Academic (hours per week)**	9.46	6.74	8.07	6.09
Email*	.96	.188	.92	.279
Research for class*	.79	.408	.69	.465
Banking/paying bills**	.61	.488	.34	.477
Social networking**	.86	.345	.73	.445
College portal**	.91	.283	.81	.398
Reading online*	.21	.411	.14	.351
Instant messaging*	.37	.485	.26	.441
Sharing photos**	.54	.500	.37	.485
Editing photos**	.47	.501	.27	.445

*p<.05. **p<.01.

Table 19: Computer/Technical Differences between Men and Women How Men Use Computers

	Women		Men	
	M	*SD*	*M*	*SD*
YouTube**	.60	.491	.77	.423
Online games*	.22	.418	.32	.468
Offline games*	.38	.486	.53	.501
Editing audio files**	.10	.301	.22	.415

*p<.05. **p<.01.

Women also had significantly higher course grades and cumulative grade point averages (GPA's) compared to men. On a 4.0 grading scale, women earned an average of 2.56 (SD = 1.44) in the surveyed courses while 2.21 (SD = 1.55) was the average for men. The cumulative grade point average (GPA) of women was 2.82 (SD = 89) with men earning a mean GPA of 2.63 (SD =.99). There were no significant differences between women and men regarding course withdrawal rates.

The Impact of Age Differences on Computer Efficacy

Age was the primary variable that was used to distinguish traditional from nontraditional students. When other factors were discounted, students over the age of 24 were considered nontraditional; students 24 and below were considered traditional. Certain expectations regarding nontraditional students were verified in this research: they work more hours, have more children, and are more likely to enroll part-time and in evening or online classes. Not surprisingly, the older group revealed less efficacious behavior regarding computer-related skills. However, they compensated for this deficit in various ways.

As noted previously, a variable, “level of nontraditionality” was created to identify correlations that may be affected by nontraditional factors other than age. This variable was created by aggregating points for age, marital status, children, part-time enrollment, and employment status. Various regressions, correlations, and independent-samples t-tests were conducted using both variables.

Table 20 provides descriptive statistics for both colleges as well as the total sample.

Table 20: Descriptive Statistics Regarding Age

	College A	College B	Total Sample
Minimum age	17	18	17
Maximum age	57	57	57
Mean age	24.88	25.69	25.16
Mode age	18	18	18
Median age	20	21	20
Percentage of traditional students	68.0%	63.9%	66.6%
Standard deviation	9.638	9.661	9.640

Significant differences between traditional and nontraditional students are depicted in Table 21. Traditionally-aged students enrolled in more credit hours and attended college full-time. They pursued higher degrees (Table 22), were more comfortable using computers, and owned more smart phones and laptop computers. Nontraditional students typically worked more hours per week. Expectedly, they also enrolled in more evening and online courses as compared to day courses (Table 23). In spite of less comfort with computers and less confidence in their computer skills, nontraditional students reported spending more hours on a computer each week than traditional students.

Table 21: Significant Differences between Traditional and Nontraditional Students

	Traditional		Nontraditional	
	M	*SD*	*M*	*SD*
Credit hours enrolled**	13.76	2.87	11.24	3.85
Course withdrawal rates**	9.8%	.298	17.7%	.383
Hours worked per week**	28.63	10.11	36.32	10.27
Hours on a computer each week**	17.65	24.34	23.63	19.88
Own a smartphone*	76%	.431	64%	.483
Own a laptop computer*	91%	.292	83%	.376

*p<.05. **p<.01.

Table 22: Differences in Academic/Degree Goals

	Traditional	Nontraditional
Certificate	2.2%	5.3%
Associate Degree	52.7%	60.2%
Bachelor Degree	26.5%	25.7%
Graduate Degree	16.4%	7.1%

p<.05.

Table 23: Differences in Enrollment by Class Format

	Traditional	Nontraditional
Day classes	79.2%	20.8%
Evening classes	45.2%	54.8%
Online classes	48.6%	51.4%

p<.05.

As expected, older students began using computers at a later age and acquired less computer experience in high school. Of the 339 students surveyed, 225 were traditional according to age (from 17 to 24 years) and 98% of those had used computers in high school. The remaining 114 students were nontraditional by age (over 24). Of those, 58% had used computers in high school. As the sample increased in age, the likelihood of computer use in high school decreased. By the age of 46, no students reported any computer use in high school. These students graduated from high school prior to 1985 which was before computers were commonly available in secondary schools. Similarly, the mean age that students were initially exposed to computers was 10.72 for traditionally-aged students (SD = 11.44) and 20.45 for nontraditional students (SD = 14.50).

Correlational analyses revealed significant negative relationships between age and computer efficacy (r = -.150, n = 337, p= 0.003.) and computer skills (r = -.239, n = 336, p=.000). Although participation in an introductory computer class improved skills and efficacy, a significant, but weak negative relationship emerged between age and enrollment in computer literacy courses (r = -.102, n = 338, p=.031). Only 25% of students enrolled in the sampled introductory and computer applications classes were nontraditionally-aged, despite the fact that over 33% of students in the entire sample were nontraditional by age. However, the majority of computer literacy courses surveyed were conducted during the day, which was when most of the students enrolled were traditional.

Traditional and nontraditional students reported significantly different ways of obtaining their computer experience. While most traditionally-aged students learned how to use computers on their own, older students relied on external assistance (Table 24).

However, the largest difference between the two groups was in on-the-job experience. Since most traditional students have limited work experience, it should be expected that they would report fewer skills gained from employment.

Table 24: How Students Obtain Computer Experience

	Traditional	Nontraditional
On their own	61.9%	45.1%
Family or friend	4.9%	7.1%
On the job	1.8%	20.4%
Formal computer class	31.0%	26.5%

When comparing traditional and nontraditional students (as determined by age) using independent-samples t-tests, nontraditional students consistently revealed a lack of computer skills (Table 25).

Table 25: Nontraditional Students' Report Fewer Computer-related Abilities

	Traditional		Nontraditional	
	M	*SD*	*M*	*SD*
Perceived computer skills	3.71	.735	3.42	.784
Comfort using computers	3.20	.710	2.93	.842
Word processing skills	4.25	.794	3.80	.927
Presentations skills	3.97	.963	3.03	1.18
Graphics skills	3.04	1.29	2.63	1.30
Organizing folders/files	3.70	1.157	3.34	1.190
Creating folders/files	4.04	1.058	3.61	1.051
Searching on Internet	4.43	.731	4.15	.759

$p<.01$.

Independent-samples t-tests were also used to compare nontraditional freshmen (earned less than 30 credit hours) and nontraditional students who had earned 30 or more college credits. Significant differences between these groups indicated that nontraditional students who were early in their college careers had lower computer efficacy than their counterparts who had completed more hours (Table 26).

Table 26: Nontraditional Freshmen Report Fewer Abilities than Non-Freshmen

	Freshmen		Non-Freshmen	
	M	*SD*	*M*	*SD*
Perceived computer skills	3.15	.777	3.49	.960
Comfort using computers	2.75	.764	3.08	.881
Word processing skills	3.56	.938	4.00	.876
Not afraid of mistakes	3.69	1.13	4.15	.910

$p<.05$.

One significant skill that was reported more frequently by nontraditional students than by traditional students was the use of online library resources. The mean value for the younger group was 3.00 (SD = 1.17) on a scale of 1 to 5 and the mean for students over the age of 24 was 3.24 (SD =.928).

As noted above, nontraditional students were compared using two identification methods in this study. One method considered age alone: students 24 and younger were considered traditional while students over 24 were considered nontraditional. The second method aggregated various nontraditional characteristics (age, marital status, children, employment, and enrollment status) to determine the student’s level of nontraditionality. Interestingly, these two identifiers revealed significant differences in some correlational analyses. Table 27 displays how these two methods of identification differed regarding specific computer efficacy-related activities.

Table 27: Differences between Age and Level of Nontraditional Characteristics

	Age as the only Factor	Age plus other Nontraditional Factors
Lack confidence in word processing skills	.111	ns
Afraid of destroying information	ns	.128
Afraid of making mistakes	ns	.113
Lack confidence in locating/copying files	.175	.107
Lack confidence in organizing folders/files	.219	.106
Lack confidence in learning new software	.148	ns
Lack confidence in understanding terminology	.094	ns

ns = not significant

$p<.05$.

General operating system tasks such as manipulating files and folders on computer drives are deficient regardless of the method used in identifying and classifying nontraditional students. Otherwise, correlations that only considered age identified more issues involving confidence, while the statements involving "fear" only correlated significantly to those students who exhibited greater levels of nontraditional factors. For example, when age was the only factor used to identify nontraditional status, older students had less confidence in word processing, learning new software, and understanding terminology. However, when other factors were included such as marital status and children, nontraditional students were significantly more afraid of making mistakes and destroying information.

In spite of reduced skills and less confidence in those skills, nontraditional students reported a significantly higher preference for using computers than traditional students. An independent-samples t-test with a significance of p=.015 revealed that the mean of nontraditional students was 3.17 (SD =.823) on a scale of one (strongly disagree) to five (strongly agree) compared to 2.98 (SD =.726) among traditional students.

There was a weak but significant correlation between the level of nontraditionality and course withdrawal rates. A Pearson correlation coefficient was computed to assess the relationship between the level of nontraditional characteristics exhibited by students and course withdrawal rates. There was a positive correlation between the two variables, r = 0.131, n = 339, p= 0.008. Likewise, when an independent-samples t-test was conducted to compare withdrawal rates between students aged 24 and under with those over the age of 24, there was a significant difference using a one-tailed test: traditionally-aged students (M =.098, SD =.298) and nontraditionally-aged students

(M =.177, SD =.383); [t(182) = -1.92, p= 0.028]. Overall, there was a positive correlation between nontraditionally-aged students and course withdrawal rates. This was particularly evident among nontraditional freshmen students. Over 21% of adult students with fewer than 30 college credits earned withdrew from their surveyed class by the end of the semester compared to 11% of the remainder of the student sample.

However, nontraditional students did not withdraw from computer-related or online courses at significantly higher rates than traditional students. Independent-samples t-tests were calculated to compare the mean withdrawal rates of traditional students and the mean withdrawal rates of nontraditional students. No significant difference was found when means were compared in computer-related classes [t(23.72) = -1.154, p>.05]. Likewise, no significant difference was found between means of traditional and nontraditional student withdrawal rates in online courses [t(68) = 67.93, p>.05].

Independent-samples t-tests also revealed that no significant differences existed between traditional and nontraditional students when comparing course failure rates: [t(328) = -.062, p>.05]. Consequently, although nontraditional students withdrew from more classes in general, they did not fail more classes than traditional students and they did not withdraw more often from computer-intensive courses.

The Impact of Computer Experience on Computer Efficacy

This study recognized several methods of obtaining computer experience: in high school, in computer literacy courses, through employment, through friends and family, and in the college classroom. The results indicated that all forms of computer experience impact computer efficacy positively and powerfully. Not surprisingly, traditional students obtained the majority of their formative experience during high school and the most experienced nontraditional students acquired skills from employment. Although on-the-job experience is a powerful compensatory measure for older students, younger students with high school experience reported greater levels of efficacy than nontraditional students with work experience. In spite of greater efficacy among younger students with high school experience, students with more computer use as a result of employment or classroom requirements were more successful in completing college courses.

Students who used computers in high school had significant, positive relationships with most computer-related variables. In almost all comparisons, the strength of the relationship increased as the amount of use in high school increased (Table 28).

Table 28: High School Computer Use Improves Efficacy and Skills

Variables	Students who reported any computer use in high school r^2	Students who reported extensive computer use in high school r^2
Computer efficacy	.220	.376
Computer skills	.289	.442
Comfort using computers	.233	.356
Believe they have adequate skills for college	.160	.221
Are not intimidated by online classes	.109	.172

$p<.05$.

Interestingly, there were no significant correlations between students reporting computer use in high school and the preference for using computers over traditional methods [$r(333) =.063$, $p>.05$]; nor were there significant correlations between high school computer use and the number of devices owned [$r(337) =.082$, $p>.05$]. However, there were weak, yet significant relationships between preferences and device ownership and the *extent* of computer use in high school: preference for using computers [$r(319) =.143$, $p<.01$], number of devices owned [$r(323) =.178$, $p<.01$]. The importance of this particular analysis was that students who used computers in high school to any degree were more confident in their skills; however, this confidence increased as they gained more computer experience during those years. Likewise, students who obtained more extensive skills in high school were more inclined to use technology when completing tasks.

A regression analysis was calculated to predict students' computer efficacy based on various computer applications used in high school (word processing, presentation software, spreadsheets, database, computer programming, web page design, computer networking, email, Internet use, and video/audio editing). A significant regression equation was found [$F(10,313) = 7.315$, $p=.000$], with an r^2 of .189. The most significant variables in descending order were presentation software, database applications, spreadsheets, and word processing.

Students who participated in an introductory computer literacy course, either in high school or college, demonstrated significantly higher levels of computer efficacy and skills than their counterparts who were never enrolled in such a course. Additionally, the students enrolled indicated that they had greater confidence in understanding terms pertaining to computers and technology. Results were compiled from an independent-samples t-test that compared the means of variables between students who took an introductory course to those who did not. A five-point Likert scale was implemented to rank responses from one (least skill) to five (most skill) (Table 29).

Table 29: Introductory Computer Courses Provide Greater Confidence

	Completed an Introductory Course		Did not complete an Introductory Course	
	M	*SD*	*M*	*SD*
Computer efficacy	3.43	.635	3.11	.634
Prefer using computers	3.12	.748	2.78	.767
Computer skills	3.68	.758	3.31	.765
Confident understanding terms	3.43	.976	3.16	1.027
Confident managing files	4.03	.964	3.71	1.062
Adequate skills for college[a]	2.72	.490	2.59	4.96

[a] Scale of 1 – 3 (no/sometimes/yes)
$p<.05$.

Interesting results were discovered regarding students who used computers for employment purposes and those who did not. Students were divided into two groups: those who used computers while working and those who didn't work or didn't use computers for work. Although nontraditional students are generally more likely to withdraw from college than traditional students, a Pearson correlation revealed that nontraditional students who use computers while working are not more likely to fail or withdraw from college classes. However, correlational analysis conducted on the group of students who did not use computers for employment exposed different results. Among students who do not use computers for employment purposes, there was a significant negative correlation between the level of nontraditional characteristics students displayed and successful completion of the course. A Pearson correlation coefficient was calculated for the relationship between participants' level of nontraditional characteristics and his or her likelihood of not successfully completing the course. A significant correlation was found [$r(212) =.162$, $p=.009$], indicating a linear relationship between the two variables. Thus, students with higher levels of nontraditional characteristics who did not use computers for employment purposes were more likely to fail or withdraw from a class than nontraditional students who did use computers on the job.

Perhaps the most revealing results stemmed from an independent-samples t-test that compared two groups of students: those who passed the course with a grade of A, B, C, or D and those who failed the course with a grade of F or withdrew. Although there were virtually no significant differences between the groups regarding employment status and the number of hours worked per week, the differences involving the use of computers for employment were astounding. On average, students who successfully completed their classes spent more than 12 hours per week on the computer for work and students who withdrew from or failed their classes spent less than six hours per week using the computer for work. It appears that students who do not use computers for employment purposes are less successful in finishing a class (Table 30).

Table 30: Students Using Computers for Employment are More Successful in College

	Grade of A-D		Grade of F or Withdrawn	
	M	*SD*	*M*	*SD*
Number of hours computers are used during employment	12.17	15.29	5.50	11.99

$p<.01$.

Although this relationship may reveal the significance of on-the-job computer experience, it is possible that students who have computer-related jobs have certain characteristics that are lacking in students who are employed as general laborers. For example, students who are employed in jobs that require some level of technical skills may be more motivated to obtain a college degree.

Students with little access to computers during high school have reduced levels of computer efficacy and skills. However, extensive computer use during employment provides a significant opportunity for nontraditional students to improve their skills. Unfortunately, such on-the-job experience does not completely close the gap. Table 31 depicts the differences in relationships between efficacy and experience gained during employment or in high school.

Table 31: High School Experience Creates Greater Efficacy than Work Experience

Variables	*Experience gained on the job* r^2	*Experience gained in high school* r^2
Computer efficacy	.169**	.376**
Computer skills	.109*	.442**
Believe they have adequate skills for college	.120*	.221**
Comfort with using computers	ns	.356**
Are not intimidated by online classes	ns	.172**

ns = not significant.
*p<.05. **p<.01.

In spite of the stronger relationships resulting from high school experience, students with more computer hours on the job have greater preferences for using computers over traditional methods ($r^{2} =$ .126, p=.01). In fact, there was no significant relationship between high school experience and a preference for using computers. Moderately strong relationships existed for both groups (experience gained on the job and experience gained in high school) and students with nontraditional characteristics. However, the relationship between nontraditional students and high school experience was negative ($r^{2} =$ -.494, p=.000) compared to the positive relationship between nontraditional students and on-the-job experience ($r^{2} =$ .371, p=.000). As expected, older students did not use computers in high school, but may be using them currently for employment purposes.

Another opportunity for students to gain computer experience is while in college. The extent of computer use in general classes varies according to instructor preferences; however, students who reported greater percentages of computer activities also reported more efficacious attitudes. In the survey, students were asked to report the percentages of their classes that required the use of email, Internet-based research, online course management systems, word processing, and specialized course software (accounting software, networking, computer-aided drafting, website design, etc.). Additionally, all variables regarding methods of computer use in classes were averaged to create a single "average computer use" variable.

Students reported that slightly more than 80% of their courses required the use of email for communicating with the instructor and 79% of courses required the use of a course management system for retrieving assignments or uploading homework. Internet research was needed in approximately half of all courses; 37% of courses required the use of word processing for reports and essays; and nearly one-fourth required the use of some form of specialized software. A Pearson correlational analysis resulted in the relationships represented in Table 32. In addition to the individual types of computer requirements, the average of all activity variables is included and correlated to the efficacy-related variables.

Table 32: Effects of Computer Activities in the College Classroom

	Mean of All Activities	Course Mgt System	Internet Research	Word Processing	Special Software
Computer efficacy	.177	.143	.104	.183	.208
Computer skills	.159	.150	.173	.140	.165
Believe they have adequate skills	.154	.099	ns	.176	.167
Comfort with using computers	.147	.124	ns	.149	.179
Not intimidated by online classes	.172	.131	ns	.097	.203
Preference for using computers	.129	.102	ns	ns	ns

ns = not significant.
$p<.05$.

Another factor in determining a student's confidence with computers may be his or her academic level. A positive relationship emerged between the student's year and semester of college and computer-related confidence at [r(335) =.128, p=.009]. It appears that students who are farther along in their academic programs have increased efficacy. This may indicate that students' skills and confidence increase as they persist through college. However, it could also suggest that students with fewer skills and efficacy drop out of college and only those with adequate skills persist. Similarly, Table 33 depicts averages for computer efficacy, preferences for using computers over traditional methods, and self-reported level of computer skills for each of the academic levels: first-semester freshmen, second-semester freshmen, sophomores, and students with over 65 credit hours earned. Although not significantly different, in nearly all dimensions computer-based skills and efficacy appear to slightly improve as students' progress through the academic levels.

Table 33: Computer Efficacy and Skills Reported for each Academic Level

	First Semester n = 150		Second Semester n = 60		Sophomore n = 99		Over 65 Credits n = 30	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Computer efficacy	3.47	.726	3.55	.897	3.71	.737	3.68	.910
Preference for using computers	2.98	.699	3.06	.852	3.10	.774	3.11	.867
Computer skills	3.57	.748	3.60	.787	3.71	.729	3.58	.892

Effects of Computer Access on Efficacy

The primary factors relating to computer access are the availability of the Internet and ownership of computer-related devices. Results indicated that computer efficacy is improved by higher quality Internet access and the accessibility of technical devices. The most significant correlations in this study included the ownership of computer-related devices.

Of 339 students surveyed, only one reported no home or public Internet access. Ninety-one percent (91%) had Internet access at home (30 students did not) and 86% of students (292) use public Internet access. There was a significant, but weak negative correlation between Internet access at home and the use of public Internet, indicating that home access understandably diminished the need for public access ($r^2 = -.095$, $p<.05$). Correlational analysis revealed that students with Internet access at home have adequate computer skills for college ($r^2 =.108$, $p<.05$) and own more computer-related devices, such as cell or smart phones, laptops, tablets, or electronic readers ($r^2 =.184$, $p<.05$). More significantly, Internet access correlated to successful completion of coursework ($r^2 =.106$, $p<.01$). Students who did not have Internet access at home tended to be less successful in completing the course in which the student was surveyed. This relationship reliably parallels the previously discussed connection between increased Internet-based research and successful course completion. Table 34 depicts the frequencies of home Internet connectivity reported by the participating students.

Table 34: Frequencies of Various Internet Connections at Home

Internet Connectivity	*Quantity*	*Percentage*	*Cumulative Percentage*
None	30	9%	9%
Dial-up	9	3%	12%
Satellite	25	7%	20%
Cable	51	15%	34%
DSL	76	22%	56%
Wireless	140	41%	98%
Other	8	2%	100%

Although the vast majority of students have Internet access at home, some forms of access are faster and more reliable than others. Poor bandwidth and latency performances associated with dial-up and some satellite connections often prevent students from adequately performing course requirements such as uploading and downloading assignments, watching online videos, and even completing online tests. Additionally, conducting research and other online activities may be frustrating or nearly impossible. As a result, an independent-samples t-test was conducted to compare the means of various factors between two groups: the first group consisted of students with no Internet access at home or with dial-up or satellite connections. The second group consisted of students with higher quality connections: cable, DSL, and wireless. Significant differences between the two groups are revealed in Table 35. The first item, "use public Internet access", was a two point scale: 0 represented a negative response and 1 represented a positive response. The next two variables included five-point Likert responses ranging from 1 = strongly disagree to 5 = strongly agree. The final variable, "devices owned", was an average of the number of technological devices that the student owned (cell phone, smart phone, desktop computer, laptop computer, tablet, and eReader).

Table 35: Higher Quality Internet Access has Positive Results

	High Quality[a] Internet Access		No Access or Poor[b] Internet Access	
	M	*SD*	*M*	*SD*
Use public Internet access	.84	.368	.95	.213
Prefer using computers	3.08	.748	2.87	.803
Comfortable communicating online	3.97	.824	3.67	.950
Devices owned	3.07	.977	2.78	1.05

[a]Cable, DSL, Wireless. [b]No access, Dial-up, Satellite.
$p<.05$.

Understandably, students with poorer Internet connections at home tend to use public locations to supplemental their access. As greater numbers of public locations provide Internet connectivity, many of the digital gap issues that developed because of poor home connections have been alleviated. Consequently, few variables denote strong correlative differences between poor access and better access. However, one difference may prove to be critically linked to some very essential outcomes: increased ownership of computer-related devices.

A plethora of computer and technology devices are available in today's society. Students have access to a variety of cell phones and smartphones, laptops, tablet computers, and electronic readers (eReaders). Table 36 depicts ownership of various computer-related devices. The number of devices that students own is a significant factor in computer skills, computer efficacy, and successful course completion. The number of students who own multiple devices is revealed in Table 37.

Table 36: Ownership of Various Computer-Related Devices

	Percentage of students who own the device
Cell phone	40.7%
Smart phone	71.7%
Desktop computer	61.7%
Laptop computer	88.2%
Tablet	20.9%
eReader	18.9%

Table 37: Most Students Own at Least Three Devices

Number of Devices	Number of Students	Percentage
1	12	3.5%
2	98	28.9%
3	128	37.8%
4	75	22.1%
5	24	7.1%
6	2	.6%

Correlative and regressive analyses were conducted to identify relationships between the ownership of computer devices and other technological and educational variables. The results were conclusive. Individual device variables were compared; additionally a single variable (devices owned) was created to aggregate the number of devices that each student owned. This factor correlated significantly and positively with nearly every existing computer-related variable. As expected, access to computer-related devices positively affects computer efficacy. Efficacious factors that significantly correlated to the number of devices students owned are represented in Table 38.

Table 38: Effects of Access to Computer-related Devices on Efficacy

Computer Efficacy Variables	r^2
Prefer using computer over traditional methods	.220
Computer efficacy	.341
Computer skills	.330
Believe they have adequate skills for college	.233
Comfort in using computers	.263

$p<.001$

Effects of Time Spent with Computers and the Amount of Computer Activities

Computer usage by students was measured by two factors: the number of hours they reported using computers each week and the number of computer-related activities in which they participated. Evidence suggests that computer efficacy improved with more time and greater numbers of computer-related activities. The number of hours of use was measured by (a) any type of use, (b) academic use, and (c) work-related use. Results are displayed in Table 39.

Table 39: Skills and Efficacy Improve with More Time Spent on the Computer

	Hours Used for Any Purpose	Hours Used for Academic Purposes	Hours Used for Work Purposes
Computer efficacy	.278*	.155*	.169*
Computer skills	.210*	.114**	.109**
Believe they have adequate skills	.117**	ns	.120**
Comfort with using computers	.229*	.183*	ns
Are not intimidated by online classes	.201*	.142*	ns
Preference for using computers	.243*	.157*	.190*

ns = not significant.
*p<.05. **p<.01.

Students who generally spend more time on the computer for any purpose had significantly improved skill and efficacy. However, only the number of hours that they spent on computers for work significantly correlated to successful completion of coursework (Table 45). Surprisingly, there was not a significant relationship between successful completion of classes and the number of hours spent on computers for academic purposes. Consequently, using computers on the job appears to relate to higher course completion rates. Since there was no significant relationship depicted between employment status and any academic achievement (course grade, GPA, or successful completion), the connection appears to be solely based on the amount of time spent on the computer while on the job. However, it is possible that students employed in semi-skilled positions that require computers are more motivated to obtain a college degree than those in positions that require no technical skills.

Computer activities were measured by student-selected responses to a variety of common online and offline functions. Selections were aggregated to create total values that represented the amount of activities in which students participated. Although it stands to reason that students who participated in more computer-related activities would also spend more hours on the computer, increasing the variety of computer activities yielded stronger relationships than simply increasing computer hours when comparing the same variables (Table 40). Student participation in greater varieties of computer-related activities correlated strongly with computer efficacy and computer skills.

Table 40: Skills and Efficacy Improve with More Computer Use

	Variety of Computer Activities	Hours Spent on the Computer
Computer efficacy	.496	.278
Computer skills	.494	.210
Believe they have adequate skills	.349	.117
Comfort with using computers	.405	.229
Are not intimidated by online classes	.371	.201
Preference for using computers	.392	.243

$p<.001$.

Finally, a multiple regression was calculated to predict computer efficacy based on the level of the following independent variables:

- nontraditional characteristics
- amount of computer use in high school
- the amount of use in college classes
- the number of hours a computer is used on the job
- completion of an introductory computer course
- the number of computer devices owned
- general computer skills

A significant regression equation was found [$F(7, 298) = 255$, $p=.000$], with an r^2 of .857. More than 85% of the dependent variable can be explained by the independent variables. The three strongest predictor variables in descending order were general computer skills, level of nontraditional characteristics, and number of hours the computer was used on the job. Computer experience gained in high school indicated a slightly stronger relationship to computer efficacy when compared to completing an introductory computer course. However, the introductory course should not be ignored because of the significant numbers of nontraditional students who gained limited or no computer experience in high school. This is especially important if that student is not currently employed in a position that utilizes computers.

Significant Differences between the Two Community Colleges

Comparisons between the two colleges in this study revealed several significant differences, but none that would suggest students at one campus had technological advantages over the other. College B students reported higher levels of efficacious behavior regarding overall computer efficacy, preferences for using computers over traditional methods, and general confidence in using computers. However, College A students began using computers at significantly younger ages, completed more introductory computer courses, and owned more smart phones. (Table 41)

Table 41: Advantages among College A Students Compared to College B

	College A		College B	
	M	*SD*	*M*	*SD*
Own a smart phone	.75	.431	.65	.480
Completed Intro to Computers course	.84	.366	.72	.453
Age of first computer use	12.65	9.35	16.79	18.52

$p<.05$.

Although the age differences between students were not significant, College B revealed slightly higher ages and a greater percentage of nontraditional students among the sample. This marginal difference could explain some of the differences in the age that students began using computers. If College B students were older than students attending College A, they likely began using computers at a later age. Surprisingly, in spite of an older sample, College B students reported significantly higher levels of computer efficacy. (Table 42).

Table 42: Advantages among College B Students Compared to College A

	College A		College B	
	M	*SD*	*M*	*SD*
Computer efficacy	3.32	.641	3.48	.625
Preference for using computers	2.94	.739	3.24	.772
Confidence in using computers	3.49	.787	3.73	.754

$p<.05$.

A variety of Internet options exist for consumers, particularly those located in urban areas. Students living in more densely populated areas may connect via DSL, cable, or wireless channels. All of these options are considered relatively high speed, reliable, and generally inexpensive. However, students who reside in rural areas have fewer choices. Their only options may be through dial-up telephone lines, satellite connections, or nothing. Although dial-up connections are becoming less common, they are still inexpensive compared to satellite broadband; however, connection speeds are insufficient for the vast majority of course requirements. The best option for students in these areas is often satellite Internet. Within the rural areas surrounding these two community colleges, a typical monthly cost for satellite connectivity is $80, compared to $20 to $40 for the alternative high-speed options that are available in the metropolitan areas. Lower income individuals who reside in rural areas may be limited to dial-up connections or no Internet service. Those who can afford satellite options are often hindered by the lower bandwidth and latency issues that are common with that service. Although they are expensive, satellite connections typically are less reliable than other methods. In addition to normal latency problems that exist due to the distances between the earth and high-altitude satellites, severe weather can significantly decrease upload and download speeds and even completely disconnect the user from the Internet during use.

High-bandwidth course requirements such as online testing and watching video and audio streams can be problematic in these situations.

As expected, students in College B, which was closer to the metropolitan area, reported improved levels of Internet access and more students had Internet access at home (Table 43). In spite of better home connectivity, those students also used more public Internet access points (Table 44).

Table 43: Inter-campus Comparison of Students with Poorer Internet Access

	College A	College B
No access	10%	6.7%
Dial-up Internet	3.2%	1.7%
Satellite Internet	10.9%	5.5%
Total:	**24.1%**	**13.9%**

Table 44: Inter-campus Comparison of Students using Public Internet Access

	College A	College B
Any public Internet access	84%	90%
Public library	28%	50%
Internet cafe	43%	50%
Campus Internet	73%	87%
Work Internet	25%	21%

College B students have distinct advantages regarding Internet access, both public and private, and higher levels of computer efficacy. These results align with previous analyses that depict significant relationships between Internet access and efficacy; therefore, improved Internet access appears to be a significant contributor to increased computer efficacy. Interestingly, students at College A own more smart phones. Since smart phones typically have Internet access, these students may be compensating for poor or no Internet access at home, which may also affect course outcomes. Some of this researcher’s students have had to complete online tests, participate in discussion topics, and upload assignments using smartphones.

Hypothesis 2: Students with diminished levels of computer efficacy are less successful in college.

Effects of Computer Efficacy and Skills on Academics

A significant component of this research was to determine if computer efficacy impacts a student's success in college. College success is the result of many environmental and individual factors. Personal motivation, previous education, and other responsibilities are just a few issues that impact a student's education. However, this research revealed distinctive correlations between a variety of computer-related factors and computer efficacy, and ultimately between computer efficacy and successful completion of courses. Additionally, students with higher levels of computer efficacy were more likely to enroll in courses with greater expectations regarding the use of computers and technology, such as online courses and traditional courses that required extensive computer usage.

Two factors that had a significant impact on course grades and successful completion of coursework were the amount of time that students spent on computers and access to computer-related devices. Table 45 reveals that the number of hours that students spent on computers for any purpose or specifically for employment purposes correlated with course grades. Students who spent more time on the computer had higher grades. Interestingly, the number of hours that students spent on computers for academic purposes did not directly affect grades. Additionally, students who frequently used computers for work were more likely to complete the course with a passing grade (A – D).

Table 45: Academics Improve with More Time Spent on the Computer

	Hours Used for Any Purpose	Hours Used for Academic Purposes	Hours Used for Work Purposes
Course grade	.106	ns	.101
Successful course completion	ns	ns	.137

ns = not significant.
p<.05.

In addition to the amount of time that students spent with computers, the availability of technological devices correlated significantly to student grades and course completion. Results indicated that such access improves the likelihood that students will successfully complete coursework (Table 46). However, it is possible that other socio-economic factors contribute to persistence in courses and students who own more devices may be more financially secure. As a result, they may be less likely to withdraw from courses because of financial hardships, for employment reasons, or due to family expectations.

Table 46: Relationship of Access to Computer Devices and College Success

Variables	r^2
Course grade*	.122
GPA*	.119
Successful completion of course**	.168

*p<.05. **p<.01.

Another factor that impacted course grades and withdrawal from the class was the academic level of the student. Table 47 reveals the average course grade and withdrawal rate for each segment of students. Survey participants categorized themselves as a first-semester freshman (0 – 15 credits earned), second-semester freshman (16 – 30 credits earned), sophomore (31 – 65 credits earned), or over 65 credits earned. Students in higher academic levels earned progressively higher grades than those in lower academic levels. However, withdrawal rates revealed a different pattern. First-semester freshmen had the lowest withdrawal rates, but second-semester freshmen had the highest level of withdrawal rates. These results indicated the level of persistence that students had within a single course and not from one semester to the next. Longitudinal persistence from semester to semester was not recorded. Consequently, these results should not lead to assumptions about total withdrawal from college at any academic level.

Since most two-year degrees require approximately 65 credits, students who have earned over 65 credits may be nontraditional students who have previously earned a degree and are returning to college after an extended absence. This concept is strengthened by two characteristics shared by nontraditional students and those with over 65 credits: they have higher grade point averages and with the exception of second semester freshmen, they are more likely to withdraw from their classes.

Table 47: Course Grades and Withdrawal Rates Reported for each Academic Level

	First Semester n = 150		Second Semester n = 60		Sophomore n = 99		Over 65 Credits n = 30	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Course grade	2.24	1.51	2.38	1.62	2.57	1.44	3.04	1.11
Withdrawn[a]	.107	.310	.183	.390	.121	.328	.133	.346

[a] Scale was from 0 = completed class (with grade A, B, C, or D) to 1 = withdrew from the class.
p<.05.

A series of survey questions asked students to report the percentage of college courses that required the use of (1) email,(2) an online course management system (such as Blackboard or Moodle), (3) the Internet, (4) word processing, or (5) specialized software (such as accounting, software applications, or programming languages). Results were averaged for each application and the mean values are indicated in Table 48. Such outcomes suggest that computer-related technologies, particularly email and course management systems, are being used quite extensively in the community college classroom.

Table 48: Percentage of Courses Requiring Computer Usage

Technology	*M*	*SD*
Course Management System	80%	28.47
Internet	64%	34.14
Word Processing	38%	31.18
Specialized Software	26%	27.00
Email	82%	28.36

Furthermore, a regression analysis was conducted to determine if the computer skills and efficacy of students affect their choices when selecting computer-intensive courses. Results indicated that students who reported higher levels of computer efficacy tend to enroll in courses that require greater levels of computer use. An aggregate computer efficacy score for each student was calculated by averaging his or her responses to a series of Likert survey questions regarding efficacious behavior. Responses ranged from strongly disagree to strongly agree. Six variables were included in the regression to examine their combined effect on the likelihood of students' taking courses that require high levels of computer use. These six predictor variables were: computer efficacy, completing an introductory computer course, the number of computer devices, Internet access at home, the amount of computer use in high school, and the belief that one has adequate skills for completing college courses. The effect of these variables on courses with extensive computer usage was [$F(6, 298) = 4.292$, $p=.000$], with an r^2 of .08. While the r^2 was relatively low, the level of significance was strong, indicating that there is an effect between efficacy and course selection, but additional factors exist when students make enrollment decisions. As with online courses, increased computer and Internet requirements in all classes mandate that students have sufficient skills and confidence in those skills to successfully complete courses.

Individual correlations between five commonly required course applications (use of email, the Internet, word processing, specialized software, and a course management system) and the computer efficacy variable can be found in Table 49. With the exception of email, the remaining technologies indicate that a significant difference exists between computer efficacy among students who take classes requiring extensive use of technology and those who don't. However, as previously stated, the relatively low r^2 values demonstrate that other factors are involved.

Table 49: Relationships between Efficacy and Extensive Computer Use in Courses

Technology	r^2
Course Management System	.114**
Internet	.191*
Word Processing	.157*
Specialized Software	.185*
Email	ns

ns = not significant.
* p<.05. ** p<.01.

Additionally, students who reported higher levels of computer use in meeting course requirements demonstrated improved course grades and greater likelihood of completing the course (Table 50). This was especially true when the course required an extensive amount of Internet research. The individual use of email, course management systems, or word processing had no significant effect on success.

Table 50: Courses Requiring Extensive Computer Use Improved Student Success

	Mean of All Activities	Internet Research	Special Software
Course grade	.122***	.133***	.134***
Successful course completion	.149***	.188*	ns

ns = not significant.
* p<.05. *** p<.001.

Students indicating increased Internet usage were significantly more successful in completing their surveyed course. While other required computer activities were not significant factors, the composite variable of all computer-related course requirements (mean of all activities) was also noteworthy for the successful course completion factor (r^2 =.149, p=.003). This indicates that students who committed more time on the computer while meeting course requirements are more likely to successfully complete the course.

Compared to students in the classroom, students who were enrolled in online courses reported significantly greater efficacy levels and a preference for using computers over traditional methods. They also spent significantly more hours working with computers while on the job. Results from an independent-samples t-test are revealed in Table 51.

Table 51: Students in Online Courses Report Increased Computer Efficacy

	Online Students		Students in Classroom	
	M	*SD*	*M*	*SD*
Computer Efficacy	3.55	.651	3.28	.679
Preference for Using Computers	3.30	.717	2.98	.763
Hours Spent on Computers for Work	10.61	15.60	5.35	11.46

p<.01.

As expected, students with higher levels of computer efficacy enrolled in more online courses. However, there were no significant differences between online students and traditional classroom students regarding their reported levels of computer skills. This indicates that computer efficacy is more critical to students who select online courses than computer skills. Similarly, a correlational analysis compared three class formats: online, day, and evening, to the computer efficacy variable. Correlational analysis determined that students who enrolled in online courses had greater confidence in their computer abilities (r^2=.125, p=.011).

Students who work during the day often have difficulty in completing college coursework. Online courses may be their only option for obtaining a degree. Therefore, it is critical that students have sufficient levels of skill to complete online course requirements. However, the study revealed that students who worked in nontechnical positions didn't enroll in online courses as frequently as those who worked with computers on the job (Table 52).

Table 52: Students Who Use Computers on the Job Enroll in More Online Courses

	Percentage enrolled online
Employed students who use computers on the job	30.8%
Employed students who do not use computers on the job	19.4%

Although overall withdrawal rates in online courses were higher than other types of courses, nontraditional students did not withdraw from them in significantly higher numbers than traditional students. Nontraditional students did, however, reveal higher tendencies to withdraw from other types of college classes when compared to traditional students. A Pearson correlation coefficient was calculated to obtain the relationship between nontraditional characteristics and eventual withdrawal from the course that the student was enrolled in during the survey. A positive correlation was found. Generally, students with higher levels of nontraditional characteristics were more apt to withdraw from the course they were enrolled in when the survey was conducted [$r(337) = .131$, $p = .008$]. However, when the same analysis was conducted specifically with online classes, no significant relationship was revealed [$r(68) = .236$, $p > .05$]. Similarly, when the same analysis was conducted on the computer literacy courses, results indicated that nontraditional students did not withdraw from more of those classes than traditional students [$r(79) = .299$, $p = > .05$]. Although nontraditional students generally withdrew from more college classes than traditional students, they did not have higher withdrawal rates from courses that required an extensive use of computers, including online courses. However, the surveyed online courses did experience greater withdrawal rates in general than other classes. Results are displayed in Table 53.

Table 53: Online Courses Experience Higher Withdrawal Rates

	Enrollment	Withdrawn	Withdrawal Percentage
Online classes	70	15	21.4%
Day classes	187	20	10.7%
Evening classes	54	8	14.8%
Computer classes	81	7	8.6%

A Pearson correlational analysis was conducted to examine significant relationships between various computer-related variables and unsuccessful course completion. Computer efficacy, computer skills, home Internet access, belief in adequate computer skills, number of devices owned, and the percentage of college classes that required the use of computers revealed significant correlations with successful course completion. The implication is that as technological factors increase, the chance for succeeding also increases; in other words, students successfully complete more courses if they have greater levels of computer skills and efficacy. Results are displayed in Table 54.

Table 54: Factors that Relate to Successful Course Completion

	r^2
Computer efficacy	.105
Computer skills	.124
Internet access at home	.106
Belief in adequate computer skills	.107
Number of devices owned	.168
Percentage of classes requiring computer use	.149

$p<.05$.

Although the correlation coefficients are low, consideration must be given to the fact that many variables comprise academic achievement, including individual motivation, prior education, family support, family obligations, employment, income, etc. Additionally, an independent-samples t-test revealed two significant differences between students who failed or withdrew from courses and those who passed courses: the number of devices owned by the student and the number of hours spent on computers for work (Table 56). While significant relationships appeared between these variables and college success, other causal factors that were not included in this study may exist.

Table 55: Computer-Related Factors Linked to Course Success

	Course was Failed or Withdrawn		Course was Passed	
	M	*SD*	*M*	*SD*
Number of devices owned	2.71	.91	3.11	1.00
Computer hours for work	3.24	9.15	7.36	13.29

$p<.05$.

Similarly, Table 57 displays results from a Pearson correlation that compared various computer efficacy, skills, and behavioral factors to course grades. Although the relationships were not strong, they were significant, which indicates some level of linkage between the factors.

Table 56: Computer-Related Factors Linked to Course Grades

	r^2
Computer efficacy	.093
Computer skills	.095
Belief in adequate computer skills for college	.073
Hours spent on a computer	.106
Amount of computer use in class	.122
Number of devices owned	.122

$p<.05$.

Evidence of a significant relationship was discovered in a multiple regression that predicted a student's belief that he or she had adequate computer skills for college-level work. The independent variables included:

- amount of online activity;
- nontraditional versus traditional by age;
- type of Internet connection;
- freshman or sophomore status;
- number of hours spent on the computer each week for any purpose;
- number of devices owned; and
- preference for using computers over traditional methods.

A significant regression equation was found at $[F(9, 275) = 10.33, p=.000]$, with an r^2 of .253. Although this was not a strong relationship, the results were significant considering that a large variety of factors ultimately affect an abstract belief such as adequate skills for college. Confidence in one's skill is a critical point considering that it correlates to successful completion of coursework. Ultimately, students who don't trust their skills may be less inclined to successfully finish courses leading to a college degree.

Summary

Nontraditional students are older than traditionally-aged college students and have different issues regarding education. Typically, they begin using computers at a later age and consequently, have different attitudes regarding technology. Since they began using computers later in life, they have lower efficacy, or confidence, in their skills and in how they use technical devices. In addition to age, gender differences are also factors that determine how individuals gain technical skills and use computers. The majority of women in the study were nontraditional; consequently, women and nontraditional students exhibited similar results. Since the two groups are so closely aligned, it was difficult to determine if certain outcomes were the result of gender or age. Women and nontraditional students were less likely than males or traditional students to use computers for entertainment purposes, typically preferring to use them only for productivity. Although women felt less skilled than men regarding computer maintenance tasks such as performing hardware and software installations, they embraced technology by owning and using more computers than men.

Nontraditional students began using computers later in life, but that is primarily due to the limited availability of computers during their youth. In spite of the decreased skills and efficacy that result from later use, nontraditional students indicate a greater preference for using computers than traditional students.

High school access is the most significant factor in determining computer efficacy in college students. In this study, efficacy increases exponentially as high school students were exposed to greater levels of operations and applications during these years. The second most successful method of obtaining technical confidence was when computers were used in the workplace. This provided an excellent opportunity for the majority of older students who did not have high school opportunities. Additional factors that improved efficacy were high-bandwidth Internet access and the availability of technical devices.

Unfortunately, many high schools have limited requirements regarding computer instruction. Students who don’t take advantage of such classes or who have worked in environments without computers are significantly at risk of having insufficient skills and efficacy for college-related work. In these situations, community college remedial and introductory computer classes are essential.

Although many factors affect success in college, evidence suggests that computer efficacy and various other computer-related factors significantly influence completion of classes. In addition to successful completion of courses, technical confidence appears to affect course selection decisions. Research indicated that students with increased levels of computer efficacy seemed to choose courses that required significant amounts of computer use, while those with less skill may have avoided such classes. Similarly, students who enrolled in online courses demonstrated higher levels of computer efficacy. Since online courses are often the only options for working nontraditional students, sufficient computer skills and computer efficacy may be critical for adult students who wish to earn college degrees.

Chapter 5: Analysis and Implications

This chapter presents a summary of the study, significant conclusions drawn from the data presented in Chapter 4, and recommendations for future research. Adequate computer and technical skills are necessary in today's society; they are necessary for suitable employment and necessary to successfully complete an education in pursuit of that employment. This study serves in part to identify the most significant computer-related issues that exclude community college students from achieving their educational goals and ultimately, employment opportunities.

Gender, age, and nontraditional characteristics were examined along with computer skills, computer ownership and access, computer experiences, and computer efficacy, in an effort to identify factors that aid or impede student success in college. Ultimately, these variables were compared to college success factors such as cumulative grade point averages, course grades, and course completion rates, with particular attention given to nontraditional students. The focus of this study was the nontraditional student. When compared to traditionally-aged students, adult learners have different attitudes regarding college. They are mature and have experienced life on their own. They know they must be responsible for themselves and their families. They have witnessed first-hand how the lack of a college degree adversely affects income and employment security. During the most recent recession, many found themselves underemployed or unemployed and realized that the key to their future success was a college degree. Consequently, they enrolled in community colleges.

Until just a few decades ago, gender was considered to be a nontraditional factor. However, women currently constitute a larger percentage of college students than men;

therefore, including gender as a nontraditional factor is no longer accurate. Gender differences were examined separately in this study to identify specific issues that may exist between men and women concerning computer use, training, and experience. Although most computer-related factors did not impact men and women in significantly different ways, the study revealed that the two genders use computers for different purposes.

Women recognize computers as academic tools and prefer using them for coursework.

Computers are machines, and historically machines have been tools that were used primarily by men. Perhaps this is why women reported less confidence when troubleshooting computer problems and performing physical maintenance tasks such as adding memory or installing programs. They also felt less confident in their understanding of computer-related definitions and terminology. All of these aspects relate strongly to the technical nature of computers and appear to be less appealing to women.

Fortunately, computing has evolved from consisting primarily of hardware-centric devices with high failure rates into inexpensive and reliable tools that are driven by software. This allows the end-user to focus on the applications that accomplish specific tasks rather than the machine that exists between the individual and the intended outcome. The result is a less intimidating environment for people who have reduced computer skills and efficacy.

Women appear to have overcome many previous reservations about computer use. Compared to men, they own a greater variety of computer devices and use them more frequently. Interestingly, they seem to prefer using computers as practical tools for work and school or for socializing rather than for entertainment purposes. Women spend more time with computers each week for academic purposes, are more inclined to use them to conduct research for class, and use a course management system more frequently. When given a choice between using computers or traditional pen and paper methods for coursework, they would rather use technology while men prefer traditional methods. This indicates that female students in the study weren't afraid or intimidated by technology. Despite an expressed lack of confidence in their computer maintenance and troubleshooting skills, overall, they didn't exhibit lower levels of computer efficacy when compared to their male classmates. Additionally, women seemed less interested in computer-related entertainment, preferring to use them only for practical purposes. Women's perception of computers as academic tools rather than for entertainment may explain why they have greater preferences for using them as coursework instruments when compared to men. If male students, particularly younger ones, view computers as a means of entertainment, they may not recognize their value as productivity devices for work and school and consequently are less interested in using them as such.

Significant computer preferences and use may impact women's success in college.

In addition to greater preferences for using computers and spending more time on computers for academics, women had significantly higher course grades and cumulative grade point averages when compared to men. Furthermore, they were less likely to withdraw from their courses. Considering the high percentage of courses that require some level of computer use for coursework, it seems that the practical affiliation that females have with computers is positively related to educational success. However, women in the study were generally older than men, so differences in grades may be the result of age rather than gender. Typically, older students are more mature and have a greater appreciation for college. Consequently, they may exert more effort into education. This finding suggests that additional research is merited that separates men and women of similar ages into groups based upon how frequently they use computers for academic work, controlling for other factors such as socio-economic status, number of hours worked, etc. It could then be determined how significantly computer use affects college performance without regard to age.

In addition to gender, other nontraditional characteristics have changed as society has changed. The significant factor that conventionally defines nontraditional status is age. Although age was a strong consideration for purposes of this study, other factors were also included: marital status, the presence of children, financial independence, employment status, and enrollment status (part-time versus full-time). Most students over the age of 24 exhibit multiple characteristics of nontraditionality. However, many students aged 24 and under who are typically considered “traditional” by age also have nontraditional characteristics. They work, they marry, they attend part-time, and they have children. As a result, many students under the age of 24 are effectively “nontraditional” and therefore have similar issues as their older counterparts.

As student age increases, computer efficacy decreases and withdrawal rates increase.

This research revealed that the nontraditional students had less confidence in their computer skills; in fact, as age increased, confidence and level of skills decreased. Older students were less likely to learn how to use computers on their own through trial and error, preferring instead to learn under the guidance of family, friends, instructors, or coworkers. This preference for external support is a characteristic of low efficacy. Such students lack the confidence to attempt something new unless someone who they believe is more experienced is available for direction and assistance.

Many older students begin college with insufficient computer skills. They already feel somewhat intimidated about returning to college amidst the younger generations and are concerned about their outdated and seldom used math and writing skills. A lack of confidence in computer skills only increases that anxiety. In addition to updating study skills that have not been used since high school and meeting college-level course requirements, they often must learn how to operate a computer. Simple word processing operations can become extremely frustrating when facing composition deadlines. Such issues may partially explain the high withdrawal rates of nontraditional students in the study (21% of nontraditional freshmen compared to 11% of the rest of the sample), particularly if they were in their first year of college. Many factors affect nontraditional students' decisions to finish their courses. They may have family and employment obligations that interfere with homework and attendance or financial hardships that hinder educational goals. In addition to the normal issues that affect students with adult responsibilities, a lack of computer efficacy can compound the problems that interfere with persistence in college.

Regardless, adult students in the study seemed to compensate for their technical deficiencies by spending considerably more time on the computer in spite of enrolling in fewer credit hours than their traditional counterparts. In fact, one skill that nontraditional students reported at considerably higher levels than traditional students was in using online library resources. Older students value education and work hard to achieve their academic goals. Subsequently, they compensate for delayed college enrollment by using all of the resources available to them. In spite of reduced experience and lower efficacy, nontraditional students in this study preferred to use computers when given the choice between technology and traditional methods. Although they reported fewer skills and less confidence, they understood the value of computers in education and employment and would rather use computers to complete tasks.

Computer experience in high school produces the most computer skills and highest efficacy.

Computer experience from high school was the most significant factor that positively affected computer skills and computer efficacy among college students. In fact, as the number of computer-related high school courses increased, efficacy and skills also increased. Although this was a positive experience for current high school graduates, older students who did not have the opportunity to use computers in high school were disadvantaged.

At first glance, it might appear that this problem will soon be alleviated as computer use in high school continues to increase. However, two critical issues remain. College students who are over the age of 40 had limited, if any, computer experience in high school. Yet, this group of students will be active in the workforce for the next 20 to 30 years. Therefore, these students will require updated computer skills for many years to come. Additionally, today's state-of-the-art high school skills will be obsolete tomorrow. As a result, any future high school graduates who delay college enrollment will experience a certain degree of decreased computer skills and efficacy when they pursue higher degrees. This problem will be accelerated among high school graduates who do not acquire jobs that involve computer use before returning to college.

On-the-job computer experience is the most significant equalizer for nontraditional students regarding computer skills, efficacy, and course completion.

For many working students, their employers require an extensive amount of computer use. The study demonstrated that on-the-job experience is the most critical equalizer regarding technical skills for students who gained little or no computer experience in high school. Consequently, adult students who return to college for re-training have significant advantages if they already possess work-related computer skills. In addition to general operating proficiency, these students may be obtaining skills necessary to use computers to analytically solve problems. As with women in the study, using computers for practical applications may lead to the nontraditional students' preference for using them to complete homework assignments, register for classes, etc. For students with existing computer experience, this process of navigating campus websites for information and enrolling and communicating online is much less intimidating. Unfortunately, adult students who have not been employed in computer-enabled positions are significantly disadvantaged and show lower academic computer use, lower efficacy, and lower course success. Many have few, if any, technical competencies and find college daunting.

Perhaps most significant is the effect that computer-related employment has on course completion. As the level of nontraditional characteristics increased among students with no computer skills gained on the job, students are more likely to fail or withdraw from courses. It is reasonable to expect employed students to have high withdrawal rates as a result of their work schedules. They also drop because of family obligations, financial situations, and personal issues. However, nontraditional students with jobs that require more hours on the computer actually finish more courses than other students. This appears to substantiate the effect that quality computer skills and efficacy have on perseverance in college, though the study does not account for other characteristics that may distinguish students employed in computer-related jobs from the rest of the student population.

When nontraditional students enroll in computer literacy courses, they are less apt to withdraw from them than they are to withdraw from other courses.

Alarmingly, nontraditional students' have increased tendencies to withdraw from their courses, especially within the first academic year. Since lower computer efficacy and higher withdrawal rates are more concentrated among nontraditional freshmen, it is possible that limited computer skills have an adverse effect on educational perseverance. Interestingly, although nontraditional students generally were more prone to withdraw from college courses in general, their persistence in computer-related classes was as strong as traditional students. This may be an indication that these students recognize the critical importance of addressing this deficiency. When they enrolled in courses with significant amounts of computer use, such as introductory, computer application, or online courses, nontraditional students did not have higher withdrawal rates than traditionally-aged students. Nontraditional students seem to appreciate the need for these types of courses and are reluctant to withdraw from them.

Computer efficacy is more critical than computer skills when selecting computer courses.

The students who were enrolled in the surveyed computer literacy classes (Introduction to Computers and Computer Applications) did not have increased computer skills or efficacy when compared to the students in other classes. Thus, superior skills and confidence in those skills were not necessary to enroll in the courses designed to improve their skills. However, students enrolled in online courses reported significantly higher levels of confidence and efficacy, but not higher levels of skills. This indicates that efficacy is more critical than computer skills when students make academic choices regarding online courses. Students may have similar levels of actual skills, but those with a stronger belief in their skills are more likely to pursue online courses and other challenging opportunities because they have greater confidence in their abilities to produce the results they desire. Students in computer classes that are conducted in the traditional environment with a teacher present know they can rely on that teacher if problems arise. However, students also realize that in an online environment, face-to-face teacher interactions are limited. Therefore, if problems arise, the students are more isolated and they must be comfortable with using their own resources. This also aligns with efficacy and the preferred method of gaining computer experience. Students with increased efficacy are comfortable learning about computers on their own, while those with decreased efficacy prefer the availability of external assistance.

In addition to online classes, a significant concern regarding this study was that students may avoid other high-tech classes if they don’t have a sufficient level of computer efficacy. A regression analysis indicated that higher levels of computer efficacy also impacted students' decisions regarding any courses that included an extensive use of computers. According to the results, students with higher degrees of efficacy are more inclined to enroll in courses that include computer-related demands, while those with low efficacy choose non-technical classes. If students avoid the classes that will maximize their technical skills, they may negatively impact their future employment and earning potential. They will miss opportunities necessary to obtain the skills needed for high-salary careers. Furthermore, if the projected high-tech job shortages continue, this type of problem will not only adversely affect individual families, but the nation as a whole. As more people compete for low-level jobs, the higher salaried positions will remain vacant. Ultimately, employers will have to seek greater numbers of employees from other countries to fill the better positions.

Employed students are more apt to enroll in online courses, but only if they have used computers for their jobs.

Not surprisingly, the students who spent greater numbers of hours on the computer for work enrolled in more online courses. Although it is reasonable to assume that working adults are more prone than unemployed students to participate in web-based courses because of work schedules, the amount of time spent with computers on the job is also a contributing factor. The level of efficacy that results from occupational computer use is a significant predictor for online course enrollment.

This research revealed several educational advantages for students who have extensive work-related computer experience. Unfortunately, the implication is that students who don't use computers for employment purposes may not be as successful in college, nor have the confidence necessary to take advantage of online opportunities.

Such a disadvantage may become a critical factor in degree completion for working students in non-technical positions. Typically, such positions result in lower salaries when compared to jobs requiring computer use. If such students are further disadvantaged in their educational attempt to achieve a better lifestyle, the gap between lower class and middle or high class may continue to widen.

Internet access and online research assignments have positive effects on course outcomes.

Students who reported higher percentages of classes that required the use of Internet research were more apt to finish their surveyed class with a passing grade. This factor was more significantly related to college success than other computer-related course requirements such as using email, course management systems, word processing, etc. The alternate computer-related requirements were application specific and required the student to operate individual software programs. Typically these hands-on courses involve little, if any, data analysis or inference. Rather, students learn how to operate the software through repetitive, step-by-step instruction. Although such courses are effective for learning about specific components of various software applications, they often don’t include one of the critical components of information fluency: the critical thinking skills that allow individuals to apply technology to solve complex problems.

Conversely, effective Internet searching requires students to develop appropriate search techniques, locate relevant information, then extrapolate and synthesize that information to meet the requirements of assignments. Such critical thinking abilities, in conjunction with the vast amount of course-relevant information available on the Internet, are likely to have positive effects on course outcomes. Students are likely to gain more knowledge as they analytically sift through various Internet resources than if they relied on the traditional printed materials alone.

Furthermore, results from the study indicated that students who had Internet access at home had higher course completion rates than those without residential online access. This substantiates the importance of sufficient skills and Internet access to college success. Students who don't have access at home may be critically disadvantaged compared to students with constant availability of online resources. In addition to a lack of resources for coursework, today's college students may find it difficult to obtain assignments and submit completed homework since many instructors in the traditional classroom environment use course management systems to deliver coursework. Because of the expense of satellite connectivity, rural students with limited income and no other Internet options may be at the most risk.

Two of the most significant differences between the students in the colleges surveyed were computer efficacy and Internet access. Students who took classes at College B, which was located nearer to the metropolitan area, had better Internet access than the college that was more rurally positioned. More students had access to inexpensive, high bandwidth Internet at home than the services reported by College A students. Undoubtedly, this was due to better Internet options that are available in densely populated areas. These students also reported higher levels of computer efficacy than the students from College A. Clearly, improved methods of constant Internet access have positive outcomes regarding education.

Interestingly, students from College A owned more smart phones than College B students. Since smart phones typically include cellular Internet data plans, these students may be using them to compensate for inferior online availability.

First-semester computer literacy courses may be critical for college persistence.

Students who participated in an introductory computer literacy course, either in high school or college, demonstrated significantly higher levels of computer efficacy and skills than their counterparts who were never enrolled in such a course. Since one of the critical factors regarding successful completion of courses was computer efficacy, enrollment in such courses is important to provide the training that will help students succeed in college.

An analysis regarding academic levels revealed that second-semester freshmen had considerably higher withdrawal rates than any other level (18.3% compared to 12.1% of sophomores). This may be substantiated by the high percentage of freshmen students participating in this study. More than twice as many freshmen as sophomores were enrolled in the courses surveyed. If this is typical, such disproportionate participation suggests that only half of the students who begin at these colleges persist through the second year. Consequently, students may be at the most risk during their second semester of college enrollment. Socio-economic trends also impact class sizes, so there could be several reasons for a significantly larger freshmen class; however, a CollegeBoard study previously projected declining numbers of high school graduates, which ultimately would reduce the numbers of college freshmen (WICHE, 2008).

In addition to the innumerable personal reasons that lead to course withdrawal, a number of computer-related factors (skills, efficacy, and access) correlated significantly with withdrawal rates. Although college administrators, faculty, and staff can't eliminate all of the issues that cause students to withdraw from classes, ensuring that students obtain computer literacy skills in their first semester may alleviate academic pressures that stem from poor skills.

Implications and Additional Research

To an extent, computer and Internet use is almost essential for all college classes. In fact, students who reported significant computer use in their general classes had improved skills and efficacy compared to those with fewer technology-enabled requirements. According to students in the survey, 80% of the courses that students had previously completed required the use of a course management system. Since these systems allow instructors to provide assignments and online tests, students with reduced computer skills have difficulties in accessing and completing coursework.

Unfortunately, as with older college students, many college instructors have limited computer skills and efficacy. The first step in improving computer skills among students is to ensure that instructors have appropriate skills, particularly if they are teaching online courses. If instructors are confident with their skills, they will be more likely to implement computer and Internet requirements in their classes and will be in a better position to assist students with limited skills. Such requirements not only provide benefits and conveniences for faculty and students with coursework, but also improve computer efficacy among students. Thus, an opportunity for further research may include an evaluation of the level of computer efficacy among faculty.

Most of today's college instructors are from the baby boomer or generation X generations, while the younger students are known as millennials or generation Y. The various terms for these societal generations stem from the diverse lifestyles that each age group develops; typically as a result of the political, cultural, and technological influences of the periods during which people mature. Technology is particularly influential because of how rapidly it has developed during the past few decades. As a result, older generations often have difficulty understanding and relating to the younger generations. One particular problem results from assumptions that baby boomers often have regarding the technical abilities of millennial students. Because of the abundance of computer-related devices that existed during the growth of this younger generation and because of their apparent lack of intimidation in using technical devices, older instructors often assume that younger students have more skills than they actually possess. Consequently, training in basic skills for younger students is sometimes neglected.

An open-ended question on the survey asked students to report if anything would have helped them prepare for the computer requirements of college. An overwhelming majority of newly graduated high school students recounted one or more of the following:

- more computer classes should be available in high school;
- more computer classes should be required in high school; and
- more rigorous computer classes should be available in high school.

High school and college faculty and administrators who develop curricula may be assuming that today's students have sufficient computer skills. Such assumptions may be mistakenly based on students' abilities to play computer games and use social networking sites. However, the ability to efficaciously use computers for amusement does not equate to comprehensive computer skills and knowledge. Teachers who assume that is the case may be neglecting instruction in basic computer skills. Additional research may be beneficial to determine if high school and college instructors have certain assumptions regarding student ability and consequently neglect essential training.

Students who reported a sophomore academic level displayed higher levels of computer efficacy than freshmen students. This could be the result of students obtaining additional skills and increased efficacy by meeting computerized course requirements during their first year of college. Alternately, students with low efficacy may be dropping out of college after the first year. Additional research regarding persistence from term to term could determine how adversely a lack of computer efficacy affects future enrollment and degree attainment. If computer efficacy is a forecaster of perseverance in college, technology-related interventions may be necessary during the first year of enrollment to reduce withdrawal rates. Similarly, a longitudinal study could be conducted to follow students who completed a computer literacy course during their first semester. This research could determine if those students have improved persistence toward completing their degrees when compared to other students.

The research revealed an interesting finding regarding students employed with computer-enabled jobs. In addition to understandably higher levels of efficacy, these students appeared to have greater persistence in completing their coursework during the semester that the study was conducted. A follow-up study could usefully examine the characteristics of these students to more accurately determine if job-related computer use results in increased academic persistence, or if other factors account for these results.

Summary

Nontraditionally-aged students now constitute approximately one-third of the entire student population. In terms of meeting the future needs of skilled workers, this percentage is quite significant. However, adult students enter college with a wide range of computer skills. Students with pre-existing skills find fewer barriers in college than those without skills. The simple process of obtaining information on campus websites and selecting classes may be daunting enough; however, when they enter the classroom, they often find that course requirements include writing papers with word processing, researching online, and accessing course materials through web-enabled course management systems. Consequently, in addition to successfully learning the specific content of the course, they must also learn how to operate a computer, learn basic word processing skills, and conduct research on the Internet.

High school computer courses and on-the-job experience are the two factors that develop the majority of computer-related skills that lead to efficacy. Students who did not have either of these opportunities are disadvantaged before they enter the classroom. It is critical for colleges to provide sufficient methods for such students to obtain the skills that are not only necessary for future employment, but also to persist through college. Additionally, this training should begin very early in the college experience.

Although nontraditional students have decreased levels of computer skills and efficacy, they also are more likely to withdraw from their college courses. Interestingly, they are not more likely to withdraw from computer literacy or online courses when compared to traditionally-aged students. Adult students seem to compensate for their reduced proficiency by persisting in the classes necessary to improve those skills and by spending extra time on computers for research.

An additional compensatory measure exists when students are employed in positions that require computer use. Skills gained during work experiences have a positive impact on computer efficacy which leads to improved course completion rates and preferences for online courses. When enrolling in online courses, it appears that computer efficacy is more critical than computer skills. Students who have significant beliefs in their abilities are likely to enroll in online courses, even if their skills are lower than students who lack such confidence.

Ultimately, computer efficacy is a complexly evolving process that contributes to success in college. Although technology is used more extensively at all levels of education, the problems associated with low skills and efficacy will never completely disappear. Technology constantly changes, so unused skills will gradually become obsolete; therefore, adult college students who return after an extended absence from academia will always require a certain degree of re-training.

Higher education has always created the best opportunity for people who dream of obtaining a middle or upper class lifestyle. In today's world, computers and technology are an integral component of the academic and occupational environments. However, students who don't have sufficient skills when they first walk through the halls of higher learning are already disadvantaged, so colleges must provide sufficient opportunities for training. Although introductory computer literacy courses that are offered early in the academic career are important, all instructors can assist in teaching these skills by incorporating computer-based coursework in the curriculum. Online research assignments that encourage critical thinking are among the best options for developing information literacy in students. An abundance of information regarding every subject is available online. Such information far exceeds anything available in a textbook and should be incorporated into the classroom to enhance learning. Just as Peter

Drucker envisioned more than twenty years ago, education is shifting toward a self-teaching environment in which students should be encouraged to seek their own knowledge (Reingold & Drucker, 1990, para. 3). In addition to creating engaging assignments and improving the computer efficacy needed to complete college-level work, these skills are highly desired in the workforce. Since the goal of education is to prepare students for employment, improving skills and efficacy is a significant responsibility in higher education.

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Appendix

Student ID number: ___________________

The Impact of Computer Efficacy on the Success of Nontraditional Community College Students

Thank you for participating in this survey! The purpose of this research is to determine if a lack of computer experience has a negative effect on community college students, particularly nontraditional students. The results may indicate that additional computer training may better prepare some students for the college experience.

This survey is completely voluntary; you may choose not to answer any questions and you may cancel at any time. Results are anonymous. Names will not be associated with the survey. Student ID numbers are requested merely to correlate with final semester grades. The final results will be generalized with no personal records revealed.

Again, thank you!

Background/Demographic Information

1. What is your gender?	Female ☐	Male ☐
2. What is your age?	☐	
3. What is your ethnicity?	African American ☐	
	Asian ☐	
	Caucasian/White ☐	
	Hispanic ☐	
	Other ☐	

4. Please specify your academic level:	First semester Freshman (0 to 15 hours earned)	☐
	Second semester Freshman (16 to 30 hours earned)	☐
	Sophomore (31 to 65 hours earned)	☐
	Over 65 hours earned	☐
5. Please indicate your academic intention:	Seeking a Certificate (1 year or less)	☐
	Seeking an Associate's (2 year) degree	☐
	Seeking a Bachelor's (4 year) degree	☐
	Planning to earn a Graduate degree (Masters, Doctoral)	☐
	Upgrading Job Skills (Not seeking any degree)	☐
	Taking classes for personal satisfaction	☐
6. If you are seeking a degree, specify your major:	☐	

7. How many credit hours are you enrolled in this semester?	☐	
8. Are you currently employed?	Yes ☐	No ☐
9. If you are employed, how many hours do you typically work per week?	☐	
10. Are you married?	Yes ☐	No ☐
11. Do you have children?	Yes ☐	No ☐
12. Are you financially independent?	Yes ☐	No ☐
13. Did you begin college immediately after high school?	Yes ☐	No ☐

Experience with Computer Technology

14. Did you use computers in school (K – 12)?	Yes ☐	No ☐

15. If you answered 'Yes" to question 14, what type of computer experience did you gain in school? Check all that apply.

- ☐ Word processing – Word, Word Perfect, etc.
- ☐ Electronic spreadsheets – Excel, etc.
- ☐ Presentations – PowerPoint, etc.
- ☐ Database software – Access, etc.
- ☐ Programming – BASIC, Pascal, C, CGI, Java, Perl, etc.
- ☐ Web page development – HTML, Dreamweaver, GoLive, Flash, Front Page, etc.
- ☐ Networking and/or Servers – Cisco, Windows Server 2008, Netware, Linux, Unix, etc.
- ☐ Email
- ☐ Internet searching
- ☐ Video/audio/graphic editing
- ☐ Other: ____________

16. Did your high school or does your college offer an introductory computer class?	Yes ☐	No ☐	Don't know ☐
17. If so, have you taken an introductory computer class in high school or college?	Yes ☐	No ☐	Am taking one now ☐

18. How have you obtained most of your computer experience? Select one.

- ☐ On your own - You learned by your own experience
- ☐ Family member or friend taught you
- ☐ On the job
- ☐ In a formal computer class
- ☐ Other: ____________

19. At what age did you begin to use a computer? ____________

Access to Computers and Internet Technology

20. Which of the following devices do you own and/or use? Check all that apply

☐ Mobile (cell) phone (basic phone without Internet functionality)	
☐ Smart phone (cell phone with Internet functionality, apps, etc.)	
☐ Desk top computer	If so, how old is it?
☐ Laptop/notebook computer	If so, how old is it?
☐ Tablet/mobile device	If so, how old is it?
☐ eReader (Kindle, Nook, etc)	

21. Do you have Internet access at home?	Yes ☐	No ☐

22. If you answered yes to question 21, what type of Internet connection do you have? Select from the list below.		
☐	Dial-up	
☐	DSL	
☐	Satellite	
☐	Cable	
☐	Wireless	
☐	Other:	

23. Do you use public Internet access?	Yes ☐	No ☐
	If yes, where do you access the Internet? Check all that apply.	
☐	Public library	
☐	Restaurants or other public Internet cafes	
☐	College campus or school	
☐	Work	
☐	Other:	

Level of Computer and Internet Use

24. How many hours per week do you use a computer for any purpose?	
25. How many hours per week do you use a computer for academic purposes? (research, homework, retrieving assignments, etc.	
26. How many hours per week do you use a computer as a part of your employment responsibilities? If you are not employed, enter 0.	

27. Which of the following online activities do you participate in regularly? Check all that apply.					
☐	Email	☐	Access a college portal (register for classes, access grades or assignments	☐	Read news/magazines
☐	Research/reference for personal benefits	☐	Access YouTube	☐	Create blogs
☐	Research/reference for classwork	☐	Read online books	☐	Contribute to wiki's
☐	Banking/paying bills	☐	Online forums/discussions	☐	Share photos
☐	Shopping	☐	Make phone calls/Skype	☐	Web conferencing
☐	Social Networking/Facebook	☐	Download music	☐	Upload videos/movies
☐	Selling	☐	Instant message/chat	☐	Create avatars or play online games

28. Which of the following off-line computer based activities do you participate in regularly? Check all that apply.			
☐	Create personal documents	☐	Play games
☐	Homework	☐	Create and edit audio/video files
☐	Listen to digital music	☐	Create web pages
☐	Edit photos	☐	Create or edit graphics

29. What percentage (0 – 100%) of your college classes have required the use of email for communication?	☐
30. What percentage (0 – 100%) of your college classes have required the use of an online learning or course management system (Blackboard, Moodle, MyMAC, etc.)?	☐
31. What percentage (0 – 100%) of your college classes have required the use of the Internet for research?	☐
32. What percentage (0 – 100%) of your college classes have required the use of word processing for reports?	☐
33. What percentage (0 – 100%) of your college classes have required the use of course specific software (accounting, networking, medical coding, computer programming, spreadsheets, etc.)?	☐

Perceived Level of Computer Skills (Computer Efficacy)

34. How would you describe your general computer skills?

○	Poor	○	Below average	○	Average	○	Above average	○	Excellent

35. How comfortable are you with you with using computer related technology?

○	Not comfortable	○	Somewhat comfortable	○	comfortable	○	Very comfortable

36. Do you believe that you have enough technical and computers skills to adequately perform computer related assignments?

○	Yes	○	Sometimes	○	No

37. What is your level of skill in using the following computer technologies and applications?

Word processor (Word, etc.)	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent
Presentations (PowerPoint, etc.)	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent
Spreadsheets (Excel, etc.)	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent
Graphics/photo editing software	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent
Online library resources	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent
Computer maintenance tasks (Installing updates, extra memory, etc)	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent
Organizing folders and files	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent
Creating, saving, deleting, moving, copying files and folders	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent
Using a course management system (MyMAC, Blackboard, Moodle, etc.)	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent
Social networking (Facebook, MySpace, etc.)	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent
Email (sending and receiving, attaching files, organizing messages, etc.)	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent
Searching for information on the web	○	Don’t use	○	Poor	○	Average	○	Good	○	Excellent

38. If computer use is optional in a class, do you use the computer or do you use the traditional method (pen & paper, printouts)?			
○	Use the computer	○	Do not use the computer

39. Please rate your level of agreement with the following statements:									
Web based instruction intimidates me.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I am comfortable when communicating online.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I prefer talking to people in person rather than communicating on the web.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I would rather answer questions in class than with an online discussion board.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I would rather get class notes and materials as handouts than have to retrieve them on the web.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I would rather not have to use computers in any of my classes.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I would rather get my grades from the instructor and register for classes in person than have to use the Internet.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I feel confident when creating word processing files such as letters or reports.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I feel confident when locating, copying, moving and deleting files.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I feel confident when learning about new software and applications.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I feel confident when troubleshooting minor computer problems.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I feel confident in organizing, managing, and moving files in folders.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I feel confident in understanding most words and terms about computers and related technology.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
It scares me to think that I could destroy large amounts of important information by pressing the wrong key.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree
I am reluctant to use a computer because I am afraid that I will make a mistake that I cannot correct.									
○	Strongly agree	○	Agree	○	Neutral	○	Disagree	○	Strongly disagree

40. What would have helped you prepare for the computer skills that are expected in college?