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Predictors of persistence in distance education.

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PREDICTORS OF PERSISTENCE IN DISTANCE EDUCATION

By

Jennifer R. Hammond
B.A., University of Louisville, 1997
M.S.S.W., Kent School of Social Work, 2001

A Dissertation
Submitted to the Faculty of the
Graduate School of the University of Louisville
In Partial Fulfillment of the Requirements
for the Degree of

Doctor of Philosophy

Department of Leadership, Foundations and Human Resource Education
University of Louisville
Louisville, Kentucky

May 2006

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A Dissertation Approved on

April 5, 2006

by the following Dissertation Committee:

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Dissertation Director

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DEDICATION

This dissertation is dedicated to my mother

Fern Hammond Winder

who has taught me that hard work, dedication, and persistence are the keys to

success and achievement.

Thank you for your love, encouragement and always believing in me.

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ABSTRACT

Predictors of Persistence in Distance Education

Jennifer R. Hammond

May 13, 2006

The purpose of this exploratory study was to identify which factors predict persistence among a sample of distance education students. Age, gender, GPA, computer experience, computer self-efficacy, and gender role were examined in relation to persistence (i.e., successful completion of a course). A Web-based survey was administered to a convenience sample of undergraduate and graduate students currently enrolled in distance education courses at four colleges in the state of Kentucky ($N = 293$), during the Fall 2005 and Spring 2006 semesters. The survey instrument consisted of background/demographic questions, the Computer User Self-efficacy (CUSE) Scale, and the Personal Attributes Questionnaire (PAQ).

Correlations, one-way ANOVAs, multiple regressions, logistic regression, and hierarchical logistic regression were performed on the data. Additionally, factor analyses were used to examine the factor structure of the CUSE Scale. Major findings include: (a) a moderate relationship between age and GPA ($r^2 = .12$); (b) a relationship between the CUSE score and the masculine subscale score on the PAQ ($r = .180$, $p < .01$); (c) GPA was the only statistically significant predictor of persistence ($\beta = .891$, $p = .018$) of all the variables included in the

logistic regression model; (d) a three-factor solution on the CUSE Scale was obtained. Additional results, conclusions, theoretical extensions, recommendations for future research and practice are presented.

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CHAPTER I

INTRODUCTION

Overview

Distance education has revolutionized learning by making it easy for anyone to work toward a degree without physically being in the classroom. This type of medium has become very popular for various reasons. It allows individuals to pursue professional education and lifelong learning, as well as achieve personal enrichment (Mehrotra, Hollister, & McGahey, 2001). These programs make lifelong learning a viable alternative to traditional face-to-face programs, allowing individuals who hold full-time jobs and possess family responsibilities to work toward their degree at their own pace. By offering choices as to where, when, how, and from whom students learn, distance education has become a current reality allowing students to continue with their busy lives while working toward a baccalaureate or advanced degree (Fjortoft, 1995; Mehrotra et al.).

The earliest type of distance education was correspondence courses, where course assignments were completed by the student and then returned to the instructor for a grade (Mehrotra et al., 2001). Telecourses were another type of distance education which allowed students to watch televised programs and complete course assignments. The introduction of online courses began in the mid-1990s (Mehrotra et al.). The popularity of the personal computer, the

Internet, and the World Wide Web made delivering education to students' homes and workplaces a viable option (Mehrotra et al.). This type of education allows students with an Internet connection to learn at their own convenience. In fact, 11% of all higher education students in the United States took at least one distance education course during the fall semester of 2002 (Allen & Seaman, 2003; Kentucky Council of Postsecondary Education, 2003). In 2003, the number of online students was expected to grow to over 2.6 million by fall 2004, up 24% from the previous year (Sloan-Consortium, n.d.).

Distance education is very attractive to adult students because it provides an accommodating learning environment in which students can pursue their educational goals (Chyung, Winiecki, & Fenner, 1998). It allows students, who hold full-time jobs and have family responsibilities, to compete in an ever-changing workforce (Parker, 2003). Not only is a lack of education a barrier to entry in many occupations, many companies also have education requirements for career advancement (Mehrotra et al., 2001). Research shows that obtaining a college degree nearly doubles annual income earnings (U.S. Census Bureau, 2005). In addition, many professions require that their members obtain additional continuing education requirements yearly in order to renew their licenses (Mehrotra et al.).

In 2004, 33.7 million adults over 25 years old had received Bachelor's degrees to stay current or advance in their existing job or begin a new career (U.S. Census Bureau, 2005). Many of these individuals pursue graduate degrees to be more marketable in the workplace. Between 2002 and 2003, 17.9 million

students had attained Master-level degrees or higher (National Center for Education Statistics, 2003).

Colleges and universities have found competition for students in the increasing number of online courses and programs. Many postsecondary institutions across the United States now offer online courses to capture the enrollment of working adult students. In 2001, 1,680 institutions in the United States offered 54,000 online courses (Simonson, Smaldino, Albright, & Zvacek, 2000). By 2003, 97% of public institutions in the United States offered at least one fully distance education course or blended course, while 49% offered degree programs completely online (Kentucky Council on Postsecondary Education, 2003; National Center for Education Statistics, 2003). In this way, institutions are able to expand their enrollments to a broad student population and beyond the vicinity of their campuses.

Implementing distance education programs can be very costly. Institutions are investing in new hardware and software technologies to support online instruction, as well as updating and upgrading hardware and software for instructors and developers (Mehrotra et al., 2001). Training and technical support for faculty are additional costs of distance education programs (Mehrotra et al.).

Over the last two decades, student persistence, as a factor of retention, has become a major interest of distance education researchers (Simonson et al., 2000). Because it is a relatively new learning medium, little is known about the reasons why students persist or fail to persist in distance education. Nearly 25% of students who enroll in 4-year institutions drop out after their first year,

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contributing to the issue of retention (Tinto, 1993). When a student enrolls in a distance education course, both the student and the institution are making investments. The student invests money and time, while the institution invests money in recruiting, admitting, and advising the student. When a student drops out of or fails these courses, colleges suffer a decrease in enrollment, resulting in monetary loss.

For the individual and society, there are social implications of student dropout (Tinto, 1996). For example, individuals without a college education have lower salaries than their college-educated counterparts (Gordon, 1993). In addition, a higher level of skills and knowledge of technological advancements are necessary to remain competitive in the work environment. Therefore, those without college degrees may miss out on job opportunities and career advancement (Rendon & Hope, 1996). A college degree is the ticket to the future; individuals with "the highest level of education possible as well as the specific skills required by a changing society" are more likely to succeed in the competitive workforce (Rendon & Hope, p. 28-29).

Statement of the Problem

Despite the convenience of distance education courses, not all students succeed in this environment. Distance education courses typically have higher dropout rates than traditional face-to-face courses, with some institutions suffering up to 40% attrition rates within their distance education programs (Carter, 1996; Kember, 1995). The completion rates of distance education programs are important to educational administration because of the increasing

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number of colleges offering distance education courses. Colleges and universities all over the world are offering distance education courses in hopes of capturing the enrollment of students who hold full-time jobs, have family responsibilities, and still want to pursue their educational goals. Because student enrollments produce tuition and because institutions are tuition driven, the importance of understanding why students persist to completion in distance education environments becomes crucial to postsecondary administrators and online program designers. Furthermore, some state legislatures link completion rates to the appropriations allotted to institutions; therefore, these institutions are very concerned about completion rates of distance education.

Persistence has been a major concern in both traditional and distance education programs driven largely by the monetary loss associated with lowered enrollment rates when students drop out of school. Many of the factors examined in relation to persistence have been determined by utilizing theoretical models of student persistence to guide subsequent research studies. Through comparison of widely used conceptual frameworks of persistence, many variables are consistently examined in relation to persistence. Some common factors examined in relation to student persistence are student demographics (i.e., age and gender), student GPA, and computer experience. These factors have been studied as possible predictors of success or failure in distance education. However, there has been little research on the relationship between persistence and level of computer self-efficacy and student's perceived gender role. To date there are no conceptual models that include these factors as possible predictors

of student persistence; therefore, it is imperative to determine whether or not these factors are related to student persistence in distance education.

Purpose

The purpose of this study was to determine the relationship between student persistence in distance education and the following variables: age, gender, GPA, computer experience, computer self-efficacy, and gender role. The study sought to identify which factors predict successful course completion by undergraduate and graduate students enrolled in distance education courses at colleges and universities in the state of Kentucky. This study was critical in determining the significant relationships between persistence and demographic (i.e., age and gender), educational (i.e., GPA and computer experience), and personality variables (i.e., computer self-efficacy and perceived gender role). In addition, this study examined how student's computer self-efficacy and perceived gender role contribute to persistence in a distance education course.

Research Questions

The following research questions were addressed in this study:

1. What are the intercorrelations among the research variables (age, gender, GPA, computer experience, computer self-efficacy, gender role, and persistence)?

2. Using age, gender, GPA, computer experience, computer self-efficacy, and gender role as predictor variables, what is the probability of completing an online course successfully?

3. After controlling for the demographic and personality variables, to what degree do the educational variables predict persistence?

4. What is the factor structure of the scores obtained from the Computer User Self-Efficacy (CUSE) Scale?

Answers to these questions were used to help clarify what factors are related to student persistence in distance education courses at colleges and universities in the state of Kentucky.

Figure 1

Variables included in this study and their relationship with persistence

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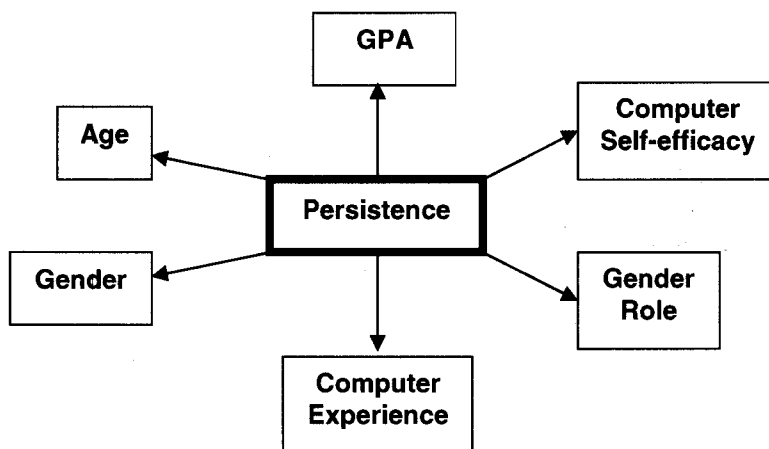
Significance of the Study

The results of this study are significant to a number of stakeholders within higher education, such as faculty, administrators and college advisors, current and potential online students, technology developers and providers, and federal, state, and local policy makers. As enrollment in distance education programs continues to grow, it is important to determine how to encourage students to

persist. For example, all public institutions in Kentucky employed some type of distance education during the fall semester of 2002 and research shows that the distance education market in Kentucky will continue to flourish (Kentucky Council on Postsecondary Education, 2003). In addition, 67% percent of postsecondary institutions consider distance education as a critical element of their institution's long-term strategy (Kentucky Council on Postsecondary Education). Therefore, there is an apparent need to identify and understand the factors that contribute to student persistence in distance education courses. Determining the factors related to persistence may assist universities and colleges that offer such programs in being more prepared to meet the needs of the students, as well as increase retention and degree completion rates. In addition, this knowledge will assist administrators in the design, development, and maintenance of distance education programs, as well as improve the overall distance student support infrastructure. Furthermore, this study may provide stakeholders within higher education with valuable information that can be used when screening students enrolling in distance education courses.

Determining factors related to persistence in distance education contributes to the existing body of research on student persistence in distance education. This study also examined other factors in relation to persistence, by examining two variables (i.e., computer self-efficacy and gender role) in which little or no previous research has been done. Understanding which factors contribute to student persistence may provide insight regarding student persistence to the institutions offering such programs, as well as students who

are considering pursuing degrees via distance education (Kowalik, 1989). These findings may also aid in the improvement of the distance education programs, as well as accommodate the needs of such learners.

Limitations

This study had four major limitations, which are common among research studies.

Limited Causality and Generalizability

This study used a nonexperimental research design, which limits causality. The researcher also used convenience sampling to obtain a sample of distance education students currently enrolled in an online course. The lack of a true random sample limits the generalizability of the findings from this study.

Self-Report Instruments

This study relied on self-reported data from students; therefore, the data possessed elements of subjectivity. Although, self-report instruments continue to be the most widely used type of survey instrument used in empirical research studies, it is important to identify the limitations these measures possess. A major limitation of self-reports is that they require survey participants to recall information. Because self-report instruments depend on the participant's memory, results are often unreliable and can be inaccurate (Berk, Lohman, & Cassata, 2001). In addition, some questions asked participants to assess themselves, which can also be problematic. Because there is a tendency for people to report socially desirable responses, this type of instrument can be quite subjective (Berk et al.).

Because data collection in this study relied on self-report instruments, common method variance may be a concern. Podsakoff, MacKenzie, Lee, & Podsakoff (2003) define common method variance as "variance that is attributable to the measurement method rather than to the constructs the measures represent" (p. 879). According to the authors, one recommendation for controlling common method variance is by using more than one method of data collection (Podsakoff et al.). Because that was not possible in the present study due to the limited access to survey participants, the possibility of inflated correlations between variables could not be eliminated, which might limit the generalizability of this study's results. However, other recommendations were utilized to control for common method variance. First, the anonymity strategy was employed to partially minimize the possibility of common method variance (Podsakoff et al.). Second, the researcher also reduced evaluation apprehension by assuring respondents that there are no right or wrong answers and encouraged them to answer each question as honestly as possible (Podsakoff et al.). By including this type of language in the survey, the respondents may have been less likely to answer questions in ways that are more socially desirable and how they perceived the researcher wanted them to respond (Podsakoff et al.).

Web Survey Data Collection

Web survey data collection poses some limitations as well. Although Web surveys are seen as "the survey technology of the new millennium", there are many possible drawbacks that need to be pointed out (Couper, 2001). One problem with Web survey data collection is that it limits the survey population to

those who have Internet access (Couper, 2000). However, this is often overcome by limiting the study to those with access to the Internet (Couper). It should be noted that because the population in this study consisted of distance education students, who must have access to the Internet to be enrolled in such programs, the effects of this problem are minimal.

In order to effectively implement a Web survey, it is important to recognize the potential for technical problems and to carefully plan how to overcome these problems if they are to arise (Shannon, Johnson, Searcy, & Lott, 2002). The development of the Web survey may impact the way it is received and viewed by the subjects. It is important to be aware that students will be operating on computers with varying modem and internet connection speeds, a host of hardware and software settings, and browser types and versions; therefore, the Web survey should be designed and developed accordingly (Couper, 2001). These differences determine how much time is needed to download Web pages, so it is necessary to keep the file size of the survey small to decrease the time it takes for students to download pages (Best & Krueger, 2002; Dillman, 2000; Ilieva, Baron, & Healey, 2002).

An additional concern with Web surveys is that they usually generate lower response rates than mail surveys. Some studies have reported response rates for Web surveys ranging from 32 to 39.6 % (Cook, Heath, & Thompson, 2000; Shannon & Bradshaw, 2002). The researcher in this study used the reported response rates as a guide and targeted a sample large enough to yield at least a 30% response rate. In addition, Dillman's (2000) recommendations for

improving response rates for Internet surveys were followed. However, because third-party contacts were used to distribute the email requests and survey Weblink, an exact response rate was not possible. In this study, the response rate was around 6%, which is consistent with a study by Simsek and Viega (2001) who reported a wide range of response rates from 7 to 76%. These procedures are discussed further in Chapter Three.

Delimitations

There have been numerous variables examined in relation to persistence in distance education; however, it was not possible to include all of these variables in the present study. Four of the variables in this study were selected based on their importance as identified in the literature, while two variables were selected because very little research has been conducted in relation to persistence in distance education.

Lastly, this study was designed to explore student persistence among students enrolled in distance education courses in the state of Kentucky, which may not be representative of the general population of distance learners. This convenience sampling method limits generalizability to other populations, because it is difficult to determine if the sample is representative of the larger population of distance education students (Creswell, 2002). The findings of this study can only be generalized to student populations at universities of comparable size and comparable student characteristics. In addition, this study included a small sample of non-persisters, which limits the generalizability of this

study's findings to the larger population of non-persisters in distance education settings.

Definitions of Terms

The following definitions are provided for terms that were used throughout this study. There are several terms that are prevalent in literature on persistence, which may have multiple definitions and interpretations; therefore, those terms are defined below for consistency purposes.

Computer experience – This variable was operationalized in two ways: the number of previous online courses previously taken and perceived level of computer experience.

Computer self-efficacy – A personal trait that affects a person's capability and decision to use a computer (Compeau & Higgins, 1995).

Femininity – An individual's tendency to endorse a significantly higher number of feminine, or expressive, personality traits as compared to masculine, or instrumental, personality traits (Bem, 1977).

Gender role – The attitudes, behaviors, rights, and responsibilities that a society associates with each of the sexes (Holt & Ellis, 1998).

Masculinity – An individual's tendency to endorse a significantly higher number of masculine, or instrumental, personality traits as compared to feminine, or expressive, personality traits (Bem, 1977).

Persistence – Defined as the successful completion of a distance education course. Successful completion is determined by whether or not the student received what is deemed a passing grade by the program in which the

student is enrolled. In this study, persisters were defined as students who completed the course with a "C" or better for undergraduate students and "B" or better for graduate students, while non-persisters were defined as those with lower course grades or withdrew from the distance education course.

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

Conclusion

This study explored the relationship between persistence and demographic (i.e., age and gender), educational (i.e., GPA and computer experience), and personality variables (i.e., computer self-efficacy and perceived gender role). Many of the variables were chosen using various conceptual models of persistence and examining the results of other studies. To date there are no conceptual models that include computer self-efficacy and gender roles as possible predictors of student persistence; therefore, it is imperative to determine whether or not these factors are related to student persistence in distance education. This study was critical in determining significant relationships between persistence and demographic, educational, and personality variables.

This paper is divided into five chapters. This first chapter provides an overview of persistence in distance education, a statement of the problem, research questions, significance of the study, limitations of the study, and definitions of terms used within this study. Chapter Two provides a comprehensive review of the literature pertaining to this study, as well as reviews

conceptual frameworks commonly used in examining student persistence. Chapter Three describes the sample, the instruments used in this study, the procedure utilized, the design of this study, independent and dependant variables, and statistical analysis. Chapter Four presents the results of the study and analyzes the research questions. Chapter Five provides a summary of major findings and discussion, theoretical extensions, recommendations for future research and practice, and an overall conclusion of this study.

to student persistence. One of the first models to gain attention was Durkheim's (1961) theory of suicide, which both Spady (1971) and Tinto (1975) used to guide the development of their conceptual models of student dropout. Durkheim's theory posits that individuals who fail to integrate into society are more likely to commit suicide. Spady is credited with the initial hypothesis that the same held true for college students regarding the decision to dropout of college. Both Spady and Tinto agreed that social and academic integration are related to student persistence. Tinto further explained that students who fail to integrate into the college's social system are more likely to drop out of college. Consequently, social and academic integration became major components of his conceptual model of student dropout. The two most relevant models to the present study are Tinto's Dropout Model and Kember's (1989) Model of Drop-Out from Distance Education. These two models use similar predictors of dropout, but apply them to different educational environments. While Tinto's model focused on student integration in campus environments, Kember acknowledged that this does not apply to the distance education environment. Instead, Kember focused on how the student integrates off-campus study with work, family, and social commitments.

Tinto's (1975) Dropout Model

Tinto (1975) is viewed as the pioneer in the development of conceptual models explaining student persistence. Tinto's Dropout Model has guided many studies, including his own, in the pursuit of explaining student persistence in higher education programs (Kember, Murphy, Siaw, & Yuen, 1991; Pascarella &

Chapman, 1983; Pascarella & Terenzini, 1983; Tinto, 1997). In addition, this model has paved the way for additional conceptual models. This model posits that student dropout is a longitudinal process of interactions between the student and the college's social and academic systems. Tinto (1975) hypothesized that family background (e.g., socioeconomic status, parents' educational backgrounds, and quality of relationships), individual attributes (e.g., individual's gender and measures of ability, such as standardized test scores and past academic performance), and pre-college schooling (e.g., grade point average or class rank) affect goal and institutional commitments. Goal and institutional commitments affect the overall academic system, which include grade performance, intellectual development, peer-group interactions, and faculty interactions. The academic system then affects academic and social integration. Lastly, Tinto (1975) asserts that academic and social integrations continually modify commitments (goal and institutional), which ultimately affect dropout decisions. According to this model, either low goal commitment or low institutional commitment tends to increase the likelihood of dropout.

The validity of Tinto's (1975) Dropout Model was tested in a study by Pascarella and Chapman (1983), who used a sample of freshmen from eleven postsecondary institutions ($N = 2,326$). Four-year residential, four-year commuter, and two-year commuter were the different types of institutions evaluated. The study evaluated student background variables that included sex, age, high school GPA, and socioeconomic status. Institutional characteristics, such as institutional type (two-year, four-year), institutional size, and academic

major, were also included in the study. The study also included additional variables related to academic and social integration, as well as institutional and goal commitment. Persistence served as the dependent variable. Results of discriminant and path analyses indicated that the variables (i.e., sex, age, high school GPA, socioeconomic status, institutional type, institutional size, academic major, academic and social integration variables, and institutional and goal commitment variables) used to operationalize Tinto's Dropout Model accounted for a small percentage of the variance in freshman dropout decisions, as denoted by the canonical correlation, R^2_c = .01 to .13 (Pascarella & Chapman). In addition, only between 70 to 75% of students were classified correctly, which offers little predictive power. Pascarella and Chapman suggest that inadequate operationalization of the variables could explain the poor predictive power found in this study. The researchers concluded that the variables in Tinto's model explain some of the variance in persistence and holds potential for understanding student persistence in postsecondary education; however, the majority of the variance is not explained by the variables in Tinto's model. The researchers cautioned that personal and environmental factors not addressed in the model could be strongly related to persistence and that there is a need to identify other variables that explain more of the variance found in persistence. Therefore, they suggested that these limitations be taken into consideration in future empirical studies using Tinto's model to examine student persistence.

Similarly, other researchers have suggested that the major components that explain persistence in Tinto's (1975) model may not be independent of each

other (Pascarella & Terenzini, 1983). The researchers agreed that the model is useful in explaining the process which leads to persistence or withdrawal, but suggested that the model "may not capture the full complexity of the phenomenon" of student dropout and may include variables irrelevant to persistence (Pascarella & Terenzini, p. 225). The researchers argued that there may be other factors not examined that are related to student persistence. Discriminant analysis of the model indicated that the background variables (i.e., family background, individual attributes, and pre-college schooling) and pre-college goal and institutional commitments accounted for very little variance in persistence, represented by the canonical correlation, $R^2_c = .022$. Only after adding academic and social integration and modified goal and institutional commitments did the model explain 19% of variance in persistence, suggesting that the greatest impact on persistence are events that happen to the student after arriving on campus. The results from the two previous studies suggest that the operational definitions of variables need refinement or other variables need to be incorporated into a conceptual model to offer a better understanding of student persistence.

In later years, Tinto (1997) modified his earlier model of student persistence while conducting a research study that sought to determine how learning communities and adopted collaborative learning strategies enhance student learning and persistence. Using a sample of undergraduate students ($n = 121$) in the Coordinated Studies Program (CSP) and a comparison group of students enrolled in similar subjects but not in the CSP ($n = 166$), Tinto assessed

possible predictors of persistence. Results of a step-wise logit regression indicated the five significant predictors of persistence were participation in the Coordinated Studies Program, college GPA, hours studied per week, perceptions of the faculty, and involvement with other students. Tinto concluded that when students are more academically and socially involved in shared learning experiences, the more likely they are to be "more involved in their own learning and invest the time and energy needed to learn" (p. 615). This conclusion led to Tinto's (1987) Student Integration Model, in which Tinto added classroom and learning experiences as factors related to persistence. By including these additional variables, Tinto may have improved the predictive ability of the model.

Kember's (1989) Model of Drop-Out from Distance Education

Modifying Tinto's (1975) Dropout Model, Kember (1989) developed a conceptual model explaining drop-out decisions among distance education students. Kember argued that most existing conceptual models that attempted to explain persistence in traditional education settings included variables on how the student integrated into campus life, which is not applicable to distance education. Kember's Model of Drop-Out from Distance Education asserts that drop-out is a longitudinal process in which a number of variables interact with one another and ultimately lead to drop-out or course completion. This is a two-track model where students can elect to take the positive track toward course completion or the negative track toward course drop-out (Kember). Student characteristics (e.g., individual, family and home, work, and educational) affect one's goal commitment, which includes both intrinsic and extrinsic motivation. In

turn, goal commitment affects the academic environment, which affects academic integration; social and work environment are also affected by goal commitment, which then affects social and work integration. The variables of academic integration and social and work integration in Kember's model are seen as intervening variables between the student characteristics and the outcome decision (i.e., drop-out or completion). These variables then lead to a cost/benefit analysis, where the student decides if the perceived benefits of completion outweigh the time, effort, and energy he or she is likely to put into the course. This ultimately leads to the decision to drop-out or complete the course.

Kember's (1989) model was empirically tested in a study conducted on distance education students ($N = 1060$) in Hong Kong. In this study, Kember et al. (1991) used a path analysis to determine causal relationships among the following variables: background characteristics (e.g., sex and age); emotional encouragement; academic accommodation (e.g., positive impression of the course and active questioning in learning); external attribution (e.g., insufficient time for study and considering withdrawal from the course); academic incompatibility (e.g., negative impression of course and considering withdrawal from the course); and persistence characteristics (i.e., GPA and drop-out ratio). Of the variables included in the study, only a few of the background variables were statistically significantly related to GPA or drop-out ratio (i.e., persistence characteristics); these variables were sex ($\beta = .10$), salary ($\beta = .10$), and qualification ($\beta = .10$) (Kember et al., 1991). Although significance was reported between these variables, the researchers failed to report the level of significance.

The numerous variables in Kember's model explained a large amount (R^2 = .80) of variance in student persistence (GPA and drop-out ratio). However, the multiple coefficient of determination (R^2 = .10) for GPA was considerably lower, which suggests that the unusually large R^2 explained by Kember's model may be due to the large number of predictor variables. The researchers concluded that other factors not addressed in the model possibly could have considerable influence on persistence (Kember et al., 1991). Because of these findings, it is not surprising that Kember's (1989) model has not been widely used in empirical studies on persistence. There is an apparent need to identify predictor variables that explain more of the variance in persistence.

Discussion of Conceptual Models

There are similarities and differences between Tinto's (1975) and Kember's (1989) models. One major similarity between these models is that both look at persistence as a longitudinal process by which a number of variables interact with one another and ultimately lead to a dropout decision. Another similarity is that both models include some of the same variables. Kember used Tinto's model to develop his own model; consequently, the models share some of the same independent variables. These variables are goal commitment, and academic and social integration. Although both models include various independent variables, both models focus on the dependent variable of dropout. Both models presented persistence as a dichotomous variable, measured as dropout, in which a student either makes the decision to dropout or to complete the course.

Although Kember (1989) developed his model using Tinto's (1975) Model of Dropout, there are many differences between the models. While Tinto's model included family background, individual attributes, and pre-college schooling, Kember's model included individual, family and home, work, and education characteristics within one block. Kember recognized that the predictors of persistence in traditional education were not the same for distance education; for that reason, institutional commitment, peer-group interactions and faculty interactions were not included in his model. Although Kember used goal commitment (just as Tinto had), he divided it into intrinsic and extrinsic motivation. Tinto's academic system consisted of grade performance, intellectual development, peer-group interactions, faculty interactions, and academic and social integration; Kember's model had academic environment, social and work environment, academic integration, and social and work integration. One of the biggest differences between the models is that Kember's includes cost/benefit analysis, which is the point where the student makes a decision as to whether the cost is worth the ultimate benefit of completion. Because Kember's model focuses on distance education, he made necessary adjustments in Tinto's model while applying his own theories. These adjustments make Kember's model a more in-depth model than Tinto's and more useful for assessing persistence in the realm of distance education.

Tinto's (1975) and Kember's (1989) models, along with other conceptual models, use many of the same predictor variables when examining the phenomenon of persistence. Although neither Tinto's nor Kember's model has

been very useful in explaining the variance in persistence in subsequent research studies, these conceptual models are often used as a theoretical base for selecting variables in research studies. These models include demographic and achievement (e.g., educational) variables when examining persistence in educational settings. Demographic or background variables often include age and gender. For example, both Tinto and Kember include background characteristics (e.g., age and gender) in their models. Bean's (1980) Student Attrition Model argues that background variables (e.g., age and gender) have a causal effect on academic (e.g., study habits) and environmental variables (e.g., finances, employment, and encouragement) that ultimately leads to student persistence.

Expectedly, achievement or educational variables are also often examined in relation to student persistence. Tinto's (1975) and Kember's (1989) models of student dropout however, include different measures of achievement. Tinto's model examines grade performance (e.g., GPA), while Kember's model considers educational characteristics (e.g., GPA and computer experience). GPA is commonly used as a predictor of persistence. Another example is Cabrera, Nora and Castaneda's Integrated Model of Student Persistence (1993), which combined two major theories of persistence, Tinto's (1987) Student Integration Model and Bean's (1980) Student Attrition Model. This model included GPA as one of its variables, in which the researcher found one of the largest total effects on persistence was accounted for by GPA (β = .463). Because these conceptual models identify similar variables that are related to student persistence, it is

important to include some of these variables when conducting research on predictors of persistence. Examples include demographic variables (i.e., age and gender) and academic/educational variables (i.e., GPA and computer experience). All of these variables are commonly examined as variables related to student persistence. The relationship between these variables and persistence will be expanded upon in the second section of this review.

Definition of Persistence

In the previously discussed conceptual models, persistence was not measured in the same manner. The same holds true for research studies that evaluate student persistence in both traditional and distance education programs. In these studies, definitions of persistence have varied from completion status, re-registration in a subsequent semester, withdrawal/failure, and success. The most common way to define persistence is completion status (Kemp, 2002; Parker, 1999; Richards & Ridley, 1997). In one study, Garrison (1985) defined dropouts as "those students who did not receive a grade at the end of the course and were classified as incomplete" (p. 30). Related to completion status, persistence has also been measured as course withdrawal or failure status (Pugliese, 1994). Conversely, other studies measured persistence in relation to student's re-registration and active enrollment status (Belawati, 1998; Fjortoft, 1996). One different perspective is to view persistence as success. This could either mean that the student completed the course without dropping out or that the student achieved a grade that is deemed "successful." For example, Muse (2003) evaluated the factors leading to success in community college distance

education courses by separating students into two groups: the unsuccessful group, consisting of students who had dropped out or failed their course, and the successful group, consisting of all the other students. These terms all have the same meaning as persistence, but have different operational definitions. Despite the inconsistent definitions of persistence, the majority of the studies reviewed operationalize persistence as completion status. If a student completes a course, does not dropout, and proceeds to be successful in that course, that student is described as being persistent.

Demographic Variables Related to Persistence

Research studies on student persistence in distance education programs have addressed a number of variables in relation to persistence. Age and gender have commonly been examined in relation to persistence. As discussed in the previous section, research studies have found significant relationships between these two variables and student persistence in education programs.

Age

Some researchers contend that as we advance into adulthood, we lose the capacity to learn because of cognitive decline, while others argue that we do not lose the ability to learn as we age (Erhman, 1990; Schleppegrell, 1987). Recent research studies have found that despite reduced performance, plasticity of learning and underlying competence could remain stable as a person gets older (Datan, Rodeheaver, & Hughes, 1987). This is supported by Schleppegrell, who argues that older adults are capable of learning just as effectively as younger adults under the right conditions and when instructional methodology is

modified to meet their needs. Older adults have more life experiences, increased maturity and more self-discipline than younger adults (Dille & Mezack, 1991). In addition, older adults tend to hold full-time jobs, have a family, and are responsible for their own college expenses (Dille & Mezack). Because of this, older adults may be more likely to put a higher value on the time and money they invest in their education than younger students who do not hold these same types of responsibilities (Dille & Mezack). While many research studies include age as an antecedent to student persistence and conclude that age is a significant predictor of persistence in educational settings, there are other studies that find the opposite to be true.

Among the reviewed studies, only one did not find a significant relationship between age and persistence. In this study, persistence was measured by achievement-type variables, such as test scores, homework assignments, and final course grades. Comparing a sample of face-to-face ($N =$ 23) and online ($N = 24$) undergraduate students enrolled in a Business Communications class, Tucker (2002) conducted t-tests to determine whether there were significant age differences among the groups. Although the age difference was significant ($p < .05$), the average age of the face-to-face group was 23, while the average age for the online group was 38. The researcher did not find a significant relationship between age and the measures of persistence (i.e., test scores, homework assignments, and final course grades) across both groups and, thus, concluded that age does not determine whether a student will do better or worse in an online course. This study's small sample size may have

affected the results. Because the sample was derived from one course at a single university, the results cannot be generalized to different populations.

On the other hand, some studies have found age to be a significant predictor of student persistence (Fjortoft, 1996; Langenbach & Korhonen, 1988). In one study, Fjortoft sought to determine which factors are related to student persistence using a sample of adult students enrolled in a post-baccalaureate distance learning program in pharmacy ($n = 179$) and all students who had been admitted to the program but withdrew before completing ($n = 216$). Persistence was defined as persisting to the next year of study. Results of a regression analysis determined age as a significant predictor of persistence ($\beta = -.192$), which suggests students are less persistent as they age. As a consequence, the researcher concluded that older students were less likely to persist in distance learning programs. In contrast, Langenbach and Korhonen found statistically significant differences in persistence between the average age of persisters ($n = 192$) and non-persisters ($n = 260$) and concluded that older students ($M = 42.2$) who enroll in nontraditional graduate programs soon after completing their Bachelor's degrees are more likely to persist. In this study, persistence was defined as successfully completing the program. The difference in the operational definition of persistence makes it difficult to compare the results to one another. In addition, Fjortoft's sample only includes students who are enrolled or withdrew from a pharmacy program; hence, the generalization of the results is limited.

In the following studies, persistence was measured as success (Dille & Mezack, 1991; Muse, 2003; Neuhauser, 2002). In one study, Neuhauser sought

to determine any differences in the demographics and success rates among students enrolled in two sections of an undergraduate Management course ($N =$ 68), one taught online and the other taught in the traditional face-to-face format. In addition to other variables, age was included as an independent variable in this study. T-test results indicated a difference between traditional students (18-22 years of age) and nontraditional (over 22 years of age) students, although the mean ages of the groups were not reported. The result indicated that both the online and face-to-face groups had higher attrition rates among the traditionally-aged students, suggesting that younger students (18-22 years of age) are less likely to complete their courses and more likely to drop out than older students (over 22 years of age). In a second study, Dille and Mezack performed a multiple regression to determine predictors of success (defined as completion of course with "C" or better) among telecourse students ($N =$ 151) at a southwestern community college. Results indicated that age was a statistically significant ($p =$ .05) predictor of success; the researcher failed to report the actual beta value. Additional results from an ANOVA showed a statistically significant difference (p = .03) between the average age ($M =$ 25.14) of the 43 non-successful students and the average age ($M =$ 28.46) of the 108 successful students. The researchers concluded that it made sense that older students would perform better in telecourses because they tend to have a higher level of maturity, more self-discipline, have completed more college credit hours, typically work full-time, have a family, and are responsible for their own college expenses (Dille & Mezack). Older adults may put more value on time and money and are less likely

to drop out of a telecourse because of this (Dille & Mezack). In a third study, Muse examined the factors that lead to success in distance education among a sample of Web-based community college students ($N = 276$), finding that successful students tend to be older. In this study success was defined as passing multiple Web-based courses at the community college level. Again, the operational definition of success differed in each of the studies.

Summary of Age and Persistence

In general, the results suggest that older students tend to be significantly more persistent than younger students. The significance and major findings of the reviewed literature regarding the relationship between age and persistence are summarized in Table 1.

Table 1

Summary of Literature: Age and Persistence

Research Study	Sample	Measure of Persistence	Significant	Major Finding
Dille & Mezack (1991)	Telecourse community college students (*N* = 151)	Completion of course with "C" or better	Yes	Older students (*M* = 28.46) more likely to persist
Fjortoft (1996)	Distance education graduate students who enrolled in the pharmacy program (*n* = 179) and those who withdrew before completing (*n* = 216)	Persisting to the next year of study	Yes	Older students are less likely to persist in distance education programs
Langenbach & Korhonen (1988)	Students enrolled in a masters of liberal studies program (*N* = 452)	Successful completion of the program	Yes	Older students (*M* = 42.2) are more likely to persist
Muse (2003)	Web-based community college students (*N* = 276)	Passing multiple Web-based courses	Yes	Older students (*M* = 30) are more successful
Neuhauser (2002)	Online (*n* = 37) and traditional (*n* = 25) students enrolled in undergraduate management course	Successful completion of course	Yes	Older students (< 22) are more likely to persist
Tucker (2002)	Undergraduate students in a traditional course (*n* = 23) and students in an online course (*n* = 24)	Test scores, homework assignments, or final course grades	No	Age does not determine how well a student will perform in an online course

As the table indicates, one study did not find age to be a significant predictor of persistence and concluded that age does not determine how well a student will do in an online course (Tucker, 2002). On the other hand, five out of the six studies reported a significant relationship between these variables. Of those studies, only one study concluded that younger students are more likely to persist than older students (Fjortoft, 1996), while the results of four studies indicated that older students tend to be more persistent than younger students (Dille & Mezack, 1991; Langenbach & Korhonen, 1988; Muse, 2003; Neuhauser, 2002).

In making generalizations about the results of the studies, it is important to note that the studies do not operationally define variables in the same manner. In these studies, persistence is defined as successfully completing a program, completing a Web-based course, and completing a course with a "C" or better. The incongruent operational definitions of persistence and success make it difficult to compare the results of the studies. In addition, older nontraditional students were defined differently, with some studies defining older students as being older than 22 years of age and other studies defining older students as being mid-20's to mid-30's. This could pose a problem when comparing these results to studies involving graduate students who are more than likely older than 22 years of age. Although the majority of the studies reviewed found a significant relationship between age and persistence, the differences in these definitions may have affected the results of the studies. Therefore, more research is needed to examine the relationship between age and persistence.

Gender

The results of studies that considered the effects of gender on persistence are inconclusive, with four out of nine studies finding no significant gender differences in persistence in education courses (Dille & Mezack, 1991; Fjortoft, 1996; Langenbach & Korhonen, 1988; Muse, 2003). In a study by Langenbach and Korhonen, who analyzed the differences in gender between persisters and non-persisters in a nontraditional, liberal education graduate program, results indicated no significant gender difference in persistence. Similarly, Fjortoft found a low, nonsignificant correlation ($r = -.009$) when examining the relationship between two nominal variables: gender (coded as 1 = *female* and 2 = *male*) and persistence (coded as 0 = *nonpersistence* and 1 = *persistence)* in a sample of pharmacy students ($N = 395$). Results of a multiple regression analysis, in which gender was one of many independent variables examined, indicated that gender explained only 3.17% of the variance in persistence. The researcher did not specify in what order the variables were entered into the regression model; it is possible that gender may have explained more variance in persistence if it had been entered first.

Other studies examined gender in relation to academic success, which was used as a measure of persistence. For example, Dille and Mezack (1991) sought to predict success in telecourses, in which results determined that gender was not a significant predictor of student success. Finding similar results, Muse (2003) used Fisher's Exact Test to evaluate the relationship between gender and success among distance education students. Fisher's Exact Test is a test

statistic that measures the association between two nominal variables (Vogt, 1999). Although the researcher failed to report the actual value of the Fisher's Exact Test, results indicated that gender was not a significant discriminating variable ($p = .740$) in predicting success among distance education students.

Contrary to those findings, five other studies reported a gender difference in persistence (Allen, 1997; Feldman, 1993; Fenske, Porter, & DuBrock, 2000; Leppel, 2002; Sadler, Cohen, & Kockesen, 1997). In a sample of college freshmen ($N = 581$) which was representative of the target population, Allen used structural equation modeling to determine that gender had a significant direct effect on persistence (operationalized as enrollment status) of minority students ($\gamma = -.34$, $p > .01$) and nonminority students ($\gamma = -.43$, $p > .01$). The gamma values, which measure associations between two ordinal variables, indicate a moderate relationship between gender and persistence (Vogt, 1999). However, the nature of the relationship is not clear; the results do not specify whether males or females tend to be more persistent in education settings.

The majority of studies reviewed found that females tend to be more persistent than males (Feldman, 1993; Fenske et al., 2000; Leppel, 2002). In a longitudinal study examining the persistence rates of students majoring in science, math and engineering ($n = 1967, 1679, 1614$, and 1924), Fenske et al. found that females were more than twice as likely to persist to graduation within in four years than males (i.e., 16.9% vs. 7.0%, respectively). This finding was supported by Leppel, who evaluated persistence rates between African American males ($N = 2,647$) and African American female college students ($N = 2,737$)

enrolled between 1989 and 1990. Although results indicated that African American females had slightly higher persistence rates than African American males (i.e., 93.28% vs. 92.78%, respectively), the difference was not statistically significant.

Additionally, Feldman (1993) examined the relationship between gender and persistence among a sample of community college students ($N = 1,140$); results of chi square analysis indicated that males were more likely to drop out than females, thus less persistent. Although gender was related to persistence when examined by itself, when other factors, such as GPA and age, were accounted for in the follow-up logistic regression, the relationship did not hold up (Feldman). On the contrary, Sadler et al. (1997) examined a sample of college freshmen ($N = 272$) who did not reenroll in a subsequent year, finding that being female had a negative influence on student retention, which is related to persistence. The sample size in this study was much smaller than the sample sizes in previous studies, which may have affected the results. A larger sample may have yielded more meaningful conclusions regarding the group of students (Huck, 2004).

Summary of Gender and Persistence

There are many research studies that include gender as a variable of interest in relation to student persistence. The results are mixed in regard to whether or not gender is a significant predictor of persistence. The significance and major findings of the reviewed literature regarding the relationship between gender and persistence are summarized in Table 2.

Table 2

Summary of Literature: Gender and Persistence

Research Study	Sample	Measure of Persistence	Significant	Major Finding
Allen (1997)	College freshmen ($N = 581$)	Student's enrollment status	Yes	Gender had a significant direct effect on persistence of minority students ($\gamma = -.34$) and nonminority students ($\gamma = -.43$)
Dille & Mezack (1991)	Telecourse community college students ($N = 151$)	Completion of course with "C" or better	No	Gender is not a significant predictor of success in a telecourse
Feldman (1993)	Community college students ($N = 1,140$)	One year student retention	Yes	Males were less persistent than females
Fenske et al. (2000)	Undergraduate students majoring in science, math and engineering (n's = 1967, 1679, 1614, and 1924)	Student's enrollment status	Yes	Females had higher persistence rates than males
Fjortoft (1996)	Distance education students who enrolled in the Doctor of Pharmacy program ($n = 179$) and those who withdrew before completing ($n = 216$)	Persisting to the next year of study	No	Gender only explained 3.17% of the variance in persistence

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Langenbach & Korhonen (1988)	Students enrolled in a masters of liberal studies program ($N = 452$)	Successful completion of the program	No	No significant difference between gender and persistence
Leppel (2002)	Male ($N = 2,647$) and female ($N = 2,737$) undergraduate students enrolled between 1990-1991	Students who were enrolled sometime during 1990-1991	Yes	African American females had higher persistence rates than African American males
Muse (2003)	Web-based community college students ($N = 276$)	Passing multiple Web-based courses	No	Gender was not a significant discriminating variable in predicting success among distance education students
Sadler (1997)	College freshmen ($N = 272$) who did not reenroll in a subsequent year	Student retention	Yes	Being female has a negative influence on student retention

Of the reviewed studies, four found that gender is not a significant predictor of student persistence (Dille & Mezack, 1991; Fjortoft, 1996; Langenbach & Korhonen, 1988; Muse, 2003). Some research studies have attributed their results to inadequate statistical power (Whitley, 1997). Despite these findings, five of the studies reviewed found the opposite to be true (Allen, 1997; Feldman, 1993; Fenske et al., 2000; Leppel, 2002; Sadler et al., 1997). The review of literature seems to indicate a slight trend that females tend to be more persistent in education environments. Major conclusions of studies that found significance between gender and persistence include: gender had a significant and moderate direct effect on persistence of minority students ($\gamma = $ -

.34) and nonminority students ($\gamma = -.43$), females are more persistent than males, and being female has a negative influence on student retention. Because of the inconsistency among findings, future research on the relationship between gender and persistence is needed.

Educational Variables Related to Persistence

Research studies on student persistence in distance education programs have addressed a number of educational variables in relation to persistence. A number of researchers have examined GPA and computer experience in relation to persistence in distance education. The major findings of these studies are reviewed in the next subsection.

Grade Point Average

Conflicting results exist among studies that have examined the relationship between GPA and persistence, with one-third of studies concluding that there is not a significant relationship between the variables in both traditional and distance education programs (Fjortoft, 1996; Kember et al., 1991; Langenbach and Korhonen, 1988). For example, in a study on persistence among graduate students in a nontraditional liberal education program, Langenbach and Korhonen found no significant difference between the undergraduate GPAs of persisters and non-persisters; therefore, they concluded that GPA does not significantly predict student persistence in a graduate program.

Similarly, Fjortoft (1996) found a low, negative correlation between self-reported previous college GPA and persistence ($r = -.125$) among online

pharmaceutical students, which suggests a weak relationship between the variables. The researcher did not report whether or not the correlation was significant. After entering all independent variables (i.e., previous college GPA, gender, age, satisfaction with previous college experience, intrinsic job satisfaction, ease with learning on own, perceived intrinsic benefits, and perceived extrinsic benefits) into a multiple regression analysis, results indicated that previous college GPA explained only 5% of the variance in persistence. In this study, previous college GPA was not a statistically significant predictor of persistence in a distance learning program (Fjortoft).

This finding was also supported by Kember et al. (1991), who examined GPA in relation to student persistence while conducting research on students (N = 1,060) enrolled in one of four distance education courses in Hong Kong. The researchers conducted a path analysis, in which the variables in the model (i.e., GPA, emotional encouragement, external attribution, academic accommodation, and academic incompatibility) explained 80% of the variance in student persistence. Despite the high amount of variance explained by the predictor variables, the multiple coefficient of determination for GPA (R^2 = .10) alone was considerably lower. This finding suggests GPA by itself is not a strong predictor of student persistence (Kember et al.). Although the researchers stated there was a significant relationship between these variables, the actual alpha value was not reported.

GPA has been found to be a significant predictor of student persistence in two-thirds of the studies reviewed. Hagedorn, Maxwell, Chen, Cypers and Moon

(2002), for instance, contend that GPA and course completion, which is linked to persistence, essentially measure the same behavior: course achievement. This contention holds true in studies that operationalize GPA as a measure of achievement, in which persistence is operationalized as either course completion or achieving a "C" or better in a course. Therefore, failure to persist in a course will ultimately be reflected in a student's GPA. Keeping that in mind, it makes sense that a number of researchers have concluded that GPA is a significant predictor of persistence in traditional face-to-face education programs (Ammons, 1971; Cejda & Rewey, 1998; Kahn & Nauta, 2001; Lufi, Parish-Plass, & Cohen, 2003).

First-semester GPA has been reported as a strong predictor of freshman-to-sophomore persistence (Ammons, 1971; Kahn & Nauta, 2001). Similarly, Cejda and Rewey (1998) also found a significant relationship between community college GPA and persistence, in that student transfers from community colleges with a GPA of 3.0 or higher were more likely to persist to graduation at a liberal arts college. In another example, Lufi et al. (2003) found that persisting students had significantly higher GPAs than non-persisting students, among a sample of Israeli students ($N = 181$). Students included in the persisting group were those who completed all requirements for their degree. In this study, GPA was measured using an Israeli scale (which goes from 1 to 100), which is much different from the traditional grade point scale used in the United States. The persisting group's mean GPA was 83.45 and the non-persisting group's GPA was 80.84, which was significant at $p < .05$. The findings of these

studies suggest that students who persist tend to have higher GPAs than students who do not persist. Individuals who place importance on having a higher GPA may also find it important to put forth the effort to complete a course or a program.

While some of the previous studies have found a significant relationship between persistence and GPA in traditional education programs, there are other studies that have focused on this relationship in the distance education environment (Dille & Mezack, 1991; Muse, 2003). In these studies, the researchers used success as a measure of persistence. For example, Muse found a significant difference ($p = .0001$) in self-reported GPA between the successful and non-successful groups of Web-based community college students ($N = 276$), which indicated a positive relationship between the variables. In this study, success was operationalized as successful completion of Web-based courses. The researcher concluded that there was a significant relationship between GPA and success. In a similar study on success, Dille and Mezack evaluated the relationship between GPA and success among community college telecourse students. In this study, success was operationalized as the completion of the required telecourse with a grade of "C" or better. ANOVA results revealed a statistically significant difference ($p = .0006$) between the GPAs of the 43 non-successful students ($M = 2.85$) and the GPAs of the 108 successful students ($M = 3.15$). Students with higher GPAs tend to also have strong academic skills, which would prepare them to achieve better in any learning environment (Dille & Mezack).

For the majority of studies above, it is unclear if GPA was obtained through self-reporting or by accessing student records (Dille & Mezack, 1991; Kember et al., 1991; Langenbach & Korhonen, 1988). Because administrative rules and privacy issues may inhibit researchers from gaining access to official student records, researchers may be forced to rely upon self-reported GPAs (Cassady, 2001). It should be noted that if self-report was the only means of collection for student GPA, the results of these studies may be subjective due to the reliance on subject's ability to recall their GPA accurately. In Fjortoft's (1996) study, self-report was the method used to obtain GPA. With self-reported GPAs, researchers must rely on students to provide an accurate and unbiased GPA without verification through official student records (Cassady). Students with lower GPAs tend to report higher GPAs, which could yield erroneous results (Dobbins, Farh, & Werbel, 1993; Frucot & Cook, 1994). However, self-reported GPA has been found to be remarkably similar to official records, with studies reporting relatively high reliability, ranging from $r = .70$ to .97 (Cassady). Because of administrative rules and privacy issues regarding access to student information, self-report becomes a practical solution to obtaining students' GPAs.

Summary of GPA and Persistence

There are mixed results regarding the relationship between GPA and persistence. The significance and major findings of the reviewed literature regarding the relationship between GPA and persistence is summarized in Table 3.

Table 3

Summary of Literature: GPA and Persistence

Research Study	Sample	Measure of Persistence	Significant	Major Finding
Ammons (1971)	Freshmen at a junior college (*N* = 1,691)	Persisting from freshman to sophomore year	Yes	The strongest predictor of persistence was first-semester GPA
Cejda & Rewey (1998)	Undergraduate students at a private, liberal arts college who transferred from a community college and had completed an Associate degree (*N* = 263)	Completion of baccalaureate degree	Yes	Student transfers from community colleges with a GPA of 3.0 or higher were more likely to persist to graduation at a liberal arts college
Dille & Mezack (1991)	Telecourse community college students (*N* = 151)	Completion of course with "C" or better	Yes	There was a statistically significant difference in GPA between the 43 non-successful students and the 108 successful students (*p* = .0006)

Fjortoft (1996)	Distance education students who enrolled in the Doctor of Pharmacy program ($n = 179$) and those who withdrew before completing ($n = 216$)	Persisting to the next year of study	No	Previous college GPA was not a statistically significant predictor of persistence in the distance learning program
Kahn & Nauta (2001)	Freshmen ($N = 400$) at a large public Midwestern university	Persisting from freshman to sophomore year	Yes	The primary predictor of freshman-to-sophomore persistence was first-semester GPA
Kember (1991)	Undergrad students enrolled in one of four distance education courses in Hong Kong ($N = 1,060$)	GPA and ratio of number of modules failed versus number of modules attempted	No	GPA by itself is not a strong predictor of student persistence
Langenbach & Korhonen (1988)	Students enrolled in a masters of liberal studies program ($N = 452$)	Successful completion of the program	No	Undergraduate GPA does not significantly predict student persistence in a graduate program
Lufi et al. (2003)	Israeli students majoring in high school education at a 4 year teachers college ($N = 181$)	The Persistence Scale in School (PSS)	Yes	The persisting group had a significantly higher GPA than the non-persisting group
Muse (2003)	Web-based community college students ($N = 276$)	Passing multiple Web-based courses	Yes	There is a significant relationship between GPA and success

As outlined in the chart, only a few studies found that GPA alone is not a significant predictor of persistence (Fjortoft, 1996; Kember et al., 1991; Langenbach & Korhonen, 1988). The majority of the reviewed studies have found a significant difference in GPA between the persisting and non-persisting students in both traditional and distance education programs (Ammons, 1971; Cejda & Rewey, 1998; Dille & Mezack, 1991; Kahn & Nauta, 2001; Lufi et al., 2003; Muse, 2003). The differences in the findings between these studies could be attributed to different populations, research methods, sample sizes, and the way in which variables were operationalized. For example, persistence was operationalized as successfully completing an entire program, completing a course, and completing a course with a "C" or better. The differences in the operationalization of persistence make it difficult to compare studies to one another. In addition, reliance on students' self-reported GPA without verifying through official student records may have produced biased results (Cassady, 2001).

Computer experience

Past computer experience has been examined in relation to student persistence in distance education, but the number of studies is scant. Although there are not enough empirical studies that examine this relationship, there are a few studies that have yielded mixed results as to whether or not computer experience significantly predicts student persistence. Computer experience has commonly been operationalized as both the number of previous online courses taken and computer skills. Those who hypothesize that there is a significant relationship between the number of previous online courses taken and

persistence in distance education courses contend that first time online students often lack the independence and time management skills needed to persist in distance education courses (Eisenberg & Dowsett, 1990; Erhman, 1990). The studies reviewed in this section contradict this contention (Houle, 2004; Muse, 2003; Parker, 1999). For example, Parker sought to determine if the number of distance education courses completed could predict dropout of community college students ($N = 94$) in distance education courses. In this study, persistence was measured as completion of a distance education course. Through a correlational analysis, the researcher found a nonsignificant correlation ($r = .01$) between the number of distance education courses completed and completion status, which is related to persistence. This study concluded that the number of distance courses previously taken is not a significant predictor of completion of distance education courses.

Similar results were found by Muse (2003), who also used completion of a Web-based course as a measure of persistence. The researcher conducted a discriminant function analysis to determine whether or not a number of independent variables, including the number of previous distance courses taken, could predict successful completion of Web-based courses. The results yielded a nonsignificant discriminant function coefficient of .12, indicating that the number of previously taken distance courses is not a significant predictor of successful completion of Web-based courses. These results are consistent with Houle's (2004) study, who found that among a sample of distance education students ($N = 212$) only 8.6% of successful students (i.e., completed the course) had taken

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previous online courses, while 18.8% of the unsuccessful students (i.e., did not complete the course) had taken previous online courses. The results of these studies suggest that computer experience, measured as the number of previous online courses taken, is a poor predictor of persistence in distance education.

Computer experience has also been operationalized as various types of computer skills (Muse, 2003; Richards & Ridley, 1997; Sherry & Sherry, 1997; Sherry & Sherry, 2000). Some researchers claim that computer experience (e.g., previous experience with word processing, spreadsheets, or desktop publishing; previously taken computer courses; and computer ownership) may influence students' achievement in a course (Carlson & Wright, 1993; Schumacher, Morahan-Martin, Olinsky, 1993). Following up on a previous study by Sherry and Sherry (1997) that reported a significant relationship between second semester persistence and a student's ability to use spreadsheets for college assignments, Sherry and Sherry (2000) evaluated the relationship between pre-enrollment computer-related factors and success in college among a sample of community college students (N = 1,434). In this study, success was measured as persistence from one semester to the next, while 10 computer-related questions were used to measure computer experience (i.e., computer confidence in using word processing, databases, spreadsheets, graphics programs, and online usage, current and planned computer usage, and computer access patterns). Chi-square statistics revealed that database usage is significantly related to student persistence. In addition, current use of computers at school and work was entered into the logistic regression equation fourth, behind educational goal

for college, Mathematics I score, and ethnicity. Using the variables in this model, 73% of the students were classified correctly. Although the researchers failed to report the corresponding statistics, they concluded that database usage and current use of computers at school and work is significantly related to student persistence.

The previous studies reported significant relationships between student persistence and computer experience, as measured as computer skills in the traditional education environment. Examining this relationship in the distance education setting, Muse (2003) sought to determine factors leading to success among community college students by evaluating many variables, including computer skills, to determine which variables could be used to calculate a student's ability to successfully complete a Web-based course. The researcher used successful completion of a Web-based course as a measure of persistence. Students were asked to complete a questionnaire, in which one section contained five items measuring computer skills. An exploratory factor analysis was performed to determine which factors would be useful in computing the discrimination of Web-based college students into successful or nonsuccessful groups (Muse). The computer skills factor explained 25.15% of the variance in the factor analysis, which indicates that computer skills can be useful in computing a student's ability to successfully complete a Web-based course (Muse).

The relationship between computer skills and successful completion of an online course was also examined among a sample of online students ($N = 69$)

enrolled at Christopher Newport University (Richards & Ridley, 1997). Seventy-seven percent of persisting students had taken computer skills training prior to enrolling in their first online course. Of these students, 42% reported that the computer skills training strongly influenced their decision to enroll in their first online course. The results of this study indicate a possible relationship between computer experience (i.e., computer skills) and student persistence, but the small sample size from one university and the lack of inferential statistics limit these results from being generalized to other populations.

Summary of Computer Experience and Persistence

There are mixed results regarding the relationship between computer experience and persistence. The significance and major findings of the reviewed literature regarding the relationship between computer experience and persistence are summarized in Table 4.

Table 4

Summary of Literature: Computer Experience and Persistence

Research Study	Sample	Measure of Persistence	Significant	Major Finding
Houle (2004)	Students enrolled in an asynchronous Web-based Associate Degree Program in Applied Information Technology ($N =$ 212)	Successful completion of a course	No	Only 8.6% of successful students had taken previous online courses, while 18.8% of the unsuccessful students had taken previous online courses

Muse (2003)	Web-based community college students (N = 276)	Passing multiple Web-based courses	No	• The number of distance courses previously taken is not a significant predictor of successful completion of Web-based courses
			Yes	• The factor of computer skills can be useful in computing a student's ability to successfully complete a Web-based course
Parker (1999)	Community college students enrolled (N = 94) in distance education courses	Course completion	No	The number of distance courses previously taken is not a significant predictor of completion status in distance education courses
Richards & Ridley (1997)	Online undergraduate students enrolled in the Christopher Newport University (CNU) online program (N = 69)	Successful completion of a course	Qualitative study	• 77% of persisting students had taken computer skills training prior to enrolling in their first online course • 42% reported that computer skills training strongly influenced their decision to enroll in their first online course
Sherry & Sherry (1997)	Community college students (N = 543)	Second semester persistence	Yes	Second semester persistence and a student's ability to use spreadsheets for college assignments are significantly related

Sherry & Sherry (2000)	Community college students ($N = 1434$)	Second semester persistence	Yes	Significant relationship between student persistence and database usage and current use of computers at work and school

The studies reviewed did not find a significant relationship between number of online courses previously taken and persistence (Houle, 2004; Muse, 2003; Parker, 1999). The major conclusion of these studies is that the number of distance courses previously taken is not a significant predictor of completion status or success, both measures of persistence. In contrast, other studies have found significant relationships between student persistence and computer experience, as measured as different types of computer skills: spreadsheet usage (Sherry & Sherry, 1997), database usage and current use of computers at work and school (Sherry & Sherry, 2000). In addition, two studies reported that computer skills influence decisions to either enroll in (Richards & Ridley, 1997) or complete (Muse) an online course. The results of these studies make it difficult to draw any conclusions about the relationship between computer experience and persistence. In addition, a limited amount of research exists that examines computer experience as a predictor of persistence in distance education. The importance of computer experience to persistence in distance education is that the computer is the main source of interaction for distance students. Distance education students must possess basic computer skills and/or experience to complete course assignments (Mehrotra et al., 2001). If students do not have basic computer skills and/or experience, they may be more likely to dropout and

not persist through the course. Because the relationship between computer experience and student persistence is not clear, further research is needed.

Personality Variables Related to Persistence

The next section reviews studies related to two personality variables relevant to persistence: computer self-efficacy and gender roles. This section contains two subsections. The first subsection consists of studies pertaining to computer self-efficacy, while the second subsection consists of studies pertaining to gender roles. Each subsection contains a brief overview of the theoretical frameworks underlying these constructs, as well as their importance to persistence in distance education.

Computer Self-efficacy

Computer self-efficacy "refers to a judgment of one's capability to use a computer" (Compeau & Higgins, 1995). This construct does not refer to basic computer subskills, such as formatting disks or entering formulas into an Excel spreadsheet; instead, it incorporates one's judgment of their ability to apply skills to a broader range of computer tasks, such as preparing written reports or analyzing data (Compeau & Higgins). Computer self-efficacy is a subconstruct of self-efficacy. For a more comprehensive understanding of computer self-efficacy, it is imperative to first understand self-efficacy. The next section provides a brief overview of the theoretical framework behind self-efficacy, as well as empirical studies.

Social cognitive theory postulates that human behavior has a triadic, reciprocal interaction with personal factors and environmental influences (Bandura, 1977b, 1986). This construct is based on the idea that personal factors (e.g., personality and demographic characteristics), environmental influences (e.g., social pressure and unique situations), and human behavior are all reciprocally determined (Bandura, 1986; Compeau & Higgins, 1995). Self-efficacy is a major construct in social cognitive theory that explains human behavior (e.g., performance, achievement, and persistence) and is defined as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). The level of self-efficacy is determined by previous experience, vicarious experience, verbal persuasion, and affective or psychological state (Cassidy & Eachus, 2002; Smith, 1994).

Bandura (1977b) differentiated between efficacy expectations and response-outcome expectancies. The researcher defined efficacy expectations as "the conviction that one can successfully execute behavior required to produce outcomes" and outcome expectancy as "a person's estimate that a given behavior will lead to certain outcomes" (Bandura, 1977b, p. 193). The terms are differentiated because a person may have the belief that a particular action will yield a desirable outcome but if the person doubts his or her own capabilities to perform that action, performance is likely to be affected (Bandura, 1977b). In addition, level of confidence in one's effectiveness (i.e., perceived self-

efficacy) directly influences choice of activity, level of effort and persistence, learning and achievement, and resilience (Bandura, 1977b; Pajares, 1996). People with higher levels of self-efficacy tend to tackle task-related activities more frequently and have a higher level of persistence in coping efforts, which enhances self-efficacy (Bandura, 1977b, 1982). On the other hand, people with lower levels of self-efficacy tend to avoid task-related activities and give up more easily, which lowers their level of self-efficacy (Bandura, 1977b, 1982).

When examining self-efficacy, it is important to consider the operationalization of the self-efficacy construct. For instance, Pajares (1996) examined the contribution of Bandura's (1977a) concept of self-efficacy to understanding self-regulation and motivation in academic settings. To build his case, Pajares reviewed numerous studies that sought to understand the role that self-efficacy played in academic settings, in which he determined that there are two major areas of focus in self-efficacy research in academic settings: the link between efficacy beliefs and college major and career choices; and "the relationships among efficacy beliefs, related psychological constructs, and academic motivation and achievement", which is more relevant to the present study (Pajares, p. 551-552). This is supported by Schunk's (1984, 1991) argument that self-efficacy contributes to the understanding of motivation and achievement-related behaviors in academic settings, which ultimately influence persistence (Pajares). However, effect sizes and strength of relationships are contingent upon the researcher's operationalization of self-efficacy (Pajares). For example, self-efficacy has been measured as: scores from a scale developed

from a larger pool of self-efficacy measures (Wood & Locke, 1987); educational requirements in technical and scientific fields (Brown, Lent, & Larkin, 1989); academic milestones (Brown et al.; Hackett, Betz, Casas, & Rocha Signh, 1992); and overall occupational self-efficacy (Hackett et al.). The numerous ways in which self-efficacy has been measured may affect the overall results, as well as make it difficult to compare study results to one another.

Achievement, performance, and persistence have been examined in relation to self-efficacy in educational settings. These variables often share similar operational definitions; hence, it is reasonable to assume that these variables may be related to one another. For example, Bandura (1986) argued that perceived ability ultimately influences actual performance, which is directly related to academic achievement in educational settings. In fact, beliefs that a person hold regarding his or her capabilities is a better predictor of how that person will behave or perform than what the person is actually capable of achieving (Bandura, 1977a). Furthermore, students with higher levels of self-efficacy are more likely to engage in achievement-type behaviors and persist in spite of any obstacles (Bandura, 1977a). In other words, students who perform at a high level are also likely to have high achievement (measured as GPA, test scores, course grade, or course assignments), and would be described as persistent. Although persistence is the focus of the present study, it is important to understand performance and achievement as they relate to persistence. Academic performance and achievement (e.g., standardized test scores, grades, GPA) are terms that are often used interchangeably; however, there has been

confusion regarding the operational definitions of these terms. Because of this, both of these variables will be examined in relation to self-efficacy. The following subsection provides an overview of the studies that examine performance, achievement, and persistence in relation to self-efficacy.

Empirical Studies on Self-efficacy and Persistence and Related Variables

Performance is important in academic settings, in which students are judged and graded based on their performance on various tasks. Bandura (1986) argued that a strong sense of self-efficacy is linked to optimal performance, and other researchers contend that perceived self-efficacy is a significant predictor of performance (Locke, Frederick, Lee, & Bobko, 1984; Schunk, 1984). This contention is supported by Multon, Brown, and Lent (1991), who averaged the results of 38 empirical studies in a meta-analysis that suggested that self-efficacy is significantly related to performance. These findings indicate that self-efficacy explained about 14% of the variance in academic performance, while the estimated effect size for performance was .38, which is considered a small to medium effect size (Cohen, 1988). The suggested relationship between self-efficacy and performance is supported by Bandura's (1977a, 1986) argument that task performance is affected by self-efficacy.

In another study that examined the relationship between self-efficacy and performance, Wood and Locke (1987) conducted three studies on a sample of undergraduate students (*N* = 581). The researchers developed and used their own instrument to measure strength and magnitude of self-efficacy for academic performance. A hierarchical regression was performed and strength of self-

efficacy was the second variable to be entered into the equation. Although beta values were not reported, results revealed that strength of self-efficacy explained an additional 6.27%, 3.42%, and 7.83% in academic performance, in the three studies respectively ($\Delta R^2 = .0672$, $\Delta R^2 = .0342$, $\Delta R^2 = .0783$, $p < .01$). These findings suggest that students who have high levels of self-efficacy tend to perform better academically.

Using a subconstruct of self-efficacy, Hackett and Betz (1989) examined the relationship between math self-efficacy and mathematical performance among undergraduate students ($N = 162$) enrolled in introductory psychology courses at a large, Midwestern university. In this study, math self-efficacy and mathematical performance were measured by the 52-item Mathematics Self-Efficacy Scale (MSES) and the Dowling (1978) Mathematics Confidence Scale, respectively (Hackett & Betz). The results of correlational analyses indicated a moderately strong positive correlation ($r = .44$, $p = .001$) between math self-efficacy and math performance (Hackett & Betz). These findings are supported by Bandura's (1977a) theory that self-efficacy is a significant predictor of past and future performance (Bandura, 1986). Despite the moderate correlation between math self-efficacy and math performance, math self-efficacy explains only 19% of the variance in math performance. Although the results from this study indicate a relationship exists between math self-efficacy and math performance, the small amount of variance suggests that other variables (e.g., GPA or course grade) may also be related to performance.

Achievement, which is very important to the area of learning and education, is another variable that has been linked to perceived self-efficacy (Bandura, 1977b; Bandura, 1986; Pajares, 1996). In an academic environment, achievement is often a measure of success which can be operationalized as GPA, test scores, course grade, and course assignments (Dille & Mezack, 1991; Muse, 2003). Despite a failed performance on a task, a person with high self-efficacy will persevere until he or she succeeds at that task (Bandura, 1986). Studies on the relationship between achievement and self-efficacy include an examination by Lent, Brown, and Larkin (1984) on a small sample of students majoring in engineering and science ($N = 42$). Items designed to measure self-efficacy were used to assess students' perceived ability to fulfill various educational requirements and job duties, while achievement was operationalized as Preliminary Scholastic Aptitude Test (PSAT) scores, high school ranks, college grades, and declared major choices. Findings suggest that students with higher levels of self-efficacy tend to achieve higher grades and persist longer than those with lower levels of self-efficacy. While these findings support Bandura's (1977a, 1986) contention about self-efficacy's ability to predict academic achievement, it is important to point out a limitation which may have affected the results. For example, Lent et al. used a small sample of science and engineering majors from one university, which limits generalizability to other populations.

Various subconstructs of self-efficacy (e.g., academic self-efficacy and math self-efficacy) have been examined in relation to achievement, performance,

and persistence. Schunk (1989) applied self-efficacy theory to academic environments, in the development of the concept of academic self-efficacy. Academic self-efficacy is defined as "the motivation to engage in and persist in academic behaviors leading to achievement in classroom situations" (McCue-Herlihy, 1997, p. 14). In addition, academic self-efficacy consists of confidence in one's study skills, course participation, performance, and course completion, which are all measures of achievement (Bandura, 1977a, 1986). This theory was tested in a study by Brown et al. (1989), who explored the relationships between academic self-efficacy and academic achievement (measured as GPA) among a sample of students majoring in science and engineering ($N = 105$). Hierarchical multiple regression results indicate that academic self-efficacy explains 20% of the variance in academic achievement ($R^2 = .20$, $p < .01$).

Similar results were found by Hackett et al. (1992) who examined the relationship between academic milestones self-efficacy and academic achievement of engineering students ($N = 218$). The researchers adapted scales developed by Lent, Brown, and Larkin (1986) to measure self-efficacy, while achievement was measured as college GPA (Spring quarter and cumulative). Stepwise multiple regression analysis was conducted using academic milestones self-efficacy and five other predictor variables (i.e., high school GPA, faculty encouragement, strain, interests, and support) to predict academic achievement, measured as both spring quarter and cumulative GPA. Academic milestones self-efficacy was entered first into the regression equation and yielded regression coefficients of $\beta = .32$ and $\beta = .30$ for spring quarter GPA and cumulative GPA,

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respectively. Results of the first regression analysis indicated that spring quarter GPA, along with five other predictor variables (i.e., high school GPA, faculty encouragement, strain, interests, and support) explained 30% of the variance in academic performance (adjusted R^2 = .30). Results of the second multiple regression analysis indicated that cumulative GPA, along with the other five predictors, explains 51% of the variance in academic performance (adjusted R^2 = .51). In both regression analyses, the strongest predictor of academic achievement (i.e., spring quarter and cumulative GPA) was academic milestones self-efficacy.

Self-efficacy has also been linked to persistence, which is the focus of this review. The higher a person's perceived self-efficacy, the more likely he or she will choose difficult tasks, persist at them longer, and perform the tasks successfully (Bandura, 1986). This supposition was tested in a study by Brown et al. (1989), who explored the relationship between academic self-efficacy and persistence (i.e., number of quarters enrolled in the school the following year) among a sample of students majoring in science and engineering (N = 105). Results of a hierarchical multiple regression indicated that academic self-efficacy explained 16% of the variance found in persistence (R^2 = .16, $p < .001$). These findings were also supported by Jacobs, Prentice-Dunn, and Rogers (1984), who examined the relationship between self-efficacy expectancy and persistence (i.e., length of time to perform on a second task after failing on a first task) among a sample of undergraduate students (N = 96). ANOVA results demonstrated that self-efficacy expectancy had a significant strong effect on persistence (F = 12.53,

$p < .001$). In other words, students, who believe that they can successfully perform well enough to achieve a desired outcome, are more likely to be persistent in their efforts.

These findings suggest that self-efficacy is predictive of persistence. This contention is substantiated by Multon et al. (1991), who conducted a meta-analysis on studies that examined self-efficacy and persistence. By averaging the results of 15 empirical studies, findings indicated a statistically significant relationship between self-efficacy and persistence (Multon et al.). Although the findings suggest a relationship between self-efficacy and persistence, the results may have been affected by varying operational definitions of persistence. In addition, the reviewed studies only included 11 studies that involved college students and some studies did not include sufficient information needed to calculate effect sizes.

Summary of Self-efficacy and Persistence and Related Variables

The previous studies provide support that there is a relationship between self-efficacy and achievement, performance and persistence. Because confusion exists regarding the operational definitions of performance and achievement, both variables as well as persistence were examined in relation to self-efficacy. The significance and major findings of the reviewed literature regarding the relationship between self-efficacy and achievement, performance and persistence is summarized in Table 5.

Table 5

Summary of Literature: Self-efficacy and Performance, Achievement, and Persistence

Research Study	Sample	Measure of Persistence	Significant	Major Finding
Brown et al. (1989)	Undergraduate students majoring in science and engineering ($N = 105$)	Academic achievement (GPA), Persistence (number of quarters enrolled in the school the following year)	Yes	A strong relationship between academic self-efficacy and achievement and persistence exists
Hackett & Betz (1989)	Undergraduate students enrolled in introductory psychology courses ($N = 162$)	Mathematical performance	Yes	There is a moderately strong positive correlation between math self-efficacy and math performance
Hackett et al. (1992)	Undergraduate engineering students ($N = 218$)	Achievement (college GPA)	Yes	The strongest predictor of academic achievement was self-efficacy
Jacobs et al. (1984)	Undergraduate students ($N = 96$)	Length of time to perform on a second task after failing on a first task	Yes	Self-efficacy expectancy had a significant strong effect on task persistence
Lent et al. (1984)	Undergraduate students majoring in engineering and science ($N = 42$)	Achievement (PSAT scores, high school ranks, college grades, declared major choices)	Yes	Students with higher levels of self-efficacy tended to achieve higher grades and persist longer than those with lower levels of self-efficacy

Multon et al. (1991)	Various	Various	Yes	• Estimated effect sizes for performance and persistence were .38 and .34, respectively
				• Self-efficacy explained 14% of the variance in academic performance and 12% of the variance in academic persistence
	Note: This meta-analysis reviewed 39 studies			
Wood & Locke (1987)	Undergraduate students (*N* = 581)	Academic performance	Yes	Students who have high levels of self-efficacy tend to perform better academically

The research indicates that self-efficacy is significantly related to performance, in which major findings include: students who have high levels of self-efficacy tend to perform better academically and about 14% of the variance in academic performance can be explained by self-efficacy. Achievement is another variable found to be strongly related to self-efficacy. Major findings from these studies include: students with higher levels of self-efficacy tend to achieve higher grades and the strongest predictor of academic achievement is self-efficacy. Self-efficacy is also significantly related to persistence, the major variable of interest in this study. Significant findings include: self-efficacy expectancy has a significant strong effect on persistence and about 12% of the variance in academic persistence can be explained by self-efficacy. These findings are consistent with self-efficacy theory which argues that a person with

high self-efficacy will engage in achievement-type behaviors by choosing difficult tasks, persist at them longer in spite of any obstacles, and perform the tasks successfully (Bandura, 1977a, 1986). Although the results suggest a significant relationship between self-efficacy and persistence and related variables, the findings need to be replicated using larger sample sizes and varying sample populations. In addition, due to the differences in operational definitions of self-efficacy, achievement, performance, and persistence, results should be compared with caution.

Importance of Computer Self-efficacy to Persistence

The empirical relationship between self-efficacy and performance, achievement and persistence in traditional education programs has been well established. There are many subconstructs of self-efficacy across various behavioral domains. The previous studies used different subconstructs of self-efficacy, such as academic and math self-efficacy. Another subconstruct of self-efficacy is computer self-efficacy. The connection between persistence and computer self-efficacy can be explained through self-efficacy theory. However, currently, there are no studies that evaluate the relationship between computer self-efficacy and persistence in education settings. Because of the established relationship between self-efficacy and persistence, it is reasonable to expect that students with high computer self-efficacy would be more persistent in completing a distance education course than students with low computer self-efficacy.

Based on Bandura's (1977a) construct of self-efficacy, Compeau and Higgins (1995) suggest there are three dimensions to understanding computer

self-efficacy. These dimensions are magnitude, strength, and generalizability. Magnitude of computer self-efficacy indicates the level of one's expected capability and the level of support needed to perform a task. A person with a high magnitude of computer self-efficacy will be more likely to complete difficult computing tasks with little or no assistance than a person with a lower magnitude (Compeau & Higgins). Strength refers to the amount of confidence a person has in his or her ability to perform computer tasks. People with strong computer self-efficacy will have more confidence in their ability to perform specific behaviors successfully (Compeau & Higgins). Lastly, the generalizability of computer self-efficacy "reflects the degree to which the judgment is limited to a particular domain" of computer activity, such as hardware and software configurations (Compeau & Higgins, p.192). People with high computer self-efficacy generalizability will believe that they can use various software packages and computer systems more competently than those individuals who possess low computer self-efficacy generalizability (Compeau & Higgins).

Computer self-efficacy is an important construct to consider when evaluating persistence in distance education because the computer is the main source of interaction for distance students. These students must possess basic computer skills to complete assignments, communicate with instructors and classmates via message boards and email, post assignments, and conduct research, if necessary (Driscoll, 2002; Mehrotra et al., 2001). If students do not have basic computer skills and/or experience, they may be more likely to dropout and not persist through the course. When students drop out of or fail these

courses, colleges suffer a decrease in enrollment resulting in monetary loss (Mehrotra et al.). Therefore, it is imperative to understand the role that computer self-efficacy plays in student persistence.

In addition, if the specificity of the construct is closely related to a specific task, self-efficacy is more likely to have higher predictive value (Bandura, 1997). Many studies on self-efficacy have examined the relationship between task-specific self-efficacy and specific types of performance, such as the relationship between: mathematical self-efficacy and math performance (Hackett and Betz, 1989); academic self-efficacy and academic achievement, measured as GPA (Brown et al., 1989), and career self-efficacy and career goals and development (Smith, 2001). These constructs are more closely related to the task which they measure, than a general measure of self-efficacy. Therefore, when researching distance education, in which courses require students to use computers to communicate with their instructors and fellow students, as well as complete course assignments and tests, it makes logical sense to examine whether or not a student's computer self-efficacy predicts successful completion of a distance education course.

The review of literature suggests that persistence is a major component of self-efficacy. The established relationship between self-efficacy and persistence supports the expectation that students with high computer self-efficacy will be more persistent in completing a distance education course than students with low computer self-efficacy. With increasing enrollments of online students, there is a

need to fill the gap in the literature by focusing on a more specific subconstruct of self-efficacy (i.e., computer self-efficacy).

Gender Roles

Theoretical Framework

Gender role development is "the process whereby children come to acquire the behaviors, attitudes, interests, emotional reactions, and motives that are culturally defined as appropriate for members of their sex" (Perry & Bussey, 1984, p. 262). This process begins from the moment they are born, when boys and girls are treated differently based on their anatomical differences (Boudreau, Sennott, & Wilson, 1986). While girls are treated with warmth and affection, boys are treated in a more aggressive and assertive manner (Boudreau et al.). Gender roles are influenced by biological and cultural influences, as well as one's identity as male or female (Schaffer, 1981). Because femininity and masculinity are seen as fundamental dimensions of personality, men are expected to possess masculine characteristics, while women are expected to adopt feminine characteristics (Nielson, 1990).

Gender stereotypes are also established and encouraged during childhood when a child's gender becomes the determining factor for toy choices (e.g., dolls versus trucks), sex-typed activities (e.g., playing house versus playing sports), and pink versus blue clothing and room colors (Boudreau et al., 1986; Golumbok & Fivush, 1994; Rheingold & Cook, 1975; Shakin, Shakin, & Sternglanz, 1985). Children begin to believe that biology is destiny and respond to their social environment accordingly (Taylor, 1996). Examples of how boys and girls are

treated differently include: little girls are comforted when they cry, while little boys are discouraged from crying or showing emotion; boys are more likely to be discouraged from exhibiting feminine-type behavior than girls who exhibit masculine behaviors; boys are encouraged to explore their physical surroundings, which provides a greater sense of competence, while girls are not encouraged to do so (Golumbok & Fivush). These experiences guide one's perception about appropriate gender roles. Because these perceptions are so strong, children will often revert to behaviors stereotypical of their gender when placed in situations that are uncomfortable or unfamiliar (Haslett, Geis, & Carter, 1992).

These gender stereotypes become even more prevalent in adulthood, when men and women internalize these beliefs and consequently choose behaviors that are deemed appropriate for their gender (Eagly, 1987). Societal beliefs encourage men to be independent, assertive, and achievement-oriented, while females are encouraged to be dependent, sensitive, and expressive (Keller, 1974). In addition, females are encouraged not to be aggressive, assertive, or power striving (Keller). Historically, not only was it expected that men and women would adopt traits appropriate to their gender, but they were also encouraged not to exhibit traits of the opposite gender (Schaffer, 1981). Individuals who are confined by self-perceived feminine or masculine gender roles are limited to behaviors that are considered appropriate for their gender, which ultimately restricts their potential (Bem, 1974). Because masculine traits (e.g., independence, competitiveness and self-confidence) are typically more desirable and positively valued than feminine traits, women stand to lose more by conforming to the stereotypical feminine

gender role (Broverman, Vogel, Broverman, Clarkson & Rosenkrantz, 1972). For example, because achievement is consistently described as being a masculine characteristic, women may be discouraged from having high levels of achievement because it is not considered appropriate for their gender (Schaffer).

Although these well-defined stereotypes regarding gender roles are still evident in today's society, research indicates a shift away from such beliefs. Masculinity and femininity were initially assumed to be opposite ends on a single continuum and inversely correlated, with individuals possessing either feminine or masculine characteristics (Schaffer, 1981). The major problems with this approach is that it does not allow for gender role flexibility and fails to consider situational variables that may affect one's masculinity or femininity, as well as behaviors (Schaffer). This suggests that masculine and feminine traits are not always stable. For instance, research shows that as education level increases, women tend to become more masculine (Schaffer). Supporting this contention, Constantinople (1973) argued against the bipolar definitions and measures of masculinity and femininity and suggested it may be more practical to refer to these variables as orthogonal. Furthermore, femininity and masculinity are not necessarily determined by biological gender (Constantinople).

Other researchers have also argued against the idea that individuals possess either masculine or feminine characteristics (Bem, 1974; Spence, Helmreich & Stapp, 1975). Bem suggested that individuals could possess both masculine and feminine characteristics at the same time, which ultimately influences behavior. The multidimensionality of masculinity and femininity was

operationalized in the development of the Bem Sex Role Inventory (BSRI), which

categorized individuals as masculine, feminine, androgynous, or undifferentiated.

As individuals begin to display both masculine and feminine characteristics, they

become more androgynous. This concept of androgyny indicates that one

possesses both masculine and feminine characteristics, rather than conforming to

one or the other (Bem). Androgyny is the most desirable and healthiest state,

allowing these individuals more behavioral flexibility and adaptability in situations

than those who possess high levels of masculinity or femininity (Bem; Spence et

al.). While highly sex-typed individuals are restricted to behave in ways that are

considered appropriate for their gender, androgynous individuals are not confined

to one set of behaviors. These individuals have a wide range of behaviors, both

masculine and feminine, which gives them the ability to be more flexible and

adaptable in various situations (Bem).

Importance of Gender Role to Persistence

Gender role has been important in explaining various types of human

behavior. Although there are currently no research studies examining the

relationship between gender roles and persistence, as measured as completion

status in educational settings, there are research studies that have included

gender role as a variable related to other measures of persistence, such as

performance and achievement. Performance and achievement are variables

commonly examined in traditional educational settings and often share similar

operational definitions. This suggests that perhaps the variables are related to one

another, which was previously explored in the self-efficacy section. Although

persistence is the focus of the present study, it is important to understand how performance and achievement relate to persistence, as well as their relationship to gender roles. The following subsection provides an overview of studies examining the relationship between gender roles and performance, achievement, and persistence.

Performance. Performance is an important variable in educational settings, because academic success is dependent on students' performances on various tasks. Academic performance and persistence are determined simultaneously and are also influenced by many of the same variables (Leppel, 2002). High performance achievers tend to be more successful and persistent in educational settings than low performance achievers (Uhlinger & Stephens, 1960). In respect to gender roles, there are differences between the performance levels of males and females, which may be attributed to males and females differing in their motivation to achieve personal success (Boudreau et al., 1986). Houts and Entwistle (1968) contend that there is a relationship between sex role attitudes and performance. Performance can be affected by the sex-appropriateness of the task (Stein & Bailey, 1973). For example, females may have lower performance on the assembly of a car engine than males, because it is not deemed a sex-appropriate task. In a study on female college students ($N = 58$), higher performance was significantly related ($p < .05$) to an increased masculine self-concept, in that stereotypical masculine subjects performed better than feminine subjects (Coutts, 1987). This result seems to indicate that masculinity is related to performance, which ultimately relates to achievement and persistence.

Achievement. Previous research suggests that masculine characteristics, such as assertiveness, independence, competitiveness, and belief in one's own competence, influence achievement in educational settings (Keller, 1974; Long, 1989; Stein & Bailey, 1973; Stein, Pohly, & Mueller, 1971). Because these characteristics are valued and rewarded in educational settings, it is possible that these behaviors can predict student's success in educational environments. Early in childhood, boys and girls achieve at relatively the same level; though, as adults, female achievement levels have been found to be considerably lower than those of males (Stein & Bailey). During the college years and beyond, female underachievers outnumber male underachievers (Raph, Goldberg, & Passow, 1966). This may be due to the generalized sex role stereotype imposed on cultures that deem females as being less competent than males (Stein & Bailey). Females tend to place more importance on social relationships, while males tend to place their importance on individual achievement (Golombok & Fivush, 1994). However, girls with parents who reinforce and encourage achievement-related behavior, are more likely to have higher achievement and independence, which are stereotypically masculine traits (Stein & Bailey).

Achievement behavior can be defined as "the evaluation of performances against some standard of excellence" (Schaffer, 1981, p. 60). Achievement behaviors are traditionally found to be related to masculine characteristics (Broverman et al., 1972). Differences in gender roles are related to specific sex-role relevant behaviors and attitudes (Broverman et al.). Because masculine traits (e.g., independence, competitiveness, and self-confidence) are more socially

desirable than feminine traits (e.g., dependent, noncompetitive, and emotional), women may feel compelled to align themselves with these behaviors (Broverman et al.). Horner (1972) argued that this belief may stem from a societal belief that intellectual achievement contradicts femininity. Therefore, it is possible that women who reject the socially defined feminine sex role and adopt traditional masculine characteristics, are more likely to possess higher achievement than those who are confined to the traditional feminine sex-role. The differences between males and females may result in gender role differences in academic achievement (Golombok & Fivush, 1994)

In a sample of sixth grade students ($N = 96$), findings indicate that sex appropriate tasks influence achievement behavior among boys only (Stein et al., 1971). This can be attributed to the parental and societal pressure placed on boys to behave in a sex-appropriate manner (Stein et al.). However, females that had a high preference for the masculine sex role were found to be more persistent on masculine tasks than girls who had low masculine preferences (Stein et al.). This suggests that a girl's definition of the feminine sex role influences her achievement behavior: those who adopt a traditional feminine sex role have lower achievement than those who adopt a nontraditional feminine sex role (Stein et al.). This has been supported by others who have found a relationship between sex role attitudes or beliefs and achievement behavior (Alper, 1973; Peplau, 1976). In another study, Hock and Curry (1983) found a significant relationship between sex role identification and academic achievement among a sample of male and female adolescents ($N = 45$). A major conclusion was that masculine behavior benefits

both males and females in regard to achievement (Hock & Curry). Females who imitate their fathers will show higher levels of academic achievement (Hock & Curry). These findings support the contention that masculine characteristics are related to achievement in educational settings.

The relationship between gender roles and achievement-related variables was also examined by Eccles (1987), who examined the relationship between gender roles and women's achievement-related decisions. Although female enrollment in law, medicine, and business schools have dramatically increased, Eccles & Hoffman (1984) claim that women are still less likely to enter and complete advanced graduate programs. Eccles argued for the necessity of a model that explains women's educational and occupational choices and takes into account how gender role socialization affects these choices. The researcher developed a predictive model that asserts educational and occupational choices are most influenced by the value the person places on the choices as they deem appropriate, as well as the person's self-perceptions of attainable success at each of the choices (Eccles). Not only can gender role orientation influence achievement-related choices, it can also influence one's definition of successful performance and completion (Eccles). Success and completion have been used as measures of persistence in various studies on persistence in education.

Persistence. If gender role influences achievement-related choices, successful performance and completion, one might presume that it also influences persistence. Therefore, there is an apparent need to evaluate the relationship between gender roles and persistence in education settings. Results of empirical

studies suggest that the instrumental traits associated with masculinity are predictive of performance and achievement in education courses. It seems reasonable that a masculine student is more likely to be successful in an educational setting than a feminine student. The relationship between masculinity and achievement has been well established; thus it is reasonable to expect that masculine characteristics are related to persistence in educational settings.

Examining the relationship between sex role and persistence, Yanico and Hardin (1981) conducted a follow-up study on female college students majoring in either engineering (stereotypical masculine college major) or home-economics (stereotypical feminine college major). In this study, persistence was defined as those students still enrolled in their original major after 3 years. ANOVA results indicated that sex role was not significantly related to persistence in a traditional or a nontraditional college major. The researchers did find a slight trend that females with higher masculine characteristics may be more likely to persist in any type of curriculum; however, the reported statistics were not clear enough to support this claim (Yanico & Hardin). In another research study, gender role was examined in the distance education setting. Results suggested that the encouragement of androgyny in educational environments may be useful in developing self-sufficient learners in distance education (Magotra, 1996). Researchers contend that online students often lack the independence and time management skills needed to persist in distance education courses (Eisenberg & Dowsett, 1990; Erhman, 1990). Perhaps a self-sufficient learner, which is a masculine characteristic, may be more

persistent in distance education courses; however, currently there are no studies that examine this possible relationship.

Relationship Between Self-efficacy and Masculine Traits. Historically, stereotypical masculine traits, such as independence, competitiveness and self-confidence, have been linked to achievement in educational settings (Bandura, 1977b; Weiner, 1974). These characteristics have also been linked to self-efficacy, which posits that choice of activity, level of effort, persistence, learning, achievement, and resilience are all influenced by an individual's perceived self-efficacy (Bandura, 1977b; Pajares, 1996). Self-confidence in one's academic ability can ultimately influence academic success and achievement, in which both self-confidence and achievement are stereotypical masculine traits (Pajaras & Schunk, 2001). Hence, students with higher levels of self-efficacy are more likely to engage in achievement-type behaviors and persist in spite of any obstacles (Bandura's, 1977a). It is plausible to expect that students with high levels of academic achievement, which is related to persistence, will possess both high self-efficacy and identify with a masculine gender role.

One empirical study, in fact, reported that there was a significant relationship between gender roles and self-efficacy. Choi (2004), sought to determine the differences in gender roles in three levels of self-efficacy (i.e., general, academic, and course specific) among a sample of undergraduate students (*N* = 215) at a southeastern university. Various instruments were used to measure self-efficacy, while gender role orientation was measured using the Personal Attributes Questionnaire (PAQ), developed by Spence, Helmreich, and

Stapp (1974). Results of correlation coefficients revealed a statistically significant ($p < .01$) relationship between masculinity and the three levels of self-efficacy scores (Choi). The researcher also conducted a one-way MANOVA to determine sex role differences between the three types of self-efficacy. Results indicated a significant relationship between sex role orientation and self-efficacy (Wilk's λ = .68, $p < .01$). Other major findings include a strong association between masculinity and general and academic self-efficacy and a moderate relationship between femininity and general self-efficacy. The shared variance between general self-efficacy and masculinity was 32%, while only about 5% between general self-efficacy and femininity. The large amount of variance between masculinity and general self-efficacy suggests that masculinity is a stronger predictor of self-efficacy than femininity. Although self-efficacy is strongly associated with masculinity and femininity, there is a stronger association with masculinity when compared to a more global measure of self-efficacy (Choi).

Summary of Gender Roles and Persistence and Related Variables

The studies in this subsection evaluated the relationship among gender roles and performance, achievement, and persistence. Previous research suggests that masculine characteristics influence achievement-related behaviors (e.g., performance and persistence) in educational settings. Some major findings included: female students who adopt a traditional feminine sex role have lower achievement than those who adopt a nontraditional feminine sex role; masculine behavior benefits both males and females in regard to achievement; gender role orientation influences achievement-related choices, as well as one's definition of

successful performance and completion; females with higher masculine characteristics may be more likely to persist in any type of curriculum; and encouragement of androgyny in educational environments may be useful in developing self-sufficient learners in distance education.

Research studies argue that women and men are becoming more similar in their degree of masculinity, which indicates a shift toward androgyny (Twenge, 1997). From what we know about self-efficacy, one may suspect that those with more masculine or androgynous characteristics (e.g., self-confidence) would be more likely to persist in educational settings. Because there are currently no studies evaluating the relationship between gender roles and persistence, as measured as course completion, there is an apparent need to further analyze the relationship in the distance education setting.

Summary of Persistence and Demographic, Educational, and Personality
Variables

Lack of student persistence continues to be a major concern in both traditional and distance education programs. Understanding what factors are related to persistence in educational settings is extremely important to institutions that are trying to maintain and increase student enrollment. Identifying potential predictors of persistence encourages institutions and instructors to develop programs and courses accordingly. There are a number of conceptual models that have been used to explain student persistence in educational settings (Bean, 1980; Cabrera et al., 1993; Kember, 1989; Spady, 1971; Tinto, 1975 and 1987). These models use many of the same predictor variables when examining

persistence and can serve as theoretical frameworks in the selection of variables to examine in relation to persistence. Student persistence has been examined in relation to many variables, including demographic, educational, and personality variables.

Demographic variables, such as age and gender, have commonly been examined in relation to persistence. The majority of the reviewed studies reported a significant relationship between age and persistence with a trend that older students tend to significantly persist more than younger students (Dille & Mezack, 1991; Langenbach & Korhonen, 1988; Muse, 2003; Neuhauser, 2002). Regarding the relationship between gender and persistence, results are inconclusive. A little over half of the studies reviewed found a statistical significant relationship between these variables, in which results seem to indicate that females tend to be more persistent in the education environment (Feldman, 1993; Fenske et al., 2000; Leppel, 2002).

Educational variables are also often examined in relation to student persistence, with GPA commonly used as a predictor of persistence. Although there are mixed results regarding the relationship between GPA and persistence, the majority of the reviewed studies have found a significant difference in GPA between persisters and non-persisters in both traditional and distance education programs (Ammons, 1971; Cejda & Rewey, 1998; Dille & Mezack, 1991; Kahn & Nauta, 2001; Lufi et al., 2003; Muse, 2003). Additional examination of these variables will add to the existing literature, as well as help further explain the relationship between GPA and persistence in distance education settings.

Another educational variable is computer experience, as measured by the number of previous online courses taken or computer skills. Little research has been found that considered the relationship between computer experience and persistence in distance education courses. Results of reviewed studies do not support a significant relationship between persistence and the number of online courses previously taken (Houle, 2004; Muse, 2003; Parker, 1999). On the other hand, a couple of studies found that computer skills influence decisions to either enroll in (Richards & Ridley, 1997) or complete (Muse, 2003) an online course. Because there is little research that examines the relationship between these variables in distance education, further research is needed.

No research has been found that considers the relationship between personality variables (i.e., computer self-efficacy and gender roles) and persistence in distance education settings. Computer self-efficacy is a subconstruct of self-efficacy, which has been significantly related to variables commonly examined in educational settings, such as performance, achievement, and persistence (Brown et al., 1989; Hackett & Betz, 1989; Hackett et al., 1992; Jacobs et al., 1984; Lent et al. 1984; Multon et al., 1991; Wood & Locke, 1987). Because the empirical relationship between self-efficacy and persistence and persistence related variables has been well established, it is reasonable to expect a similar relationship would exist between these variables and computer self-efficacy. The potential relationship between persistence and computer self-efficacy can be explained by self-efficacy theory which argues that a person with high self-efficacy will engage in achievement-type behaviors by choosing difficult

tasks, persist at them longer in spite of any obstacles, and perform the tasks successfully (Bandura, 1977a, 1986). It is possible that students with high computer self-efficacy would be more persistent in completing a distance education course than students with low computer self-efficacy.

Another personality variable is gender role, which has been important to the explanation of various types of human behavior, such as persistence. Although there are currently no research studies examining the relationship between gender roles and persistence (measured as completion status) in distance education settings, other research studies have included gender role as a variable related to other measures of persistence, such as performance and achievement. Stereotypical masculine characteristics (e.g., self-confidence and independence) have historically been linked to achievement-related behaviors (e.g., performance and persistence) in educational settings (Bandura, 1977b; Weiner, 1974). From the research on gender roles and self-efficacy theory, it is reasonable to suspect that students with more masculine or androgynous characteristics (e.g., self-confidence) are more likely to persist in educational settings. Self-confidence in one's academic ability can ultimately affect academic success and achievement, which is directly related to persistence (Pajaras & Schunk, 2001). Therefore, there is an apparent need to examine the relationship between persistence and gender roles in future studies.

The overview of various conceptual models and research studies on persistence provide evidence that it is important to evaluate demographic, educational and personality variables in relation to student persistence in

distance education. Conceptual models have identified a number of variables that affect student persistence. Some common variables are age, gender, and academic performance. Because the relationships between these variables (i.e., age, gender, GPA, and computer experience) and persistence are not completely clear, additional research is needed. There are other variables, such as computer self-efficacy and gender roles, that have not been examined in relation to persistence (measured as completion status). Based on self-efficacy theory, both computer self-efficacy and gender roles are likely to be related to persistence. For that reason, it is imperative to examine these relationships as well. The primary purpose of this study is to determine the probability of completing an online course successfully, using age, gender, GPA, computer experience, computer self-efficacy, and gender role as predictor variables. The secondary purposes of this study are to establish any intercorrelations among the variables and to identify which set of variables (demographic, educational, or personality) are more important predictors of successful online course completion (i.e., persistence).

CHAPTER III

METHODOLOGY

This chapter describes the research design that was used in this study including the participants, the survey instruments, the research procedures, the data collection procedure, and the statistics that were used to analyze the data. The purpose of this chapter is to provide the reader with enough detail to replicate this study in other distance education environments.

Participants

The target population included students enrolled in distance education courses. The sample population consisted of undergraduate and graduate students enrolled in online courses at colleges and universities in the state of Kentucky during the 2005 Fall and 2006 Spring semesters. The four participating institutions were Bluegrass Community & Technical College, Murray State University, Sullivan University, and University of Louisville. Convenience sampling of participants was used and participation was voluntary. Due to the personal nature of the responses, every effort to maintain confidentiality and anonymity was followed in this study (Magalhaes & Scheil, 1997). In order to maintain confidentiality, data was only accessed by the researcher. Maintaining anonymity was accomplished by excluding any questions that revealed identifying information about students. Before data collection began, the researcher obtained approval from the University of Louisville's Human Subject

Committee, as well as complied with human subjects guidelines at each institution.

Guided by Dillman's (2000) online survey protocol, a prenotification email with an explanation of the research study was sent to distance learning coordinators at three of the participating institutions and directly to the online instructors at one university. The email requested that these individuals forward to potential participants. Three days after this email has been sent, the researcher sent an email containing the survey Weblink and a request for participation to the same contact persons, who were asked to forward the information to distance education students. In order to generate a larger response rate, a reminder email was sent to two of the institutions that had low response rates after the second email. Lastly, a thank you/reminder email was sent with an additional request to complete the survey if they have not already done so. This email was sent using the same distribution method as before. Throughout this study, the researcher did not have access to student email addresses or student identification numbers. Consequently, the researcher had to rely on contact persons to forward the Weblink to the appropriate population.

In order to obtain a large enough sample, the researcher targeted all undergraduate and graduate students enrolled in distance education courses during the Fall 2005 and Spring 2006 semesters. There were a total of 245 distance education courses being offered during these semesters at the participating institutions for a target population of 5,275 distance education students. For consistency purposes, only courses that were entirely online were

included in this study. Because the researcher did not have direct access to survey participants, an exact survey response rate could not be calculated. The inability to ascertain an exact response rate is a limitation reported in studies by Koresdoski (2002) and Mungania (2004). In both studies, the researchers relied on third parties to forward survey requests and Weblinks to the target population; therefore, estimates of response rates were made.

Before an estimated response rate could be calculated, it was necessary to estimate the number of instructors that would forward the Weblink to their students. In a similar study on student persistence in an online environment, Tello (2002) requested permission from 76 instructors to access their students, to which 74 out of the 76 instructors agreed to participate. In a related study, Satterfield (1999) examined academic persistence among college freshmen in a traditional environment. The researcher solicited instructors of 38 sections of a course, requesting access to their students; 35 of the 38 instructors granted access to their students. In the present study, because the researcher relied on third parties to forward the Weblink to online students, it was estimated that between 20 and 30% of the instructors would agree to forward the Weblink to their students. The researcher calculated that the possible sample would be between 980 and 1,480 students (49-74 courses x 20 students per course). Using an average response rate for Web surveys of 30%, it was estimated that approximately 294 and 444 students would complete the Web survey (Cook, Heath, & Thompson, 2000; Shannon & Bradshaw, 2002; Simsek & Veiga, 2001). The institutions, the number of distance education courses offered during the

semesters, and the average number of students in each course is presented in

Table 6.

Table 6

Targeted Sample

Institution	Number of distance education courses during semester	Average number of students per class	Total number of potential subjects
Bluegrass Community & Technical College	56	17	952
Murray State University	44	20	880
Sullivan University	91	22	2,002
University of Louisville	54	ranges	1,441
TOTALS	245	----	5,275

Instruments

The survey instrument consisted of three parts: demographic and

background questions, the Computer User Self-Efficacy (CUSE) Scale

developed by Cassidy and Eachus (2002), and the Personal Attributes

Questionnaire (PAQ) developed by Spence et al. (1974). The beginning of the

Web survey contained a consent form and instructions on how to complete the

Web survey. Students' willingness to participate was indicated by their

completion of the survey, which was explained in the consent form. The consent

form is presented in Appendix B, while the demographic survey, the CUSE Scale

and the PAQ are presented in Appendix C.

Demographic/Background Questions

The first part of the Web survey consisted of fifteen questions inquiring

about students' demographic and background characteristics. Based on their

importance as identified in the literature, four of the independent variables (i.e.,

age, gender, GPA, computer experience) were collected in this section. This

section also asked students questions regarding the last online course they had

taken, as well as to report the grade they received in that course. This self-report

item was used to measure persistence in this study.

Computer User Self-Efficacy (CUSE) Scale

Cassidy and Eachus (2002) contended that because self-efficacy is an

egocentric construct, it is imperative to measure it directly and, therefore, should

be measured using self-report scales. The researchers developed and validated

the CUSE Scale to measure general computer self-efficacy in a population of

adult students. Computer experience, computer training, familiarity with software

packages, and ownership of a computer are hypothesized to be related to an

increased computer self-efficacy (Cassidy & Eachus). This scale may be helpful

in identifying 'at risk' students who may have difficulty taking advantage of a

"learning environment that relies heavily on computer technologies" (Cassidy &

Eachus, p. 133).

Development of the CUSE Scale

A sample of experienced and inexperienced staff and computer users within the University Faculty of Health Care and Social Work Studies assisted in generating the 47-items on the instrument. The instrument required respondents to indicate their level of agreement or disagreement to statements, using a 6-point Likert scale (6 = *strongly agree*, 1 = *strongly disagree*). Some items that were included were "I find working with computers very easy", "I am very unsure of my abilities to use computers", and "I find working with computers very frustrating." The second part of the instrument consisted of items regarding the following related factors: computer experience, familiarity with software packages, computer training, and computer ownership.

Reliability and Validity of the CUSE Scale

In Phase One, Cassidy and Eachus (2002) performed the preliminary analysis on randomly sampled university students (*N* = 101) in various degree programs in the Faculty of Health at a university in Great Britain. The results indicated the instrument had the following acceptable psychometric properties: an alpha of .94 contributing to a high degree of internal consistency; and construct validity indicated by significant positive correlations between computer self-efficacy and computer experience (*r* = .55, *p* < .001), as well as between computer self-efficacy and familiarity with software packages (*r* = .53, *p* < .001). Through factor and item analyses on the original 45-item instrument, the researchers determined that the scale was unidimensional; therefore, the

researchers trimmed the scale down to 30-items without adversely affecting the instrument's psychometric properties (Cassidy & Eachus, 2002).

In Phase Two, the researchers assessed the psychometric properties of the 30-item scale and evaluated the relationship between self-efficacy and computer experience, usage of software packages, computer training, computer ownership, and gender (Cassidy & Eachus, 2002). The sample ($N = 212$) consisted of university students: four groups of students from the Faculties of Health and Computing and a group outside of the University asked to complete the instrument via the Internet. The major results were as follows: high internal consistency (*coefficient alpha* = .97, $N = 184$); test-retest reliability ($r = .86$, $N = 74$, $p < .0005$); acceptable levels of construct validity with significant correlations between computer self-efficacy scores and computer experience ($r = .79$, $p < .0005$, $N = 212$) and familiarity with software packages ($r = .75$, $p < .0005$, $N = 210$); and criterion validity. The researchers concluded the CUSE Scale is a reliable and valid measure of computer self-efficacy.

Although the CUSE Scale was available to the public via the Web in 1996, it was not published until 2002; hence, this is a relatively new instrument. The instrument has been popular among doctoral dissertations examining computer self-efficacy and related topics (Christian, 2000; Mungania, 2004; Pennington, 2003). For example, Christian used the 30-item CUSE Scale to assess the effect of training on computer self-efficacy among a sample of undergraduate students at historically Black colleges and universities ($N = 91$). The researcher performed a factor analysis to determine if the 30 items on the CUSE could be grouped as

dimensions of computer self-efficacy. The results indicated a three-factor solution, consisting of competence, confidence, and learning. Through further examination of the psychometric properties of the CUSE Scale, results indicated that the instrument possesses a high level of internal consistency (*Cronbach's alpha* = .93, N = 160) and a statistically significant test-retest reliability (r = .84, N = 53, p < .001). The 30-item CUSE Scale was also utilized in a study by Pennington, who examined the relationship between group cohesion and students' perceived self-efficacy when using computers among a sample of online college students (N = 27). However, the researcher failed to report validity or reliability measures. Lastly, Mungania used a modified version of the CUSE Scale in a study that examined the perceptions of barriers in E-learning among a sample (N = 865) of employees at organizations that have implemented E-learning. Because the focus of the study was on E-learning, the researcher used a portion of the CUSE items to develop an instrument appropriate for her study.

Other researchers have used modified versions of the CUSE Scale, such as Lim (2001) who examined computer self-efficacy as a predictor of satisfaction among distance education students (N = 235); however, the researcher failed to report the reliability and validity of the instrument. A study by Galpin, Sanders, Turner, and Venter (2003) examined computer self-efficacy among a sample of first-year Computer Science university students (N = 77) and a sample of 15 to 16-year old students (N = 125). A slightly modified version of the CUSE Scale (24 of the 30 items), which yielded a high degree of internal consistency (*Cronbach's alpha* = .86), was used to measure computer self-efficacy among the 15 to 16-

year old students. Computer self-efficacy among university students was measured using scores from the 30-item CUSE Scale. A examination of the psychometric properties revealed that the instrument possesses a high level of internal consistency (*Cronbach's alpha* = .93), which was consistent with that reported by Cassidy and Eachus (2002). The psychometric properties found by each of the studies are presented in Table 7.

Table 7

Psychometric Properties of the CUSE Scale

Study	Instrument Used	Reliability and Validity
Cassidy & Eachus (2002)	CUSE Scale	• High internal consistency (*coefficient alpha* = .97, *N* = 184) • Test-retest reliability (*r* = .86, *N* = 74, *p* < .0005) • Acceptable levels of construct validity
Christian (2000)	CUSE Scale	• Demonstrated construct validity • High level of internal consistency (*Cronbach's alpha* = .93, *N* = 160) • Statistically significant test-retest reliability (*r* = .84, *N* = 53, *p* < .001).
Galpin, Sanders, Turner, & Venter (2003)	▪ A modified version of the CUSE Scale ▪ CUSE Scale	24-item modified version: • High degree of internal consistency (*Cronbach's alpha* = .86, *N* = 125). 30-item CUSE Scale • High degree of internal consistency (*Cronbach's alpha* = .93, *N* = 77).
Lim (2001)	A modified version of the CUSE Scale	Not reported
Mungania (2004)	A modified version of the CUSE Scale	Because items from the original scale were used along with other items to form an E-learning instrument, reliability and validity would not be meaningful.
Pennington (2003)	CUSE Scale	Not reported

Personal Attributes Questionnaire

The PAQ is a self-report measure that requires subjects to rate themselves and rate stereotypical characteristics as either male or female (Choi & Jenkins, 2000; Spence et al., 1974). The first section of the PAQ uses a five-point Likert-type scale for students to rate themselves on 55 bipolar items, which were derived from the Sex Role Stereotype Questionnaire (SRSQ) developed by Rosenkrantz, Vogel, Bee, Broverman, and Broverman (1968). The second section of the PAQ asks respondents to compare stereotypical attributes between males and females, using the same scale they used to rate themselves. These attributes include: (a) male valued attributes such as independence, active, outgoing, and self-confidence; (b) female valued attributes such as emotional, tactful, gentle, and understanding; and (c) sex specific attributes such as aggressive (male), loud (male), needs approval (female), and religious (female). The comparison ratings also use a five-point Likert-type scale with one endpoint labeled as "Much more characteristic of the male," the midpoint labeled as "Equally characteristic of both sexes, and the other endpoint labeled as "Much more characteristic of the female" (Spence et al.).

Development of the PAQ

The Short Version of the PAQ. A short-form of the PAQ exists, which consists of 24 items. The short-form PAQ yields the following three subscales: the Masculine (M) subscale, which consists of self-assertive and instrumental characteristics; the Feminine (F) subscale, which consists of interpersonally-oriented expressive characteristics; and the Masculine-Feminine (M-F) subscale,

which reflects characteristics from both the M and F subscales (Choi & Jenkins, 2000). Each subscale consists of 8 items. The correlation between the short form of the PAQ and the original PAQ was .92 (Spence et al., 1974). Spence (1986) purports the short-form PAQ as being "conceptually purer" than the original PAQ.

Reliability and Validity of the PAQ. Spence (1991) contends that the PAQ is a valid measure of "desirable instrumental and expressive traits" in regard to self-esteem, sex-role attitudes, and gender-schematic processing (p. 141). The PAQ has been found to possess adequate internal consistency and test-retest reliability (Spence & Helmreich, 1978). Analysis of the M, F, and M-F subscales yields reliability coefficients of .85, .82 and .78, respectively (Spence, 1986). This was consistent in a study by Wilson and Cook (1984) who reported reliability coefficients of .80 for both the M and F scale. In another study using a sample of undergraduate students (*N* = 651), Choi & Jenkins (2000) reported lower coefficient alphas for the M, F, and M-F subscales: .77, .77, and .53, respectively. In all studies, the M and F scales are toward the high range (i.e., above .70), which suggests the items of each scale are consistently measuring the same construct; therefore, these scales are deemed to be fairly reliable (Vogt, 1999).

Procedures

Sample Size Estimates

In determining an adequate sample size for this study, three estimates of sample size were used. For logistic regression and hierarchical logistic regression, estimates were calculated using α = .01, α = .05, power = .80, power

= .90, and an estimated R^2 = .10, which was averaged from other studies on persistence (Fjortoft, 1996; Kember et al., 1991; Muse, 2003). According to this method, an adequate sample size for this study would be between 130 and 216 (Cohen, Cohen, West, & Aiken, 2003). The estimated sample sizes with respective alpha levels, power, and the formulas and used are outlined in Table 8.

Table 8

Estimated sample sizes using Cohen, Cohen, West, & Aiken (2003)

	Power = .80	Power = .90	Formulas Used
$\alpha = .01$	177	216	Power = .80 $n^* = \dfrac{18.87}{.111} + 6{+}1 = 177$ Power = .90 $n^* = \dfrac{23.18}{.111} + 6{+}1 = 215.83$
$\alpha = .05$	130	164	Power = .80 $n^* = \dfrac{13.62}{.111} + 6{+}1 = 129.70$ Power = .90 $n^* = \dfrac{17.42}{.111} + 6{+}1 = 163.94$

Figure 2

Formulas used to calculate estimated sample sizes in Table 6.

$$f^2 = \frac{R^2}{1 - R^2} = \frac{.10}{.90} = .111 \qquad n^* = \frac{L}{f^2} + k + 1$$

Using an online sample size calculator also gave an estimate of adequate sample size. Raosoft's online sample size calculator yielded a recommended sample size of 385 (available: http://www.raosoft.com/samplesize.html). This estimate was calculated using a 5% sampling error, 95% confidence level, a response distribution of 50%, and a population size of 2.6 million, which is the estimated number of online students in the US during the year of 2004 (available: http://www.aln.org/resources/survey.asp). The sample size does not vary much for populations larger than 20,000 (available: http://www.raosoft.com/samplesize.html); therefore, the estimated population size was sufficient. The online calculator's estimate for adequate sample size was consistent with the table found in Dillman's (2000) *Mail and Internet Surveys*, which yielded a sample size of 384 with a 95% confidence level. The formula for calculating this estimate is shown in Figure 3.

Figure 3

Formula for Sample Size Estimate (Dillman, 2000, p. 207)

$$Ns = \frac{(Np)\ (p)\ (1-p)}{(Np-1)\ (B/C)^2 + (p)\ (1-p)}$$

Ns = completed sample size needed for desired level of precision
Np= size of population
p = proportion of population expected to choose one of the two response categories
B = acceptable amount of sampling error; .05 = ± 5% of the true population value
C = Z statistic associated with the confidence level; 1.96 corresponds to the 95% level

For exploratory factor analysis, the recommended ratio between the number of participants per survey item have ranged from 5:1 to 15:1 (Gorusch, 1983; Hatcher, 1994; Nunnally 1978; Stevens; 2002). Because the CUSE Scale contains 30 items, an adequate sample size would be between 150 and 450. Web surveys usually yield a lower response rate than traditionally mail surveys, with response rates ranging between 7 to 76% (Simsek & Veiga, 2001). Using an average response rate for Web surveys and adequate sample sizes, this study targeted a sample large enough to yield at least a 30% response rate by targeting between 980 and 1,480 distance education students.

Survey Method

Before any data were collected, the proposal for this study was submitted to the University of Louisville's Human Subjects Committee for review and approval. Appendix A contains the letter requesting expedited review, which was submitted with the application material to the Human Subjects Committee. In addition, approval to conduct the study at the other institutions was also obtained prior to data collection.

The method used to collect data in this study was a self-administered Web-based survey. This Web-based survey was developed using Zoomerang™, an online survey software. Electronic surveys, including Web-based surveys and email surveys, have gained a lot of attention over the past decade. There are many benefits to using Web-based surveys, such as reduced cost, ability to target a larger population, and Web surveys are likely to have fewer missing values (Shannon et al., 2002). In addition, survey participants are more likely to

respond to a Web-based survey, if all they have to do is click on the provided Weblink (Shannon et al.). However, Web-based surveys are not free from limitations. One major concern is that the participants may not be familiar with the technology (Babbie, 1998; Dillman, 2000). Because the population of interest is students enrolled in distance education courses, it is assumed that survey participants will already have knowledge and experience using computers and the Internet. Because of the population of interest in this study, a Web-based survey is more advantageous than a traditional mail survey.

Dillman (2000) recommends contacting the targeted survey participants five times to ensure a high response rate. It is recommended to use the first three contacts and follow up with the last two contacts if the desired response rate is not achieved (Dillman). Because of the design of this study, making five contacts was not feasible. However, the first three contacts were attempted at two institutions, while four contacts were made at the other two institutions. The first recommended contact is a pre-notice. Sending pre-notification to survey recipients has been found to influence response rates (Dillman; Shannon et al., 2002). Because the researcher in this study did not have direct access to students, a pre-notification email was sent to the contacts at the participating institutions and forwarded to online students. The second recommended contact was sent three days after the pre-notification email (Dillman). This email, which was sent out in the same fashion, was linked to the Web-based survey, in which the students were instructed to click on the Weblink to access the survey (Simsek & Veiga, 2001). Lastly, it is recommended to thank the participant and

ask them to complete the survey, if they have not already done so (Dillman). Using the same distribution method, a thank you/reminder email containing the Weblink was sent out. This last contact was performed to help generate a larger response rate.

Design of the Study

The primary purpose of this nonexperimental, correlational study was to identify which factors predict persistence among a sample of distance education students. Consequently, the dependent variable, persistence (i.e., successful completion of a course), was examined in relation to six predictor variables: age, gender, GPA, computer experience, computer self-efficacy, and gender role. This study also sought to determine which blocks of variables (i.e., demographic, educational, and personality) predict student persistence. The secondary purpose of this study was to examine the factorial validity of the CUSE Scale, developed by Cassidy and Eachus (2002).

A survey instrument, which consisted of three sections, was used to collect data in this study. The first section consisted of 15 demographic/ background questions, which included age, gender, GPA, computer experience, and last course grade received for an online course. The second section contained the CUSE Scale and the third section contained the PAQ, both of which use Likert-type scaled questions to generate responses. A copy of the entire survey instrument can be found in Appendix C.

Independent and Dependent Variables

This subsection lists the variables that were examined in this study, as well as how the variable was measured. The independent variables included:

1. Demographic variables:
   a. Age: Interval variable.
   b. Gender: Nominal variable.
2. Educational variables:
   a. GPA: Interval variable that was measured using a traditional 4.0 scale.
   b. Computer experience: Ordinal variable that was operationalized as number of previous online courses previously taken and a perceived level of computer experience.
3. Personality variables:
   a. Computer self-efficacy: Interval variable that was operationalized as the score from the CUSE Scale.
   b. Gender role: Nominal variable that was dummy-coded. This variable was operationalized using the score from the PAQ to determine a preferred gender role of masculine, feminine, androgynous, or undifferentiated.

The dependent variable in this study was persistence, measured as successful completion of a distance education course. Successful completion is measured as passing course grade, as determined by the college or university.

All of the variables, as well as the corresponding coding, are presented in Table

9.

Table 9

Coding for Variables

Variable Name	Coding
Age	1 = 22 and under 2 = 23-30 3 = 31-40 4 = 41-50 5 = 51 and over
Gender	1 = female 2 = male
Computer Experience (number of online courses previously taken)	0 = none 1 = 1 online course 2 = 2-3 online courses 3 = 4 or more online courses
Computer Experience (perceived level of computer experience)	0 = none 1 = very limited 2 = some experience 3 = quite a lot 4 = extensive
Gender Role	1 = Masculine 2 = Feminine 3 = Androgynous 4 = Undifferentiated
Persistence	0 = non-persistence (failing grade/withdrawal) 1 = persistence (passing grade)

Statistical Analysis

The data was analyzed using the Statistical Package for Social Sciences

(SPSS), version 13.0. Both descriptive and inferential statistics were used. The

descriptive statistics that were used include means, frequencies, modes,

medians, and standard deviations. Inferential statistics were analyzed against an

alpha level of .05, which is commonly used in educational studies (Glanz, 1998). In addition, correlation coefficients among independent variables and internal consistency of each instrument were obtained. Four research questions were analyzed using the following statistical techniques.

1. What are the intercorrelations among the research variables (age, gender, GPA, computer experience, computer self-efficacy, gender role, and persistence)?

   Pearson product-moment correlation coefficients (Pearson r) were used to examine the correlations between the variables (Vogt, 1999). Coefficients of determinations (r^2) were used to determine the proportion of variance that is shared between the dependent variable and each of the independent variables (Vogt).

2. Using age, gender, GPA, computer experience, computer self-efficacy, and gender role as predictor variables, what is the probability of completing an online course successfully?

   Logistic regression was used to analyze to what extent the predictor variables predict the probability of the dependent variable, persistence. The purpose of this technique was to analyze the relationships between the predictor variables to a dependent variable, as well as determine the extent to which each variable predicts whether a student will belong to one group versus another group (Huck, 2004; Sweet & Grace-Martin, 2003). Logistic regression is a viable statistical technique for examining the influence of predictor variables, which can be categorical or continuous, on a dichotomous

dependent variable (Huck, 2004; Sweet & Grace-Martin). That is, a student cannot be classified as persistent and non-persistent at the same time. In this study, persistence was coded as 1 and non-persistence was coded as 0 (Menard, 2002). By dummy coding the dependent variable, persistence, values can be interpreted as probabilities (Pampel, 2000). The logistic regression model used in this study is shown in Figure 4 (Field, 2000).

Figure 4

Logistic Regression Model

$P(Y) = \dfrac{1}{1 + e^{-Z}}$

$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon_i$

$P(Y)$ = probability of Y occurring
e = base of the natural logarithms (≈ 2.718)
β_0 = Constant
$\beta_1 \ldots \beta_6$ = Logistic regression coefficients (attached to that predictor)
$X_1 \ldots X_6$ = Predictor variables (age, gender, GPA, computer experience, computer self-efficacy, gender roles)

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3. After controlling for the demographic and personality variables, to what degree do the educational variables predict persistence?

Based on theory and empirical research, hierarchical logistic regression was used to test the theoretical model of student persistence in distance education courses. This statistical procedure was employed to determine how much variance in the dependent variable, persistence, can be explained by a set of independent variables (Sweet & Grace-Martin, 2003). The researcher determined the order of entry of the variables (i.e., blocks) into the equation,

guided by theory and research. In this study, the first block consisted of the demographic (i.e., age and gender), the second block consisted of personality variables (i.e., computer self-efficacy and gender role), and the third block consisted of the educational variables (i.e., GPA and computer experience).

After the demographic and personality variables (i.e., control variables) were entered, the research variables were entered into the equation to determine their respective unique contributions to student persistence in distance education courses (Huck, 2004). Results were used to evaluate the tenability of the theoretical model. Empirical support for the model may guide future persistence theory and research, as well as assist college administrators and admission advisors in screening students who are likely to be either successful or unsuccessful in a distance education environment.

4. What is the factor structure of the scores obtained from the Computer User Self-Efficacy (CUSE) Scale?

The factor structure of the CUSE Scale was examined using exploratory factor analysis (EFA). EFA is commonly used to "identify the factor structure or model for a set of variables" (Stevens, 2002, p. 411). In addition, this technique can be used to determine the number of factors and the pattern of the factor loadings (Stevens). There is a weak literature base regarding the use of the CUSE Scale; therefore, further research is necessary to assess the predictive validity of the CUSE Scale (Cassidy and Eachus, 2002; Stevens). EFA was used to provide evidence of the computer self-efficacy construct and theoretical validity of the latent constructs (e.g., computer experience,

familiarity with software packages, computer training, and computer ownership) as hypothesized in the study (Stevens).

Conclusion

The purpose of this study was to examine predictors of student persistence in a distance education environment. This chapter outlined the research methods and procedures that were used to collect and analyze data in this research study. Participants, instruments, data collection procedures, and statistical techniques were reviewed. This study addressed the following four research questions: (a) What are the intercorrelations among the research variables (i.e., age, gender, GPA, computer experience, computer self-efficacy, gender role, and persistence)?; (b) Using age, gender, GPA, computer experience, computer self-efficacy, and gender role as predictor variables, what is the probability of completing an online course successfully?; (c) After controlling for the demographic and personality variables, to what degree do the educational variables predict persistence?; and (d) What is the factor structure of the scored obtained from the Computer User Self-Efficacy (CUSE) Scale? The results of this study are presented in Chapter Four.

CHAPTER IV

RESULTS

The purpose of this exploratory study was to examine relationships among research variables, determine the predictive value of variables and blocks of variables on persistence, and examine the factor structure of the CUSE Scale (measure of computer self-efficacy). This chapter presents the results of statistical analyses performed on the data obtained from a Web-based survey that targeted students currently enrolled in distance education courses. The survey contained three sections: (a) demographic and background questions; (b) the Computer User-Self-Efficacy (CUSE) Scale developed by Cassidy and Eachus (2002); and (c) the Personal Attributes Questionnaire (PAQ) developed by Spence, et al. (1974). The chapter reviews the overall survey response rate, presents results of reliability analyses on the survey instruments, as well as provides an overview of the demographic and background characteristics of the sample. In addition, the analyses of the study's main findings are reviewed based on the research questions which guided this study. The research questions were:

1. What are the intercorrelations among the research variables (age, gender, GPA, computer experience, computer self-efficacy, gender role, and persistence)?

2. Using age, gender, GPA, computer experience, computer self-efficacy, and gender role as predictor variables, what is the probability of completing an online course successfully?

3. After controlling for the demographic and personality variables, to what degree do the educational variables predict persistence?

4. What is the factor structure of the scores obtained from the Computer User Self-Efficacy (CUSE) Scale?

The researcher used the Statistical Package for Social Sciences (SPSS), version 13.0, to analyze the data. Both descriptive and inferential statistics were used to analyze the data collected from the Web-based survey. Demographic and background characteristics were analyzed using descriptive statistics, such as frequencies, percentages, means, and standard deviations. Inferential statistical procedures (e.g., Pearson product-moment correlation coefficients, logistic regression, hierarchical logistic regression, and exploratory factor analysis) were utilized to answer the research questions, as well as to further investigate the relationships between the research variables.

Email Distribution and Response Rate

The research study was conducted at the following four colleges in the state of Kentucky: Bluegrass Community and Technical College, Murray State University, Sullivan University, and the University of Louisville. At three of these institutions, emails were sent to contact persons who then forwarded the emails to online instructors. At one institution, the researcher emailed the survey invitations directly to the online instructors. Table 10 outlines the dates of which

the pre-notification, survey request, and reminder emails were sent. Copies of

the actual emails sent are presented in Appendix D.

Table 10

Dates of Email Distribution

	Bluegrass Community & Technical College	Murray State University	Sullivan University	University of Louisville
Prenotice Date	11/14/05	11/9/05	11/8/05	1/9/06
Request/Weblink	11/27/05	11/14/05	11/11/05	1/12/06
1st Reminder	N/A	11/22/05	12/1/05	N/A
2nd Reminder/Thank You	12/7/05	12/2/05	12/7/05	1/19/06

A total of 293 online students completed the survey: 19 from Bluegrass

Community and Technical College, 72 from Murray State University, 91 from

Sullivan University, and 108 from the University of Louisville. The researcher did

not have direct access to the sample population, thus making it impossible to

calculate an exact survey response rate. Therefore, estimated response rates

were calculated for each of the institutions using the potential and actual number

of respondents. In addition, the estimated overall response rate for the research

study was about 6%. This response rate was consistent with a study by Simsek

and Veiga (2001), who reported a wide range of response rates from 7 to 76%.

The number of online classes, number of potential subjects, actual number of

responses, and response rates for each institution are presented in Table 11.

Table 11

School Response Rates

	Bluegrass Community & Technical College	Murray State University	Sullivan University	University of Louisville	Totals
Distance Education Courses for Semester	56	44	91	54	245
Number of Potential Subjects	952	880	2,002	1,441	5,275
Number of Responses	19	72	94	108	293
Overall Response Rate	2.0%	8.2%	4.7%	7.5%	5.6%

Instrument Reliability and Validity

Reliability analyses were performed on the items of the CUSE Scale (Cassidy & Eachus, 2002) and the PAQ (Spence et al., 1974). Cronbach's alpha was used to measure the internal consistency of the survey instruments. The results indicated good scale reliability for both instruments (Henson, 2001). The 30-item CUSE yielded a Cronbach's alpha of .95, which indicates high reliability. The 24-item PAQ consists of three subscales consisting of eight items each: the Masculine (M) subscale; the Feminine (F) subscale; and the Masculine-Feminine (M-F) subscale, which reflects characteristics from both the M and F subscales (Choi & Jenkins, 2000). The Cronbach's alpha for these scales were .81, .80, and .39, respectively. The M and F subscale alphas are toward the high range (i.e., above .70), which suggests the items of these scales are consistently

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measuring the same construct and therefore, deemed to be fairly reliable (Vogt, 1999). Gender role is determined by the masculine score on the M subscale and the feminine score on the F subscale. The items contained in the M-F subscale are not used to measure one's perceived gender role (i.e., masculine, feminine, androgynous, and undifferentiated); therefore, the low reliability of this subscale is not disconcerting.

Additionally, the researcher performed an exploratory factor analysis (EFA) with varimax rotation on the PAQ (Spence et al., 1974) to further examine the construct validity of the instrument. Principal component analysis (PCA) was the extraction method used to determine the initial eigenvalues and percentage of variance for which each factor is accounted. Results of the Bartlett's test of sphericity had an approximate Chi-square of 2337.89 and was statistically significant ($p = .00$). The value of the Kaiser-Meyer-Olkin (KMO) Measure of Sampling was .85, which is greater than the criterion for acceptable sampling adequacy of .60 (Stevens, 2002). These results indicate that factor analysis is appropriate for this data (Field, 2000; Stevens). Because the PAQ consists of three subscales (i.e., M, F, and M-F), three factors were extracted (Spence et al.). The subsequent eigenvalues and scree plot support the decision to extract three factors (Cattell, 1965; Stevens, 2002).

The three factors accounted for 46.88% of the variance in the PAQ. The first factor accounted for 17.68% of the variance and consisted of 10 factor loadings, in which eight items were consistent with items on the M scale. The second factor accounted for 15.31% of the variance and yielded seven factor

loadings, which are all items contained on the F subscale. The third factor, accounting for 13.88% of the variance, consisted of six factor loadings: five items from the M-F subscale and one item from the F subscale. In addition, item 11 failed to load on any of the factors. The cross-loading of items on the factors indicate that the subscales may be conceptually ambiguous. This may be due to the large percentage of females included in the sample. Nevertheless, these results suggest that further refinement of the PAQ may be needed. Table 12 reports the values of initial eigenvalues and rotation sums of squared loadings. The PAQ items and their respective factor loadings obtained with varimax rotation with Kaiser normalization and the correlation matrix is located in Appendices E and F.

Table 12

Components of Personal Attributes Questionnaire (PAQ) with Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.35	22.28	22.28	4.24	17.68	17.68
2	3.83	15.98	38.26	3.68	15.31	33.00
3	2.07	8.62	46.88	3.33	13.88	46.88

Extraction Method: Principal Component Analysis; Varimax Rotation

Note: N = 289 – 292

Demographic and Background Characteristics

The researcher targeted 5,275 distance education students at the four institutions; however, because of the data collection method, it was impossible to determine how many instructors forwarded the email requests onto their online students. The inability to determine an exact response rate is a limitation reported in studies by Koresdoski (2002) and Mungania (2004). Because both of these researchers relied on third parties to forward survey requests to their target populations, they reported estimated response rates. The present study also estimated the response rate using the total number of potential subjects and the actual number of survey respondents ($N = 293$). This subsection provides a description of the demographic and background characteristics of the sample. Various descriptive statistics were used to analyze the data, including frequencies, percentages, means, and standard deviations for each of the variables measured.

Demographic Variables

Twenty-five percent of the survey respondents were 22 years of age or younger ($n = 74$), while 20% were over the age of 40 ($n = 60$). The majority of the respondents, over 54%, fell into either the 23-30 age range ($n = 89$) or the 31-40 age range ($n = 69$). The mean age of the respondents was 30.79. Seventy-seven percent of the sample were female ($n = 226$) and 23% were male ($n = 67$). The demographic variables are illustrated in Table 13.

Table 13

Summary of Demographic Variables

Characteristics	Frequency	Percentage
Age (years)		
≤ 22	74	25.34
23-30	89	30.48
31-40	69	23.63
41-50	47	16.10
≥ 51	13	4.45
Total	292	100
Gender		
Female	226	77.13
Male	67	22.87
Total	293	100

Educational Variables

Forty-nine percent of respondents reported a GPA of 3.5 or greater ($n =$ 132). About 27% reported a GPA between 3.0 and 3.4 ($n = 72$), 17% reported having a GPA between 2.5 and 2.9 ($n = 46$), and nearly 7% reported a GPA of less than 2.5 ($n = 18$). The mean GPA of the respondents was 3.31, with a standard deviation of .60.

Computer experience was operationalized two different ways. First, respondents were asked to report the number of online courses they had previously taken. Interestingly, almost 55% of the students reported that they had not taken an online class before ($n = 149$). Five percent had taken one online course ($n = 14$), 12% had taken between two and three online courses ($n = 33$), and almost 28% had taken over four online courses ($n = 76$). Secondly, computer

experience was also measured as the students' perceived level of computer experience. Respondents were asked to rate their level of computer experience as either "none", "very limited", "some experience", "quite a lot", and "extensive." The majority of respondents had either some or quite a lot of computer experience. Almost 62% reported having quite a lot of computer experience ($n =$ 180), 35% reported some experience ($n = 102$), and only 3% reported very limited computer experience ($n = 10$). The educational variables (i.e., GPA and computer experience) are reported in Table 14.

Personality Variables

The two personality variables of interest in this study were computer self-efficacy ($M = 148.71$, $SD = 21.27$) and gender role. Fifty-five percent of the respondents had high computer self-efficacy ($n = 161$), while about 45% had low computer self-efficacy ($n = 131$). These categories were determined using the mean sample score of 148.71. For gender role, respondents were classified as masculine, feminine, androgynous, or undifferentiated, as determined by their masculine and feminine subscale scores on the PAQ (Spence et al., 1974). Results indicated that 44% had a feminine gender role ($n = 129$), 30% were androgynous ($n = 88$), 15% were undifferentiated ($n = 44$), and almost 11% had a masculine gender role ($n = 31$). The gender role percentages were similar to that found by Ametrano and Pappas (1996) who examined gender role among a sample of graduate students training to become counselors; however, the researchers used the extended 40-item PAQ instead of the short-form PAQ. The summary of personality variables for this study is presented in Table 15.

Table 14

Summary of Educational Variables

Characteristics	Frequency	Percentage
GPA		
1.9 or less	3	1.12
2.0 – 2.4	15	5.60
2.5 – 2.9	46	17.16
3.0 – 3.4	72	26.87
3.4 – 4.0	132	49.25
Total	268	100
Computer Experience (Number of Online Courses Previously Taken)		
None	149	54.78
1 course	14	5.15
2-3 courses	33	12.13
4 or more courses	76	27.94
Total	272	100
Computer Experience (Perceived Level of Computer Experience)		
None	0	0
Very Limited	10	3.43
Some Experience	102	34.93
Quite A Lot	180	61.64
Extensive	0	0
Total	292	100

Table 15

Summary of Personality Variables

Characteristics	Frequency	Percentage
Computer Self-Efficacy		
Low CSE (less than 149)	131	44.86
High CSE (149 or greater)	161	55.14
Total	292	100
Gender Role		
Masculine	31	10.61
Feminine	129	44.18
Androgynous	88	30.14
Undifferentiated	44	15.07
Total	292	100

Persistence

Persistence was operationalized as successful completion of the student's last online course. Out of the overall sample (N = 293), 177 of the online students reported that they had taken an online course prior to the current semester. One of the items on the Web-based survey asked respondents to report on their last online course in which they received a grade. Of those who had previously taken an online course (n = 177), nearly 55% had received an "A" in their last online course (n = 97), 31% reported a "B" (n = 55), and 14% reported a "C" or lower or withdrew from the course (n = 25). Consistent with previous studies, this grade information was then used to classify the student as a persister or a non-persister (Dille & Mezack, 1991; Houle, 2004; Parker, 1999; Richards & Ridley, 1997). Persisters were defined as students who completed the course with a "C" or

better for undergraduate students and "B" or better for graduate students. Non-persisters either had a lower course grade or withdrew from the online course. From the data collected, 94% of the respondents were classified as persisters (n = 167) and 6% were classified as non-persisters (n = 10). The total number of persisters and non-persisters are shown in Table 16.

Table 16

Summary of Undergraduate and Graduate Persistence in Distance Education

Characteristics	Persisters		Non-Persisters		N
	Frequency	Percentage	Frequency	Percentage	
Undergraduate	133	95.42	6	4.58	139
Graduate	34	89.47	4	10.53	38
n	167	---	10	---	177

Other Background Characteristics

Additional background information was collected during the Web-based survey. These survey questions inquired about degree type, current number of credit hours, number of computer packages used, accessibility to a computer when not at work or school, completion of a computer training course, and computer ownership.

Almost 66% percent of the respondents were pursuing a Bachelor's degree (n = 192), 10% were pursuing an Associate's (n = 30), 19% were pursuing a Master's (n = 56), and 5% indicated "other" or "not pursuing a degree" (n = 15). Almost 27% of students reported 25 or less credit hours (n = 74), 19%

reported between 26-50 credit hours ($n = 54$), 15% reported 51-75 credit hours ($n = 40$), 18% reported 76-100 credit hours ($n = 49$), almost 13% reported 101-125 credit hours ($n = 35$), and nearly 10% reported over 126 credit hours ($n = 26$). The mean of students' reported credit hours was 65, with a standard deviation of 49.36. The frequencies and percentages for degree type and number of credit hours are presented in Appendix G.

One item on the Web-based survey asked respondents if they had used a number of computer packages, including wordprocessing packages (e.g., Microsoft Word, Wordperfect), spreadsheets (e.g., Excel), databases (e.g., Access), presentation packages (e.g., PowerPoint, Harvard Graphics, Coreldraw), Statistics packages (e.g., SPSS), desktop publishing, and multimedia (e.g., Macromedia Flash, Dreamweaver, Authorware). Nearly 24% respondents reported having used 3 or less of the computer packages ($n = 69$), 53% reported having used 4 or 5 packages ($n = 155$), and 23% reported having used 6 or 7 packages ($n = 68$). This finding is consistent with the study by Cassidy and Eachus (2002) whose sample ($N = 212$) reported an average number of computer packages used as 4.5. Furthermore, these findings are consistent with previous studies that found that college students have substantial prior computer experience and familiarity with computer packages (Sherry & Sherry, 1997; Sherry & Sherry, 2000; Taylor & Mounfield, 1994). The frequencies and percentages for number of computer packages used are illustrated in Table 17.

Table 17

Other Background Characteristics: Number of Computer Packages Used

Characteristics	Frequency	Percentage
Number of Computer Packages Used		
3 or less	69	23.63
4 or 5	155	53.08
6 or 7	68	23.29
Total	292	100

The Web-based survey also included three yes/no questions regarding computer access, computer training, and computer ownership. Almost 98% of respondents reported having access to a computer when not at work or school (n = 285), while just 2% reported otherwise (n = 6). Nearly 56% of the students reported that they had taken a computer training course in the past (n = 163), while 44% of the students had not (n = 129). For computer ownership, 97% reported that they owned a computer (n = 282), while only 3% reported that they did not (n = 10). These findings were consistent with previous research that found approximately 50% of their samples had previously taken a computer training course (Cassidy & Eachus, 2002; Mungania, 2004; Taylor & Mounfield, 1994) and 88% reported owning a computer (Mungania). The frequencies and percentages for computer ownership, computer training, and computer ownership are reported in Appendix H.

Section Summary

This section presented the demographic and background characteristics of the survey respondents. Frequencies, percentages, means, and standard deviations were used to describe the sample. The results indicate that the majority of the online students were female, between the ages of 23 and 40, and classified as persistent. The average GPA of the sample was 3.31 and the average number of credit hours reported was 65. In addition, the majority of students had not taken an online course prior to the current semester, reported "quite a lot" of computer experience, had high computer self-efficacy, and possessed a feminine gender role. Furthermore, most online students were pursuing a Bachelor's degree, had used between four and five computer packages, reported having computer access when not at work or school, completed a computer training course, and owned a computer. The next subsection presents the results of the four research questions employed in this study.

Research Questions

Research Question One

The first question inquired about the intercorrelations among the research variables (i.e., age, gender, GPA, computer experience, computer self-efficacy, gender role, and persistence). Pearson product-moment correlation coefficients (Pearson r) were used to examine the correlations between the variables (Vogt, 1999). Coefficients of determination (r^2) were used to determine the proportion of variance that is shared between the variables.

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There were several statistically significant correlations among the research variables. Persistence had a statistically significant and positive correlation with age ($r = .17$, $p < .05$), GPA ($r = .17$, $p < .05$), and computer experience ($r = .28$, $p < .01$). The coefficients of determination for these variables were .03, .03, and .08, respectively, which corresponds to small to moderate effect sizes (Cohen, 1988). This suggests that as age, GPA, and computer experience increases, a student is more likely to persist. There were four additional variables that were statistically significantly correlated with age: gender ($r = .15$, $p < .05$); GPA ($r = .35$, $p < .01$); previous number of online courses taken ($r = .33$, $p < .01$); and the masculine subscale score on the PAQ ($r = .32$, $p < .01$). The strongest of these relationships was between age and GPA, implying that age explains 12% of the variance in GPA ($r^2 = .12$), which is a medium effect size (Cohen). Gender was also found to be statistically significantly correlated with the number of online courses previously taken ($r = .13$, $p < .05$) and the masculine subscale score on the PAQ ($r = .20$, $p < .01$). In addition, there was a statistically significant, inverse correlation between gender and the feminine score on the PAQ ($r = -.22$, $p < .01$). The coefficients of determination (i.e., $r^2 = .02, .04, .05$, respectively) correspond to small effect sizes (Cohen).

An unexpected correlation existed between the CUSE score (computer self-efficacy measure) and the masculine subscale score on the PAQ ($r = .18$, $p < .01$); however, the relationship is minimal. The strongest of all relationships among the research variables was between the CUSE score and computer experience ($r = .56$, $p < .01$), with a coefficient of determination of .32, which

corresponds to a large effect size (Cohen, 1988). This result indicates that computer experience explains 32% of the variance found in the CUSE score. This finding is consistent with the research conducted by Cassidy and Eachus (2002), which demonstrated statistically significant relationships between the CUSE items and other computer-related variables, such as computer experience. However, Cassidy and Eachus found that 64% of the variance in the CUSE could be explained by computer experience. The correlations among the research variables are presented in Table 18, while the coefficients of determination for statistically significant correlations are reported in Table 19.

Table 18

Intercorrelations Among Research Variables

Variables	1	2	3	4	5	6	7	8	9
1. Persistence	–								
2. Age	.17*	–							
3. Gender	.03	.14*	–						
4. GPA	.28**	.35**	.10	–					
5. Number of Online Courses Taken	.13	.33**	.14*	.22**	–				
6. Computer Experience	.17*	.09	.02	.13*	.24**	–			
7. Computer Self-efficacy	.10	.08	.01	.12	.19**	.56**	–		
8. Masculine Score	.08	.32**	.20**	.22**	.21**	.16**	.18**	–	
9. Feminine Score	-.09	-.03	-.22**	-.04	-.15*	.02	.09	.02	–

Note: $N = 177 - 293$, *$p < .05$, **$p < .01$.

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Table 19

Coefficients of Determination (r^2) for Statistically Significant Correlations Among Research Variables

Variables	1	2	3	4	5	6	7	8	9
1. Persistence	–								
2. Age	.03*	–							
3. Gender		.02*	–						
4. GPA	.08**	.12**		–					
5. Number of Online Courses Taken		.11**	.02*	.05**	–				
6. Computer Experience	.03*			.02*	.06**	–			
7. Computer Self-efficacy					.04**	.32**	–		
8. Masculine Score		.10**	.04**	.05**	.05**	.03**	.03**	–	
9. Feminine Score			.05**		.02*				–

Note: $N = 177 - 293$, $*p < .05$, $**p < .01$.

Further Exploratory Analyses

In addition to analyzing the first research question, other statistical procedures were performed to further examine the data. Numerous cross tabulations and one-way ANOVAs were conducted to test for the existence of possible relationships among the research variables. The results of these findings are discussed below.

Cross Tabulations. To assess relationships among the categorical variables, cross tabulations were conducted (Sweet & Grace-Martin, 2003). Pearson chi-square significance tests were then performed to determine if the relationships were due to chance. First, the researcher sought to determine if there were any statistically significant relationships between the school groups (i.e., Bluegrass Community and Technical College, Murray State University, Sullivan University, and University of Louisville) and number of online courses previously taken, computer self-efficacy, gender role, age, gender, and persistence. All of the variables were coded into categories for this analysis. Results indicated that there were statistically significant relationships between the school groups and number of online courses previously taken (x^2 = 53.42, $p <$ .01), gender role (x^2 = 25.24, $p <$ .01), age (x^2= 83.40, $p <$ .01), and gender (x^2 = 13.99, $p <$ .01). The significance levels indicate a probability of less than one in a thousand that the relationships between these variables are due to chance. Hence, students at the University of Louisville had lower than expected GPAs and students at Sullivan University and Murray State University had higher GPAs than what was expected by chance.

Secondly, the relationships between persistence and GPA, number of online courses previously taken, computer self-efficacy, gender role, age, and gender, were examined. The results of the chi-square statistic indicates a statistically significant relationship between persistence and GPA (x^2 = 46.56, p < .01). Students high in persistence had higher GPAs than those low in persistence. The significance level suggests that the relationship between persistence and GPA is not due to random chance (Sweet & Grace-Martin, 2003). This finding was consistent with the results from the logistic and hierarchical logistic regressions conducted for research questions two and three.

The third cross tabulation performed was to test the relationship between gender and age, GPA, number of online courses previously taken, computer self-efficacy, and gender role. Results show statistically significant relationships between the following: (a) gender and age (x^2 = 10.79, p < .05), indicating that female students were older than the male students; and (b) gender and gender role (x^2 = 29.77, p < .01), which is to be expected since this simply meant that females are more likely to identify with a feminine gender role and males are more likely to identify with a masculine gender role. Lastly, the researcher examined the relationship between age and persistence, GPA, number of online courses, and computer self-efficacy. Results of the chi-square significance tests signify statistically significant relationships between age and the following variables: (a) GPA (x^2 = 52.51, p < .01), which indicates that older students are more likely to have higher GPAs than younger students; and (b) the number of online courses previously taken (x^2 = 33.20, p < .01), which suggests that older

students are more likely to have taken more online courses than younger students. The significance levels imply that the relationships between age and GPA, gender role, and number of online courses previously taken are greater than what is expected by chance (Vogt, 1999).

One-Way ANOVAs. One-way analysis of variance (ANOVA) is used to reveal "how much the mean values of a numerical variable differ among the categories of a categorical variable" (Sweet & Grace-Martin, 2003, p. 113). The researcher first sought to determine any statistically significant differences between the school groups and the following variables: computer self-efficacy score, GPA, the masculine score from the PAQ, the feminine score from the PAQ, perceived level of computer experience, number of computer packages previously used, and grade in last online course. Individual one-way ANOVAs were conducted for each variable in relation to the school groups. Only results that produced statistically significant differences and did not violate the Levene's test of homogeneity of variance are reported.

The results of the first one-way ANOVA suggested statistically significant differences between the school groups in GPA, $F(3, 265) = 10.86$, $p < .01$. Scheffé's post hoc comparison was conducted to determine where the difference exists between the groups. The results indicate that the means for GPA were statistically significantly lower at University of Louisville ($M = 3.06$) than at Murray State University ($M = 3.44$) or at Sullivan University ($M = 3.49$).

Another one-way ANOVA revealed statistically significant differences between the school groups in masculine subscale scores on the PAQ, $F(3, 288)$

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= 5.77, $p < .01$. Results of Scheffé's post hoc comparison suggests that masculine scores on the PAQ were statistically significantly higher at Sullivan University ($M = 23.39$) than at University of Louisville ($M = 20.82$).

The last one-way ANOVA was conducted between the school groups and number of computer packages previously used. Results show that there was a statistically significant difference among the groups in number of computer packages used, $F(3, 288) = 3.45$, $p < .05$. Post hoc comparisons indicate that a statistically significant difference existed between the number of computer packages used by students at Murray State University ($M = 4.24$) and the number of computer packages used by students at Sullivan University ($M = 4.81$) at the .05 alpha level.

One-way ANOVAs were also performed on the gender role groups and computer self-efficacy (i.e., CUSE score), GPA and computer experience. The results indicated a statistically significant difference between the gender role groups and CUSE scores, $F(3, 288) = 5.90$, $p < .01$. Scheffé's post hoc comparisons indicated that the means of CUSE scores were statistically significantly lower for the undifferentiated group ($M = 137.59$) than for the masculine ($M = 155.68$), feminine ($M = 148.94$), or androgynous gender role groups ($M = 151.48$), at the .05 alpha level. Another one-way ANOVA performed using gender role and GPA also revealed a statistically significant difference between groups, $F(3, 264) = 4.35$, $p < .05$. Post hoc comparisons suggest that the mean GPA for the androgynous gender role ($M = 3.44$) was statistically

significantly higher than that of the undifferentiated group (M = 3.12), at the .05 alpha level.

Research Question Two

The second research question sought to determine the probability of completing an online course successfully, by using age, gender, GPA, computer experience (i.e., number of online courses previously taken and perceived level of computer experience), computer self-efficacy, and masculine gender role as predictor variables. Based on prior research and theory that suggests that the instrumental traits associated with masculinity (e.g., assertiveness, independence, and belief in one's own competence) are predictive of persistence-related variables (e.g. achievement and performance), the researcher used the masculine subscale score on the PAQ to further examine if masculine gender role was predictive of persistence in a distance education course (Keller, 1974; Long, 1989; Stein & Bailey, 1973; Stein et al., 1971). Logistic regression analysis was performed to determine the extent the six predictor variables successfully predicted the probability of the dependent variable, persistence. According to Field (2000), this statistical procedure was a natural choice because it requires a dichotomous, mutually exclusive dependent variable, such as persistence (i.e., 0 = non-persister, 1 = persister). The primary objectives of logistic regression are explanation and prediction (Huck, 2004). Logistic regression is also able to determine relationships between the independent variables, as well as assess the probability of the dependent variable occurring (Sweet & Grace-Martin, 2003). This research study sought to

gain an understanding of variables that explain student persistence in distance education courses. Additional goals were to determine if these variables could predict whether or not a student would persist in a distance education course, as well as determine the probability of occurrence.

Before delving into the results of the logistic regression, it is imperative to understand the terms that are used in relation to logistic regression. The purpose of logistic regression is to predict likelihoods of occurrences, which are measured by probabilities, odds, and log-odds (Sweet & Grace-Martin, 2003). It is important to distinguish between odds and probability. Probability is defined as "the ratio of the number of occurrences to the total number of possibilities", while odds describe the "ratio of the number of occurrences to non-occurrences" (Sweet & Grace-Martin, p. 159). The concept of odds is central to the understanding and interpretation of the results of logistic regression analysis (Huck, 2004). Logistic regression produces logistic regression coefficients, known as log-odds, which specify the strength and direction of the relationship between the predictor and outcome variables (Sweet & Grace-Martin). The change in odds is known as Exp(β), or odds ratio, which "is an indicator of the change in odds resulting from a unit change in the predictor" (Field, 2000, p. 182). This value is even more critical to interpreting logistic regression. The value of the odds ratio has a similar interpretation as the logistic regression coefficient, except that it is much easier to comprehend, due to the fact that it does not require logarithmic transformation.

The logistic regression output in SPSS produces two blocks: (a) block 0, which includes only the value of the constant in the model; and (b) block 1, in

which the independent variables are introduced into the model. The log-likelihood statistic and the goodness-of-fit for the model are given in the SPSS output (Field, 2000). The log-likelihood statistic is an indication of "how much unexplained information there is after the model has been fitted", in which large values suggest poorly fitted statistical models because more unexplained observations exist (Field, p. 177). In SPSS, this value is multiplied by negative 2 and sometimes referred to as -2LL (Field). Goodness-of-fit can be determined by subtracting the subsequent -2LL from the initial -2LL.

Examining the results of the SPSS output for this study shows that the beginning block, which contains the constant value only, produced an initial -2LL of 63.32. This is an indication of how much unexplained information still exists in the model. The classification table indicates that none of the non-persisters were correctly classified, while 150 of the persisters were correctly classified, for a total percentage of 94.9% correctly classified. By adding the predictor variables in the first block, the researcher expected to find a -2LL value less than 63.32, which was produced when only the constant was included in the model (Field, 2000). It is also desirable that the model will show an increase in the percentage of persisters and non-persisters correctly classified.

Examination of the first block indicates that the -2LL has dropped to 49.39. This reduction indicates that the model is better at predicting persistence than it was before the predictor variables were added (Field, 2000). To determine how much better the model predicts persistence, the model chi-square statistic, which measures the difference between the two models, was examined. This value is

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derived by subtracting the subsequent -2LL from the initial -2LL (i.e., 63.32 – 49.39). The value of the chi-square statistic is 13.93, which is statistically significant ($p = .05$). Therefore, the researcher concluded that overall the model is predicting student persistence in distance education courses statistically significantly better than it was when only the constant was included in the model.

The examination of the Wald statistic can also be used to determine if a predictor variable is making a statistically significant contribution to the prediction of student persistence (Field, 2000). This statistic has a chi-square distribution and indicates whether the regression coefficient is significantly different from zero (Field). If this is the case, the researcher can presume that the predictor is making a statistically significant contribution to the prediction of persistence. The Wald statistic for GPA is 6.56, which is much higher than for the other predictor variables. However, Field suggests using this statistic with caution and recommends examining the likelihood ratio statistics instead, which are more accurate. The Wald statistic for each predictor is listed in Table 21.

The classification table shows that one non-persister was correctly classified, but seven other cases were misclassified, for a 12.5% success rate. For the persisters, 95.6% were correctly classified. The overall accuracy of classification is the weighted average of the two percentages (Field, 2000). This model correctly classified a higher percentage of non-persisters, as well as higher overall percentage of correctly classified cases, which increased slightly to 95.6% from the initial 94.9% success rate. This indicates that the model correctly

classified a higher percentage of cases than when the constant was the only

value included in the model. These results are presented in Table 20.

Table 20

Classification Table for Persisters and Non-persisters

			Predicted		
			Persistence		Percentage Correct
Observed			Non-persister	Persister	
Step 1	Persistence	Non-persister	1	7	12.5
		Persister	0	150	95.6
	Overall Percentage				96.2

During the next step of analysis, the logistic regression coefficients,

significance, odds-ratios, and confidence intervals for the variables included in

the equation, were examined. Of all the predictor variables, GPA was the only

variable that reliability predicted persistence (β = .97, p < .05). To make the

results easier to understand, GPA values were coded into the following

categories before they were entered into the model: 1 = *1.9 or less*; 2 = *2.0 - 2.4*;

3 = *2.5 - 2.9*, 4 = *3.0 - 3.4*, and 5 = *3.5 - 4.0*; these categories were similar to that

used by Stokes (2001), who performed a logistic regression to determine

predictors of satisfaction of college students. The beta coefficient of .97 indicates

that students with higher GPAs have a log-odds of persisting in a distance

education course that are .97 units higher than students who have lower GPAs,

with all other variables held constant. The odds-ratio or Exp(β) provides a better

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explanation. The odds ratio for GPA is 2.64, which indicates that for each one unit change in GPA, students are twice as likely to persist. Therefore, as GPA increases, students are more likely to persist in distance education courses. Lastly, the results yielded a Nagelkerke R^2 of .26, which is a large effect size (Cohen, 1988). The results of the logistic regression are shown in Table 21.

Table 21

Logistic Regression Predicting Persistence From Predictor Variables

Variable	B	S.E.	Wald	Sig.	Exp(β)	95% CI Lower	Upper
Age	.38	.44	.73	.39	1.46	.62	3.44
Gender	-.28	.96	.08	.77	.76	.11	4.99
GPA Category	.97	.38	6.56	.01	2.64	1.26	5.53
Number of Online Courses	.08	.39	.04	.83	1.09	.51	2.32
Computer Experience	.21	.76	.08	.78	1.23	.28	5.50
CUSE Category	-.06	.97	.00	.95	.94	.14	6.27
Masculine Subscale Score (PAQ)	-.04	.10	.16	.69	.96	.79	1.17
Constant	-.83	2.57	.11	.75	.44	---	---

Note: n = 158, *$^*R^2$* = .26

To further interpret the results of the logistic regression, the probability of occurrence and non-occurrence were calculated using the logistic regression coefficient for GPA. Using the formula in Figure 5, the probabilities of a student with a GPA of 3.0 persisting in an online course and a student with a 4.0 GPA were calculated. The calculations for each case are presented in Figure 6.

Figure 5

Equations for Probability and Odds

Probability of Occurrence	Probability of Non-Occurrence	Odds
$P(Y) = \dfrac{1}{1 + e^{-Z}}$ $Z = \beta_0 + \beta_1 X_1$	$P\,(No\;Y) = 1 - P$	$\dfrac{P(Y)}{P\,(No\;Y)}$

$P(Y)$ = probability of persisting in an online course
e = base of the natural logarithms (≈ 2.718)
β_0 = Constant (2.931)
β_1 = Logistic regression coefficients (.969)
X_1 = GPA value

Figure 6

Examples of Probability and Odds of Student Persistence

GPA	Probability of Occurrence	Probability of Non-Occurrence	Odds
3.0 (GPA cat. is 4)	$P(Y) = \dfrac{1}{1 + 2.718^{-6.807}}$ $P(Y) = .99890$ $Z = 2.931 + (.969 \times 4)$ $= 6.807$	$P\,(No\ Y) = 1 - .99890$ $= .0011$	$\dfrac{.99890}{.0011}$ $= 908.09$
4.0 (GPA cat. is 5)	$P(Y) = \dfrac{1}{1 + 2.718^{-7.776}}$ $P(Y) = .99960$ $Z = 2.931 + (.969 \times 5)$ $= 7.776$	$P\,(No\ Y) = 1 - .99960$ $= .0004$	$\dfrac{.99960}{.0004}$ $= 2499$

As the calculations suggest, a student with a 3.0 GPA (i.e., GPA category 4) has a 99.89% probability of persisting in a distance education course and less than a .11% probability of not persisting. Furthermore, the odds that a student with a GPA of 3.0 will persist in an online class are 908 to 1. There is very little difference between the probabilities of persistence for the student with a 3.0 GPA and a student with a 4.0 GPA. The student with a 4.0 GPA (i.e., GPA category 5) has a 99.96% probability of persisting and a .04% of not persisting. The odds that a student with a 4.0 GPA will persist are 2,499 to 1. The proportionate change in odds between these values, are calculated by dividing 2,499 by 908.09. This value equals 2.75, which is very close to the odds ratio of 2.64; however, because of rounding, the values are slightly different. Therefore, the researcher concluded from these calculations that a student with a GPA of 4.0 is almost three times as likely to persist in a distance education course as a student with a 3.0.

Further Exploratory Analyses

Due to the exploratory nature of this study, subsequent statistical analyses were performed on the data. Multiple regressions were conducted to determine any statistically significant findings among the research variables. The purpose of multiple regression is to examine how predictor variables act together to effect the dependent variable (Sweet & Grace-Martin, 2003). There were two multiple regressions performed with GPA and CUSE score serving as the dependent variables. The first multiple regression was utilized to determine which of the four predictor variables would be most predictive of the criterion variable, GPA. These

variables were chosen because of their statistically significant correlation to GPA, as determined in research question one. Although relationships appeared to exist between the variables, the correlations were modest (e.g., age was statistically significantly correlated with GPA, $r = .35$, $p < .01$). However, the four-predictor model was statistically significant, $F(4, 245) = 10.83$, $p < .01$. The regression equation yielded an R of .39 and an R^2 of .15, which is a medium effect size (Cohen, 1988). This meant that 15% of the variance in GPA can be explained by age, number of online courses, computer experience, and masculine subscale score on the PAQ. Consequently, of the variables included in the model, age was the only statistically significant predictor of GPA. This finding is supported by previous research (Dille & Mezack, 1991; Fjortoft, 1996). The results of this analysis and the model summary are presented in Tables 22 and 23.

Table 22

Summary of Multiple Regression Analysis to Predict GPA

Model	Unstandardized Coefficients		Standardized Coefficients		95% CI for β	
1	β	S.E.	β	t	Lower	Upper
(Constant)	2.45	.22		11.28**	2.03	2.88
Age	.14	.03	.28	4.29**	.08	.21
Number of Online Courses	.04	.03	.09	1.46	-.01	.10
Computer Experience	.07	.07	.07	1.10	-.06	.20
Masculine Score on PAQ	.01	.01	.10	1.65	-.00	.03

Note: $N = 269 - 292$. **$p < .01$

Table 23

Model Summary of Relationships between GPA, Age, Number of Online Courses, Computer Experience, and Masculine Score

	R	R^2	Adj. R^2	Std. Error of the Estimate	Change Statistics				
Model					R^2 Change	F Change	Df1	df2	Sig. F Change
1	.39	.15	.14	.55	.15	10.83	4	245	.00

Note: $N = 269 - 292$

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The second multiple regression was performed using CUSE score as the dependent variable and the predictor variables of computer experience, number of online courses previously taken, and number of computer packages previously used. Statistically significant correlations were found between the variables ($p <$ .01). However, it must be noted that the correlations found in this study range from slight to moderate. As expected, the three-predictor model was statistically significant, $F(3, 268) = 47.01$, $p < .01$. The regression equation produced an R^2 of .35, which indicates a large effect size (Cohen, 1988). This suggests that nearly 35% of the variance in CUSE scores can be predicted by computer experience, number of online courses previously taken, and number of computer packages previously used. These findings are supported by Cassidy and Eachus (2002) whose findings suggest that computer-related variables (e.g., computer experience, number of online courses previously taken, and number of computer packages previously used) are statistically significantly related to the items on the CUSE. The results of this analysis and the model summary are presented in Tables 24 and 25.

Table 24

Summary of Multiple Regression Analysis to Predict Computer User Self-Efficacy (CUSE) Score

Model	Unstandardized Coefficients		Standardized Coefficients		95% CI for β	
1	B	S.E.	β	t	Lower	Upper
(Constant)	88.58	5.24		16.91**	78.26	98.89
Number of Online Courses	.17	.85	.01	.20	-1.51	1.85
Computer Experience	18.58	2.06	.49	9.02**	14.52	22.64
Number of Computer Packages	2.70	.85	.18	3.17**	1.02	4.37

Note: $N = 272 - 292$. **$p < .01$

Table 25

Model Summary of Relationships between CUSE score, Number of Online Courses, Computer Experience, and Number of Computer Packages

	R	R^2	Adj. R^2	Std. Error of the Estimate	Change Statistics				
Model					R^2 Change	F Change	Df1	df2	Sig. F Change
1	.59	.35	.34	17.31	.35	47.01	3	268	.00

Note: $N = 272 - 292$

The third research question inquired to what degree do educational variables (i.e., GPA and computer experience) predict persistence, after controlling for the demographic and personality variables. Hierarchical logistic regression was performed; thus, blocks of variables were entered into the model. The first block consisted of the demographic variables (i.e., age and gender), the second block consisted of personality variables (i.e., computer self-efficacy and masculine subscale score), and the third block consisted of the educational variables (i.e., GPA and computer experience). Again, due to prior research and theory that suggests that the instrumental traits associated with masculinity are predictive of persistence-related variables, the masculine subscale score on the PAQ was entered into the logistic regression model to further examine if masculine gender role was predictive of persistence in a distance education course.

There were many similarities between the logistic regression analysis performed in research question two and the hierarchical logistic regression that was conducted to answer research question three. Because the variables examined were the same in both of these models, the researcher found many of the values to be exactly the same. The first block, which contained only the constant in the model, yielded the same -2LL of 63.32 as well as the same percentage (i.e., 94.9%) of cases correctly classified.

Step One

In block one, the demographic variables (i.e., age and gender) were added to the persistence model baseline. The -2LL decreased to 59.54, but was not statistically significant ($p = .15$). This indicates that adding age and gender did not statistically significantly contribute to the prediction of student persistence. Consequently, the percentage of correctly classified cases also remained the same. Examination of the regression coefficient, odds ratio, and level of significance confirm that age is not a statistically significant predictor of persistence. This finding is not consistent with the majority of the literature reviewed that found a statistically significant relationship between age and persistence (Dille & Mezack, 1991; Fjortoft; Langenbach & Korhonen, 1988; Muse, 2003; Neuhauser, 2002). Although not statistically significant, it should be noted that the significance level of age is marginal; hence, further research is needed to explore the predictive value of age on persistence. Results also suggest that gender is not a statistically significant predictor of persistence, which is supported by the literature, in that the majority of studies failed to find any significance between gender and persistence (Dille & Mezack, 1991; Fjortoft, 1996; Langenbach & Korhonen, 1988; Muse, 2003). The logistic regression coefficients, standard errors, Wald statistics, significance, odds ratios, and confidence intervals for age and gender are presented in Table 26.

Table 26

Logistic Regression Predicting Persistence From Age and Gender

Variable	B	S.E.	Wald	Sig.	Exp(β)	95% CI Lower	Upper
Age	.66	.37	3.26	.07	1.94	.94	3.99
Gender	-.09	.85	.01	.91	.91	.17	4.83
Constant	1.47	1.30	1.27	.26	4.35	---	---

Note: $n = 158$, $*R^2 = .07$

Step Two

In block two, the personality variables (i.e., computer self-efficacy and masculine subscale score) were added to block one to determine if the predictive ability of the model improved. Initially, the researcher added the CUSE factor scores in the predictive model; however, none of the three factors had statistical relevance to this model. To be consistent with previous research, the researcher then choose to use the total CUSE score to represent computer self-efficacy in the model (Cassidy & Eachus, 2002; Christian, 2000).

Once the variables were added into the model, the -2LL decreased to 58.44; however, this was not statistically significant ($p = .30$). This suggests that adding the personality variables did not improve the model's ability to predict student persistence. Accordingly, the overall prediction success rate of the model remained the same at 94.9%. The results (i.e., regression coefficients, odds ratios, and significance) indicate that computer self-efficacy and gender role are not statistically significant predictors of persistence. However, 44% of the sample

consisted of students who identified with a feminine gender role, which may have affected the overall results. Because of theory and empirical studies that suggest that the instrumental traits associated with masculinity may be predictive of persistence-related variables (e.g., achievement and performance), the predictive value of gender role on persistence deserves further investigation. The logistic regression coefficients, standard errors, Wald statistics, significance, odds ratios, and confidence intervals for computer self-efficacy (i.e., CUSE category) and gender role are presented in Table 27.

Table 27

Logistic Regression Predicting Persistence From Computer Self-Efficacy and Gender Role

Variable	B	S.E.	Wald	Sig.	Exp(β)	95% CI Lower	Upper
CUSE Category	.80	.79	1.04	.31	2.24	.91	10.36
Masculine Subscale Score (PAQ)	-.01	.09	.00	.95	.99	.83	1.19
Constant	5.94	2.10	.80	.79	1.81	---	---

Note: $n = 158$, $*R^2 = .09$

Step Three

In block three, the educational variables (i.e., GPA and computer experience) were added to block two. The -2LL decreased to 49.39, which was statistically significant ($p = .03$). This reduction suggests that the model is better

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at predicting persistence than it was before the educational variables were added to the model (Field, 2000). By adding these variables, the model has now correctly classified a higher percentage of non-persisters, as well as the overall percentage of correctly classified cases, which increased to 95.6% from the initial 94.9% success rate. It should be noted that the value of the chi-square statistic of 13.93 and the classification success rate of 95.6% are the same values found for the persistence model examined in research question two. Once more, the researcher concluded that overall the model is predicting student persistence in distance education courses statistically significantly better now that the educational variables have been added to the model.

A close examination of the regression coefficients, odds ratios, and significance, reveal the same conclusion as before. Of all the variables entered in the model, GPA is found to be the only statistically significant predictor of student persistence in distance education courses (β = .97, p = .01). Although the researcher concluded that the addition of the educational variables produced a statistically significant persistence model, the only variable contributing toward the significance is GPA. This finding is consistent with the majority of the reviewed studies that have found a statistically significant difference in GPA between persistence and nonpersistence (Ammons, 1971; Cejda & Rewey, 1998; Dille & Mezack, 1991; Kahn & Nauta, 2001; Lufi et al., 2003; Muse, 2003). Additionally, the results of computer experience as a predictor of persistence is also supported by the literature that indicates computer experience (e.g., number of online courses previously taken and perceived level of computer experience)

is not a statistically significant predictor of persistence (Houle, 2004; Muse, 2003; Parker, 1999).

The logistic regression coefficients, standard errors, Wald statistics, significance, odds ratios, and confidence intervals for GPA and computer experience (i.e., number of online courses previously taken and perceived level of computer experience) and are presented in Table 28.

Table 28

Logistic Regression Predicting Persistence From GPA and Computer Experience

Variable	β	S.E.	Wald	Sig.	Exp(β)	95% CI Lower	Upper
GPA Category	.97	.38	6.56	.01	2.64	1.26	5.53
Number of Online Courses	.08	.39	.04	.83	1.09	.51	2.32
Computer Experience	.21	.76	.08	.78	1.23	.28	5.50
Constant	-.83	2.57	.11	.75	.44	---	---

Note: n = 158, $^*R^2$ = .26

Research Question Four

The fourth research question sought to determine the factor structure of the scores obtained from the Computer User Self-Efficacy (CUSE) Scale. A principal components exploratory factor analysis (EFA) with varimax rotation was performed to determine the factor structure of the 30 items included in the CUSE Scale. This analysis was used to "reduce a large number of observed variables to a smaller number of factors" that account for a large proportion of the

observed variance (Tabachnick & Fidell, 1996, p. 636). The orthogonal varimax method of rotation was used to maximize the variance of factor loadings, which would also minimize the number of variables loading on more than one factor (Tabachnick & Fidell). The goal of this process is to produce factors that are distinctly defined for both theoretical interpretation and practical implication (Tabachnick & Fidell).

The results of the initial factor analysis produced a four-factor solution, which accounted for 59.42% of the variance. To interpret the factor loadings on the rotated components matrix, the critical value of .33 was compared to the matrix. This value was calculated by doubling the critical value of .16 for the sample size (Stevens, 2002). A factor loading with an absolute value over .33 was considered statistically significant, while factor loadings less than .33 were regarded as insignificant. The extraction method of principal component analysis (PCA) was used to determine the initial eigenvalues and percentage of variance for which each factor is accounted. Following Kaiser's (1960) recommendation, only the factors with eigenvalues greater than one were retained. The first factor accounted for 18.61% of the total CUSE Scale variance and consisted of 11 loadings, which ranged between .72 and .45. The second factor accounted for 17.48% of the variance and consisted of eight loadings that ranged between .71 and .54. The third factor accounted for 14.81% of the variance and contained seven loadings, ranging between .81 and .50. Finally, the fourth factor accounted for 8.52% of the variance and consisted of only three loadings, which ranged from .74 and .53. It should be noted that the scree plot suggested that the

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instrument consisted of three or four factors (Catell, 1960; Kaiser, 1960). The initial eigenvalues and rotation sums of squared loadings are shown in Table 29.

Table 29

Components of Computer User Self-Efficacy (CUSE) Scale with Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.41	44.69	44.69	5.58	18.61	18.61
2	1.79	5.97	50.65	5.24	17.48	36.09
3	1.52	5.06	55.71	4.44	14.81	50.90
4	1.11	3.71	59.42	2.56	8.52	59.42

Extraction Method: Principal Component Analysis; Varimax Rotation

Note: N = 289 – 292

As seen in Table 30, Bartlett's test of sphericity had an approximate Chi-square of 5301.11 and was statistically significant ($p = .00$). This finding indicates that correlations exist between the items and a factor analysis can be productive (Stevens, 2002). The value of the Kaiser-Meyer-Olkin (KMO) Measure of Sampling was .95, which is greater than the criterion for acceptable sampling adequacy of .60 (Stevens). This indicates that the data is factorable.

Table 30

Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity for CUSE Scale

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.952
Bartlett's Test of Sphericity		.
	Approx. Chi-Square	5301.11
	df	435
	Sig.	.000

The fourth factor consisted of the following three items: (a) 21. Computer jargon baffles me; (b) 25. Sometimes, when using a computer, things seem to happen and I don't know why; and (c) 17. I seem to waste a lot of time struggling with computers. The psychometric properties of the fourth factor were questionable because only three items loaded on the factor. In a similar study by Christian (2002), results of a factor analysis performed on the CUSE yielded three dimensions of computer self-efficacy. Based on Christian's findings and the questionable nature of the fourth factor, there was enough empirical evidence to warrant running a three-factor solution. Furthermore, the scree plot supports the decision to extract three factors (Cattell, 1965; Stevens, 2002).

The results of the subsequent factor analysis in this study were not entirely consistent with Christian's (2002) findings. The results of Christian's analysis indicated that the three dimensions within the CUSE Scale were competence, confidence, and learning. In this study, the first dimension accounted for 22.59% of the variance and consisted of 13 factor loadings of items that related to negative experiences with computers. The items that loaded

highest on this factor were: (a) 28. I find working with computers very frustrating (.70); (b) 19. I always seem to have problems when trying to use computers (.68); and (c) 30. When using computers I worry that I might press the wrong button and damage it (.67). The second dimension accounted for 17.62% of the variance and identified 8 factor loadings of items that related to computer confidence and competence. The items with the highest loadings on this factor were: (a) 1. Most difficulties I encounter when using computers, I can usually deal with (.71); (b) 12. I am very confident in my abilities to make use of computers (.71); and (c) 2. I find working with computers very easy (.69). The last dimension, accounting for 15.50% of the variance, consisted of 8 factor loadings of items that related to learning experiences and productivity when using computers. Items with highest loadings were: (a) 24. Computers are good aids to learning (.82); (b) 18. Using computers makes learning more interesting (.81); and (c) 20. Sometimes computer packages definitely make learning easier (.69).

The results produced the same Chi-square and KMO as before; however, the three factors now accounted for 55.71% of the variance. In addition, several items cross-loaded on the factors, indicating that the items may be conceptually ambiguous. Therefore, it is suggested that the CUSE Scale is further refined in subsequent studies. Table 31 reports the values of initial eigenvalues and rotation sums of squared loadings. The CUSE items and their respective factor loadings obtained with varimax rotation with Kaiser normalization and the correlation matrix are located in Appendices I and J.

Table 31

Components of Computer User Self-Efficacy (CUSE) Scale with Total Variance Explained

	Initial Eigenvalues			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.41	44.69	44.69	6.78	22.59	22.59
2	1.79	5.97	50.65	5.29	17.62	40.22
3	1.52	5.06	55.71	4.65	15.50	55.71

Extraction Method: Principal Component Analysis; Varimax Rotation

Note: $N = 289 - 292$

Cronbach's alpha was used to examine the internal consistency of the three factors. The Cronbach's alpha for these factors (i.e., Negative experiences with computers; Computer confidence and competence; and Learning and productivity) yielded highly correlated and statistically significant alphas of .90, .89, and .89, respectively. The alpha values for the three subscales and the overall CUSE scale are outlined in Table 32.

Table 32

Cronbach's Alpha on 30-item CUSE Scale and Subscales

	Cronbach's alpha
Negative Experiences with Computer (Factor 1)	.90
Computer Confidence and Competence (Factor 2)	.89
Learning and Productivity (Factor 3)	.89
CUSE Scale (Total)	.95

One of the CUSE items failed to load on any of the factors during the initial or subsequent factor analyses. This item was "I often have difficulties when trying to learn how to use a new computer package." Examination of the communalities indicates that this item is not contributing to the overall factor structure of the CUSE. The cross-loading of the item on other factors is evidence of conceptual ambiguity. Therefore, this item may need to be refined further in future studies in which the CUSE Scale is utilized.

Conclusion

This chapter presented the results of statistical analyses performed on the data collected during this research study, which targeted students currently enrolled in distance education courses. The chapter reviewed the overall survey response rate, presented results of reliability analyses on the survey instruments, and provided an overview of the demographic and background characteristics of the sample. Means and frequencies were used to characterize the average survey respondent. In this study, the average respondent was female, between

the ages of 23 and 40, had an average GPA of 3.31, reported an average of 65 credit hours, reported "quite a lot" of computer experience, had high computer self-efficacy, possessed a feminine gender role, and also classified as a persister. In addition, the majority of respondents had used between four and five computer packages, reported having computer access when not at work or school, had taken a computer training course, and owned a computer. The research questions yielded the following major findings: (a) a moderate relationship between age and GPA ($r^2 = .12$); (b) a statistically significant relationship between the CUSE score and the masculine subscale score on the PAQ ($r = .18$, $p < .01$); (c) of the variables included in the logistic model, GPA was the only statistically significant predictor of persistence ($\beta = .97$, $p = .01$); (d) a three-factor solution of the CUSE Scale was obtained.

Chapter Five presents a summary of the major findings, discusses theoretical extensions, makes recommendations for research and practice, and provides an overall conclusion of this research study.

CHAPTER V

DISCUSSION

The primary purpose of this study was to identify which factors predict persistence among a sample of distance education students. A Web-based survey was administered to a convenience sample of undergraduate and graduate students currently enrolled in distance education courses at four colleges in the state of Kentucky ($N = 293$). Persistence (i.e., successful completion of a course) was examined in relation to six predictor variables: age, gender, GPA, computer experience, computer self-efficacy, and gender role. This study also sought to determine which blocks of variables (i.e., demographic, educational, and personality) predicted persistence with statistical significance. The secondary purpose of this study was to examine the factor structure of the CUSE Scale developed by Cassidy and Eachus (2002).

This chapter presents a summary of the major findings by further analyzing and synthesizing the results presented in Chapter Four. In addition, theoretical extensions and recommendations for research and practice are also discussed. Lastly, an overall conclusion of this research study is presented. The research questions that guided this study were: (a) What are the intercorrelations among the research variables (age, gender, GPA, computer experience, computer self-efficacy, gender role, and persistence)?; (b) Using age, gender, GPA, computer experience, computer self-efficacy, and gender role as predictor

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variables, what is the probability of completing an online course successfully?; (c) After controlling for the demographic and personality variables, to what degree do the educational variables predict persistence?; and (d) What is the factor structure of the scores obtained from the Computer User Self-Efficacy (CUSE) Scale?

<div align="center">Review of Findings</div>

<div align="center">*Demographic Variables*</div>

Numerous research studies have investigated the relationship between demographic variables (e.g., age and gender) and student persistence in educational settings (Allen, 1997; Dille & Mezack, 1991; Feldman, 1993; Fenske et al., 2000; Fjortoft, 1996; Langenbach & Korhonen, 1988; Leppel, 2002; Muse, 2003; Neuhauser, 2002; Sadler et al., 1997; Tucker, 2002). Both Tinto (1975) and Kember (1989) included demographic variables (e.g., age and gender) as predictors of drop-out (i.e., student persistence) in their theoretical models. However, the findings of the present study contradict the previous research and theoretical models.

Age

Over 54% of the survey respondents were between the ages of 23 and 40, while 25% of the respondents were under the age of 23. The results of this study indicate that the relationship between age and persistence is not statistically significant. This is supported by some previous research which suggests that older adults are just as capable of learning as younger adults (Datan et al., 1987; Schleppegrell, 1987). However, this finding conflicted with the majority of the

<div align="center">156</div>

studies reviewed, which concluded that age is a statistically significant predictor of persistence in educational settings. Furthermore, the findings from the previous research suggest that older students tend to be significantly more persistent than younger students (Dille & Mezack, 1991; Langenbach & Korhonen, 1988; Muse, 2003; Neuhauser, 2002). Reasons for this may include: (a) older adults have more life experiences, increased maturity, and more self-discipline than younger adults; and (b) older adults tend to hold full-time jobs, typically have family responsibilities, and are responsible for their own college expenses. Therefore, older adults may be more likely to put a higher value on the time and money they invest in their education than younger students who do not hold these same types of responsibilities (Dille & Mezack, 1991). Although this contention is not supported by the findings from the present study, previous research suggests that the relationship between age and persistence deserves further investigation.

Gender

Seventy-seven percent of the sample was comprised of women, while only 23% were men. Conflicting with findings by Tinto (1975) and Kember (1991), the research findings in the present study indicate that gender is not a statistically significant predictor of persistence. This finding is, however, supported by previous research studies which concluded that gender is not related to student persistence or success (Dille & Mezack, 1991; Fjortoft, 1996; Langenbach & Korhonen, 1988; Muse, 2003). On the other hand, the review of literature signifies a slight trend that females tend to be more persistent in educational

environments (Feldman, 1993; Fenske et al., 2000; Leppel, 2002). Because the majority of the survey respondents in this study were women, it is possible that men were not adequately represented, which may have affected the overall findings from this study.

Educational Variables

GPA

Results from the logistic regressions found that GPA was the only variable that was statistically significant at predicting persistence. These findings support the premise that as GPA increases, students are more likely to persist in distance education courses. This finding was not consistent with some studies that found that GPA alone is not a statistically significant predictor of persistence (Fjortoft, 1996; Kember et al., 1991; Langenbach & Korhonen, 1988). However, the results of this study are supported by numerous studies that have found statistically significant differences in GPA between persisters and non-persisters in traditional and distance education (Ammons, 1971; Cejda & Rewey, 1998; Dille & Mezack, 1991; Kahn & Nauta, 2001; Lufi et al., 2003; Muse, 2003). The findings from these studies are also consistent with conceptual models, such as Tinto's (1975) Dropout Model and Kember's (1989) Model of Drop-Out from Distance Education, which link persistence to academic performance (e.g., GPA). Futhermore, researchers contend that high academic competence will yield better academic performance, and thus the greater likelihood of persistence (Lokowski, Robbins, & Noeth, 2004).

Computer experience

The computer experience variable was operationalized as the number of online courses previously taken and perceived level of computer experience. The results of the logistic regression indicated that neither of these variables are statistically significant predictors of student persistence in distance education courses. This finding was supported by previous studies which failed to find a relationship between persistence and the number of online courses previously taken (Houle, 2004; Muse, 2003; Parker, 1999). An additional study concluded that computer experience is not significantly related to course grade, which was ultimately used to measure persistence in the present study (Schumacher et al., 1993). However, these findings contradict earlier studies that found significance between persistence and computer skills, which are directly related to computer experience (Muse, 2003; Sherry & Sherry, 1997; Sherry & Sherry 2000; Taylor & Mounfield, 1994).

Personality Variables

Computer Self-Efficacy

The results of this study suggest that computer self-efficacy is not a statistically significant predictor of persistence. Although this variable had not previously been examined in relation to student persistence (operationalized as successful completion of a course), self-efficacy and other related constructs (e.g., academic self-efficacy and math self-efficacy) have been found to predict persistence-related variables (e.g., performance and achievement). All of the

studies reviewed found statistically significant relationships between self-efficacy or related-constructs and persistence-related variables (Brown et al., 1989; Hackett & Betz, 1989; Hackett et al., 1992; Jacobs et al., 1984; Lent et al., 1984; Multon et al., 1991; Wood & Locke, 1987).

Bandura (1997) contended that if the specificity of the construct is closely related to a specific task, then self-efficacy is more likely to have a higher predictive value. According to self-efficacy theory, a person with high self-efficacy will engage in achievement-type behaviors by choosing difficult tasks, persist at them longer in spite of any obstacles, and perform the tasks successfully (Bandura, 1977a, 1986). Theoretically speaking, when researching persistence in distance education, it is reasonable to expect a relationship between students' computer self-efficacy and successful completion of a distance education course, in which the computer is the main source of interaction and communication. The established relationship between self-efficacy and persistence, as discussed in the literature review, supports the expectation that students with high computer self-efficacy may be more likely to persist in distance education settings than students with low computer self-efficacy.

Gender Role

The results of this study indicate that gender role is not a statistically significant predictor of persistence. This finding is supported by Yanico and Hardin (1981) who examined the relationship between gender role and persistence, operationalized as those students still enrolled in their original major after 3 years. Results indicated that gender role was not statistically significantly related to

persistence in traditional or nontraditional college majors. Although reported statistics were not clear enough to support the claim, the researchers did find a slight trend that females with higher masculine characteristics may be more likely to persist in any type of curriculum (Yanico & Hardin). Although not statistically significant, this finding deserves further examination to determine if females with masculine gender roles are more likely to persist in distance education environments.

Gender role had not previously been examined in relation to student persistence, operationalized as successful completion of a course. Nevertheless, research indicates that there is a possible relationship between these variables. In fact, gender role has been important in explaining various types of human behavior, such as performance and achievement. Research suggests a significant relationship between a masculine gender role and performance and achievement (Broverman et al., 1972; Coutts, 1987; Hock & Curry, 1983). Furthermore, results of empirical studies suggest that the instrumental traits associated with masculinity (e.g., assertiveness, independence, competitiveness, and belief in one's own competence) are predictive of performance and achievement in educational settings (Keller, 1974; Long, 1989; Stein & Bailey, 1973; Stein et al., 1971). Because masculine characteristics are valued and rewarded in educational settings, it is reasonable to expect that masculine characteristics may influence student persistence in distance education courses.

Research Questions

Research Question One

The first research question examined the intercorrelations between the research variables. While many of the variables were statistically significantly correlated, the coefficients of determination indicated small to moderate effect sizes among these variables. One of the strongest relationships was between age and GPA, which indicated that age explained 12% of the variance in GPA, which is a moderate effect size (Cohen, 1988). This finding is supported by Hagedorn et al. (2002) who concluded that age has a direct effect on GPA. Consequently, GPA essentially measures the same underlying behavior of course achievement as the dependent variable, persistence (Hagedorn et al.). Because of the statistically significant relationship found between age and GPA, there is an expectation that the relationship between age and persistence will also exist.

A statistically significant correlation between the CUSE score and computer experience indicated that computer experience explained 32% of the variance found in the CUSE score, which is a large effect size (Cohen, 1988). This finding is supported by Cassidy and Eachus (2002) who also found a high correlation between these variables; however, in their study, the researcher found that 64% of the variance in the CUSE score could be explained by computer experience. The results suggest that computer experience is a strong predictor of computer self-efficacy. Additionally, a correlation found between the CUSE score and the masculine subscale score on the PAQ suggested that as

CUSE score increases, masculine score also increases. This finding was consistent with Choi's (2004) research which concluded that masculinity more strongly predicts self-efficacy than femininity. Choi also found that masculinity was more predictive of general self-efficacy than of academic self-efficacy. This is also consistent with the present study's findings which indicates that the masculine subscale score explained only 3% of the variance in CUSE score, indicating a small effect size (Cohen).

Because of the exploratory nature of this study, the researcher performed subsequent statistical procedures to further examine the data. Cross tabulations and one-way ANOVAs were conducted to determine any statistically significant relationships among the research variables. Some of these findings include:

- Statistically significant relationships between the following variables: (a) persistence and GPA, (b) gender and age, (c) gender and gender role, (d) age and GPA, and (e) age and number of online courses previously taken.

- The means for GPA were statistically significantly lower at the University of Louisville ($M = 3.06$) than at Murray State University ($M = 3.44$) or at Sullivan University ($M = 3.49$).

- Masculine scores on the PAQ were statistically significantly higher at Sullivan University ($M = 23.39$) than at the University of Louisville ($M = 20.82$).

- Students at Murray State University ($M = 4.24$) had used statistically significantly fewer computer packages than students at Sullivan University ($M = 4.81$).

- The average CUSE scores were statistically significantly lower for the undifferentiated gender role ($M = 137.59$) than for the masculine ($M = 155.68$), feminine ($M = 148.94$), or androgynous gender role groups ($M = 151.48$).

- The average GPA for the androgynous gender role ($M = 3.44$) was statistically significantly higher than that of the undifferentiated group ($M = 3.12$).

Research Question Two

The second research question sought to determine the probability of completing an online course successfully using age, gender, GPA, computer experience, computer self-efficacy, and masculine gender role (i.e., M subscale score on PAQ) as predictor variables. Once the predictor variables were added, analysis of the logistic regression model indicated that overall the model predicted student persistence in distance education courses statistically significantly better than it had when only the constant was included in the model (Field, 2000). This finding demonstrates the predictive performance of the model. The model classified 95.6% of the cases correctly, which is a higher success rate than when the constant was the only value included in the model. In addition, the results yielded a Nagelkerke R^2 of .26, which is a large effect size (Cohen, 1988). However, GPA was the only variable that was statistically significant at predicting

persistence. This finding suggests that as GPA increases, students are more likely to persist in distance education courses.

To further examine the data, the researcher performed subsequent multiple regressions to determine any statistically significant findings among the research variables. Some of these findings include:

- Fifteen percent of the variance in GPA can be explained by age, number of online courses, computer experience, and masculine subscale scores from the PAQ.

- Nearly 35% of the variance in CUSE scores can be predicted by computer experience, number of online courses previously taken, and number of computer packages previously used.

Research Question Three

The third research question sought to determine to what degree do the educational variables predict persistence, after controlling for the demographic and personality variables. Hierarchical logistic regression was performed to determine how much variance in persistence could be explained by blocks (i.e., demographic, personality, and educational) of independent variables (Sweet & Grace-Martin, 2003). The results implied that the model was better at predicting persistence than it was before the educational variables were added to the model (Field, 2000). Adding these variables also improved the correctly classified success rate, which increased to 95.6%. Because the variables were the same as those used in the logistic regression analysis in research question two, the results yielded the same Nagelkerke R^2 of .26, indicating a large effect size

(Cohen, 1988). However, as with the results of the logistic regression, GPA was found to be the only statistically significant predictor of student persistence ($\beta = .97$, $p = .01$). A one-unit change in GPA translates to a student being almost three times as likely to persist in a distance education course.

Research Question Four

The fourth and final research question examined the factor structure of the scores obtained from the CUSE Scale. The initial factor analysis performed on the CUSE produced a four-factor solution; however, the psychometric properties of the fourth factor were questionable because only three items loaded on the factor. The results of a factor analysis performed on the CUSE Scale by Christian (2002) yielded three dimensions of computer self-efficacy. Based on Christian's findings and the questionable nature of the fourth factor, there was enough empirical evidence to warrant running a three-factor solution. Therefore, the researcher in this study conducted a subsequent factor analysis in which three factors were extracted. The three-factor solution produced by the second exploratory factor analysis accounted for 55.71% of the variance. Based on the items that loaded on each factor, the three factors were categorized and named as the following: (a) Negative experiences with computers, (b) Computer confidence and competence, and (c) Learning experiences and productivity when using computers. These factors accounted for 22.59%, 17.62%, and 15.50% of the variance in the CUSE Scale, respectively. Additionally, Cronbach's alpha yielded highly correlated and statistically significant alphas of .90, .89, and .89, respectively.

Although the results of the factor analysis were not the same as those found by Christian (2002), there were some similarities between the findings. For example, Christian's analysis indicated that the three dimensions within the CUSE Scale were competence, confidence, and learning; results of the present study combined the competence and confidence factors into one factor and added productivity to the learning factor. However, the first factor extracted in the present study was described as "Negative experiences with computers." All of the items that loaded under this factor were negative statements which related to problems with using or understanding computers. Items included: (a) 28. I find working with computers very frustrating; (b) 19. I always seem to have problems when trying to use computers; and (c) 30. When using computers I worry that I might press the wrong button and damage it.

Theoretical Extensions

Persistence

Many theoretical models used to explain student persistence include GPA as a predictor variable (e.g., Cabrera, Nora and Castaneda's Integrated Model of Student Persistence (1993), Tinto's (1975) Model of Dropout and (1987) Student Integration Model, and Kember's (1989) Model of Drop-Out from Distance Education). The review of literature concluded that the majority of studies found GPA to be a statistically significant predictor of student persistence (Ammons, 1971; Cejda & Rewey, 1998; Dille & Mezack, 1991; Kahn & Nauta, 2001; Lufi et al., 2003; Muse, 2003). Consequently, some researchers assert that GPA and course completion, which is linked to persistence, essentially measure the same

behavior of course achievement (Hagedorn et al., 2002). Therefore, failure to persist in a course will ultimately be reflected in a student's GPA. This contention is supported by the results of the present study, which found GPA to be the only statistically significant predictor of persistence of all the variables included in the logistic regression model. Hence, this study has further contributed to existing theoretical models and literature regarding GPA as a predictor of persistence.

Computer Self-efficacy

The current study has contributed to existing research on computer self-efficacy, as well as provided more support for the use of the CUSE Scale, developed by Cassidy and Eachus (2002). According to Bandura (1997), when the specificity of the construct is closely related to a specific task, self-efficacy is more likely to have higher predictive value. Although there have been numerous studies which have examined the relationship between task-specific self-efficacy and specific types of performance (Brown et al., 1989; Hackett and Betz, 1989; Smith, 2001), there is relatively little research examining the relationship between computer self-efficacy and persistence in distance education. Although the results of the present study indicates that computer self-efficacy does not statistically significantly predict student persistence, this study has contributed to the existing body of literature on persistence, particularly with the limited research on computer self-efficacy in relation to persistence in distance education.

Results of the current research study provide support for the use of the CUSE Scale, as a general measure of computer self-efficacy in a population of

adult students. Reliability analysis on the 30-item CUSE Scale yielded a Cronbach's alpha of .95, which indicates that the scale is highly reliable. This finding is supported by previous research studies that examined the reliability of the CUSE Scale (Cassidy & Eachus, 2002; Christian, 2000; Galpin et al., 2003). Factor analyses on the scale produced a three factor solution: (a) Negative experiences with computers, (b) Computer confidence and competence, and (c) Learning and productivity. Cronbach alphas for these factors were .90, .89, and .89, respectively, which suggests that the items that comprise the CUSE Scale are internally consistent.

Gender Role

The current study has contributed to existing research on gender roles, as well as provided more support for the use of the PAQ, developed by Spence et al. (1974). Although previous research exists that have included gender role as a variable related to other measures of persistence (e.g., performance and achievement), the present study provided valuable information regarding the relationship between gender role and persistence. While the results of this study indicate that gender role was not a statistically significant predictor, further research is necessary because there is relatively little research on this subject matter. By examining the relationship between masculine gender role and persistence (i.e., successful course completion), this research study has encouraged future researchers to expand upon the findings from this study and further explore the relationship between these variables. In addition, this research study did find a relationship between gender role and computer self-

efficacy. Future research studies can build upon the current research and further examine the relationship between gender role and computer self-efficacy in educational settings.

The current study also provided support for the use of the 24-item PAQ (Spence et al., 1974). Reliability analyses on the Masculine (M), Feminine (F), and the Masculine-Feminine (M-F) subscales yielded the following Cronbach alphas: .81, .80, and .39, respectively. The results indicate that the M and F subscales are toward the high range (i.e., above .70), which suggests the items on these scales are consistently measuring the same construct (Vogt, 1999). The low reliability of the M-F subscale is not of much concern, because gender role is determined by the scores on the M and F subscales. Supported by previous research, this study concluded that the PAQ is a fairly reliable measure of gender role (Choi & Jenkins, 2000; Spence, 1986; Wilson & Cook, 1984).

Research Recommendations

There are five areas which are recommended for future research. The first recommendation is to further analyze the relationship between persistence and demographic, educational, and personality variables. Although the majority of these variables were not found to statistically significantly predict persistence, previous research studies indicate otherwise. Secondly, it is recommended that future studies operationalize persistence differently by employing longitudinal research. The third recommendation is for future research studies on persistence to incorporate qualitative research methods to provide a more comprehensive explanation as to why students persist or fail to persist in distance education

courses. The fourth recommendation is to study the phenomenon of persistence by examining different student populations. The final recommendation for future research is to further explore the relationship between computer self-efficacy and gender role. These recommendations for future research are further discussed in the subsequent pages.

Further Examination of Research Variables

Demographic Variables

It is recommended that future research further analyzes the relationships between persistence and demographic variables, such as age and gender. Although the results of the present study indicated that age and gender are not predictors of persistence, previous research findings are contrary. The majority of the studies reviewed found that older students tend to be statistically significantly more persistent than younger students (Dille & Mezack, 1991; Langenbach & Korhonen, 1988; Muse, 2003; Neuhauser, 2002). Although there is not a direct relationship between age and persistence, an indirect relationship cannot entirely be ruled out. The coefficient of determination between age and GPA indicated that age explains 12% of GPA, which is directly related to persistence. In addition, other research indicates that females tend to be more persistent in educational settings than males (Feldman, 1993; Fenske et al., 2000; Leppel, 2002). Hence, the inclusion of more men in the sample may have influenced the overall results regarding the relationship between gender and persistence. In the present study, all of the non-persisters were 40 years of age or younger and 80% were female. The overrepresentation of persisters and females in the sample and

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the conflicting findings among previous research signify that further investigation on the relationship between these variables is necessary.

Educational Variables

Although GPA was found to be a statistically significant predictor of persistence, results from this study indicate that computer experience is not a predictor of persistence. This finding conflicts with other studies that contend persistence is statistically significantly related to computer skills or computing experience (Muse, 2003; Sherry & Sherry, 1997; Sherry & Sherry 2000; Taylor & Mounfield, 1994). Moreover, the amount of research that examines computer experience as a predictor of persistence in distance education is relatively limited. It is imperative that distance education students possess at least basic computer skills and/or experience to complete course assignments (Mehrotra et al., 2001). Students without basic computer skills and/or experience, may be more likely to dropout and not persist through the distance education course. Because the computer is the main source of interaction for distance education students, it is plausible to expect a relationship between computer experience and persistence. Because of conflicting research findings, the relationship between computer experience and student persistence is not entirely clear. Therefore, further research should be conducted to fully understand if a relationship exists between computer experience and persistence in distance education courses.

Personality Variables

The results of this study indicate that computer self-efficacy is not a statistically significant predictor of persistence. Although there is very little research examining computer self-efficacy in relation to persistence, the relationship between self-efficacy and persistence-related variables has been well established (Brown et al., 1989; Hackett & Betz, 1989; Hackett et al., 1992; Jacobs et al., 1984; Lent et al., 1984; Multon et al., 1991; Wood & Locke, 1987). Previous research supports the expectation that students with high computer self-efficacy may be more likely to persist in distance education settings than students with low computer self-efficacy. Therefore, the relationship between computer self-efficacy and persistence deserves further investigation.

Although the current study also found that gender role is not a statistically significant predictor of persistence in distance education courses, there is a theoretical link that suggests a relationship may exist. Results of the reviewed empirical studies suggest that the instrumental traits associated with masculinity (e.g., assertiveness, independence, competitiveness, and self-confidence) are predictive of persistence-related variables (i.e., performance and achievement) in educational settings (Keller, 1974; Long, 1989; Stein & Bailey, 1973; Stein et al., 1971). Masculine characteristics have historically been well-regarded and rewarded in educational settings. Therefore, it is reasonable to expect that masculine characteristics may influence student persistence in distance education courses. In the present study, 60% of the non-persisters adopted a feminine gender role. The small sample of non-persisters, the overrepresentation of females

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in the sample, and the relatively few studies that have evaluated the relationship between gender roles and persistence indicate that there is an apparent need to further analyze the relationship between gender role and persistence in future studies.

Operationalization of Persistence/Longitudinal Research

Many research studies have utilized longitudinal data to explore persistence in educational environments. In these research studies, persistence has been operationalized differently. Examples include: (a) freshmen to sophomore persistence (Ammons, 1971; Kahn & Nauta, 2001); (b) graduate student persistence to the next year of study (Fjortoft, 1996); (c) successful completion of a graduate program (Langenbach & Korhonen, 1988); (d) completion of a baccalaureate degree (Cejda & Rewey, 1998); (e) successfully passing multiple Web-based courses (Muse, 2003); (f) second semester persistence (Sherry & Sherry, 1997; Sherry & Sherry, 2000); (g) student's enrollment status after one year (Feldman, 1993; Fenske et al, 2000; Sadler, 1997); and (h) students still enrolled in their original major after 3 years (Yanico and Hardin, 1981). In the present research study, persistence was operationalized as successful completion of a distance education course. Survey respondents were asked to report their grade in their last distance education course taken. Because the students were not able to be followed throughout the semester, the researcher was not able to establish how they performed in their current course. Consequently, operationalizing persistence differently may influence research findings.

Both Tinto's (1975) Dropout Model and Kember's (1989) Model of Drop-Out from Distance Education purport that persistence is a longitudinal process by which a number of variables interact with one another and ultimately lead to a dropout decision. Previous research studies that have employed longitudinal research designs have also produced meaningful information regarding the predictors of persistence (Ishitani & DesJardins, 2002; Schnell, Louis, & Doetkott, 2003). In the present study, data was collected on only ten non-persisters. If the duration of the study had been extended and the researcher was allowed to obtain students' grades at the end of the semester, a larger sample of non-persisters may have been identified. Thus, different findings may have resulted. It is recommended that future studies employ longitudinal research to further examine the factors that are related to persistence and nonpersistence in the distance education environment.

Qualitative Research

The majority of the research studies reviewed employed quantitative research methods, including the present study. A couple of research studies utilized both quantitative and qualitative research methods (Muse, 2003; Richards & Ridley, 1997). The use of qualitative research in addition to quantitative measures is recommended to provide a more comprehensive understanding of why some students persist and others fail to persist in distance education courses. Interviews with students who have failed to persist in online courses/programs could provide valuable explanations as to why students fail to persist in online courses/programs, as well as identify additional predictors of

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persistence. Future research that employs both qualitative and quantitative research methods may provide a better understanding of the phenomenon of persistence and non-persistence in distance education settings.

Different Student Populations

The present study targeted a convenience sample of undergraduate and graduate students currently enrolled in distance education courses. Computer self-efficacy and gender role, on which relatively little research in relation to persistence exists, were examined as possible predictors of persistence. Although findings indicate that these variables are not statistically significant predictors of persistence, it is suggested that future research utilize these variables in studies using different student populations (i.e., students enrolled in traditional education, college freshmen, and doctoral students). The following are further suggestions for future research on the relationships between persistence and computer self-efficacy and gender roles: (a) Conduct a comparative study on the relationship between computer self-efficacy and persistence between online and traditional students; (b) Conduct a comparative study on the relationship between computer self-efficacy and persistence between college freshmen and seniors; (c) Examine the relationship between gender role and persistence in doctoral students.

Relationship Between Computer Self-efficacy and Gender Role

Although the strength of the relationship was deemed small, the unexpected correlation found between the CUSE score and the masculine subscale score on the PAQ was consistent with Choi's (2004) research that

concluded that masculinity more strongly predicts self-efficacy than femininity. There were no research studies found that have examined the relationship between computer self-efficacy and gender role in the distance education setting. In the present study, those with an undifferentiated gender role had a statistically significantly lower CUSE score than the masculine, feminine, and androgynous gender roles ($p < .01$). This finding indicates that a statistically significant relationship exists between gender role and computer self-efficacy. The present study was designed to determine predictors of persistence; hence, further examination of the relationship between computer self-efficacy and gender role were beyond the scope of this study. The results of additional exploratory analyses indicate that the relationship between computer self-efficacy and gender role may not have yet been fully realized.

Recommendations for Practice

This study has made three major recommendations for higher education institutions, college administrators, instructors, college counselors, academic advisors, and students who are considering enrollment in distance education courses. Because GPA was found to be the only statistically significant predictor of persistence, the researcher focused on the non-findings based on previous research in order to make the majority of the following recommendations. The first recommendation for practice is that institutions should ensure that both students and instructors are familiar and comfortable with the technology used in distance education courses. Secondly, instructors should be responsible for creating and maintaining open communication to decrease student dropout due

to isolation. The last recommendation is that institutions should work with college administrators, college counselors, and academic advisors to provide preadmission counseling and establish prerequisites for distance education enrollment. These recommendations for practice are discussed in the following pages.

Technology

Students. Based on previous literature, technology has emerged as an important aspect to consider in distance education environments. Because the computer is the main source of interaction in distance education, it is possible that students who possess computer experience and skills are more drawn to distance education courses. In this study, 53% of the distance education students reported having used 4 or 5 computer packages and 23% reported having used 6 or 7 computer packages. In addition, 97% of the survey respondents reported that they owned a computer. These findings are consistent with previous studies that found that college students have substantial prior computer experience and familiarity with computer packages (Sherry & Sherry, 1997; Sherry & Sherry, 2000; Taylor & Mounfield, 1994). However, not all students possess the same level of computer experience and skills. Students without basic computer knowledge may become discouraged and drop out of the distance education course. If this occurs, both the student and institution waste valuable resources (Mehrotra et al. 2001).

It is the institution's responsibility to ensure that their students "receive the best quality education and educational experience possible" (Lotkowski, Robbins,

& Noeth, 2004, p. 24). Instructors need to take time to introduce the technology to their students and explain how it will be used throughout the course (Mehrotra et al.). In addition, college counselors and academic advisors should ensure that students have basic computer prerequisite skills that are needed to succeed in a distance education environment. Institutions that provide their students with resources to help them obtain and improve their confidence using basic computer applications, may contribute to the overall persistence rate of students enrolled in distance education courses (Sherry & Sherry, 1997).

Providing training on the technology used in distance education courses has been found to influence computer self-efficacy (Cassidy & Eachus, 2002). This is supported by the results of this study, in which computer experience explained 35% of the variance in CUSE (measure of computer self-efficacy) score. Consequently, computer self-efficacy is an important construct to consider when evaluating persistence in distance education. Students enrolled in distance education courses must possess basic computer skills to complete assignments, communicate with instructors and classmates via message boards and email, post assignments, and conduct research, if necessary (Driscoll, 2002; Mehrotra et al., 2001). Those students without basic computer skills and/or experience may be more likely to dropout of the course. Student dropout negatively affects institutions, which suffer a decrease in enrollment resulting in monetary loss (Mehrotra et al.). Therefore, it is imperative to understand the role that computer self-efficacy plays in student persistence. It is suggested that academic advisors and college counselors are provided with more information about computer self-

efficacy and how it may impact student persistence in distance education environments.

Instructors. Previous research also suggests that institutions offering distance education should make a valiant effort to ensure that their instructors have received adequate software training to facilitate online courses (Notar, Wilson, Restauri, & Friery, 2002; Palloff & Pratt, 1999; Palloff & Pratt, 2001). Instructors, especially those who are new to distance education, would likely benefit from the following training: creating and maintaining online courses, uploading course documents and notes, posting messages, facilitating interaction among online students, and handling technological difficulties that are likely to affect students (Notar et al.; Palloff & Pratt, 2001).

Although technological advancements are creating the potential for success in distance education, it is important to note that the technology used is rapidly advancing beyond our understanding of its practical uses (Moore, 2001). It is imperative that instructors recognize the potential for technical problems and carefully plan how to overcome these problems if they are to arise (Kemp, 2000). If instructors have difficulty understanding the technology, it is unlikely that they will be able to help their students with technological problems (Notar et al., 2002). Providing instructors with the training necessary to facilitate distance education and combat technological problems will create a more comfortable and credible environment for the distance learner.

It is also important that distance education instructors are aware that students will be operating on computers with varying modem and internet

connection speeds, and should design and prepare their courses accordingly (Couper, 2001). Henke and Russum (2000) suggest that instructors reduce the file size of course material so that it will take students less time to download courses. Making it easier to download course materials may improve students' overall satisfaction with distance education courses, as well as provide a significant improvement in student persistence (Henke and Russum). Evaluating the technology and making necessary changes early in the course development stages may help enhance students' and instructors' experiences with distance education courses.

<div align="center">Communication</div>

Based on theory and previous empirical studies, open communication is an important consideration in combating student dropout in any educational environment. Both Tinto (1975) and Spady (1971) hypothesized that students who fail to integrate into a college's social system are more likely to drop out of college. There are many conceptual models of student dropout, including Tinto's Dropout Model and Kember's (1989) Model of Drop-Out from Distance Education. These models include social and academic integration as predictors of student persistence. Because traditional face-to-face courses typically offer more interaction, many students may experience isolation in distance education courses (Piercy, 2000). The feelings of isolation may influence a student's decision to drop out. For that reason, it is imperative that the instructor openly communicate with distance learners and work to prevent feelings of isolation.

Communication is important in any relationship, but is imperative in distance education. To encourage open communication, it is essential for the instructor to build rapport with their students, which "contributes to a positive teaching and learning experience" (Piercy, 2000, p. 669). In a live classroom, instructors are able to build rapport with their students and gauge their level of understanding by observing the students' non-verbal cues. The student is also able to determine the approachability of the instructor and their own comfort level with their instructor. When teaching from a distance, "rapport is more difficult to establish and maintain, as non-verbal cues from the students are missing" (Piercy, p. 669). The instructor is faced with the daunting task of learning how to build rapport with their students in whatever distance medium they have chosen.

Instructors can also overcome the impersonal nature of distance learning by supporting students before, during, and after instruction takes place (Kemp, 2000). Some instructors have had success with asking students to fill out questionnaires regarding their course expectations, while others have found that contacting students throughout the duration of the course helps to maintain rapport (Piercy, 2000, p. 669). Despite the method, these instructors found ways to build and maintain rapport with their students, which allowed them to keep the doors of communication open.

Another aspect of communication that needs to be addressed is timely feedback. Instructors can combat feelings of isolation by providing students with prompt feedback on all assignments (Piercy, 2000). Distance education students expect personal and informative feedback on their online discussion comments

and assignments (Muirhead, 2001). If distance learners do not receive adequate feedback and reinforcement, students may not know whether they have an accurate knowledge of the subject matter and become discouraged (Muirhead). Therefore, it is the instructor's responsibility to create an environment of open communication by working to build rapport with the students and provide prompt feedback. Creating such a socially supportive academic environment may help students feel less isolated, less discouraged, and less likely to drop out of the distance education course.

Distance Education Course Requirements

Distance education courses typically have higher dropout rates than traditional face-to-face courses; hence, not all students succeed in distance education environments (Carter, 1996; Kember, 1995). Some students do not possess the discipline, independence, and time management skills needed to persist in distance education courses (Eisenberg & Dowsett, 1990; Erhman, 1990). Allowing students without certain skill sets to enroll in distance education courses are potentially setting those students up for failure. It is recommended that institutions conduct thorough preadmission counseling and establish prerequisites for distance education enrollment (Mehrotra, 2001). Preadmission counseling would help both students and institutions to decide if distance education is a "good fit with the students' interests, abilities, and preparation" (Mehrotra, p. 144). Some students may not be fully aware of the additional demands of distance education, such as requiring independent study, staying on schedule, locating online resources, and how to interact with classmates

electronically (Mehrotra). For those students who are not prepared for the distance education environment, college counselors and academic advisors can help students by "either assisting them in gaining the requisite skills for success in a distance education program or encouraging them not to enroll" (Mehrotra, p. 145). Because few institutions have formal and structured preadmission counseling programs, it is suggested that college administrators coordinate systematic and comprehensive counseling programs aimed at increasing persistence (Lotkowski et al, 2004). Such programs may play a pivotal role in improving student persistence in distance education.

Drawing from previous research, as well as the results of the current study, it is also recommended that institutions establish prerequisites for distance education enrollment. Results of the present study found GPA to be a statistically significant predictor of persistence in distance education courses. Students with higher GPAs are almost three times as likely to persist in an online course and receive a passing grade. Therefore, institutions should consider setting a GPA requirement that must be met before allowing students to enroll in a distance education course or program. Most colleges and universities require a certain high school GPA before admitting students into their institution, because of the likelihood of success (Lotkowski et al., 2004). Distance education courses require independence and discipline beyond that of a traditional classroom; therefore, setting a GPA requirement is a logical standard.

Additionally, previous research indicates that computer experience and computer skills are predictive of student persistence; hence, there was an

expectation that this relationship would be revealed in the current study (Muse, 2003; Sherry & Sherry, 1997; Sherry & Sherry 2000; Taylor & Mounfield, 1994). However, the results of the present study suggest that computer experience is not a statistically significant predictor of persistence in distance education courses. Therefore, the following recommendation is based on previous literature that contradicts this study's findings.

Based on the literature, it is suggested that institutions ensure that students possess basic computer skills before allowing the student to enroll in a distance education course (Mehrotra, 2001). If the student does not have basic computer skills, the institution could provide resources so that the student may increase their computer knowledge and confidence before enrolling in a distance education course. One suggestion is for institutions to require students, who are considering distance education courses or programs, to complete an online training course that prepares students for the distance education environment. Providing students with the tools they need to succeed in distance education courses may have a positive impact on student persistence in future courses. By conducting thorough preadmission counseling and establishing prerequisites for distance education enrollment, both students and institutions are likely to benefit.

Conclusion

Research aimed at understanding which factors contribute to persistence in educational settings is extremely important to institutions that are trying to maintain and increase student enrollment. The identification of potential predictors of persistence encourages institutions and instructors to be more

prepared to meet the needs of distance education students by developing courses and programs accordingly. Such knowledge may assist college administrators and instructors in improving: (a) the design, development and maintenance of distance education programs, (b) the overall distance student support infrastructure, and (c) course and program completion rates. Additionally, improving student persistence rates may potentially influence the appropriations allotted to higher education institutions via state legislature.

Researchers have examined persistence in relation to many variables, including demographic, educational, and personality variables. The present research study has expanded upon previous research by examining the following variables in relation to persistence: age, gender, GPA, computer experience, computer self-efficacy, and gender role. One of the major contributions of this study is the confirmation of GPA as a statistically significant predictor of persistence in distance education courses. Although this study has contributed to the existing body of literature on persistence, more research is needed to identify and understand additional factors that contribute to student persistence in distance education. Such research will place stakeholders within higher education one step closer to understanding why some students persist and others fail to persist in a distance education environment. Based on the results of this study, recommendations for future research are: (a) Further analyze the relationship between persistence and demographic, educational, and personality variables; (b) Operationalize persistence differently by employing longitudinal research; (c) Incorporate qualitative research methods; (d) Examine persistence

among different student populations; and (e) Further explore the relationship between computer self-efficacy and gender role.

In the meantime, this study's recommendations can be used to aid in the improvement of distance education programs by encouraging institutions to develop techniques to accommodate the needs of these students. It should be noted that the most of these recommendations are not based on the results of the current study. Focusing on the review of literature, this study has made the following recommendations for institutions and instructors: (a) Ensure that both students and instructors are familiar and comfortable with the technology used in distance education courses; (b) Create and maintain open communication to decrease student dropout due to isolation; and (c) Provide preadmission counseling and establish prerequisites for distance education enrollment. Based on the results of this study, it is recommended that institutions set a GPA prerequisite for enrollment in distance education courses and programs. These recommendations are intended to provide stakeholders within higher education (e.g., college administrators, instructors, college counselors, academic advisors) with valuable information that can be used when screening students who are considering enrollment in distance education courses.

Lack of student persistence is a multi-faceted problem, to which additional research is needed. Institutions that are apathetic to this problem "may do a long-term disservice to those students who drop out" (Lotkowski et al., 2004, p. 24). Research shows that students who attain college degrees are more likely to have better job opportunities and career advancement, as well as higher salaries than

their uneducated counterparts (Gordon, 1993; Rendon & Hope, 1996). Although not all students will flourish in the distance education environment, identifying factors related to persistence may persuade institutions to develop persistence strategies and guide students accordingly. Colleges and universities may not be able to completely solve the problem of student dropout, but they can employ recommendations from this study to better serve the student population. These recommendations are not one-size-fits-all solutions. Each student and institution possess their own unique characteristics: (a) there are various reasons why students fail to persist, and (b) institutions need to develop persistence strategies with available resources that meet their specific needs (Lotkowski et al.). However, institutions with increased commitment to the welfare of distance education students and concentrated attempts to develop strategies that will best combat student dropout, will yield a probable improvement in student persistence in distance education programs.

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APPENDICES

APPENDIX A

Letter to Human Subjects Committee for Expedited Review

October 7, 2005

Human Subjects Protection Program Office
University of Louisville
501 E. Broadway, STE 200
Louisville, KY 40202

Dear Sir or Madam;

This letter is a request for an expedited review for a research study. The purpose of this study is to identify which factors predict student persistence among a sample of distance education students. In order to do this, persistence (i.e., successful completion of a course), will be examined in relation to six predictor variables: age, gender, GPA, computer experience, computer self-efficacy, and gender role.

The present study will commence in November 2005. The subjects in this study will consist of undergraduate students enrolled in distance education courses at colleges and universities in the state of Kentucky.

The principal investigator in this study is Dr. Carolyn Rude-Parkins. This is a doctoral dissertation research study, being conducted by Jennifer R. Hammond in the Department of Leadership, Foundations and Human Resource Education.

I have enclosed the required documents for your review and approval. Your prompt response will be greatly appreciated.

Regards

Dr. Carolyn Rude-Parkins
Principal Investigator

APPENDIX B

Informed Consent Form for Web Survey

You are being invited to participate in a research study sponsored by Dr. Carolyn R. Parkins, at the University of Louisville and conducted by Jennifer R. Hammond.

The study seeks to determine the predictors of student persistence in distance education courses. Your participation would consist of completing the Web-based survey, which will take about 15 minutes to complete. You are free to decline to answer any question that makes you feel uncomfortable.

It is not clear that you will directly benefit from the results of this study, but it is hoped that your participation will help others in the future. Foreseeable risks to you might be uncertainty of the confidentiality, purposes of the study, and slight discomfort in answering certain questions.

Although absolute confidentiality cannot be guaranteed, confidentiality will be protected to the extent permitted by law. The data will be kept in locked files. The sponsor, the Human Subjects Protection Program Office, and the Institutional Review Board may inspect the research records of this study. Should the data be published you will not be identified by name.

Your participation in this study is voluntary. You may refuse or discontinue at any time without losing any benefits to which you are otherwise entitled. If you have any questions, please feel free to call the investigator at (XXX) XXX-XXXX or contact by email at jhammond602@yahoo.com. If you have any questions about your rights as a research subject, concerns, or complaints about the research or research staff, you may call the HSPPO at (502) 852-5188 and they will put you in touch with the appropriate chair of the Institutional Review Board. The IRB is an independent committee composed of members of the University community, staff of the institutions, as well as lay members of the community not connected with these institutions. The IRB has reviewed this study.

By completing this Web-based survey, you are indicating your willingness to participate in this research study. You are further indicating that all your questions have been answered in language you understand and that you understand that all future questions will be answered in a similar manner.

Thank you for considering my invitation to participate in this study.

Regards,

Dr. Carolyn R. Parkins
Jennifer R. Hammond

Survey Instrument

STUDENT PERSISTENCE IN DISTANCE EDUCATION SURVEY

I. BACKGROUND QUESTIONS:

1. What is the name of the institution in which you are currently enrolled?

2. What is the name of the program in which you are currently enrolled?

3. What type of degree are you pursuing?

4. How many credit hours have you currently completed?

5. What is your current GPA?

6. What is the name of the last online course you have taken?

   Note: If taken more than one simultaneously, report on just one course.

7. What grade did you receive that course?

8. Prior to that course, how many online courses had you taken?

9. What is your age?

10. What is your gender?

11. What is your experience with computers?

☐ none
☐ very limited
☐ some experience
☐ quite a lot
☐ extensive

12. Please indicate the computer packages (software) you have used.

Check all that apply.

☐ Wordprocessing packages (e.g., Microsoft Word, Wordperfect)
☐ Spreadsheets (e.g., Excel)
☐ Databases (e.g., Access)
☐ Presentation packages (e.g., PowerPoint, Harvard Graphics, Coreldraw)
☐ Statistics packages (e.g., SPSS)
☐ Desktop publishing
☐ Multimedia (e.g., Macromedia Flash, Dreamweaver, Authorware)
☐ Other (specify)

13. Do you have access to a computer when you are not in college or at work?

☐ Yes
☐ No

14. Have you ever attended a computer training course?

☐ Yes
☐ No

15. Do you own a computer?

☐ Yes
☐ No

II. COMPUTER USER SELF-EFFICACY (CUSE) SCALE

DIRECTIONS: On the next page, you will find a number of statements concerning how you might feel about computers. Please indicate the strength of your agreement or disagreement with the statements using the six point scale shown below.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

You can indicate how you feel by choosing a number between 1 and 6. Click on the button which most closely represents how much you agree or disagree with the statement. There are no "correct" responses; it is your own views that are important.

Please click on the most appropriate button as far as you are concerned.

1. Most difficulties I encounter when using computers, I can usually deal with.	Strongly Disagree □ 1 □ 2	Neutral □ 3 □ 4	Strongly Agree □ 5 □ 6
2. I find working with computers very easy.	Strongly Disagree □ 1 □ 2	Neutral □ 3 □ 4	Strongly Agree □ 5 □ 6
3. I am very unsure of my abilities to use computers.	Strongly Disagree □ 1 □ 2	Neutral □ 3 □ 4	Strongly Agree □ 5 □ 6
4. I seem to have difficulties with most of the packages I have tried to use.	Strongly Disagree □ 1 □ 2	Neutral □ 3 □ 4	Strongly Agree □ 5 □ 6
5. Computers frighten me.	Strongly Disagree □ 1 □ 2	Neutral □ 3 □ 4	Strongly Agree □ 5 □ 6
6. I enjoy working with computers.	Strongly Disagree □ 1 □ 2	Neutral □ 3 □ 4	Strongly Agree □ 5 □ 6

7.	I find computers get in the way of learning.	Strongly Disagree		Neutral		Strongly Agree	
		☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

8.	DOS-based computer packages don't cause many problems for me.	Strongly Disagree		Neutral		Strongly Agree	
		☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

9.	Computers make me much more productive.	Strongly Disagree		Neutral		Strongly Agree	
		☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

10.	I often have difficulties when trying to learn how to use a new computer package.	Strongly Disagree		Neutral		Strongly Agree	
		☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

11.	Most of the computer packages I have had experience with, have been easy to use.	Strongly Disagree		Neutral		Strongly Agree	
		☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

12.	I am very confident in my abilities to use computers.	Strongly Disagree		Neutral		Strongly Agree	
		☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

13.	I find it difficult to get computers to do what I want them to.	Strongly Disagree		Neutral		Strongly Agree	
		☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

14.	At times I find working with computers very confusing.	Strongly Disagree		Neutral		Strongly Agree	
		☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

15.	I would rather that we did not have to learn how to use computers.	Strongly Disagree		Neutral		Strongly Agree	
		☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

		Strongly Disagree		Neutral		Strongly Agree	
16.	I usually find it easy to learn how to use a new software package.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
17.	I seem to waste a lot of time struggling with computers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
18.	Using computers makes learning more interesting.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
19.	I always seem to have problems when trying to use computers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
20.	Some computer packages definitely make learning easier.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
21.	Computer jargon baffles me.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
22.	Computers are far too complicated for me.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
23.	Using computers is something I rarely enjoy.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
24.	Computers are good aids to learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
25.	Sometimes, when using a computer, things seem to happen and I don't know why.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

26. As far as computers go, I don't consider myself to be very competent.	Strongly Disagree			Neutral			Strongly Agree	
	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6		

27. Computers help me to save a lot of time.	Strongly Disagree			Neutral			Strongly Agree	
	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6		

28. I find working with computers very frustrating.	Strongly Disagree			Neutral			Strongly Agree	
	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6		

29. I consider myself a skilled computer user.	Strongly Disagree			Neutral			Strongly Agree	
	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6		

30. When using computers I worry that I might press the wrong button and damage it.	Strongly Disagree			Neutral			Strongly Agree	
	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6		

III. PERSONAL ATTRIBUTES QUESTIONNAIRE (PAQ)

DIRECTIONS: The items on the next page inquire about what kind of person you think you are. Each item consists of a pair of characteristics, with the numbers 1-5 in between. For example:

Not at all Artistic ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Very Artistic

Each pair describes contradictory characteristics. That is, you cannot be both at the same time, such as very artistic and not at all artistic. The numbers form a scale between the two extremes. You are to choose a number which best describes where you fall on the scale. For example, if you think you have no artistic ability, you would choose 1. If you think you are pretty good, you might choose 4. If you are only medium, you might choose 3, and so forth.

For the following 24 items, choose the number that best describes where you think you fall on the scale.

1.	Not at all Aggressive	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very Aggressive
2.	Not at all Independent	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very Independent
3.	Not at all Emotional	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very Emotional
4.	Very Submissive	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very Dominant
5.	Not at all excitable in a major crisis	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very excitable in a major crisis
6.	Very Passive	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very Active
7.	Not at all able to devote self completely to others	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Able to devote self completely to others
8.	Very Rough	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very Gentle
9.	Not at all helpful to others	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very helpful to others
10.	Not at all competitive	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very competitive
11.	Very home	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very worldly

12.	Not at all kind	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very kind
13.	Indifferent to others' approval	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Highly needful of others' approval
14.	Feelings not easily hurt	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Feelings easily hurt
15.	Not at all aware of feelings of others	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very aware of feelings of others
16.	Can make decisions easily	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Has difficulty making decisions
17.	Gives up very easily	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Never gives up easily
18.	Never cries	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Cries very easily
19.	Not at all self-confident	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very self-confident
20.	Feels very inferior	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Feels very superior
21.	Not at all understanding of others	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very understanding of others
22.	Very cold in relations with others	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very warm in relations with others
23.	Very little need for security	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Very strong need for security
24.	Goes to pieces under pressure	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	Stands up well under pressure

You have now completed the Survey. Thank you for your time.

APPENDIX D

Emails sent to Distance Education Instructors and Students

Prenotification Email to Distance Education Instructors

Dear Instructor/Professor,

The purpose of this email is to request your assistance in completing a research study on student persistence in distance education. As a doctoral student at the University of Louisville, I am conducting research to determine which factors contribute to student persistence in online environments. The results of this study may assist college administrators and admission advisors in screening students who are likely to be either successful or unsuccessful in a distance education environment, as well as students who are considering pursuing degrees via distance education. I will be collecting data from distance education students in the state of Kentucky during the month of November 2005.

Your willingness to forward the email request below to all of your online students and encouragement to participate in this study will help facilitate understanding as to why students persist or fail to persist in distance education. In three days, another email will be sent requesting participation, along with Weblink to the online survey. You will be asked to forward this email as well. This survey does not contain any identifying questions; therefore, students can be sure that their identities will remain anonymous.

Please contact me if you have any questions or concerns. Thank you for your consideration in forwarding this email to the online students enrolled in your course(s).

Regards,

Jennifer Hammond
Doctoral Student
University of Louisville

Dear Student,

I am a doctoral student at the University of Louisville and am collecting data for my dissertation on persistence in distance education. This is an introductory email to inform you of the upcoming study that will take place in the month of November 2005. In three days, you will receive another email with a request for participation, along with the Weblink to the online survey. Your participation is voluntary and would consist of completing the Web-based survey, which will take about 15 minutes of your time. The survey does not contain any identifying questions; therefore, your identity will remain anonymous.

Thank you for considering my invitation to participate in this study. Your contribution may help other students who are considering enrolling in online courses.

Regards,

Jennifer Hammond
Doctoral Student
University of Louisville

Dear Instructor/Professor,

The research study you were notified about three days ago is about to begin. I kindly ask that you forward the request below to all of your online students. In two weeks, you will receive a thank you/reminder email to be sent to students thanking them for participating and reminding them of the study if they have not already completed the survey. You will be asked to forward this email as well.

Thank you for your consideration in forwarding the email below to the online students enrolled in your course(s).

Regards,

Jennifer Hammond
Doctoral Student
University of Louisville

Dear Student,

As a student enrolled in a distance education course, you are being invited to participate in a research study sponsored by Dr. Carolyn R. Parkins, at the University of Louisville and conducted by Jennifer R. Hammond. The purpose of this study is to determine the predictors of student persistence (i.e., successful course completion) in distance education courses.

Your participation is voluntary and would consist of completing the Web-based survey, which will take about 15 minutes of your time. As mentioned in the previous email, your identity will remain anonymous. You can access the survey by clicking on the following link:

http://www.zoomerang.com/survey.zgi?p=WEB224R4Q2WB9Q

Thank you for considering my invitation to participate in this study. Your contribution may help other students who are considering pursuing degrees via distance education.

Regards,

Jennifer Hammond
Doctoral Student
University of Louisville

Dear Instructor/Professor,

This is a second reminder regarding a doctoral research study on student persistence in distance education. In order for this research study to be a success, we will need between 200-300 respondents. At this point, your school has had **(X)** respondents. Please forward the reminder email below to your online students, as well as encourage those who haven't yet filled out the survey to please do so.

Your assistance has been greatly appreciated.

Regards,

Jennifer Hammond
Doctoral Student
University of Louisville

Dear Student,

For those of you who have not yet completed the Web-based survey regarding student persistence in distance education, the Weblink will remain active until **December 2nd**. You can access the survey by clicking on the following link: **http://www.zoomerang.com/survey.zgi?p=WEB224R4Q2WB9Q**

At this point, your school has had **(X)** respondents. In order for this study to be a success, 200-300 respondents are needed. Your responses are very valuable to this study and greatly appreciated.

I would like to thank each of you who have already completed the Web survey. Your contribution to this study will help other students, such as yourself, as well as students considering enrolling in distance education courses.

Regards,

Jennifer Hammond
Doctoral Student
University of Louisville

Dear Instructor/Professor,

This is the final email regarding a doctoral research study on student persistence in distance education. In order for this research study to be a success, we will need between 200-300 respondents. At this point, your school has had **(X)** respondents, which translates to about an **(X%)** response rate. Therefore, I am asking that you please forward the thank you/reminder message below to your online students, as well as encourage those who haven't yet filled out the survey to please do so.

Your assistance has been greatly appreciated.

Regards,

Jennifer Hammond
Doctoral Student
University of Louisville

Dear Student,

For those of you who have not yet completed the Web-based survey regarding student persistence in distance education, the Weblink will remain active until the **December 2nd**. You can access the web-survey by clicking on the following link: **http://www.zoomerang.com/survey.zgi?p=WEB224R4Q2WB9Q**

At this point, your school has had **(X)** respondents. In order for this study to be a success, 200-300 respondents are needed. Therefore, I am asking that you please take time to complete the survey, which will take about 15 minutes. Your responses are very valuable to the success of this study and greatly appreciated.

I would like to thank each of you who have already completed the survey. Your contribution to this study will help other students, such as yourself, as well as students considering enrolling in distance education courses.

Regards,

Jennifer Hammond
Doctoral Student
University of Louisville

Table 33

PAQ Items and Factor Loading Obtained with Varimax Rotation with Kaiser Normalization

Factor 1	Item #	Bipolar Item	Loading
	6.	Very passive/Very active	.69
	1.	Not at all aggressive/Very aggressive	.69
	10.	Not at all competitive/Very competitive	.68
	4.	Very submissive/Very dominant	.64
	20.	Feel very inferior/Feels very superior	.64
	19.	Not at all self-confident/Very self-confident	.59
	17.	Gives up very easily/Never gives up easily	.58
	24.	Goes to pieces under pressure/Stands up well under pressure	.58
	16.	Can make decisions easily/Has difficulty making decisions	.53
	2.	Not at all independent/Very independent	.50
Factor 2	Item #	Bipolar Item	Loading
	21.	Not at all understanding of others/Very understanding of others	.78
	12.	Not at all kind/Very kind	.77
	15.	Not at all aware of feelings of other's/Very aware of feelings of others	.76
	22.	Very cold in relations with others/Very warm in relations with others	.69
	9.	Not at all helpful to others/Very helpful to others	.66
	8.	Very rough/Very gentle	.57
	7.	Not at all able to devote self completely to others/Able to devote self completely to others	.52
Factor 3	Item #	Bipolar Item	Loading
	3.	Not at all emotional/Very emotional	.78
	14.	Feelings not easily hurt/Feelings easily hurt	.71
	18.	Not at all self-confident/Very self-confident	.71
	5.	Not at all excitable in a major crisis/Very excitable in a major crisis	.64
	23.	Very little need for security/Very strong need for security	.56
	13.	Indifferent to others' approval/Highly needful of others' approval	.43

Correlation Matrix for Personal Attributes Questionnaire (PAQ)

PAQ Item	1	2	3	4	5	6	7	8	9	10	11	12
1	–											
2	.23**	–										
3	-.07	-.04	–									
4	.41**	.29**	-.13*	–								
5	.09	-.12*	.35**	.06	–							
6	.36**	.26**	-.05	.42**	.12*	–						
7	-.10*	.11*	.26**	.02	.11*	.13*	–					
8	-.39**	.10	.21**	-.23**	.04	-.07	.33**	–				
9	.04	.27**	.12*	.11*	-.01	.16**	.32**	.21**	–			
10	.42**	.24**	-.03	.32**	.09	.40**	.10*	-.14*	.14*	–		
11	.22**	.21**	-.16**	.15**	-.06	.21**	-.06	-.15*	.04	.12*	–	
12	-.18**	.16**	.20**	-.03	.06	.02	.37**	.37**	.53**	-.04	-.03	–

Note: $N = 288 - 292$, $^*p < .05$, $^{**}p < .01$.

PAQ Item	1	2	3	4	5	6	7	8	9	10	11	12
13	-.21**	-.18**	.23**	-.16**	.16**	-.12*	.08	.18*	.03	-.05	-.06	.17**
14	-.25**	-.10*	.56**	-.20**	.33**	-.18**	.24*	.26**	.06	-.12*	-.24**	.25**
15	-.16**	.08	.10*	-.09	-.04	.03	.27*	.38**	.39**	-.08	-.01	.54**
16	.32**	.33**	-.35**	.33**	-.25**	.29**	-.03	-.17*	.08	.22**	.19**	-.04
17	.31**	.34**	-.12*	.27**	-.14**	.33**	.12*	-.02	.27**	.38**	.17**	.10
18	-.22**	-.08	.62**	-.17**	.30**	-.14*	.16**	.25**	.02	-.14*	-.15**	.18**
19	.31**	.33**	-.32**	.28**	-.11*	.35**	-.01	-.09	.16**	.26**	.18**	.01
20	.37**	.26**	-.19**	.33**	-.14**	.38**	-.05	-.14*	.10*	.41**	.15**	-.07
21	-.10*	.09	.10*	-.12*	-.02	.08	.32**	.29**	.46**	-.07	.07	.51**
22	-.12*	-.01	.23**	-.01	.10	.12*	.36**	.31**	.38**	-.01	-.02	.49**
23	-.15**	-.07	.41**	-.12*	.13*	-.02	.19**	.24**	.07	-.08	-.14*	.11*
24	.34**	.33**	-.22**	.32**	-.25**	.31**	.01	-.17**	.16**	.32**	.22**	.01

Note: N = 288 – 292, *p < .05, **p < .01.

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PAQ Item	13	14	15	16	17	18	19	20	21	22	23	24
13	–											
14	.44**	–										
15	.18**	.18**	–									
16	-.32**	-.34**	-.07	–								
17	-.21**	-.20**	.08	.40**	–							
18	.17**	.51**	.14**	-.42**	-.20**	–						
19	-.37**	-.30**	.03	.49**	.37**	-.22**	–					
20	-.34**	-.34**	-.13*	.43**	.30**	-.25**	.54**	–				
21	.01	.08	.59**	-.02	.17**	.11*	.11*	-.03	–			
22	.04	.10*	.46**	.02	.04	.15**	.14*	.06	.51**	–		
23	.29**	.40**	.19**	-.25**	-.07	.46**	-.22**	-.18**	.15**	.18**	–	
24	-.24**	-.31**	.06	.49**	.43**	-.30**	.43**	.40**	.11*	.12*	-.13*	–

Note: N = 288 – 292, *p < .05, **p < .01.

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Table 34

Other Background Characteristics: Degree Type and Credit Hours

Characteristics	Frequency	Percentage
Degree type		
Associate's	30	10.24
Bachelor's	192	65.53
Master's	56	19.11
Other/Not Pursuing Degree	15	5.12
Total	293	100
Credit Hours		
25 or less	74	26.61
26 - 50	54	19.42
51 - 75	40	14.39
76 - 100	49	17.63
101 – 125	35	12.59
126 – 150	16	5.76
151 or greater	10	3.60
Total	278	100

Appendix H

Table 35

Other Background Characteristics: Computer Access, Training, and Ownership

Characteristics	Frequency	Percentage
Computer Access (when not at work or school)		
Yes	286	97.95
No	6	2.05
Total	292	100
Computer Training Course		
Yes	163	55.82
No	129	44.18
Total	292	100
Computer Ownership		
Yes	282	96.58
No	10	3.42
Total	292	100

Table 36

CUSE Items and Factor Loading Obtained with Varimax Rotation with Kaiser Normalization

Factor 1: Negative Experiences with Computers

Item #	Item Statement	Loading
28.	I find working with computers very frustrating.	.70
19.	I always seem to have problems when trying to use computers.	.66
30.	When using computers I worry that I might press the wrong button and damage it.	.67
17.	I seem to waste a lot of time struggling with computers.	.66
22.	Computers are far too complicated for me.	.66
13.	I find it difficult to get computers to do what I want them to.	.63
5.	Computers frighten me.	.62
26.	As far as computers go, I don't consider myself to be very competent.	.62
14.	At times I find working with computers very confusing.	.62
4.	I seem to have difficulties with most of the packages I have tried to use.	.55
25.	Sometimes, when using a computer, things seem to happen and I don't know why.	.53
23.	Using computers is something I rarely enjoy.	.50
21.	Computer jargon baffles me.	.45

CUSE Items and Factor Loading Obtained with Varimax Rotation with Kaiser Normalization

Factor 2: Computer Confidence and Competence

Item #	Item Statement	Loading
1.	Most difficulties I encounter when using computers, I can usually deal with.	.71
12.	I am very confident in my abilities to make use of computers.	.71
2.	I find working with computers very easy.	.69
16.	I usually find it easy to learn how to use a new software package.	.66
29.	I consider myself to be a skilled computer user.	.65
11.	Most of the computer packages I have had experience with, have been easy to use.	.61
8.	DOS-based computer packages don't cause many problems for me.	.57
3.	I am very unsure of my abilities to use computers.	.55

CUSE Items and Factor Loading Obtained with Varimax Rotation with Kaiser Normalization

Factor 3: Learning and Productivity

Item #	Item Statement	Loading
24.	Computers are good aids to learning.	.82
18.	Using computers makes learning more interesting.	.81
20.	Sometimes computer packages definitely make learning easier.	.69
27.	Computers help me to save a lot of time.	.69
9.	Computers make me much more productive.	.66
7.	I find that computers get in the way of learning.	.52
6.	I enjoy working with computers.	.51
15.	I would rather that we did not have to learn how to use computers.	.47

Appendix J

Correlation Matrix for Computer User Self-efficacy (CUSE) Scale

CUSE Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	–													
2	.74**	–												
3	.56**	.63**	–											
4	.50**	.50**	.53**	–										
5	.36**	.50**	.47**	.54**	–									
6	.51**	.59**	.47**	.40**	.49**	–								
7	.24**	.30**	.26**	.30**	.39**	.32**	–							
8	.35**	.36**	.24**	.29**	.15**	.32**	.03	–						
9	.52**	.58**	.43**	.39**	.44**	.56**	.42**	.22**	–					
10	.40**	.44**	.36**	.44**	.38**	.32**	.33**	.27**	.43**	–				
11	.47**	.56**	.45**	.36**	.43**	.44**	.19**	.22**	.50**	.44**	–			
12	.66**	.76**	.61**	.48**	.51**	.62**	.28**	.32**	.60**	.44**	.63**	–		
13	.48**	.59**	.46**	.50**	.43**	.47**	.43**	.25**	.50**	.48**	.40**	.53**	–	
14	.40**	.57**	.46**	.43**	.49**	.41**	.31**	.21**	.40**	.34**	.39**	.53**	.54**	–
15	.33**	.43**	.32**	.32**	.37**	.34**	.31**	.13*	.41**	.25**	.29**	.37**	.42**	.24**

Note: $N = 288 - 292$, *$p < .05$, **$p < .01$.

CUSE Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	.58**	.58**	.42**	.46**	.40**	.50**	.24**	.28**	.48**	.53**	.60**	.68**	.45**	.42**	.32**
17	.46**	.58**	.42**	.45**	.42**	.46**	.36**	.19**	.48**	.51**	.44**	.56**	.63**	.53**	.35**
18	.39**	.47**	.31**	.30**	.39**	.57**	.44**	.19**	.58**	.41**	.45**	.49**	.38**	.33**	.40**
19	.54**	.61**	.53**	.53**	.51**	.50**	.42**	.31**	.52**	.50**	.46**	.64**	.68**	.54**	.50**
20	.47**	.49**	.36**	.34**	.30**	.51**	.31**	.25**	.56**	.37**	.45**	.50**	.38**	.27**	.33**
21	.26**	.34**	.28**	.26**	.24**	.28**	.20**	.22**	.31**	.22**	.17**	.33**	.30**	.36**	.15**
22	.41**	.48**	.38**	.41**	.44**	.41**	.28**	.18**	.35**	.37**	.36**	.49**	.50**	.41**	.44**
23	.31**	.42**	.36**	.43**	.50**	.45**	.31**	.20**	.40**	.30**	.36**	.41**	.36**	.34**	.40**
24	.41**	.44**	.32**	.29**	.37**	.53**	.41**	.23**	.60**	.28**	.39**	.47**	.40**	.27**	.47**
25	.30**	.34**	.27**	.28**	.30**	.28**	.30**	.12*	.35**	.27**	.23**	.28**	.33**	.38**	.19**
26	.53**	.58**	.49**	.41**	.45**	.40**	.30**	.20**	.43**	.40**	.38**	.55**	.51**	.46**	.36**
27	.52**	.57**	.45**	.38**	.42**	.58**	.41**	.22**	.75**	.43**	.49**	.54**	.56**	.38**	.48**
28	.42**	.53**	.44**	.49**	.49**	.47**	.30**	.22**	.42**	.37**	.44**	.54**	.60**	.54**	.37**
29	.65**	.72**	.54**	.47**	.42**	.55**	.25**	.32**	.51**	.42**	.50**	.70**	.52**	.48**	.37**
30	.42**	.47**	.47**	.46**	.60**	.34**	.33**	.10*	.41**	.39**	.30**	.45**	.46**	.37**	.38**

Note: $N = 288 - 292$, *$p < .05$, **$p < .01$.

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CUSE Item	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
16	–														
17	.50**	–													
18	.40**	.47**	–												
19	.52**	.70**	.43**	–											
20	.45**	.40**	.65**	.43**	–										
21	.27**	.43**	.21**	.37**	.28**	–									
22	.44**	.54**	.30**	.62**	.32**	.35**	–								
23	.34**	.43**	.41**	.46**	.29**	.23**	.38**	–							
24	.36**	.46**	.69**	.49**	.64**	.22**	.35**	.40**	–						
25	.24**	.45**	.28**	.33**	.22**	.35**	.29**	.25**	.25**	–					
26	.44**	.55**	.31**	.57**	.30**	.31**	.50**	.43**	.36**	.34**	–				
27	.44**	.56**	.59**	.61**	.57**	.35**	.47**	.43**	.68**	.28**	.46**	–			
28	.42**	.59**	.34**	.65**	.33**	.34**	.59**	.48**	.40**	.36**	.56**	.48**	–		
29	.56**	.55**	.42**	.58**	.45**	.39**	.54**	.37**	.37**	.28**	.60**	.55**	.56**	–	
30	.38**	.50**	.32**	.53**	.34**	.28**	.49**	.37**	.33**	.34**	.47**	.42**	.49**	.44**	–

Note: $N = 288 - 292$, $^*p < .05$, $^{**}p < .01$.

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CURRICULUM VITAE

NAME: Jennifer R. Hammond

ADDRESS: 422 Las Palmas Drive
           Irvine, CA 92602

DOB: Louisville, Kentucky – June 2, 1975

EDUCATION: B.A., Sociology
               University of Louisville
               1993 – 1997

               M.S., Social Work
               Kent School of Social Work
               University of Louisville
               1998 – 2001

               Ph.D., Educational Leadership and Organization
               Development
               University of Louisville
               2002 – 2006

PROFESSIONAL
EXPERIENCE: Hazard Trainer
               ZC Sterling
               Irvine, California
               2005 – present

               Curriculum Designer
               Extron Electronics
               Anaheim, California
               2004 – 2005

               Online Learning Developer/Trainer
               United Parcel Service
               Louisville, Kentucky
               1999 – 2004