An Exploration of Factors Related to the Completion of Distance Education Coursework

Juhong (Christie) Liu

Dissertation submitted to the Faculty of the Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Curriculum and Instruction
(Instructional Design and Technology)

Dr. Barbara Lockee, Co-chair
Dr. Mike Moore, Co-chair
Dr. John Burton
Dr. Peter Doolittle
Dr. Ken Potter
Dr. Tom Wilkinson

April 4, 2007
Blacksburg, VA

An Exploration of Factors Related to the Completion of Distance Education Coursework

Juhong (Christie) Liu

ABSTRACT

With the fast growth of online education, factors influential to course completion need to be examined. Statistically, this study explored the relationship between five course status factors identified in the literature and the completion of previously incomplete online courses in a course-based approach. The five factors were about the curricular and completion status of an online course with an initially assigned "*Incomplete*" grade, including credit hours, required assignments, initially submitted assignments, initially earned points, and duration of incomplete status. The extent of coursework completion was measured by the subsequently completed assignments and subsequently earned points. Online courses ($n = 933$) offered with the 15 different course titles in an online graduate degree program and assigned an "*Incomplete*" grade in their registration terms between fall 2001 and fall 2005 were used as the units of data analysis. Multiple regression, logistic regression, descriptive statistics analyses, Chi-square tests, and independent t-tests were used for the statistical analysis. The results showed that there were significant differences ($\alpha = .05$) in the required assignments, initially submitted assignments, initially earned points, and duration of incomplete status between the courses that were completed eventually and those that remained incomplete. According to the statistically significant results, the set of the five course status variables could explain 93.6% of the variance in the completion measured by the subsequently completed assignments and account for 87% of the variance in the completion measured by the subsequently earned points. The statistically significant results also indicated that the set of the five variables could be used to predict the

probability of the coursework completion. Regarding the individual variables, the statistically significant results identified the required assignments and initially submitted assignments as the

factors contributing to the explanation of the variance in the coursework completion measured by the subsequently completed assignments; the credit hours, required assignments, initially earned points, and duration of incomplete status as the factors contributing to the explanation of the variance in the coursework completion measured by the subsequently earned points. The required assignments and duration of incomplete status were identified as significant predictors of the completion.

ACKNOWLEDGEMENTS

The journey to complete this research project and related accomplishment would not have been possible without the direction, support, and assistance from many people. To these individuals, I'm extending my deepest appreciation.

First of all, my greatest gratitude goes to my advisors and committee professors for their guidance and trust throughout the journey. The advisement and care from my advisor, Dr. Barbara Lockee, accompanied me through both the plan and details of this journey. My appreciation to her is beyond verbal expression. Her expertise in distance education, teaching, and research, and her scholarly and caring manner for her students influenced me deeply, which I hope to emulate in my future career. My special thanks go to Dr. Mike Moore who agreed to be my co-advisor at the critical moment. I can't possibly thank him enough for his experienced insights, explicit directions, and detailed reviews to guide me at the final stages of this research.

My hearty gratefulness and respect are extended to Dr. John Burton for his decisive and continued support, belief in my ability to carry out this project, and openness to diversified research needs. The success of this journey is also indebted to Dr. Ken Potter who broadened my view on instructional technology and distance education. His patient enlightenment enabled me to select this research. Without his side-by-side guidance, tremendous time investment, and proficiency in the database management, the final stages of this research would not have been so smooth. I would also like to thank Dr. Peter Doolittle for his gracious support and humor, which helped me survive the most frustrating times and also engraved this quote on my mind, "No act of kindness, no matter how small, is ever wasted". Dr. Tom Wilkinson is another invaluable role model on my committee. His dissertation got me started on this journey. His leadership and discernment in distance education have always let me know where I should improve.

iv

in finishing the IDT program. My thanks also go to Mrs. Mary Ellen Pierson who introduced me to the research data for the first time.

Many other people also made my time at Blacksburg unforgettable. I would like to thank Mr. Ed Schwartz and Dr. Eddie Watson for their mentoring in the field of faculty development. My acknowledgement also goes to Mr. Marc Zaldivar and Mr. Jamie Bishop for being great colleagues with all the help and cultural resources. Ms. Terry Davis, Lori Berry, Nancy Nolen, and Kathy Tickle in the School of Education, Ms. JoAnn Michaels and Judy Alford in the Faculty Development Institute were always there to help. Sincere appreciations are also extended to the friends and families in Blacksburg, the Lo's, the Fan's, the Schumann's, the Ho's, Dr. Zhenquan Jia, and many others. Their help and encouragement, both spiritually and physically, have been with my family and me through these years.

This research project is built on the basis of the previous studies. I would like to thank the following individuals for their generosity of sharing the dissertations or instruments: Dr. Todd M. Jamison, Dr. Jan Visser, Dr. Lya Visser, Dr. Donna M. Gabrielle, and Dr. Pamela Northrup.

Finally, I must acknowledge the great source of strength from my family. My parents strived to prepare me with the conscientiousness in learning which, until now, I have never known how valuable it was. The supportiveness from my siblings and in-laws in China paved the way for the pursuit of my academic goals. My beloved son, Howard, is a character in this journey, too. He is the first reader to test the readability of my writings and always understanding when I had to focus on the research and neglected him. My strength also came from the most important person in my life, my husband Tianming. His whole-hearted love and scientist's discerning vision have escorted me through the laughs, tears, and milestones all these years.

Table of Content

List of Tables

Chapter One: Introduction

Distance learning activities are distinctive in that they take place in locations that are different from those of instructional resources and personnel. Distance education makes it possible for individuals to get formal education without presenting themselves in face-to-face classrooms. This allows people to obtain formal education at a time and place convenient to them. To ensure successful learning and teaching activities in non-contiguous settings, educational institutions make special arrangements for technology, course design and development, and administration (Schlosser & Simonson, 2003; Simonson, Smaldino, Albright, & Zvacek, 2000). Various technologies are used to deliver instructional materials and to facilitate communication between teaching and learning groups and among individuals in the learning group (Head, Lockee, & Oliver, 2002; Keegan, 1996; Moore, 1973; Zvacek, 2004). With the fast evolution of technologies and a growing demand of educational opportunities, distance education programs are expanding (Allen & Seaman, November, 2006; Reeves, 2000; Saba, 2005). Currently, most learning and teaching activities in distance education take place in online environments that are supported and furnished with computer-mediated technologies and network connections (National Center for Educational Statistics, 2003; Smith, 2005).

Growth of Online Distance Education

Online is "becoming a default delivery medium" (Sims, 2006, p. 138) for learning and training as online technologies and resources are widely available and more accessible. Online education has opened flexible channels for people with different needs to obtain education and does not require a learner's physical presence on a brick-and-mortar campus. With online education systems, individuals not only can renew their knowledge and skills independent of the time and location requirements of learning activities, but also can perform almost all the

activities related to their educational pursuit from a remote site. These activities include but are

not limited to registration in online courses, access to instructional content, submission and

assessment of learning activities, and communication between learners and instructors, and

between learners and support personnel as well as among distance learners. Accordingly, the

enrollment in online education is continually increasing and online course/program offerings are

developing rapidly.

The fast growth of online education is evident in several aspects. First, over 90% of the

post-secondary institutions in the United States use the Internet as the primary technology to

deliver their distance education courses and/or programs (National Center for Educational

Statistics, 2003). Second, online course offerings have become pervasive at various levels in

higher education institutions. The Sloan Consortium, a consortium of American institutions and

organizations committed to the research and effective practices in online education, defines

online courses as "those in which at least 80 percent of the course content is delivered online"

(Allen & Seaman, November, 2006, p. 4). In 2004, 62.5% of the colleges and universities in the

United State that were surveyed by the Sloan Consortium offered undergraduate online courses

and 26% offered graduate-level courses (Allen & Seaman, November, 2005). More than 96% of

these institutions with over 15,000 enrollments offered online courses/programs in 2005 (Allen

& Seaman, November, 2006). Third, more and more individuals have been enrolled in online

courses for further education or knowledge renewal. In the fall term of 2005, nearly 3.2 million

students enrolled in at least one online course. Compared to the 2.3 million enrollments in the

fall term of 2004, the increase was 35% in just one year. Online enrollments were 17% of the

total higher education students in fall 2005 (Allen & Seaman, November, 2006). Fourth, online

courses and programs are becoming more diversified. In fall 2003, most discipline areas in

higher education had online offerings, including business, computer and information sciences, education, health professions and related sciences, liberal arts and sciences, humanities, psychology, social sciences and history, and many other programs. This trend will continue, even with more entire online degree programs (Allen & Seaman, November, 2005, November, 2006). Fifth, online education is becoming a long-term strategy of development at most institutions. In 2005, nearly 74% of the surveyed public colleges and universities believed that online education would be a key to their long-term development strategies, compared to 66% in 2004 (Allen & Seaman, November, 2005). Finally, policymakers are encouraging effective adoption of distance education and increasing online access to learning opportunities in higher education in the United States (U.S. Department of Education, 2006). Starting from July 1, 2006, the Department of Education began to eliminate 50% of the restrictions on distance education, mainly focusing on telecommunication courses using the Internet as a major delivery technology (U.S. Department of Education, Office of Postsecondary Education, & Office of Policy Planning and Innovation, 2005).

Flexibility and Challenges in Distance Education Systems

Compared with traditional face-to-face education, distance education possesses unique features. Its uniqueness is mainly reflected in the separation between learning and teaching activities. With various constraints imposed by their locations, work, or other schedules, many individuals at different ages and with diversified interests pursue education in distance learning environments (National Center for Educational Statistics, 2003). On the one hand, they need to take care of multiple obligations while studying distance courses for educational credentials or knowledge enrichment. Conducting most of the learning activities independently, they can choose their own schedule and methods of learning performance. On the other hand, separated

from host institutions, distance students may need to make adjustments to "transactional distance" (Moore, 1993, p. 22). They may face challenges such as getting used to technology-facilitated learning environments and being capable of using online resources. Any happenings with their other commitments in life may distract them from keeping up with the study schedule required by distance learning. Due to these characteristics of distance learning, educational institutions have special policies to allow flexibility for students to complete coursework. For example, in the Open University of the United Kingdom (UKOU), students registered in distance courses would be allowed to "take as many years off as they like" in the process of finishing the courses (Woodley, 2004, p.55).

While the inherent flexibility of distance learning systems can be very accommodating for learners, related issues such as course completion/non-completion, retention, procrastination, and dropout have become prominent concerns (Barefoot, 2004; Berge & Huang, 2004; Cookson, 1989; McIntosh, Woodley, & Morrison, 1983; Rekkedal, 1982; Rumble, 1992; Shale, 1982; Simpson, 2003; Woodley & Parlett, 1983). Delays in completing coursework can result in not completing a course. If the required coursework of a registered course has not been finished by the end of the registration term, a grade of "I" for "*Incomplete*" grade would be assigned. Multiple incomplete courses can lead to dropout, that is, a student's cessation of performing any learning activities for registered courses (Rekkedal, 1982; Simpson, 2003; Woodley, 2004; Woodley & Parlett, 1983).

The flexibility of distance education, however, also has positive implications. Coursework completion of previously incomplete courses reflects flexible assessment policies in distance learning systems. Distance programs can allow students to arrange their learning progress in a self-paced way and finish the previously incomplete courses at their discretion

(Simpson, 2003). Once the required coursework for a previously incomplete course is finished, the "*Incomplete*" grade can be changed to a letter grade, such as "*A*", "*B*", "*C*", etc. The completion and grade change are directly related to the attainment of course credit or credentials of educational qualification. Completing courses also enhances students' learning experiences, and at the same time, increases the retention rate in distance courses and/or programs (Ashby, 2004). For example, in the record for UKOU history, about 200 students picked up learning activities 30 years after leaving their student status to finish their previously registered courses so as to obtain their educational credentials (Simpson, 2003)!

Problem Statement

Coursework completion is one of the major sources contributing to the increase in retention rates in distance education. In this study, retention refers to the completion of an online course. It can also indicate the persistence and progress through an enrolled program (Ashby, 2004; Tait, 2004). However, even though online distance education is developing at an accelerating rate, retention and completion have remained as issues of concern for education practitioners, administrators, and policy-makers (Morris, Wu, & Finnegan, 2005; Simpson, 2004; U.S. Department of Education, Office of Postsecondary Education, & Office of Policy Planning and Innovation, 2005). To tackle these issues, researchers have proposed and explored various guidelines and strategies (Gaide, 2005; Simpson, 2003; Tresman, 2002). The commonality that these proposals share is the improvement of informed advisement, support, and services to distance learners. To realize this improvement, institutions that offer distance education should collect and analyze information about factors related to distance courses to diagnose the needs for possible interventions (Ashby, 2004).

Very little research has directly focused on retention in distance education (Simpson, 2004). Dropout and course non-completion are the threats to retention. These have been examined from different perspectives. To find factors that are related to distance courses and may be influential to coursework completion of previously incomplete courses, research on course completion, non-completion, and dropout are reviewed. In the literature, some factors have been identified closely related to potential dropout in distance learning. The identified factors include those inherent to distance learners, such as age and gender; those related to previous learning performance, such as GPA (grade point average) obtained; and those related to the course status of a registered distance course, such as the course workload, credit hours designated for a distance course, number of required assignments of an online course, number of assignments completed for a registered course, and length of time for which a distance course has been registered and not completed (Billings, 1988; Kellogg, 2003; Kember, 1995; Kennedy & Powell, 1976; Moskal & Dziuban, 2001; Muilenburg & Berge, 2005; Rekkedal, 1982; Shale, 1982; Sweet, 1986; Wong & Wong, 1978-1979; Woodley & Parlett, 1983). Comparatively, research on factors related to the curricular and completion status of distance courses can provide information that an education institution can manipulate for the improvement of retention (Ashby, 2004; Tresman, 2002). A course-based approach is recommended to analyze the information about course components so as to gain insight into issues related to retention in distance education systems in which the registration is course-based (Ashby, 2004).

Since the coursework completion of previously incomplete courses is important for the improvement of retention, it is a research topic of practical value to the fast development of online education. It would be beneficial to investigate how the course status factors are related to the coursework completion and to examine if these factors can predict the likelihood that a

previously incomplete course would be finished. In addition, in the previous studies, these factors were investigated only as individual variables related to the likelihood of individual course completion or non-completion, and usually in a short range of time. As more and more entire educational programs are offered online (Allen & Seaman, November, 2006), it is also meaningful to explore the relationship between the course status factors and the completion of previously incomplete online courses in an entire online program over several years.

Purpose of the Study

The purpose of this research was to statistically explore the relationship between the course status factors identified in the literature and the coursework completion of previously incomplete online courses. Three foci served this primary purpose:

(1) To statistically determine the extent of coursework completion that can be explained collectively and individually by the factors of online course status;

(2) To statistically explore if these factors can predict the likelihood that a previously incomplete online course would be finished;

(3) To statistically examine the differences in these factors between the online courses that were finished after an "*Incomplete*" grade had been assigned and those that still remain incomplete.

Multivariate and correlational approaches were used to realize the purpose and related foci of this study. The course status factors that were collectively analyzed in this study were those that could be manipulated by an educational institution, including: (1) the number of credit hours designated for an online course; (2) the number of required assignments of an online course; (3) the number of assignments completed when the "*Incomplete*" grade was initially assigned to a course; (4) the points (that is, the basic grading units of course assessment in the

online program in this study) earned for the submitted assignments when the "*Incomplete*" grade was initially assigned; (5) the duration of the "*Incomplete*" status with which a course has been kept not completed, measured as days between the grant of the "*Incomplete*" grade and the grade change. The coursework completion was measured by two indicators: (1) the number of assignments that were submitted between the initial grant of the "*Incomplete*" grade and the grade change; (2) the points that a course earned between the time when an "*Incomplete*" grade was assigned and the time when the grade change was requested for this course. The completion status was represented by having a grade change from a previously assigned "*Incomplete*" grade.

An online course with an "*Incomplete*" grade assigned at the end of its registration term, either completed subsequently or remaining unfinished, was the unit of analysis. Taking a course-based approach, this research examined the coursework completion of the online courses registered under 15 different course titles and assigned an "*Incomplete*" grade in the 17 consecutive terms between fall 2001 and fall 2005. The data were collected from an online Master's degree program in education. Totally 933 online courses with an initially assigned "*Incomplete*" grade were used for the data analysis. The study used standard multiple regression, logistic regression, analyses of descriptive statistics, Chi-square tests, and independent *t*-tests to analyze the data. The results of this study revealed the statistical relationship between the multiple pre-identified factors and distance coursework completion, both collectively and individually. The descriptive and predictive relationship between these factors and the coursework completion should be applicable in the realistic settings of online education to diagnose the need of interventions for incomplete courses.

Definition of Terms

To maintain the consistency of the context, key terms used in this study are defined as follows:

Attrition	Formal and informal discontinuation of studying for the registered course(s) in an educational program.
Completed course	An online course that was initially assigned an "*Incomplete*" grade but was completed eventually and had a grade change.
Coursework completion	The completion of remaining assignments for a registered distance course after this course was assigned an "*Incomplete*" grade. In this study, the extent of completion is measured by the number of assignments submitted and the points earned for the submitted assignments between the time when the "*Incomplete*" grade was initially awarded and the time of grade change. Its status is indicated by the request of grade change.
Dropout	The outcome that a student stops learning activities for registered course(s) and has not formally requested withdrawal from the course(s).
Grade change	The status indicating that the required coursework for a previously incomplete course has been completed and that the course qualifies for the awarding of its designated credit hours. With a grade change request, an "*Incomplete*" grade can be converted to a letter grade of "*A*", "*B*", "*C*", etc. in the online program of this research project.

Incomplete   The grade assigned to a registered distance course by the grading

deadline of its registration semester, which indicates the course non-

completion status, that is, the required coursework has not been

completed.

Point   The basic grading unit of course assessment, representing the quantity

and quality of learning activity performance, in the program of this

study.

Retention   The completion of an online course.

Unfinished   An online course that was initially assigned an "*Incomplete*" grade and
course
did not have a grade change or had a change from "*Incomplete*" to "*F*"

due to the remaining coursework.

Chapter Two: Literature Review

Distance learning is both convenient and challenging to students. Distance learners are not required to be present on campus. They can carry out learning activities at their own pace. Since most students participating in distance learning need to take care of many other commitments, any incident at work or in life may affect their ability to complete coursework. This usually induces problems such as coursework delay, course non-completion, and dropout. Therefore, retaining distance learners through the completion of their registered courses or enrolled program has been a concern and a goal for improvement (Ashby, 2004; Case & Elliot, 1997; Simpson, 2003; Tresman, 2002; U.S. Department of Education, Office of Postsecondary Education, & Office of Policy Planning and Innovation, 2005).

In the literature of distance education, retention is usually discussed in relation to course completion/non-completion and dropout. Course non-completion has been identified as a major source of potential dropout (Rekkedal, 1982; Simpson, 2003; Woodley, 2004). In contrast, course completion directly leads to the increase of retention rate (Tait, 2004; Tresman, 2002). In this research project, a special phenomenon of course completion, the completion of previously incomplete online courses, was studied.

To optimize the scalability of distance learning and ensure that learners can make the best of their learning experiences, distance programs permit students to arrange their own schedule of carrying out coursework activities (Simpson, 2003; Woodley, 2004). While distance learners can pace their learning in a flexible way, this also leaves room for them to complete coursework intermittently. Students with multiple registered distance courses may switch their time and effort among different courses. Such alternation can be reflected in the coursework delay in some

courses (Woodley, 2004). In turn, procrastination can result in incomplete courses at the end of the semester for which a course was registered.

The flexibility in distance education also allows incomplete courses to be remedied to a completion. The remaining coursework for incomplete courses can be finished in an extended period of time and the course credit can be awarded upon the completion of the course requirements. With such flexibility, some previously incomplete courses have been finished later on. Others remain incomplete, even with the extension of time.

To increase retention rates in distance education, there is need to investigate the phenomenon of coursework completion for previously incomplete courses. Since limited research has been done about retention in distance education (Simpson, 2004), literature on related studies about distance learning, course completion/non-completion, dropout, persistence, and progress were reviewed to provide the foundation for the current study.

Distance Learning

Distance learning makes it possible for students to pursue educational goals and at the same time tend to their other commitments. As distance education is expanding, its promises, characteristics, and challenges also interweave in distance learning activities. At the same time, distance learners are becoming diversified. To understand distance education and learning through online courses, this section reviews the specialties and related issues of distance learning in online environments.

Distance Learners

Out of diversified needs, individuals pursue distance education in the online learning environments. Currently, there are five major groups of distance learners, in terms of their age and educational needs (National Postsecondary Education Cooperative, 2004): (1) one major

group of online learners come from workforce development that is usually initiated by the employing corporations. Using online delivery systems, employees obtain training to upgrade skills. Such kind of online learning is usually based on the needs and requests from employers. (2) Another major group of online learners are adults pursuing personal career development. These learners may get enrolled in online courses to enrich their educational qualifications so as to enhance their chances for promotion. The difference between this group and the corporate group is that these people come to distance education with particular career goals. At the same time, however, they need to balance their time and effort among learning, work, and family obligations. (3) A third big group of online learners are college-age students, as more and more higher education institutions are adopting online media to provide or supplement their courses and/or programs. Online has become a default delivery medium in higher education institutions (Sims, 2006). (4) K-12 students are becoming an emerging group of online learners as well. Children at home schools may study an entire course in an online learning environment. Other K-12 students in either public or private schools can obtain extracurricular learning via online courses or attend remedial online programs for test preparations. (5) There is also a group of learners pursuing distance education as a recreational activity. They enjoy what they learn through distance education or just the process of learning (National Postsecondary Education Cooperative, 2004; Oblinger, Barone, & Hawkins, 2001). It is evident that distance learning is one of the multiple commitments of these learners even though their needs are quite different.

As for the current research, the students enrolled in the online program of the study were adults with employment. They pursued online distance education for professional enrichment or degree attainment. These students could enjoy the flexibility of obtaining educational credentials

as well as keeping their employment. The balance of time and effort between distance learning

and their other obligations, however, was demanding.

Characteristics and Challenges of Distance Learning

Learning through distance education is flexible and scalable. With no need to be present

in the instructional institutions, distance learners can get instruction, conduct learning activities,

and communicate with instructional personnel and resources via technologies. Two major types

of technologies are used to facilitate learning in distance education. With synchronous

technologies, such as audio- and video-conferencing, learning activities can take place at the

same time with teaching activities but in different places. Students can interact with instructors

as though they were in traditional classrooms. With asynchronous technologies, including prints,

CD-ROMs, and network connections, students can study instructional materials and conduct

learning activities at any time and in any place. Most learning activities in distance education

happen asynchronously from teaching activities, which permits students to determine the pace of

learning progress (Head, Lockee, & Oliver, 2002; Picciano, 2001). Students can conduct learning

activities such as compiling projects, writing papers, and turning in assignments at home, at work,

or even when traveling. The flexibility also enables distance students to repeatedly review

instructional content from different perspectives (Aragon, Johnson, & Shaik, 2002). Learning

may be accomplished to the best quality with no limit of time nor needs for commuting.

Distance learning is also challenging to students. Separated from host institutions and

studying independently, distance learners are anticipated to be self-directed in using technologies

to learn, modifying learning performance independently, and being good at time management

(Moore & Kearsley, 1996, 2005; Simonson, Smaldino, Albright, & Zvacek, 2000; White, 2005).

Unlike traditional on-campus students, distance learners should get used to various technologies

in a distance learning environment. Utilizing technologies, these students interact with instructional content, perform learning activities, and communicate with instructors for clarification or for solutions to problems (Moore, 1989). Not directly monitored by teachers, distance students are also expected to exercise and modify learning process according to course requirements and criteria that are known to both learning and teaching groups (Clarke, Butler, Schmidt-Hansen, & Somerville, 2004; Harrison & Bergen, 2000; Savenye, 2004). Besides, most adult distance students have social, familial, and professional commitments in addition to learning tasks. Learning activities may be delayed or stopped at any time for unknown reasons (Born & Moore, 1978; Kellogg, 2003; Simpson, 2003; Wilkinson & Sherman, 1990). For instance, about 70% students in the UKOU discontinued their learning activities in the process of pursuing distance education (Simpson, 2003).

Learning Performance of Distance Students

Learning performance in distance education can be influenced by students' perception of learning environments. Learning performance is found associated with students' needs of taking courses (Conrad, 2002; Navarro & Shoemaker, 2000). If the course content is of quality design and is relevant to a student's needs, the student will perform better. Performance is also found related to students' perception of a distance learning environment. The more positively a student perceives the interaction with instructors and with other students, the better she or he will perform in distance learning (Navarro & Shoemaker, 2000; Vonderwell, 2003).

Learning performance in distance education is also influenced by students' perceived sense of presence and sense of institutional presence. Sense of presence was defined as "a student's sense of being in and belonging in a course and the ability to interact with other students and an instructor although physical contact is not available" (Picciano, 2002, p.22).

Sense of presence was found positively correlated with students' performance in project-based written assignments (Picciano, 2002). Sense of institutional presence was defined as "the degree to which a distance student perceives the availability of support services, and the degree of connectedness with the institution" (Shin & Chan, 2004, p. 277). Shin and Chan (2004) studied the responses from 285 undergraduate and graduate students enrolled in four online courses. They found that there was a significant relationship between students' sense of institutional presence and perceived learning outcomes. In addition, the relationship between learning performance and technical problems was found to be negative (Navarro & Shoemaker, 2000; Sriwongkol, 2002).

Due to the physical separation between teaching and learning groups in distance education, learning performance needs to be assessed via certain explicit indicators, such as consistent exercise of learning activities. In the individualized learning environments of distance education, students' performance is generally assessed through "knowing what each student is undertaking to learn" and "knowing how fast and how well each is progressing" (Gagne, Briggs, & Wager, 1992, p. 323). Usually a distance education program assesses students' performance from multiple perspectives to ensure the quality of distance learning. The way each student undertakes to learn is reflected through activities of working on and submitting assignments, posting responses in online discussion, participating in group projects, taking exams, and etc. (Harrison & Bergen, 2000; Savenye, 2004). If a distance student actively exercises learning activities according to certain criteria and complete coursework, it is very likely that this student will complete the registered course and attain the course credit(s). Failing to do so, the student will have many backlogged assignments, get incomplete courses by the end of the registration semester, and may drop out or withdraw finally (Rumble, 1992).

Online Learning and Online Courses

Online learning, as a pervasive method of obtaining knowledge and skills, can happen in both educational institutions and corporate settings. Dempsey and Van Eck (2002) defined online learning as follows,

> Online learning is any learning that uses the Internet to deliver some form of instruction to a learner or learners *separated by time, distance, or both*. Online learning may occur among people scattered across the globe or among coworkers at a single facility via corporate intranet and local area networks (LANs). What defines online learning is the use of network communication systems as the delivery medium. … Regardless of what form or name online learning takes, the learning may be *asynchronous, synchronous or a mixture of the two*. (p. 283)

Online courses in educational institutions are "those in which at least 80 percent of the course content is delivered online", according to the Sloan Asynchronous Consortium (Allen & Seaman, November, 2006, p. 4).

Course completion and flexibility have been considered in the design of online courses. Three major issues that need to be addressed in online course design are *content-related*, *delivery-related*, and *learning-related issues*. A major content-related issue is students' pace to complete the course materials. The flexibility and formats of the interaction at learning and teaching is one of the delivery-related issues. Regarding learning-related issues, whether students or instructors are in control of learning pace should be taken into consideration (Rungtusanatham, Ellram, Siferd, & Salik, 2004).

More specifically, online course structure and assessment are suggested to accommodate students' pace of their learning activities. The structure of an online course usually include

course outline, components of weekly module, and learning activities including assignments and tests. The course outline is provided to get the students acquainted with the course prerequisites, the objectives and layout of the course, required materials, and grading policies. A reminder of required assignments for the week and the suggested deadline of submission should be presented in the weekly modules. The requirements of assignments should be provided with specific and explicit guidelines, timeline, and grading criteria, with which students could pace their learning progress (Harrison & Bergen, 2000). Harrison & Bergen (2000) also emphasized that course assessments should be composed of the weights or grades specifically assigned to different components of learning activities.

Research has found that both student-related and institution-related factors can be influential to the perception of and performance in online learning. Students' experience in content area, technology skills, perception of course workload, attitude, and time management skills can influence the outcomes of their online learning (DeTure, 2004; Loomis, 2000; Pérez Cereijo, 2006; Vonderwell & Zachariah, 2005). Regarding institution-related factors, learning tasks and assessment criteria for online courses, grades assigned to particular course components, and interface design of online courses can affect the participation in online learning (Jiang & Ting, 2000; Pomales-García & Liu, 2006; Vonderwell & Zachariah, 2005)

Course Completion, Retention, and Dropout

In distance education, course completion is usually discussed along with retention and dropout (Kember, 1995; Morris, Wu, & Finnegan, 2005; Simpson, 2003). The distance education literature uses "course completion" either to mean retention, persistence, and progress, or as the opposite of course non-completion, dropout, discontinuation, and attrition (Garland, 1993;

Kember, 1995; Shale, 1982; Woodley, 2004). This section reviews these relationships between course completion, retention, and dropout. An overview of the related studies is provided as well.

Retention and Completion

In traditional higher education, retention has different definitions and implications. Berge and Huang define retention in general as "continued student participation in a learning event to completion, which in higher education could be a course, program, institution, or system" (Berge & Huang, 2004, p. 3). According to Seidman (2004-2005), retention should be defined from the program, course, and student perspectives. Program-based and course-based retention refers to the persistence and completion of an enrolled program or a registered course. While student-based retention is about whether a student has obtained her/his learning goal, course-based retention rates can inform an educational institution about the needs for improving those with low completion rates (Seidman, 2004-2005).

Retention in distance education is usually discussed from two dimensions, the institutional dimension and the student dimension although there is the third dimension from the employers (Ashby, 2004; Tait, 2004). Student retention is "about students who do not complete courses or programs of study" (Tresman, 2002, p. 4) and is "a measure of the percentage of students who gain a course credit based on the number who registered for a course" (Ashby, 2004, p. 66). Retention also refers to "completion of a single course" or "persistence through a program of study" (Tait, 2004, p. 97). The institutional retention refers to academic progress within a registered course. Benchmarks of completion for different stages of the course, based on individual courses, are used to measure retention rates in UKOU (Ashby, 2004). Apparently, course completion is the major indicator of retention in distance education, shared among the various definitions. For the purpose of the present study, literature about course completion,

course non-completion, and dropout are reviewed in the following section because of the interrelationships among these concepts.

Dropout and Completion/Non-completion

In distance education, dropout can refer to a student who did not complete the registered course(s) or a phenomenon of discontinuing learning activities (Shale, 1982; Simpson, 2003; Woodley, 2004). For example, Shale defined dropout as "a student who enrolled in a [distance] course but did not successfully complete the entire course (or the portion contracted for)" (Shale, 1982, p. 114). Woodley defined dropout as the "decision made by the student" to discontinue the participation in distance learning activities (Woodley, 2004, p. 49). In Kember's definition, dropout is "anyone who enrolls in a program and does not eventually complete it" (Kember, 1995, p. 258). Obviously, dropout is defined based on the completion of a registered course or an enrolled program.

In the literature of distance education, the extent of course completion/non-completion has been described and reported in relation to dropout in different contexts. Models have been proposed to describe and predict dropout (Billings, 1988; Kember, 1995; Kennedy & Powell, 1976). Qualitative and quantitative studies have provided more detailed analysis of factors influential to dropout and course completion/non-completion (Garland, 1993; Morgan & Tam, 1999; Moskal & Dziuban, 2001; Muilenburg & Berge, 2005; Osborn, 2001). These studies are reviewed as follows.

Models for Describing and Predicting Potential Dropout and Completion

To describe and predict potential dropout or completion in distance education, researchers have proposed models and studied distance learners in educational practice. These models are developed to describe distance students at risk of dropout (Kennedy & Powell, 1976),

to predict student progress in distance education (Kember, 1995), and to predict distance course completion (Billings, 1988). Some of the prediction models are built on the basis of Tinto's Institutional Departure Model, which was developed by studying college dropout in traditional higher education (Kember, 1995; Tinto, 1987).

Kennedy and Powell's descriptive model

Kennedy and Powell (1976) proposed that both the characteristics and circumstances of distance students would jointly affect their likelihood of dropout. Their descriptive model was based on the case studies of the counselors' reports about dropout and withdrawal in UKOU. These reports recorded the characteristics and circumstances of 684 distance students who had already requested withdrawal, 291 students who were "partially" withdrawing and 236 students who were identified as at risk of dropout. Kennedy and Powell found that the joint impact from a student's characteristics and related circumstance factors could predict the student's chance of dropout. These characteristic factors included a student's learning motivation, stage of adult development, educational preparation, personality characteristics, aptitude, and self-concept of education. The circumstance factors included a learner's career commitments, familial, and social relations, health conditions, financial situation, and institutional support. When both the characteristics and circumstances of a student were strong, it was very likely that the student would continue and complete distance learning. Even if a student had some weak characteristics, the strong circumstances, such as supportive institution and family, could help them survive to complete their distance learning courses or program. The researchers suggested that by analyzing students' characteristics and circumstances with this model, counselors could provide more well-grounded advice to distance learners.

Distance education student progress model

Kember (1990) proposed that students' entry characteristics, social and academic integration with the learning environments, GPA obtained, and perception of benefit and cost of the target education would jointly affect dropout or progress in distance learning. This Student Progress Model was based on Tinto's Institutional Departure Model, which will be discussed later in this section. According to Kember's model, learners' personal characteristics and goal commitments formed the *entry characteristics* variables. *Academic integration* referred to students' compatibility with the learning environments, such as the match between course content and student needs, and communication between institutions and students. It also included students' abilities to handle learning activities and to solicit assistance for solving learning-related problems. *Social integration* referred to encouragement and support that distance students may get from their familial and employment environments. *External attribution* included demands on students' time from multiple obligations and life circumstances. "GPA provided a measure of academic achievement" (Kember, 1995, p. 121). Finally based on the analysis of the cost/benefit ratio, students would make their decision on persistence in distance learning.

Based on the model, the Distance Education Student Progress (DESP) inventory was developed. In the initial study testing the model (Kember, 1995), the DESP questionnaires were administered to approximately 540,490 distance students. These students enrolled in module-based distance courses of certificate and/or degree programs in Hong Kong. Two outcome variables used to measure students' learning progress were GPA, and the ratio between the number of modules failed and the number of modules attempted. With a response rate of 61%, the results showed that the variables in the DESP predicted 80% of the difference in distance learning progress (Kember, 1995). In another study validating the DESP, Kember, Lai, Murphy,

Siaw, and Yuen (1994) sent the same questionnaires to 1087 distance students enrolled in education, arts, business, and science courses. Five hundred and fifty-five of them returned the valid questionnaires. According to the results, the DESP variables accounted for 78% of the difference of students' progress in distance learning. The researchers concluded that the DESP studies based on Kember's model had generated similar results and the model could provide reliable guidelines for predicting potential dropout (Kember, 1995; Kember, Lai, Murphy, Siaw, & Yuen, 1994).

Correspondence course completion model

Billings (1986, 1988) proposed that under the influence of multiple factors, the earlier a student submitted the first assignment, the more likely a student would complete the correspondence course. This model was called the Correspondence Course Completion Model (Billings, 1986; Billings, 1988). According to the model, various factors related with students, institution (organization), environment, and learning activity would influence students' learning progress toward course completion. Factors relating students to educational organization included *GPA*, *courses completed*, and *courses dropped*. Factors relating students' attitude with learning outcomes included educational *goals* and *values*. Factors relating students to their environments included *support* from family, employers, and instructors. These variables would all affect students' *first lesson submission*, *intent to complete*, and *progress toward course completion*. One conspicuous difference in this model was the inclusion of the date of a student's first assignment submission, which was used to predict the student's progress toward course completion. Billings (1986) found that the earlier a student submitted the first assignment for a correspondence course, the more likely the student would complete the course.

Tinto's institutional departure model

Tinto's Institutional Departure Model (1975; 1987) laid the foundation of conceptual framework for model development and exploration of intervention with dropout in distance education (Kember, 1990, 1995; Sweet, 1986). Institutional departure referred to a student's discontinuation of learning activities in the enrolled educational institution. This model was proposed based on dropout studies of traditional college students. According to the model, multiple factors relevant to students and institution would directly or indirectly affect students' decision of learning completion in an educational institution. Factors of personal background and attributes, such as *family*, *skills and abilities*, and *prior education*, would function on a student's *academic performance* through the student's *intention* to take courses and her/his learning *goals*. Factors of a student's *academic performance* and *interaction with faculty/staff* would determine how this student would be incompatible or be *integrated* with the learning environments. A well-integrated student would be committed to complete the anticipated coursework. According to the Institutional Departure Model, *academic performance* is expected to trigger subsequent incompatibility or integration so that the student would be better able to decide whether to complete the learning activities or not.

General Categories of Factors

Studies in distance education practice have also provided general description and analysis of factors related to course completion/non-completion and dropout (Garland, 1993; Morgan & Tam, 1999; Muilenburg & Berge, 2005; Osborn, 2001). Course completion can be affected by the flexibility in registration policies and course requirements, as reflected in a study conducted in Athabasca University(AU), a distance education institution in Canada (Shale, 1982). The open registration at AU permitted prospective students to start a course with a trial module

before the full tuition was paid. After the registration, some students never started the formal coursework at all, which usually resulted in quite a number of "non-starts". Two formulas to include and exclude "non-starts" were used to calculate the completion rates at AU. Once formally starting and finishing the coursework, an AU student could obtain three or six hours of course credit. Time allowed for an AU student to complete a course was flexible. The recommended length of time for completing a six-credit course was 12 months. However, with the permission of extended or suspended study, a student could finish a six-credit course between 18 and 24 months. Shale (1982) collected the course completion data from more than 6900 AU students enrolled in the four consecutive academic terms between August 1, 1978 and November 30, 1979. Most of these students were employed and female. Both formulas were used to calculate the completion rates of seven three-credit and 14 six-credit courses. The results revealed that the overall completion rates for all the courses were 28.8% including the "non-starts", and 58.2% excluding the "non-starts". For the three-credit courses, the completion rates were 31.9% with the "non-starts" and 68.6% without the "non-starts". For the six-credit courses, 27% and 52.8% were completed with the inclusion and exclusion of the "non-starts" respectively.

When exploring the reasons for dropout in UKOU, Woodley and Parlett (1983) surveyed 18 related questions. They found that there were course-related factors, such as design quality, content relevance, difficulty level, and course workload. There were also factors related to students and their environments, such as personal attributes, familial and financial support, students' motivation, and exam anxiety. In the research, Woodley and Parlett reported the dropout rates of the courses at different levels, with 24% for the foundation courses and 37% for the higher-level courses. The dropout rates of the courses in different subject areas and at different levels were also reported. For example, the dropout rate for the foundation sciences courses was 23% while that for the third and fourth-level science courses was 40%. They also presented the completion rates for the courses with different credit hours, the dropout rate for the full-credit courses was 28% while that for the half-credit courses was 38%.

Studies have also found that institutional, situational, dispositional, and epistemological factors would hinder distance learning progress (Garland, 1993; Morgan & Tam, 1999). Garland (1993) conducted a qualitative study with 30 distance students who had completed distance learning of five print-based correspondence courses and 17 who had withdrawn from the courses. Data were collected through audio-taped interviews and field notes. The mapped qualitative data disclosed that those who withdrew and those who completed perceived the four categories of factors that would impede their progress in distance learning. These factors were found in relation with institution, situation, disposition, and epistemology (Garland, 1993). Morgan and Tam (1999) also found that the non-completion of distance courses was the consequence of multiple interacted factors. These factors were mapped into the same four categories identified in the Garland's study.

Not only did descriptive and qualitative studies map the categories of factors that could predict potential dropout, studies also supported similar patterns in findings with quantitative methods. Using Tinto's model, Sweet (1986) studied the persistence of 356 adult distance learners in the Open Learning Institute of British Columbia, Canada. Persistence was measured with assignment completion and taking exams in his study. Sweet found that the multiple factors, such as those related to student characteristics, educational institution, and students' situation, would interact among each other and function jointly on persistence (Sweet, 1986). More recent quantitative studies have also proven that multiple factors of similar categories would impose impact jointly on course completion in distance learning (Fjortoft, 1996; Muilenburg & Berge, 2005; Osborn, 2001).

Coursework Completion of Incomplete Online Courses

Incomplete ("*I*") indicates non-completion status of distance courses and implies that students can take remedial action to complete such courses. An *"Incomplete"* course is one that a distance learner registered for but has not completed the required coursework by the grading deadline of the registration semester. Originally, *"Incomplete"* is a grading policy adopted from the traditional face-to-face learning environments (Bauernfeind, 1973). Unlike the conventional ABCDF (or ABCDE), the *"Incomplete"* grade in the ABCI system innovates grading by allowing flexibility in assessing student learning performance (Bergman, 1981). It is intended to encourage students to reflect their abilities in learning performance by removing the punitive grade of failure and the time constraint of a regular academic semester (Bauernfeind, 1973; Bergman, 1981). The *"Incomplete"* grade is assigned to indicate that the amount of required coursework of a course were not finished at the end of the course registration semester and also imply that extended time is allowed to get the remaining coursework finished. It is different from

"*withdrawal*" status of a distance course which is usually processed officially through university registrar. It also differs from "*dropout*" that means cessation of activities in the registered program or courses without formal notification.

In distance learning systems, flexibility of pacing coursework is permitted through the grant of *"Incomplete"* grade so that students can master the learning content to the best quality without the pressure of time. Online learning features self-pace (Simonson, Smaldino, Albright, & Zvacek, 2000), self-directedness (Wedemeyer,1963/1971), and time- and place- independence (Picciano, 2001). Most online courses are sequenced with discrete modules of instructional units and learning activities. Some students may spend more time than others to fully master a unit of learning content. Besides, distance education systems usually allow students to register for multiple courses at the same time. To manage their study schedule, students may shift active learning performance among the registered courses, for example, picking up coursework activities for one course after the completion of another (Woodley, 2004).

The initially assigned *"Incomplete"* grade allows students to take actions toward course completion once they resolve their problems with time stress or other impediments (Van Ness, Van Ness, & Adkins, 2000). An *"Incomplete"* grade can be converted to an effective letter grade of "*A*", "*B*", "*C*", and etc., if a student has finished the course requirements. Only after an *"Incomplete"* is changed to an effective letter grade, can the hours of course credit be applied to the student's GPA and the fulfillment of her/his educational qualifications (Van Ness, Van Ness, & Adkins, 2000).

Distance students can exercise coursework activities to complete their previously incomplete courses with an extended length of time (Shale, 1982; Simpson, 2003; Van Ness, Van Ness, & Adkins, 2000). For example, in Athabasca University, Canada, the recommended

length of time for completing a six-credit course was one year. However, if a petition for suspended study was permitted, the course could be finished with an extended time range of up to two years (Shale, 1982). Van Ness, Van Ness, and Adkins (2000) reported a study on the completion of previously incomplete courses in an online learning environment. The study took place in an introductory capstone course of finance in a face-to-face learning environment and an Internet-based setting (Van Ness, Van Ness, & Adkins, 2000). Among the 680 students, 74 chose to take the web-based course. The researchers found that the rate of getting an *"Incomplete"* grade for the online students was very high. About 56.8% of them got an *"Incomplete"* grade at the end of the semester. Given an extension of one year, all the students with *"Incomplete"* grade completed their course requirements and obtained a letter grade for the course.

This study by Van Ness, Van Ness, and Adkins (2000), though standing alone, is significant in its implications for future research on coursework completion in online education. First of all, it has proven that an incomplete course is a common occurrence in distance learning environments (Kember, 1995; Simpson, 2003). Second, it confirms the functionality of the *Incomplete* status in distance education. With the flexibility implied by an assigned *"Incomplete"* grade, students are allowed to make progress without the time restriction of a traditional semester. Given an extension of time, the students with an *"Incomplete"* grade did fulfill the coursework activities and completed the required coursework. To encourage more students with *Incomplete*s to complete the remaining requirements, it is necessary to investigate what factors are related to coursework completion. Based on the investigation, the institutions that offer online courses may modify related courses from an informed perspective and appropriate counseling or tutoring services may be applied. Since this phenomenon has only

been examined on a limited basis, the literature on factors related to distance course completion and dropout within a traditional academic semester is reviewed as follows.

Identified Factors Related to Course Completion

Research has identified factors that are influential to potential course completion/non-completion and dropout in distance learning. These can be factors related to social integration, students, distance courses, and institutional supportiveness. Social integration issues include support and encouragement from family and employment background (Billings, 1988; Kember, 1995; Picciano, 2002). Student-related factors include age, gender, locus of control, learning styles, and GPA (DeTure, 2004; Dille & Mezack, 1991; Kennedy & Powell, 1976; Morris, Wu, & Finnegan, 2005; Moskal & Dziuban, 2001; Muilenburg & Berge, 2005; Osborn, 2001). Course-related factors include credit hours designated to a distance course, number of required assignments of a distance course, number of assignments completed for the registered courses, number of distance courses attempted by an individual student, and length of time that a student has been enrolled in a distance course without completing it (Anandam & Fleckman, 1977; Kellogg, 2003; Shale, 1982; Simpson, 2003; Sriwongkol, 2002; Wong & Wong, 1978-1979; Woodley & Parlett, 1983; Wright & Tanner, 2002). Supportiveness from the host institutions is also identified as a factor affecting course completion (Jamison, 2003; Rekkedal, 1982; Tallman, 1994; Taylor, 1986). Since the course-related factors can be manipulated by an educational institution and pertinent to the current study, the research on these factors is reviewed in the following section. Additionally, GPA, as obtained and accumulated grades, is also related to the completion of a registered course, the literature about it is reviewed as well.

Credit Hours Designated to a Distance Course

Credit hour is the instructional unit for quantitatively measuring the time required for the satisfactory completion of a course, that is, the certain number of hours per week to do the coursework in a semester, term, or quarter (Heffernan, 1973; Lewis, 1961; Shedd, 2003). Initiated as an academic measure of student learning in traditional education, the adequacy of credit hours for distance courses needs to be examined (Shedd, 2003). Osborn found that the number of hours a student spent on studying a distance course per week would positively contribute to the course completion (Osborn, 2001). It was also found that there were differences in the completion rates of distance courses with different credit hours. However, the reported results were not consistent. In Shale's AU study (1982), the completion rates for the seven 3-credit and 14 6-credit courses enrolled between August, 1978 and November, 1979 were reported. The overall completion rate for the 3-credit courses (31.9%) was higher than that for the 6-credit courses (27.0%). Woodley and Parlett (1983) reported the course completion rates of all the full-credit and half-credit courses that were registered between 1971 and 1981 in UKOU. The completion rate for the half-credit courses (62%) was lower than that for the full-credit courses (72%).

Number of Required Assignments

The number of required assignments is related to the course content and level. The content, level, and format of instruction of a distance course will impact students' pacing of learning (Rungtusanatham, Ellram, Siferd, & Salik, 2004). Research has found that the number of required assignments has an impact on the completion of an online course. Kellogg (2003) did a study on testing the effectiveness of short email messages on timeliness of assignment submission and completion rates of online courses. In her study, the date of students' assignment

submission was compared with the suggested due date through a computer-based system. According to the comparison, computer-generated email reminders were sent to the students who had not submitted an assignment by its suggested due time. Eighty-two graduate students enrolled in 12 courses of an online Master's degree program participated in the study. The students in the experimental group received the computer-generated email reminders and those of the control group did not. The results indicated that the experimental group submitted assignments closer to the due dates than the control group. Although the difference of timely submission of assignments was not statistically significant in her study, the course completion rates of the three groups with different numbers of required assignments were significantly different from one another, $F(1,2) = 3.225$, $p < .05$. For both the treatment and control groups, the completion rates for the courses with 7~8 required assignments had a higher completion rate than those with 4~6 and 13 required assignments (Kellogg, 2003).

In another study, Sriwongkol (2002) identified six factors related to online course completion based on literature, on the open-ended and structured questionnaires, and on the factor analysis. A prediction model of online course completion was developed thereafter. The instructors' perception of course workload in the required assignments was a factor in the prediction model. The assignment workload had an opposite relationship with online course completion rate and it was not a significant predictor in the model. The researcher suggested that studies need to be conducted on the number of required assignments and related workload for online courses (Sriwongkol, 2002).

Obtained Grades

The grades that a student has already obtained are positively correlated with her/his chance of completing distance courses (Dille & Mezack, 1991; Dupin-Bryant, 2004; Osborn,

2001; Tinto, 1997). Dille and Mezack (1991) found that students with higher GPA (grade point average) were more likely to be successful in completing distance learning. In their study, 108 completers had an average GPA of 3.15, compared with 43 non-completers whose average GPA was 2.85. This difference was significant at the .0006 level. Tinto (1997) studied the predictors of persistence in a computer-mediated learning environment. Data were collected through students' responses to a questionnaire, interviews, observation, and review of artifacts. Obtained GPA was one major variable that could reliably predict student's persistence. Osborn (2001) collected course completion/non-completion data of 501 students who enrolled in graduate-level distance courses. The average GPA for the completers was higher with smaller variation ($M =$ 3.51, $SD = .48$), in contrast to that of the non-completers which was lower with greater variation ($M = 3.01$, $SD = .76$). The data analysis results of her study indicated that GPA was one of the primary variables that could predict the completion of distance courses.

The accumulated grades and earned credits through the completed distance courses were also found related to course completion. Dupin-Bryant (2004) studied distance learners' pre-entry variables related to course completion. One thousand online course takers were randomly selected to receive the research survey. Course completion was the dependent variable. With a 51% response rate, the results indicated that six pre-entry variables were reliable predictors of online course completion. Among them, number of online courses completed and cumulative GPA were the primary factors. Woodley and Parlett (1983) found similar patterns when they surveyed different perspectives of dropout in UKOU. They found that the more credits a student had already obtained at the beginning of an academic year, the more likely such a student would successfully complete the registered courses. Seventy-five percent of the students who had zero course credits at the beginning of a year discontinued their study. Rekkedal (1982) reached the

same conclusion in his study in the NKI school, Norway. Dille and Mezack (1991) found that the average course credits earned by successful distance students were much more than those of the non-successful students, 42.2 in contrast to 23.1. This relationship between course completion and earned course credits was attributed to the confidence that students gained through getting familiar with online learning (Dupin-Bryant, 2004).

Number of Completed Assignments

Studies have shown that the number of completed assignments and the submission of the first assignment are directly related to the completion of distance courses (Anandam & Fleckman, 1977; Simpson, 2003; Wong & Wong, 1978-1979; Woodley & Parlett, 1983; Wright & Tanner, 2002). The more assignments a distance student has finished and submitted, the more likely a student will complete the registered course and earn a better grade. Wong and Wong (1978-1979) found support for this relationship through studying a group of bank employees taking a correspondence-based accounting course at the University of Toronto. The course was selected for research because it had a reputation of having a low completion rate. Two groups of students enrolled in the academic years of 1972-1973 (Group A) and 1973-1974 (Group B) served as the sample. There were 220 students in Group A and 144 in Group B. Both groups had the same instructor and the same course content. The students could spend seven months on completing the coursework of six assignments. In the eighth month of their enrollment, the students were to take the final exam so that they could complete the course and obtain the course grade. The data for the study included the number of assignments a student submitted, a student's participation in the final exam, and the grade on the final exam. About 88% of the students in Group A and 63% in Group B who did not submit any assignment did not complete the course. Ninety-one percent in Group A and 97% in Group B who had submitted four or more assignments completed the

course. The researchers found that the students who had submitted more than half of the required assignments were significantly more likely to complete the course. A significant positive correlation also existed between the number of assignments a student submitted and the score of final grade the student earned in both groups. The researchers inferred that the number of submitted assignments might enhance a student's commitment to the course and add to their confidence that they would succeed in finishing the course (Wong & Wong, 1978-1979).

Students not submitting the first assignment were more likely not to complete the course of study and ultimately drop out. In the records of UKOU and the FernUniversität of Germany, around 35% of the students registered in a distance course who had not submitted the first assignment did not complete the distance learning (Simpson, 2003). Woodley and Parlett (1983) compared the dropout rates in the UKOU with those in Athabasca University, in the Open Learning Institute of Canada, and in the National University Extension Association of the USA. They reported that students who submitted the first assignment were much less likely to drop out in the middle of distance learning. Wright and Tanner (2002) recorded a study done at a British university. At their registration of distance courses, 393 medical students were required to provide an identification photo. This administrative task was their first assignment in the study. Of the 93% (366) students who provided the pictures, only eight percent failed the end-of-the-year exam. In contrast, among the 27 students who did not submit a photo, 48% failed the exam. Anandam and Fleckman (1977) reached the same conclusion with their research. In their study, the 75 participants enrolled in a psychology course that was delivered via an open-circuit TV system and assisted with weekly radio broadcasting. The submission of the first assignment statistically explained 42% of the difference in the course completion. The researchers concluded that the submission of the first assignment on time was a reliable predictor of course completion.

Duration of Incomplete Status

The longer a registered distance course has been retained incomplete, the less likely this course would be finished. Woodley and Parlett (1983) recorded the dropout rates of the UKOU students who enrolled in distance courses between 1971 and 1981. The cut-off time for collecting data was the end of 1982. The students who did not complete their registered courses and remained in the course system in 1982 were grouped according to the year of their enrollment. The average dropout rates for each group were calculated. The results indicated that the longer a student had stayed unfinished in a distance course, the more likely the student would drop out. For instance, for the students who enrolled in distance courses in 1971 and had not completed those registered courses by 1982, the average dropout rate was 55%. For the students who enrolled in 1975 and had not completed by 1982, the average dropout rate was 45%. For those who enrolled in 1980, the average dropout rate was only 30%. In another research, Woodley concluded that "for a given workload, students do worse the longer they have been enrolled at the [Open] University" (Woodley, 1982, p. 118). Shale (1982) studied the dropout rates of distance students who enrolled in the four consecutive semesters between 1978 and 1979 at Athabasca University, Canada. February 28, 1981 was set as the cut-off time for collecting data. The average completion rates for different courses were calculated by grouping the students according to the term of their enrollment. Shale found that the shorter a distance student stayed with a distance course, the more likely this student would complete the registered course. The four-year study by Rekkedal (1982) also found a similar pattern.

Institutional Factors

Institutional factors in distance learning environments have been found related to course completion. The factors include the existence of a responsive and supportive environment

provided by host institutions, shortened turn-around time between submission of an assignment and return of the marked assignment, and communication between host institutions and students. The provision of a responsive environment is one of the best predictors of distance course completion in a web-based learning environment (Jamison, 2003). A responsive environment refers to "students' cognitive evaluations of whether their environment is supportive of their goal attainment" (Jamison, 2003, p. 81). Jamison studied 323 adult distance students who were physically located in 17 different areas. These students enrolled in online courses offered by 13 community colleges. According to the findings of Jamison's study, the students anticipated that the instructors or course facilitators would take on a proactive and caring attitude toward the problems they encountered in learning. The data analysis results indicated that a responsive environment was significantly correlated with course completion. Tallman (1994) also found that instructional support and student support services initiated by a distance education program would enhance the completion rates in distance learning. Additionally, as one major type of interaction between tutors and students, timely return of marked assignments played an important role in improving distance course completion. In an experiment recorded by Rekkedal (1982), shortened turn-around time between submission of an assignment and return of the marked assignment increased the course completion rate from 69% to 91%. To replicate Rekkedal's study with distance learners in different countries, Taylor (1986) studied 1392 undergraduate students in five universities in Australia, Canada, Pakistan, and Figi. He found that persistence in distance learning was influenced by communication between host institutions and students, frequency of feedback, and timeliness of returning marked assignments back to students (Taylor, 1986).

Summary

Distance learning systems facilitated with network connections and computer-mediated technologies provide both convenience and challenges to students. With online learning systems, students can perform learning activities at any time and in any place. To be successful in completing an online course or program, students need to be acquainted with the basics in the relevant content area, to have obtained or be willing to obtain the necessary technology skills for learning, and to be good at time management (DeTure, 2004; Loomis, 2000; Vonderwell & Zachariah, 2005). Additionally, a student is shaped by the online learning environments and needs to make consistent adjustments (White, 2005), such as getting used to "transactional distance" (Moore, 1993, p. 22). Even more challenging is that many learners enrolled in online courses are part-time students dealing with various other commitments in daily life. Having multiple tasks in addition to learning makes it difficult for a learner to complete coursework on time.

Delayed performance in coursework activities usually leads to incomplete courses, which may result in potential dropout. From a positive perspective, the unique flexibility of distance education can also allow the completion of coursework for finishing previously incomplete courses. This flexibility can certainly improve the retention rates for an online course, program, or the institution that hosts the course or program. While greater emphasis has been placed on examining dropout in distance education, only limited research has been focused on retention in the online learning environment (Berge & Huang, 2004; Roach, 2002).

This review of literature in distance education shows that course completion can be influenced by multiple factors related to educational institutions, students, and the social environments in which online courses and program are offered and taken. Among them, those

related to the curricular and completion status of distance courses that can be manipulated by the hosting institutions of online courses and program are especially relevant to the current research. These course status factors include: (1) credit hours designated to an online course, (2) required assignments of an online course, (3) assignments that were submitted for an online course, (4) accumulated grades earned for the submitted assignments, and (5) the length of time for which an online course has been registered but not completed (Dille & Mezack, 1991; Dupin-Bryant, 2004; Kellogg, 2003; Rekkedal, 1982; Shale, 1982; Wong & Wong, 1978-1979; Woodley & Parlett, 1983). Although these course status factors were found related to course completion/non-completion across different contexts, they were only studied as individual variables. The relationship between a collective set of them and coursework completion of previously incomplete online courses was not examined.

In addition, to improve course completion and retention, research on the existing course components should be conducted (Ashby, 2004; Barefoot, 2004; Tresman, 2002). In a course-based registration system like most of the distance education programs, course components related to the completion of distance courses, such as submitted assignments, duration of enrollment, and completion of learning activities, can be used in the development of a statistical model to predict completion and retention (Ashby, 2004).

Therefore, to provide an informative and comprehensive insight into the coursework completion of previously incomplete courses, the current study collectively investigated the relationship between the five course status factors identified in the literature and the coursework completion. The research questions, design of the study, research setting, and related data analysis strategies were presented in the following methodology chapter.

Chapter Three: Methodology

Coursework completion of previously incomplete courses is a major source contributing to retention in distance education. Literature has identified course-related factors that are influential to course completion and can be manipulated by an educational institution. In this study, the relationship between the coursework completion of previously incomplete online courses and a collective set of five course status factors was proposed for a statistical exploration and analysis. In this chapter, the research purpose, questions, and design of the study, as well as data analysis strategies are addressed.

Purpose of the Study and Research Questions

The primary purpose of this study was to statistically explore the relationship between the course status factors based on the literature review and the completion of previously incomplete online courses. Specifically, there were three research questions:

1. To what extent can course status variables statistically account for the coursework completion of a previously incomplete online course?

2. To what extent can course status variables statistically predict the probability that an incomplete online course would be finished?

3. With respect to course status variables, what differences statistically exist between the online courses that were finished after an "*Incomplete*" grade had been assigned and those that still remain incomplete?

The study was exploratory in nature due to the need to examine a broad array of factors that could explain the completion of previously incomplete online courses. Exploratory studies were usually anticipated to bring informed understanding to the issues that were rarely studied (Cook & Groom, 2004). More specifically, once such research was conducted to collect and

analyze information about a research target, effective interventions could be developed for similar situations in the future (Motiwalla & Tello, 2000). This research was to contribute to the design of improved distance learning systems (Simpson, 2003, 2004).

Research Design

Due to the examination of multiple factors that could account for the completion of previously incomplete online courses, correlational multivariate designs were selected to conduct this study (Gall, Gall, & Borg, 2003; Goodwin, 2002; Mark & Reichardt, 2004; Meyers, Gamst, & Guarino, 2006). The correlational design was used to examine the existence and degree of the relationships between the variables in the study (Gall, Gall, & Borg, 2003; Goodwin, 2002). In addition, in the realistic setting, the five course status variables reflected various aspects of a previously incomplete course and the extent of coursework completion was measured by more than one indicators. Therefore, the investigator adopted a multivariate approach, intending to reach a more accurate understanding of the phenomenon (Meyers, Gamst, & Guarino, 2006).

As discussed in the literature review, the variables related to the curricular and completion status of online courses could be manipulated by educational institutions (Ashby, 2004; Barefoot, 2004; Brown & Voltz, 2005). Such manipulation was anticipated to improve the quality of online course design and therefore the retention in online learning systems (Tresman, 2002). The identified course status factors included: (1) the number of credit hours designated to a course; (2) the number of assignments required by a course (Kellogg, 2003; Shale, 1982; Woodley & Parlett, 1983); (3) the number of completed assignments for a course (Wong & Wong, 1978-1979); (4) the accumulated grades earned for completed coursework (Dille & Mezack, 1991; Dupin-Bryant, 2004; Fjortoft, 1996); (5) the duration of incomplete status for which a course had been registered but not completed (Rekkedal, 1982; Shale, 1982; Woodley &

Parlett, 1983). This study explored the relationship between a collective set of five course status

variables and the completion of previously incomplete courses within an entire online degree

program over four academic years. The online graduate-level courses with an initially assigned

"*Incomplete*" grade were the units of analysis. The distance education program in which this

research project was conducted was presented in the following section.

Research Setting

The online graduate-level courses in this study included those registered under 15

different course titles in an online master's degree program in education at a southeastern U.S.

university since 2001. The program provided a course-based registration system to accommodate

diversified needs from the students. The courses were offered simultaneously each semester and

each course represented from one to three hours of graduate credit. The course content combined

web-based instruction in online modules with textbooks or CD-ROMs.

The learning activities were completely asynchronous and self-paced. Lists of suggested

due dates for assignment submission were provided in the online course modules. The number of

required assignments for completing a course and the criteria for the successful completion of an

assignment were posted in the online modules where the students had access. Once a piece of

required coursework was finished, it could be submitted through an online assignment

submission interface. Through the same interface students could check their grade and receive

instructor feedback.

As listed in Table 1, the hours of course credit and numbers of required assignments for

each of the 15 online courses varied. The number of required assignments per course ranged

from three to 16, depending on the course objectives, assignment difficulty, and related time

demands for assignment completion. For instance, creating a digital video project might take

much longer than writing a paper. In total, there were 124 graded assignments, for all 15 online courses combined. Each assignment was graded with points, the basic grading units of course assessment, according to the criteria that both the students and instructors were aware of. Upon the completion, a course would be assigned a final letter grade, such as "*A*", "*B*", "*C*", etc., depending on how well the finished assignments had met the criteria. In the program databases, the graded assignments were used to track the course progress and completion.

Table 1 *Hours of Course Credit and Number of Required Assignments for the Online Courses*

Course	Credit Hour	Number of Assignments
Introduction to Instructional Technology	1	7
Introduction to Computers	1	7
Education and Web	1	13
Learning Theories for Instructional Design	3	9
Instructional Design	3	8
Instructional Media	2	13
Digital Audio	1	8
Digital Video	1	3
Graphic Design	2	10
Telecommunications & Distance Learning	1	6
Software Evaluation	2	5
Educational Research	3	6
Multimedia Authoring	3	16
Instructional Technology in Context	2	9
Portfolio Evaluation	1	4
Total	27	124

The students were permitted to take several semesters to finish a course. A course could be assigned an "*Incomplete*" grade at the end of its registration semester if the required coursework was left unfinished. Only the letter grade, such as "*A*", "*B*", "*C*", etc., could be effective in the attainment of course credit and the calculation of related GPA. The remaining coursework for an incomplete course could be completed at a student's discretion. Once the required coursework was finished, a grade change from "*Incomplete*" to a letter grade would be requested. In the online program of this study, the grade change represented the completion of a previously incomplete course and the honor of course credit. With this option, some courses were completed after they had been assigned an "*Incomplete*" grade, but some remained unfinished.

To identify the coursework completion status of the online courses registered in the academic terms between fall 2001 and fall 2005, a search in the program databases would be conducted. In the search, the 5-digit course request number (CRN) with which a specific course was registered in a particular semester and the initially assigned "*Incomplete*" grade would be paired. This unique association between a CRN and the "*Incomplete*" grade was retained in the databases and was used to record the status of course completion. An "*Incomplete*" grade associated with a specific CRN indicated that a particular course was not finished at the end of its registration semester. It also implied that although the required coursework was not completed within a regular semester, the course could be finished in an extended period of time. If the remaining coursework had been completed later on for such a course, this course would have a grade change in the databases. The grade change was reflected with the change from an "*Incomplete*" grade to a letter grade of "*A*", "*B*", "*C*", etc. In the context of this dissertation,

those courses having a grade change were referred to as "completed courses"; those having no grade change were referred to as "unfinished courses".

Variables of Interest

In this research project, three dependent variables and five independent variables were proposed for study. The dependent variables were used to measure the extent of coursework completion of previously incomplete online courses and to represent whether an online course with an initially granted "*Incomplete*" grade was finished or remained incomplete. These dependent variables were: (1) the number of assignments that were submitted to complete a previously incomplete online course between the assignment of "*Incomplete*" grade and the grade change, (2) the points that were earned for a previously incomplete course between the grant of an "*Incomplete*" grade and the grade change, and (3) the completion status of a previously incomplete course, represented by having/having no grade change. To understand the factors that could explain and predict the completion of previously incomplete courses and could be manipulated by an educational institution, five independent variables were proposed for study. They were: (1) the number of credit hours designated to an online course; (2) the number of required assignments of an online course; (3) the number of submitted assignments when the "*Incomplete*" grade was assigned to a course; (4) the points earned for the submitted assignments when the "*Incomplete*" grade was assigned; (5) the duration of the "*Incomplete*" status for which a course had been registered but not completed. These independent variables represented the curricular and completion status of an online course, all of which had been identified in the literature and were pertinent to the current study. Since all the variables had lengthy names, Table 2 presented the abbreviated terms used for the variables in this dissertation. These factors were described in detail in the following section.

Table 2 *Abbreviations Used to Represent Variables*

Dependent Variable	Abbreviation
Number of assignments that were submitted to complete a previously incomplete online course between the initial grant of an "*Incomplete*" grade and the final grade change	Subsequently completed assignments
Points that were earned for a previously incomplete course between the initial grant of an "*Incomplete*" grade and the final grade change	Subsequently earned points
Completion status of a previously incomplete course, represented by having a letter grade change (coded as "1"), and by having a change to "*F*" or retaining "*Incomplete*" (coded as "0")	Completion status

Independent Variables	Abbreviation
Number of credit hours designated to an online course	Credit hours
Number of required assignments of an online course	Required assignments
Number of assignments submitted when the "*Incomplete*" grade was initially assigned to a course	Initially submitted assignments
Points earned for the submitted assignments when the "*Incomplete*" grade was initially assigned to a course	Initially earned points
Length of time, in days, during which an online course with an initially assigned "*Incomplete*" grade have been kept incomplete	Duration of incomplete status

Dependent Variables

   The three dependent variables in this study were used to indicate the extent and status of

the coursework completion of a previously incomplete course.

Subsequently completed assignments

This variable measured the coursework completion by looking at the number of assignments submitted for finishing an incomplete course after the "*Incomplete*" grade was assigned. It counted the number of assignments that were submitted for a previously incomplete course between the time when the "*Incomplete*" grade was assigned and the time when the grade change was requested for this course.

Subsequently earned points

This variable measured the completion by looking at the points earned after an online course was assigned an "*Incomplete*" grade. It counted the points that were earned between the time when the "*Incomplete*" grade was assigned to the course and the time when the grade change was requested for it.

As mentioned in the research setting section, points were the basic grading units for course assessment in the educational program in this study. The assignments were graded with the points according to the criteria known to both the students and instructors. The total possible points designated to all the graded assignments for each course ranged from 100 to 1,125, depending on the design of the online courses and their assessment. This made the same amount of earned points for one course unable to be compared with that for another. In addition, for two of these courses, Educational Research and Instructional Media, there were updates and revision of the course content and related assessment between fall 2001 and fall 2005. The points designated to each assignment changed as well as the total possible points for a course, which made it difficult to compare the assessment even within one course (See Table 3). To make the earned points for all the courses with the 15 course titles comparable, a normalized scale of 1,000 possible points was set up in this research project. Accordingly, the numerical relationship

between the normalized scale and the original total possible points of an online course resulted in the coefficient of normalization. As demonstrated in Table 3, the ratios between the 1,000 points and the original total possible points for each course were the normalization coefficients in this study. Normalized with the coefficients, the earned points for two different courses became comparable. Subsequently earned points would be normalized with these normalization coefficients.

Table 3 *Original Total Possible Points and Coefficients of Normalization*

Course	Original Total Possible Points	Coefficient of Normalization	Normalized Scale
Introduction to Instructional Technology	100	10.00	1000
Introduction to Computers	150	6.67	1000
Education and Web	250	4.00	1000
Learning Theories for Instructional Design	1125	0.89	1000
Instructional Design	200	5.00	1000
Instructional Media (by fall 2004)	198	5.05	1000
Instructional Media (from spring 2005)	195	5.13	1000
Digital Audio	300	3.33	1000
Digital Video	250	4.00	1000
Graphic Design	1000	1.00	1000
Telecommunications & Distance Learning	400	2.50	1000
Software Evaluation	150	6.67	1000
Educational Research (by fall 2002)	325	3.08	1000
Educational Research (from spring 2003)	295	3.39	1000
Multimedia Authoring	500	2.00	1000
Instructional Technology in Context	210	4.76	1000
Portfolio Evaluation	100	10.00	1000

Completion status

Completion status represented the completion status of a previously incomplete course. This status was recorded by examining the courses with an initially assigned "*Incomplete*" grade in the program databases to see whether or not there was a grade change for them. If there was a grade change, other than "*F*", for a course with a previously assigned "*Incomplete*" grade, this course had a completed status; if there was no record of grade change for a course with a previously assigned "*Incomplete*" grade or a change from "*Incomplete*" to "*F*", this course remained an unfinished status. The variable would be coded as dichotomous, completed status = "1", unfinished status = "0".

Independent Variables

The five independent variables in this study were related to the curricular and completion status of an online course. These variables were either identified through the literature in distance education (Dille & Mezack, 1991; Dupin-Bryant, 2004; Kellogg, 2003; Rekkedal, 1982; Shale, 1982; Wong & Wong, 1978-1979; Woodley & Parlett, 1983) or derived from the literature based on the specific research setting of this study. In this research project, the statistical relationship between these variables and the completion of previously incomplete courses was proposed for study. The differences in them between the completed and unfinished courses were proposed for statistical comparisons. These independent variables were discussed in detail as follows.

Credit hours

This variable represented the workload of an online course. Course workload was closely related to the time and effort that a distance learner should dedicate to the successful completion of a course (Heffernan, 1973; Osborn, 2001; Shedd, 2003). It was identified by Woodley and Parlett (1983), and Shale (1982) as a factor related to course completion. In addition, the number

of credit hours of a course was a basic component used to calculate GPA. GPA was also found related to course completion in distance education (Dille & Mezack, 1991; Dupin-Bryant, 2004).

Required assignments

This variable examined the course workload from the perspective of required assignments. Kellogg (2003) found that the differences in the number of required assignments had an impact on the completion of an online course. Sriwongkol (2002) suggested that further research needed to be done on the number of required assignments to regulate course workload for online courses. In this study, the relationship between the number of required assignments and the completion of a previously incomplete course was proposed for exploration.

Initially submitted assignments

This independent variable represented the number of assignments that had been submitted for an incomplete course when the "*Incomplete*" grade was assigned. The relationship between this variable and distance course completion was identified by Wong and Wong (1978-1979). They found that the students who had finished more required coursework were more likely to complete a distance course. In this research project, the variable was used to record the quantity of the completed coursework for an online course when an "*Incomplete*" grade was assigned.

Initially earned points

This independent variable represented the points earned with the completed assignments when the "*Incomplete*" grade was assigned. These points were the basic grading units assigned to individual learning activities of an online course, which was an important component for online course assessment (Harrison & Bergen, 2000). In addition, the relationship between accumulated grades and course completion in distance learning was identified by Dille and Mezack (1991),

Fjortoft (1996), and Dupin-Bryant (2004). They found that the students who could successfully complete distance courses usually had higher accumulated grades in the history of their learning performance. In this study, the variable reflected the quantity and quality of the completed coursework for an online course when the "*Incomplete*" grade was assigned. To make this variable comparable among the courses with different total possible points, it would also be normalized with the coefficients of normalization (See Table 3).

Duration of Incomplete status

This independent variable was selected based on the previous research conducted by Woodley and Parlett (1983), Woodley (1982), Shale (1982), and Rekkedal (1982). They found that the longer a registered distance course had been kept not completed, the less likely this course was to be finished. The current study explored the influence of this variable on the completion of a previously incomplete course. The variable would be measured as the days between the date when an "*Incomplete*" grade was assigned to an online course and the date when the corresponding grade change was requested for this course, if there was a grade change for such a previously incomplete course. For those incomplete courses that remained unfinished, the variable would be measured as the days between the awarding of the "*Incomplete*" grade and the cut-off date of data collection for the research.

Data Analysis

The research questions of this study were answered by performing multiple regression, logistic regression, descriptive statistics analyses, Chi-square tests, and independent *t*-tests. The courses with an initially assigned "*Incomplete*" grade were used as the units of analysis. The strategies of data analysis were summarized in Table 4. Specifically, the data of the five independent variables and the first two dependent variables, subsequently completed

assignments and subsequently earned points, were used to answer Research Question One. The third dependent variable, completion status, and the five independent variables were used to answer Research Question Two and Research Question Three (See Table 4). In the process of analyses, level of significance was set as α= .05. SPSS (Statistics Package for Social Science) was used to perform the analyses.

Table 4 *Summary of Research Questions, Variables, and Statistical Analysis Methods*

Research Question	Statistics Method	Dependent Variable	Independent Variable
1. To what extent can course status variables statistically account for the completion of a previously incomplete online course?	Multiple regression;	Subsequently completed assignments;	Credit hours;
2. To what extent can course status variables statistically predict the probability that an incomplete online course would be finished?	Logistic regression	Subsequently earned points;	Required assignments; Initially submitted assignments;
3. With respect to course status variables, what differences statistically exist between the online courses that were finished after an "*Incomplete*" grade had been assigned and those that still remain incomplete?	Descriptive statistic analyses; Chi-square tests; Independent *t*-test	Completion status;	Initially earned points; Duration of "*Incomplete*" status;

Multiple Regression Analyses

To answer Research Question One, multiple regression analyses were selected for the data analysis to explore the relationship between the course status variables and the coursework completion of a previously incomplete course. Multiple regression was selected because of its ability to statistically describe the collective contribution of a set of independent variables to the variance in a dependent variable; and its ability to depict the degree of relationship between individual independent variables and the variance in a dependent variable (Cohen & Cohen, 1983; Kerlinger & Pedhazur, 1973; Meyers, Gamst, & Guarino, 2006). In this study, standard or simultaneous multiple regression analyses were performed.

Before the outputs of the multiple regression analysis were examined, the correlations between the independent variables were screened. To do so was to detect high correlations between the independent variables which might influence the interpretation of the relationship between the independent variables and the dependent variables (Howell, 2002; Newton & Rudestam, 1999).

Among the outputs of the multiple regression analyses (Howell, 2002; Meyers, Gamst, & Guarino, 2006), several components were of interest to the researcher. These components were the R^2, squared semipartial correlation coefficient (*squared sr*), F value, Beta Weight (β), and t value. R^2 was the multiple coefficient of determination. It was used to statistically interpret the degree of relationship between the set of the five independent variables and either one of the two dependent variables, subsequently completed assignments and subsequently earned points. That is, how much variance in the completion of a previously incomplete course was accounted for by the combination of the five independent variables (Howell, 2002; Newton & Rudestam, 1999). The *squared sr* was used to statistically determine the variance in the dependent variables that

was uniquely explained by each of the independent variables, excluding the overlapped parts between the independent variables (Meyers, Gamst, & Guarino, 2006). The *F* value was used to determine whether the relationship between the set of the five independent variables and one of the two dependent variables was significant. Once the *F* value was significant, standardized regression coefficient, *Beta* weight (β), was used to identify the relative contributions from each of the independent variables to the variance in the dependent variables (Newton & Rudestam, 1999). The corresponding *t* values were referred to determine the significance of the individual contribution from each independent variable (Howell, 2002; Meyers, Gamst, & Guarino, 2006)

Logistic Regression Analysis

To answer Research Question Two, logistic regression analysis was selected for the data analysis. The second research question of this study was intended to statistically predict the probability that a previously incomplete online course would be finished. Logistic regression was selected for two reasons: (1) this analysis method matched the need of the study to predict the "completed" status for a previously incomplete online course between the two possible statuses, the completed and unfinished; (2) the research design satisfied the requirements of the analysis method, that is, the dependent variable was coded dichotomously and the independent variables were numerical data. Logistic regression was used to predict the probability of an event occurring (Howell, 2002; Kleinbaum, 1994; Meyers, Gamst, & Guarino, 2006). In this research, the event occurring was the completed status of a previously incomplete online course. In logistic regression, the dependent variable should be dichotomous; the independent variables could be numerical, categorical, or both (Gall, Gall, & Borg, 2003; Howell, 2002; Meyers, Gamst, & Guarino, 2006). In this study, the completion status of a previously incomplete course was coded as a dichotomous variable. The online courses with the completed status were coded

as "1" and those with the unfinished status were coded as "0". The five independent variables were of numerical data.

Among the outputs of the logistic regression analyses, several components were of interest to the researcher. They were the model Chi-square, Nagelkerke R Square, and *Wald* test results. The model Chi-square value was used to interpret whether the five independent variables as a set could be a statistically significant model to predict the probability that a previously incomplete online course would be finished. The Nagelkerke R^2 was used to "determine the percentage of variance in the dependent variable explained by the independent variables" (Meyers, Gamst, & Guarino, 2006, p.239). The *Wald* statistic value on each of the independent variables was used to determine if one independent variable was a statistically significant predictor in the model (Howell, 2002; Meyers, Gamst, & Guarino, 2006)

Descriptive Statistics Analyses, Chi-square Tests, and Independent t-tests

Descriptive statistics analyses, Chi-square tests, and independent *t*-tests were selected for the data analysis to answer Research Question Three. These analyses were conducted to examine the differences between the completed and unfinished online courses. The differences of analyses included:

1. Differences in credit hours;

2. Differences in required assignments;

3. Differences in initially submitted assignments;

4. Differences in initially earned points;

5. Differences in duration of incomplete status.

Analyses of differences in credit hours

Descriptive statistics and a 2 × 3 Chi-square test were selected to compare the differences in the hours of course credit between the completed and unfinished courses. Since the online courses in this study were designated with one, two, and three hours of course credit, the frequencies of previously incomplete courses at the two levels of completed and unfinished statuses and in the three categories of credit hours were counted. A 2 × 3 contingency table, as illustrated in Table 5, would be used to show the frequency distribution of courses with different credit hours at the two levels of completed and unfinished courses. A Chi-square test was used to compare whether the differences in credit hours made a significant difference between the completed and unfinished courses.

Table 5 *Contingency Table for Analyzing Differences in Hours of Course Credit*

Hours of Course Credit

	1-hour	2-hour	3-hour
Completed course			
Unfinished course			

Analyses of differences in required assignments

The differences in the number of required assignments between the completed and unfinished courses were analyzed with descriptive statistics analyses and a 2 × 3 Chi-square test as well. According to the number of required assignments, the courses with an initially assigned "*Incomplete*" grade were grouped into three categories, "few" assignments group (3-6), "medium" assignments group (7-9), "many" assignments group (10-16) (See Table 6). The frequencies of incomplete courses at the two levels of completed and unfinished statuses and in the three categories of the required assignments were counted. A 2 × 3 contingency table, as

illustrated in Table 6, would be used to show the frequency distribution of required assignments at the two levels of completed and unfinished courses. A Chi-square test was used to compare whether the differences in the required assignments made a significant difference between the completed and unfinished courses.

Table 6 *Contingency Table for Analyzing Differences in Required Assignments*

	Required Assignments		
	Few (3-6)	Medium (7-9)	Many (10-16)
Completed course			
Unfinished course			

Analyses of differences in initially submitted assignments and in initially earned points

Descriptive statistics analyses were selected to analyze the differences in the initially submitted assignments and initially earned points for the incomplete courses. The means and standard deviations of the two variables were compared between the completed and unfinished courses. Two independent *t*-tests would be used to determine if the differences were significant. Levene's Test for Equality of Variances would be used to test the existence of unequal variances, which is an assumption for independent *t*-test. If the Levene's test results were significant, *t* values with equal variances not assumed would be used for interpretation.

Analyses of differences in duration of incomplete status

These differences were also described and compared with descriptive statistics analyses. Depending on the collected data, the days that a course had been kept incomplete were categorized by months, year, or semester (Rekkedal, 1982; Shale, 1982; Woodley & Parlett, 1983). A Chi-square test would be used to find if the differences were significant.

Chapter Four: Data Collection, Results, and Discussion

The data of the three dependent variables and five independent variables were collected and analyzed in this study, based on the proposed research design and methodology. The three dependent variables: (1) subsequently completed assignments, (2) subsequently earned points, and (3) completion status, represented the extent and status of coursework completion of a previously incomplete online course. The five independent variables represented the various aspects of course status (See Table 4 for the variables in this study). Multiple regression, logistic regression, descriptive statistics analyses, Chi-square tests, and independent t-tests were used to conduct the data analysis. The results answered the three research questions of the study (See Table 4 for the research questions).

Data Collection

There were two phases in the data collection procedure, data retrieval and filtering, which prepared the data for the subsequent analyses in this research project. The data used for this study originally existed in the several databases of an online Master's degree program in a southeastern university, which was introduced in the methodology chapter of this dissertation. The databases of the online program kept track of the program course management systems, student registration and enrollment records, and course assessment information. They were only accessible to people with special duties in the online program, including the program administrators and a computer programmer.

Phase I — Data Retrieval

Based on the dependent and independent variables, the researcher composed six requests and provided them to the programmer to retrieve the needed data from the databases:

1. Provide a list of all the instances that an "*Incomplete*" grade was assigned to the online courses which were registered between fall 2001 and fall 2005;

2. Among the courses with an initially assigned "*Incomplete*" grade, identify those that were converted to completion, represented by a final grade change to "*A*", "*B*", "*C*", etc. in the databases, and those that remained incomplete, represented with no grade change and a change from "*Incomplete*" to "*F*";

3. For all the incomplete courses collected for Request 1 above, provide the number of graded assignments completed for each of them when these courses were initially assigned an "*Incomplete*" grade;

4. For all the incomplete courses collected for Request 1 above, provide the points earned for the submitted assignments when these courses were initially assigned an "*Incomplete*" grade. For instance, if 3 out of 9 assignments were submitted for a course when an "*Incomplete*" grade was assigned, how many points did these 3 assignments earn?

5. For the online courses that were initially assigned an "*Incomplete*" grade and were converted to completion that was indicated by the change from "*Incomplete*" to a letter grade other than "*F*", provide the date of the final grade change in the databases;

6. For the online courses that were initially assigned an "*Incomplete*" grade and had a final grade change in the databases, provide the total number of eventually submitted assignments and total points finally earned for such a course at its completion.

Besides the six requests, the CRN information and end-of-term grading dates of each term from fall 2001 to fall 2005 were also collected and provided to the programmer for the data retrieval. The CRN information included the unique course number with which a course was

registered in a specific term, the corresponding term in which a specific course was offered, the hours of course credit designated to a course with a specific CRN, the number of required assignments for a course, and the total possible points designated to a course. The CRN information was collected from the history documentation of the online program. The information about the end-of-term grading dates was collected from the university registrar and the graduate school of the university that hosted the online program. January 18, 2007 was the cut-off date for data retrieval in this study. For the courses with an initially assigned "*Incomplete*" grade which still remained unfinished, the lapses between the grading dates at the end of the semesters when the courses were assigned the "*Incomplete*" grade and January 18, 2007 were the durations of incomplete status. Before the retrieved data were sent to the researcher, the identification information about the students who registered in these incomplete courses was wiped out.

Phase II — Data Filtering

Since the data had to be retrieved from several databases of the online program and merged to meet the criteria set with the six requests described above, the 1,550 originally retrieved records were filtered by the researcher. After a close inspection of each record, nearly 39.8% of the 1,550 records had to be excluded due to various reasons. For example, some had to be excluded because they were converted to a "*Withdrawal*" or "*EQ*" from an "*Incomplete*" grade. Some were excluded because the courses had identical numbers for their submitted assignments and earned points at the time of the initially assigned "*Incomplete*" grade and at the time of final grade change, even if these courses had a grade change. Some other original records were excluded because the courses were registered by cohort students who did not have as much flexibility on their enrolled credit hours and completion deadlines for the courses offered in

particular semesters as the normal asynchronous distance learners had. As a result, 933 records of the online courses with an initially assigned "*Incomplete*" grade, with and without grade change, were used for the data analysis in this study.

<div align="center">*Analyses and Results*</div>

Data Coding

In order to use the various statistical methods for the analysis, the 933 usable records were coded through four steps:

Step One — Coding of completion status

Completed courses coded as "1": Among the 933 online courses with an initially assigned "*Incomplete*" grade, those that eventually had a grade change from the "*Incomplete*" grade to a final letter grade, such as "*A*", "*B*", "*C*", and "*D*", were the courses with a completed status. These courses were coded as "1". They were also call "completed courses" in this study.

Unfinished courses coded as "0": The online courses that had an initially assigned "*Incomplete*" grade but did not have a final grade change or had an "*F*" as the final grade from a previously assigned "*Incomplete*" were the courses that remained having incomplete status. The "*F*"s were assigned due to no coursework completion for a comparatively long duration after the courses were assigned an "*Incomplete*" grade. The courses that had remained incomplete by the cut-off date of the data collection were coded as "0". They were also referred to as "unfinished courses" in this study.

This step of coding converted the completion status to a dichotomous variable. This is the criterion variable for the logistic regression analysis to predict the probability of the completion of distance education coursework.

Step Two — Normalization of points designated to and earned with a course

Points were the basic grading units of the course assessment in the online program. As discussed in the methodology chapter, depending on the design of the online courses and their assessment, the total possible points designated to the graded assignments for each course ranged from 100 to 1,125. This made the earned points for one course incomparable with those for another, and even within the same course offered in different academic terms due to the update of course content. To make the earned points for all the online courses comparable, a normalized scale of 1,000 total possible points was set up for each course in this research project. The ratio between the 1,000 and the original total possible points of a course was used as the normalization coefficient in this study, as displayed in the normalization coefficient table in the methodology chapter of this dissertation (See Table 3 for the details of normalization). These normalization coefficients were applied to code the initially earned points and subsequently earned points.

Step Three — Categorization of courses according to the number of required assignments

The number of required assignments for the 15 online courses varied from three to 16. Courses with 3-6 required assignments were categorized in the "few" assignments group (coded as "1"); those with 7-9 assignments were categorized in the "medium" assignments group (coded as "2"); and those with 10-16 assignments were categorized in the "many" assignments group (coded as "3"). These categories were used for a 2×3 Chi-square test to explore the differences in the required assignments between the completed and unfinished courses.

Step Four — Categorization of courses according to the duration of incomplete status

The duration of incomplete status in this study was calculated by the days between the date when an "*Incomplete*" grade was assigned to an online course at the end of its registration semester and the date of the final grade change. If there was no grade change for a previously

incomplete course, the interval between the date when an "*Incomplete*" grade was assigned and the cut-off date of this research project, January 18, 2007, was calculated as the duration. In this study, the previously incomplete courses with different durations of incomplete status were categorized into four groups, those having the incomplete status within two months were coded as "1", those having the incomplete status between two months and one year were coded as "2", those having the incomplete status between one and two years were coded as "3", and those having been incomplete for longer than two years were coded as "4". These four categories were used in a 2×4 Chi-square test to analyze the differences in the duration of incomplete status between the completed and unfinished courses.

Descriptive Data

Among the 933 course records with an initially assigned "*Incomplete*" grade, 502 had a grade change to a letter grade of "*A*", "*B*", "*C*", etc. The other 431 remained incomplete. The overall completion rate for the 933 previously incomplete online courses was 53.8%.

Table 7 presents the completion rates of previously incomplete courses by 17 academic terms, from fall 2001 to fall 2005. In the 933 records, the term of fall 2005 had the most course counts with an initially assigned "*Incomplete*" grade, *n* = 122, and 57.4% of them were converted to completion. The courses with an "*Incomplete*" assigned in the summer I term of 2003 had the highest completion rate (86.7%).

Table 7 *Completion Rates of Previously Incomplete Courses by Academic Term*

Term	Frequency of Completed	Total Frequency	Completion Rate by Term
Fall 2001	0	5	0.0%
Spring 2002	4	7	57.1%
Summer I 2002	3	22	13.6%
Summer II 2002	11	42	26.2%
Fall 2002	7	30	23.3%
Spring 2003	33	56	58.9%
Summer I 2003	78	90	86.7%
Summer II 2003	31	60	51.7%
Fall 2003	46	72	63.9%
Spring 2004	26	56	46.4%
Summer I 2004	31	53	58.5%
Summer II 2004	27	52	51.9%
Fall 2004	48	103	46.6%
Spring 2005	34	77	44.2%
Summer I 2005	29	55	52.7%
Summer II 2005	24	31	77.4%
Fall 2005	70	122	57.4%
Total	502	933	

As demonstrated in Table 8, in terms of the courses with an initially assigned "*Incomplete*" grade under the 15 different online course titles, Learning Theories for

Instructional Design had the most incomplete courses, $n = 105$, while Instructional Technology in Context and Portfolio Evaluation had the fewest, $n = 20$. The completion rates for the online courses with an initially assigned "*Incomplete*" grade varied from 41% (Education and Web) to 75% (Instructional Technology in Context) among the 933 records of previously incomplete courses.

Table 8 *Distribution of Courses with Initially Assigned "Incomplete" Grade in 15 Online*

Courses

Course	Total Frequency	Frequency of Completed Courses	Completion Rate
Introduction to Instructional Technology	63	29	46%
Introduction to Computers	53	26	49%
Education and Web	85	35	41%
Learning Theories for Instructional Design	105	52	50%
Instructional Design	80	36	45%
Instructional Media	69	37	54%
Digital Audio	79	42	53%
Digital Video	74	42	57%
Graphic Design	67	30	45%
Telecommunications & Distance Learning	49	33	67%
Software Evaluation	49	33	67%
Educational Research	65	40	62%
Multimedia Authoring	55	38	69%
Instructional Technology in Context	20	15	75%
Portfolio Evaluation	20	14	70%
Total	933	502	

Results for Research Question One

To what extent can course status variables statistically account for the coursework completion of

a previously incomplete online course?

The set of the five course status factors could explain 93.6% of the variance in the

coursework completion measured by the subsequently completed assignments and 87% of the

variance in the coursework completion measured by the subsequently earned points. Required

assignments and initially submitted assignments were identified as the factors that could be used

to explain the completion measured by the subsequently completed assignments. Credit hours,

required assignments, initially earned points, and duration of incomplete status were identified as

the factors contributing to the explanation of the variance in the completion measured by the

subsequently earned points.

Multiple regression analyses were used to answer this research question that was intended

to explain the completion of an online course with an initially assigned "*Incomplete*" grade. In

this study, the coursework completion of online courses with an initially assigned "*Incomplete*"

grade was measured by the subsequently completed assignments and subsequently earned points.

The relationship between the five course status variables and the completion of the courses was

calculated through two separate procedures of standard multiple regression analyses on

subsequently completed assignments and subsequently earned points, respectively, with the five

independent variables. The 502 records of the completed courses were used for the data analysis.

Completion measured by subsequently completed assignments

The F value in the results of this multiple regression analysis was significant, $F(5, 496) =$

1455.91, $p = .000$ (See Appendix C). Therefore, the multiple regression coefficients, $R^2 = .936$

and adjusted $R^2 = .936$ were interpreted.

Regarding the individual contributions to the variance in subsequently completed assignments from the five independent variables, the *t* values were used for the interpretation. The *t* values for the required assignments, $t(496) = 66.818$, $p = .000$, and the initially submitted assignments, $t(496) = -32.051$, $p = .000$, were significant (See Appendix C).

The correlational matrix (See Table 9) displays the interrelationships among the variables. The five independent variables were all significantly correlated with the dependent variable. Required assignments, initially submitted assignments, and initially earned points were moderately correlated with subsequently completed assignments, $r = .603$, $-.422$, and $-.552$ ($p < .01$). Credit hours and duration of incomplete status were correlated with subsequently completed assignments, $r = .276$ and $.145$ ($p < .01$) respectively. Required assignments and initially submitted assignments were moderately correlated, $r = .431$, $p < .01$. Initially submitted assignments and initially earned points were fairly highly correlated, $r = .846$, $p < .01$.

Table 9 *Correlation Matrix of Variables for Completion Measured by Subsequently Completed*

Assignments

Variable	Subsequently completed assignments	Credit hours	Required Assignments	Initially submitted assignments	Initially earned points	Duration of incomplete status
Subsequently completed assignments	—	.276**	.603**	-.422**	-.552**	.145**
Credit hours		—	.333**	.053	-.073	-.044
Required Assignments			—	.431**	.168**	-.099
Initially submitted assignments				—	.846**	-.288**
Initially earned points					—	-.287**
Duration of incomplete status						—

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

Completion measured by subsequently earned points

The *F* value of the multiple regression analysis on the subsequently earned points was significant, $F(5, 496) = 671.076$, $p = .000$ (See Appendix D). Therefore, $R^2 = .871$ and adjusted $R^2 = .870$ were interpreted.

In terms of the contributions from the individual factors, the *t* values were interpreted. The *t* values for the credit hours, required assignments, initially earned points, and duration of incomplete status were significant, $t(496) = -3.788$ ($p = .000$), 1.966 ($p = .050$), -29.277 ($p = .000$), and -3.217 ($p = .001$) respectively (See Appendix D).

The correlational matrix (See Table 10) displayed the interrelationships of the variables in this analysis. Except for the credit hours, the other four independent variables were all significantly correlated with the subsequently earned points, of which the initially earned points were highly and negatively correlated with the subsequently earned points, $r = -.930, p < .01$. The initially submitted assignments were negatively and fairly highly correlated with the subsequently earned points, $r = -.773, p < .01$. Among the independent variables, the initially submitted assignments were fairly highly correlated with the initially earned points and moderately correlated with the required assignments, $r = .846$ and $.431$ ($p < .01$).

Table 10 *Correlation Matrix of Variables for Completion Measured by Subsequently Earned Points*

Variable	Subsequently earned points	Credit hours	Required Assignments	Initially submitted assignments	Initially earned points	Duration of incomplete status
Subsequently earned points	—	.023	−.130**	−.773**	−.930**	.218**
Credit hours		—	.333**	.053	−.073	−.044
Required Assignments			—	.431**	.168**	−.099
Initially submitted assignments				—	.846**	−.288
Initially earned points					—	−.287**
Duration of incomplete status						—

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

Checking multicollinearity

When examining the correlations among the five independent variables, the initially submitted assignments were found fairly highly correlated with the initially earned points (r = .846). Such high correlation between two independent variables would usually indicate the possible existence of multicollinearity, which would imply that one of the two variables should be considered for exclusion from the regression models (Howell, 2002; Meyers, Gamst, & Guarino, 2006). To diagnose whether multicollinearity existed in these regression models, three diagnostic procedures were computed with SPSS (See Appendix H). The results of the collinearity diagnostic tests showed that multicollinearity did not exist in the present models.

Results for Research Question Two

To what extent can course status variables statistically predict the probability that an incomplete online course would be finished?

Logistic regression analysis was conducted to answer this research question. The results indicated that the five predictor variables, as a set, could contribute to the prediction of the coursework completion, χ^2 (5, N = 933) = 780.921, p = .000 (See Appendix E). The Nagelkerke pseudo R^2 indicated that the set of predictor variables, as a model, could account for 75.7% of the total variance. This suggested that the set of predictor variables could discriminate an incomplete online course that would be finished from one that would not. The Wald test reported that the required assignments (Wald's χ^2 = 5.554, p = .018) and the duration of incomplete status (Wald's χ^2 = 216.565, p = .000) were statistically significant predictors of coursework completion (See Table 11).

Table 11 *Results of Logistic Regression Analysis for Predicting the Probability of Completion*

Step	Variable Entered	B	Wald	Sig.	Exp(B)
1	Credit hours	.060	.198	.656	1.062
	Required Assignments	-.085	5.554	.018	.919
	Initially submitted assignments	.208	1.971	.160	1.231
	Initially earned points	.000	.048	.827	1.000
	Duration of incomplete status	-.007	216.565	.000	.993
	Constant	3.983	79.271	.000	53.667

Results for Research Question Three

With respect to course status variables, what differences statistically exist between the online courses that were finished after an "Incomplete" grade had been assigned and those that still remain incomplete?

Descriptive statistics, 2 × 3 and 2 × 4 Chi-square tests, and independent *t*-tests were used to answer this research question, which was intended to analyze the differences in the five course status variables between the 502 completed and 431 unfinished courses. The five variables were the credit hours, required assignments, initially submitted assignments, initially earned points, and duration of incomplete status. The analysis results of the comparison were presented as follows.

Differences in credit hours

The results of the Chi-square analysis on the course counts with different credit hours were not significant, $\chi^2(2, N = 933) = .895, p = .639$ (See Appendix F). The differences in the credit hours designated to an online course were not related to whether or not a course was finished after it was assigned an "*Incomplete*" grade.

There were courses with one, two, and three credit hours offered by the online program in this research. Of the 933 records, nearly half were 1-credit courses ($n = 423$). As demonstrated in Table 12, the percentages of 1-credit courses in the completed and unfinished were similar (44% and 46.9%). The same patterns could also be found with the percentages of the 2 and 3-credit courses.

Table 12 *Distribution of Incomplete Online Courses with Different Credit Hours*

Credit Hours	Completed Courses		Unfinished Courses	
	Frequency	Percent	Frequency	Percent
1	221	44.0%	202	46.9%
2	115	22.9%	90	20.9%
3	166	33.1%	139	32.3%
Total	502		431	

Differences in required assignments

The Chi-square analysis results were significant, $\chi^2(2, N = 933) = 12.193, p = .002$ (See Appendix F). These indicated that the differences in the amount of required assignments and the completion of previously incomplete online courses were not independent.

The numbers of required assignments for the online courses in this study ranged from 3 to 16. The courses with different numbers of required assignments were categorized as "few", "medium", and "many" assignments groups (See p. 62 for the details of coding). Table 13

presents the frequency and percentage distribution of the completed and unfinished courses with varied numbers of required assignments. The online courses that were initially assigned an "*Incomplete*" grade and had few assignments (3~6) had the highest average completion rate (63.0%). Those with medium (7~9) and many assignments (10~16) had lower average completion rates, 50% and 50.7%.

Table 13 *Distribution of Completed and Unfinished Courses by Different Numbers of Required Assignments*

Category	Required Assignments	Completed Courses			Unfinished Courses		
		Frequency	Percent in All	Category Percent	Frequency	Percent in All	Category Percent
Few (3-6)	3	42	56.8%		32	43.2%	
	4	14	70.0%	63.0%	6	30.0%	37.0%
	5	33	67.3%		16	32.7%	
	6	73	64.0%		41	36.0%	
Medium (7-9)	7	55	47.4%		61	52.6%	
	8	78	49.1%	50.0%	81	50.9%	50.0%
	9	67	53.6%		58	46.4%	
Many (10-16)	10	30	44.8%		37	55.2%	
	13	72	46.8%	50.7%	82	53.2%	49.3%
	16	38	69.1%		17	30.9%	

Differences in initially submitted assignments

The independent *t*-test results revealed that the means of the initially submitted assignments for the completed and unfinished courses were significantly different, $t(779.207) =$

12.092, *p* = .000 (See Appendix I). The mean of the initially submitted assignments for the

completed courses (*M* = 2.71, *SD* = 3.079) was higher than that of the unfinished courses

(*M* = .80 (*SD* = 1.611) (See Appendix G).

For the completed online courses, the number of assignments submitted for a course

when the course was initially assigned an "*Incomplete*" grade ranged from zero to 14; while the

number ranged from zero to 9 for the unfinished courses. As presented in Table 14, 493 (52.8%)

out of 933 courses had zero submitted assignments when they were initially assigned an

"*Incomplete*" grade. Out of 493, 186 (37.7%) were completed later on, while 307 (62.3%)

remained incomplete. The total frequency with small numbers (≤ 6) of initially submitted

assignments was very high, that is, 878 (94%) of 933. The courses with at least one initially

submitted assignment were completed more than left unfinished and those with more initially

submitted assignment tended to have higher completion rates.

Table 14 *Descriptive Statistics of Courses with Different Numbers of Initially Submitted*

Assignments

Initially Submitted Assignments	Total Frequency	Frequency of Completed Courses	Frequency of Unfinished Courses	Percentage of Completed
0	493	186	307	37.7%
1	94	52	42	55.3%
2	65	43	22	66.2%
3	81	55	26	67.9%
4	46	36	10	78.3%
5	51	41	10	80.4%
6	48	38	10	79.2%
7	14	12	2	85.7%
8	8	8	0	100.0%
9	9	7	2	77.8%
10	11	11	0	100.0%
11	4	4	0	100.0%
12	3	3	0	100.0%
13	4	4	0	100.0%
14	2	2	0	100.0%

Differences in initially earned points

The significant independent *t*-test results indicated that the means of the initially earned points for the completed and unfinished online courses were significantly different, $t(831.079) =$

11.637, p = .000 (See Appendix J). The mean of the initially earned points for the completed courses (M = 218.62, SD = 245.568) was higher than that of the unfinished courses (M = 67.36, SD = 145.069) (See Appendix G).

After the normalization (See Table 3), the initially earned points for the completed and unfinished courses were between zero and 896 and between zero and 700 respectively. Table 15 presented the frequency distribution of both the completed and unfinished courses in nine groups, according to the different ranges of the initially earned points. For example, 496 courses (53.2%) out of 933 had zero earned points when they were initially assigned an "*Incomplete*" grade. Among them, 187 (37.7%) of 496 were finished later on while the other 309 (62.3%) still remained incomplete. The courses with non-zero initially earned points had completion rates over 50%. The courses with more initially earned points tended to have better completion rates.

Table 15 *Descriptive Statistics of Courses with Different Ranges of Initially Earned Points*

Range of Initial Earned Points (Unit=Points)	Total Frequency	Frequency of Completed Courses	Frequency of Unfinished Courses	Percentage of the Completed
0	496	187	309	37.7%
1-100	72	41	31	56.9%
101-200	99	64	35	64.6%
201-300	70	49	21	70.0%
301-400	61	49	12	80.3%
401-500	45	35	10	77.8%
501-599	21	17	4	81.0%
>599	69	60	9	87.0%
Total	933	502	431	

Differences in duration of incomplete status

The results of the 2 × 4 Chi-square analysis were significant, $\chi^2(3, N = 933) = 679.326$, $p = .000$ (See Appendix F). These indicated that the durations of incomplete status of the completed courses were significantly different from those of the unfinished courses.

For those completed courses, the lapses varied from eight to 1,245 days; while the durations for the unfinished courses varied from 309 days to 1,851 days. Since the frequencies of previously incomplete courses were widely and irregularly dispersed regarding the duration of incomplete status, a coding system for the duration of incomplete status was set up by "within two months", "between two months and one year", "between one and two years", and "longer

than two years" for the analysis about this variable (See the Data Coding on p. 63). As

demonstrated in Table 16, most of the completed courses had the incomplete status just within

one year (420 out of 421).

Table 16 *Completion Rates by Duration of Incomplete Status*

Duration of Incomplete Status	Frequency of Completed Courses	Frequency of Unfinished Courses	Percentage of the Completed
≤ 2 Months	143	0	28.5%
2 Months - 1 Year	277	0	55.2%
1-2 Years	58	127	11.5%
> 2 Years	24	304	4.8%
Total	502	431	

Discussion

Findings of this study confirmed the relationship between the variables of online course

status and course completion in distance education. The research has extended the previous

research on retention in distance education to studying the completion of previously incomplete

online courses. Course completion, as it is closely related with retention, has been a popular

research topic in distance education (Billings, 1988; Jamison, 2003; Kellogg, 2003; Simpson,

2003; Sriwongkol, 2002; Tallman, 1994; Wong & Wong, 1978-1979); however, the completion

of previously incomplete courses was rarely studied, especially with the multiple online courses

of an entire graduate degree program and a comparatively long time span (four academic years in

this study).

Recent literature about retention in distance education recommended that research on

existing information about distance courses could provide informed basis for institutions to

improve curricular provisions as well as academic support and services to distance learners (Ashby, 2004; Tresman, 2002). Studies also identified course-related factors that were influential to course completion (Billings, 1988; Kellogg, 2003; Shale, 1982; Sriwongkol, 2002; Woodley & Parlett, 1983). Based on the literature review, the present research selected five variables representing online course status: (1) credit hours designated to an online course, (2) required assignments, (3) initially submitted assignments at the grant of "*Incomplete*" grade, (4) initially earned points, and (5) duration of incomplete status. The coursework completion of previously incomplete online courses was measured by the subsequently completed assignments and subsequently earned points between the initial grant of an "*Incomplete*" grade to an online course and the final grade change for it. Using the course-based data about online courses that were registered with 15 different course titles and originally assigned an "*Incomplete*" grade in their registration terms between fall 2001 and fall 2005, this study explored the relationship between the five course status variables and the completion of previously incomplete online courses. Referring to the literature, the results of the present study are discussed as follows.

Credit Hours

Distance courses with different credit hours were found having different completion rates (Shale, 1982; Woodley & Parlett, 1983). In Shale's study conducted in Athabasca University (AU), Canada, the 3-credit courses (31.9%) had a higher completion rate than the 6-credit courses (27.0%). Woodley and Parlett (1983) found that in UKOU, the full-credit courses (72%) had a better completion rate than those half-credit courses (62%).

In the current study, the completion rates of 1, 2, and 3-credit courses with a previously assigned "*Incomplete*" grade were compared. The completion rates of the 1, 2, and 3-credit courses were all close with each other, a little above 50%. The differences in the credit hours

between the completed and finished courses were not significant. However, the number of credit hours was significantly and modestly correlated with the subsequently completed assignments and required assignments, $r = .276$ and $.333$, $p < .01$. Statistically, it was a significant factor in the explanation of the coursework completion, measured by the subsequently earned points.

Required Assignments

The relationship between the required assignments of an online course and the course completion was studied by Sriwongkol (2002) and Kellogg (2003). In Sriwongkol's study (2002), The required assignments, as the workload for online courses, were found having an opposite relationship with the online course completion rate and it was not a significant predictor of completion (Sriwongkol, 2002). Using computer-generated email reminders, Kellogg (2003) studied the assignment and course completion of online courses. She found that the courses with 7-8 required assignments had a higher mean of timely completed assignments than those with 4-6 and 13 required assignments, for both the control and treatment groups. The result was significant in Kellogg's study and she concluded that the "number of assignments within a course did impact course completion" (Kellogg, 2003, p. 51).

The present study confirmed and explored further the impact of the required assignments on the coursework completion. There were significant differences in the required assignments between the completed and unfinished courses. The courses with 3-6 required assignments had higher completion rates. In addition, the number of required assignments was a significant factor contributing to the explanation of the coursework completion, measured by both the subsequently completed assignments and subsequently earned points. It was also a significant predictor of the likelihood of coursework completion.

Initially Submitted Assignments

According to the previous research, the number of submitted assignments and the submittal of the first assignments were closely related to the completion of distance courses (Anandam & Fleckman, 1977; Simpson, 2003; Wong & Wong, 1978-1979; Woodley & Parlett, 1983; Wright & Tanner, 2002). In the study by Wong and Wong (1978-1979), the courses with more than half of the required assignments submitted had higher completion rates. Over 90% of the students who submitted more than half of the assignments took the final exam and completed the registered courses. Studies also reported that the courses with the first assignment submitted had better completion rates (Anandam & Fleckman, 1977; Simpson, 2003; Woodley & Parlett, 1983; Wright & Tanner, 2002).

In the current study, the results of the literature were confirmed with the online courses that had an initially assigned "*Incomplete*" grade. The courses that had at least one initially submitted assignment had an overall completion rate of 71.8% and those with larger numbers of initially submitted assignments had higher completion rates. Moderately correlated with the subsequently completed assignments and fairly highly correlated with the subsequently earned points, the number of initially submitted assignments was a significant factor in the explanation of coursework completion. Uniquely, the initially submitted assignments could explain 13.2% of the variance in the completion, measured by the subsequently completed assignments.

Initially Earned Points

Past studies found that students with higher grades in the history of their previous learning completed distance courses better (Dille & Mezack, 1991; Dupin-Bryant, 2004; Osborn, 2001). The results of this study showed that the initially earned points were highly correlated with the subsequently earned points and moderately correlated with the subsequently completed

assignments. The amount of the initially earned points was a significant factor in the explanation of coursework completion. It could uniquely explain 22.3% of the variance in the completion, measured by the subsequently earned points.

Duration of Incomplete Status

Previous research found that the longer a distance course had been registered and retained in the course registration system without an awarded final grade, the less likely it would be completed (Shale, 1982; Woodley & Parlett, 1983). In the study by Woodley and Parlett (1983), the distance courses registered in 1971 in UKOU had a 45% completion rate, while those registered in 1980 had a completion rate of 70%, with 1982 as the cut-off time for the calculation of the completion rates. Shale (1982) presented the completion rates of seven 3-credit courses and 14 6-credit courses enrolled in the four terms between 1978 and 1979 in AU. The cut-off date of his study was February 28, 1981. The completion rate for the courses registered within one and half years was 33.4% and that for the courses registered for longer than two years was 26.2%.

In this study, the duration of incomplete status was the lapse between the time when an "*Incomplete*" grade was assigned to an online course and the time of a final grade change for the eventually completed course, measured as days. For those unfinished courses, it was the time between the initial grant of the "*Incomplete*" grade and the cut-off date of this study, January 18, 2007. As shown in the results of the present study, the percentage of the completed courses that had incomplete status within one year was 83.7% ($n = 502$). In contrast, the percentage of the unfinished courses that had incomplete status longer than one year was 99.8% ($n = 431$). The duration of incomplete status was a significant factor in the explanation of the coursework

completion, measured by the subsequently earned points. It was also a significant predictor of the coursework completion.

Summary and Implications of this Research

This study extended the research on course completion in distance education to an online learning environment. It uniquely focused on the coursework completion of the online courses with a previously assigned "*Incomplete*" grade. The research was situated in an entire online graduate degree program in education and a variety of 15 courses offered by the program simultaneously each academic term. The learning activities in these courses were assessed with submitted assignments and earned points, which allowed the students to pace the learning flexibly. The coursework completion of the online courses ($n = 933$) that had an initially assigned "*Incomplete*" grade during the 17 consecutive terms between fall 2001 and fall 2005 were used as the units of data analysis. Five course status factors related to completion, which had been discretely identified in the literature, were examined both collectively and individually in a course-based approach in this research.

With the statistical analysis results and discussion, the three proposed research questions were satisfactorily answered and explained. There were distinctive differences in the number of required assignments, initially submitted assignments, initially earned points, and duration of incomplete status between the completed and unfinished courses. The online courses with 3-6 required assignments had better completion rates after they were assigned an "*Incomplete*" grade. Once an online course had at least one initially submitted assignment and at least one initially earned point when it was assigned an "*Incomplete*" grade, it had a better chance to be completed subsequently than left unfinished. The more initially submitted assignments and initially earned points it had, the more likely it would be completed. Most of the completed courses had a grade

change from an "*Incomplete*" to a letter grade within one year. The longer a course was left incomplete, the less likely it would have a grade change. The statistical results also demonstrated that the set of the five course status factors could be used to explain the extent and predict the likelihood of the coursework completion of previously incomplete online courses in the program of this research.

Practically, the research results can be utilized to diagnose the extent and probability of the coursework completion of previously incomplete courses in the online graduate degree program. The diagnosis can be established through incorporating the statistical relationship between the five course status factors and the coursework completion into the online course assessment system of the program.

In terms of the individual factors, the results can also provide research-based references to the design of online courses and pertinent interventions for increasing the retention rates in online programs. The results of this study have identified that the previously incomplete online courses with 3-6 required assignments had higher completion rates than the courses with larger numbers of required assignments. This finding can be a consideration for online course designers to optimize the probability of coursework completion at the design stage.

This study has also found that the previously incomplete online courses had higher completion rates once they had at least one initially submitted assignment and at least one initially earned point when they were assigned an "*Incomplete*" grade. This finding can be utilized to initiate contact with the students who had no initially submitted assignment and no initially earned point for their incomplete courses, encouraging them to increase their chance for coursework completion.

Another important factor that can be used to customize the interventions for the completion of incomplete online courses is duration of incomplete status. The results of this study have revealed that the courses with incomplete status longer than one year were much less likely to be completed than those having shorter incomplete status. Therefore, for the students having incomplete course(s) close to one year, contacts can be initiated by the hosting institutions of online courses and/or programs. With the communications, the student may become aware of the probability of their coursework completion in relation to the incomplete status so that remedial actions may be taken.

In short, this study has investigated a particular phenomenon in distance education, the coursework completion of previously incomplete online courses. Five course status factors were explored statistically, as a set and as individual variables, in relation to the coursework completion in an entire online degree program over four academic years. The results have provided research-based insights into the design of online courses and clues for possible interventions for the completion of incomplete online courses.

References

Allen, I. E., & Seaman, J. (November, 2005). *Growing by degrees: Online education in the United States, 2005*. The Sloan Consortium. Retrieved December 2, 2005, from http://www.sloan-c.org/publications/survey/pdf/growing_by_degrees.pdf.

Allen, I. E., & Seaman, J. (November, 2006). *Making the Grade: Online Education in the United States, 2006*. The Sloan Consortium. Retrieved December 4, 2006, from http://www.sloan-c.org/publications/survey/pdf/making_the_grade.pdf.

Anandam, K., & Fleckman, B. (1977). Telephone dialogue intervention in Open Learning instruction. *Journal of College Student Personnel, 18*(3), 219-223.

Aragon, S. R., Johnson, S. D., & Shaik, N. (2002). The influence of learning style preferences on student success in online versus Face-to-Face environments. *The American Journal of Distance Education, 16*(4), 227–244.

Ashby, A. (2004). Monitoring student retention in the Open University: definition, measurement, interpretation and action. *Open Learning, 19*(1), 65-77.

Barefoot, B. O. (2004). Higher education's revolving door: Confronting the problem of student dropout in US colleges and universities. *Open Learning, 19*(1), 9-18.

Bauernfeind, R. H. (1973). Grading on the bulb. *Measurement and Evaluation in Guidance, 5*(4), 483-487.

Berge, Z. L., & Huang, Y.-P. (2004). A model for sustainable student retention: A holistic perspective on the student dropout problem with special attention to e-learning. Retrieved March 2, 2006, from http://www.ed.psu.edu/acsde/deos/deosnews/deosarchives.asp

Bergman, J. (1981). *Understanding educational measurement and evaluation*. Boston, MA: Houghton Mifflin Company.

Billings, D. M. (1986). *Factors related to progress toward completion of correspondence courses in a Baccalaureate nursing program*. Unpublished Dissertation, Indiana University.

Billings, D. M. (1988). A conceptual model of correspondence course completion. *The American Journal of Distance Education, 2*(2), 23-35.

Born, D. G., & Moore, M. C. (1978). Some belated thoughts on pacing. *Journal of Personalized Instruction, 3*(1), 33-36.

Brown, A. R., & Voltz, B. D. (2005). Elements of Effective e-Learning Design. *The International Review of Research in Open and Distance Learning, 6*(1).

Case, P., & Elliot, B. (1997). Attrition and retention in distance learning programs: problems, strategies, and solutions. *Open Praxis, 1*(30-33).

Clarke, M., Butler, B., Schmidt-Hansen, P., & Somerville, M. (2004). Quality assumrance for distance learning: A case study at Brunel University. *British Journal of Educational Technology, 35*(1), 5-11.

Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavior sciences*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Conrad, D. L. (2002). Engagement, excitement, anxiety, and fear: Learners' experiences of starting an online course. *The American Journal of Distance Education, 16*(4), 205-226.

Cook, T. D., & Groom, C. (2004). The methodological assumptions of social psychology: The mutual dependence of substantive theory and method choice. In C. Sansone, C. C. Morf

& A. T. Panter (Eds.), *The Sage Handbook of Methods in Social Psychology* (pp. 19-44). Thousand Oaks, CA: Sage Publications.

Cookson, P. S. (1989). Research on learners and learning in distance education: A review. *The American Journal of Distance Education, 3*(2), 22-34.

Dempsey, J. V., & Van Eck, R. N. (2002). Instructional Design On-Line: Evolving Expectations. In R. A. Reiser & J. V. Dempsey (Eds.), *Trends and Issues in Instructional Design and Technology* (pp. 281-294). New Jersey: Upper Saddle River: Merrill Prentice Hall.

DeTure, M. (2004). Cognitive style and self-efficacy: Predicting student success in online distance education. *The American Journal of Distance Education, 18*(1), 21-38.

Dille, B., & Mezack, M. (1991). Identifying predictors of high risk among community college telecourse students. *The American Journal of Distance Education, 5*(1).

Dupin-Bryant, P. A. (2004). Pre-entry variables related to retention in online distance education. *The American Journal of Distance Education, 18*(4), 199-206.

Fjortoft, N. F. (1996). Persistence in a distance learning program: A case in pharmaceutical education. *The American Journal of Distance Education, 10*(3), 49-59.

Gagne, R. M., Briggs, L. J., & Wager, W. W. (1992). *Principles of instructional design*. Orlando, FL: Harcourt Brace & Company.

Gaide, S. (2005). Increase retention by establishing institutional and faculty benchmarks. *Distance Education Report, 9*(18), 4-7.

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational research: An introduction* (7th ed.). Boston, MA: Pearson Education.

Garland, M. R. (1993). Student perceptions of the situational, institutional, dispositional and epistemological barriers to persistence. *Distance Education, 14*(2).

Goodwin, C. J. (2002). *Research in psychology: Methods and design* (3rd. ed.). New York, NY: John Wiley & Sons.

Harrison, N., & Bergen, C. (2000). Some design strategies for developing an online course. *Educational Technology, January-February*, 57-60.

Head, J. T., Lockee, B. B., & Oliver, K. E. (2002). Method, media, and mode: Clarifying the discussion of distance education effectiveness. *Quarterly Review of Distance Education, 3*(3), 261-268.

Heffernan, J. M. (1973). The Credibility of the Credit Hour:The History, Use, and Shortcomings of the Credit System. *The Journal of Higher Education, 44*(1), 61-72.

Howell, D. C. (2002). *Statistical Methods for Psychology* (5th ed.). Pacific Grove, CA: Duxbury.

Jamison, T. M. (2003). *Ebb from the web: Using Motivational Systems Theory to predict student completion of asynchronous web-based distance education courses.* Unpublished doctoral dissertation, George Mason University, Fairfax, Virginia.

Jiang, M., & Ting, E. (2000). A study of factors influencing students' perceived learning in a web-based course environment. *International Journal of Educational Telecommunications, 6*(4), 317-338.

Keegan, D. (1996). *Foundations of distance education* (3rd ed.). London & New York: Routledge.

Kellogg, A. (2003). *Using computer generated reminders as time management support to influence assignment submission rates and course completion in an online master's program.* Unpublished doctoral dissertation, Virginia Polytechnic Institute and State University, Blacksburg, VA.

Kember, D. (1990). The use of a model to derive interventions which might reduce drop-out from distance education courses. *Higher Education, 20*, 11-24.

Kember, D. (1995). *Open learning courses for adults: A model of student progress*. Englewood Cliffs, New Jersey: Educational Technology Publications.

Kember, D., Lai, T., Murphy, D., Siaw, I., & Yuen, K. S. (1994). Student progress in distance education courses: A replication study. *Adult Education Quarterly, 45*(1), 286-301.

Kennedy, D., & Powell, R. (1976). Student progress and withdrawal. *Teaching at a Distance, 7*, 61-75.

Kerlinger, F. N., & Pedhazur, E. J. (1973). *Multiple regression in behavior research*. New York: Holt, Rinehart and Winston, Inc.

Kleinbaum, D. G. (1994). *Logistic regression: A self-learning text*. New York: Springer-Verlag.

Lewis, L. G. (1961). The Credit System in Colleges and Universities. In *New Dimensions in Higher Education*. Washington D.C.: Department of Health, Education and Welfare, Office of Education.

Loomis, K. D. (2000). Learning styles and asynchronous learning: Comparing the LASSI model to class performance. *Journal of Asynchronous Learning Network, 4*(1), 23-32.

Mark, M. M., & Reichardt, C. S. (2004). Quasi-experimental and correlational design: Methods for the real world when random assignment isn't feasible. In C. Sansone, C. C. Morf & A. T. Panter (Eds.), *The sage handbook of methods in social psychology*. Thousand Oaks, CA: Sage Publications.

McIntosh, N. E., Woodley, A., & Morrison, V. (1983). Student demand and progress at the Open University: The first eight years. In D. Sewart, D. Keegan & B. Holmberg (Eds.),

Distance education (pp. 170-194). New York: St. Martin's Press. (Original work published 1980).

Meyers, L. S., Gamst, G., & Guarino, A. J. (2006). *Applied multivariate research: Design and interpretation*. Thousand Oaks, CA.: Sage Publications.

Moore, M. G. (1973). Toward a theory of independent learning and teaching. *Journal of Higher Education, 44*, 661-679.

Moore, M. G. (1989). Three types of interaction. *The American Journal of Distance Education, 3*(2), 1-6.

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical Principles of Distance Education* (pp. 22-38): Routledge.

Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth Publishing Company.

Moore, M. G., & Kearsley, G. (2005). *Distance education: A systems view* (2nd ed.). Belmont, CA: Thomas Wadsworth.

Morgan, C. K., & Tam, M. (1999). Unravelling the complexities of distance education student attrition. *Distance Education, 20*(1), 96-108.

Morris, L. V., Wu, S.-S., & Finnegan, C. L. (2005). Predicting retention in online general education courses. *The American Journal of Distance Education, 19*(1), 23-36.

Moskal, P. D., & Dziuban, C. D. (2001). Present and future directions for assessing cybereducation: The changing research paradigm. In L. R. Vandervert, L. V. Shavinina & R. A. Cornell (Eds.), *Cybereducation: The future of long-distance learning* (pp. 157-184). Larchmont, NY: Mary Ann Liebert.

Motiwalla, L., & Tello, S. (2000). Distance learning on the Internet: An exploratory study. *The Internet and Higher Education, 2*(4), 253-264.

Muilenburg, L. Y., & Berge, Z. L. (2005). Student barriers to online learning: A factor analytic study. *Distance Education, 26*(1), 29-48.

National Center for Educational Statistics. (2003). *Distance education at degree-granting postsecondary institutions: 2000-2001*. (NCES 2003-017). Retrieved September 22, 2004, from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2003017.

National Postsecondary Education Cooperative. (2004). *How Does Technology Affect Access in Postsecondary Education? What Do We Really Know?* (NPEC 2004–831), prepared by Ronald A. Phipps for the National Postsecondary Education Cooperative Working Group on Access-Technology. Washington, DC: 2004. Retrieved December 28, 2006 from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2004831.

Navarro, P., & Shoemaker, J. (2000). Performance and perceptions of distance learners in cyberspace. *The American Journal of Distance Education, 14*(2), 15-35.

Newton, R. R., & Rudestam, K. E. (1999). *Your statistical consultant: Asnwers to your data analysis questions*. Thousand Oaks, CA: SAGE Publications, Inc.

Oblinger, D. G., Barone, C. A., & Hawkins, B. L. (2001). *Distributed Education and its Challenges: An Overview*. American Council of Education. Retrieved December 4, 2006 from http://www.acenet.edu/bookstore/pdf/distributed-learning/distributed-learning-01.pdf.

Osborn, V. (2001). Identifying at-risk students in videoconferencing and web-based distance education. *The American Journal of Distance Education, 15*(1), 41-54.

Pérez Cereijo, M. V. (2006). Attitude as predictor of success in online training. *International Journal of e-Learning, 5*(4), 623-639.

Picciano, A. G. (2001). *Distance learning: making connections across virtual space and time*. Upper Saddle River, NJ: Merrill, Prentice-Hall.

Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. *Journal of Asynchronous Learning Network, 6*(1), 21-40.

Pomales-García, C., & Liu, Y. (2006). Web-based distance learning technology: The impacts of web module length and format. *The American Journal of Distance Education, 20*(3), 163-179.

Reeves, T. (2000). Alternative assessment approaches for online learning environments in higher education. *Journal of Educational Computing Research, 23*(1), 101-111.

Rekkedal, T. (1982). The drop-out problem and what to do about it. In J. S. Daniel, M. A. Stroud & J. R. Thompson (Eds.), *Learning at a distance: A world perspective* (pp. 118-122). Edmonton, Canada: Athabasca University / International Council for Correspondence Education.

Roach, R. (2002). Staying Connected *Black Issues in Higher Education, 19*(18), 22-26.

Rumble, G. (1992). *The management of distance learning systems*. Paris: UNESCO: International Institute for Educational Planning.

Rungtusanatham, M., Ellram, L. M., Siferd, S. P., & Salik, S. (2004). Toward a typology of business education in the Internet age. *Decision Sciences Journal of Innovative Education, 2*(2), 101-120.

Saba, F. (2005). Critical issues in distance education: a report from the United States. *Distance Education, 26*(2), 255-272.

Savenye, W. (2004). Evaluating web-based learning systems and software. In N. M. Seel & S. Dijkstra (Eds.), *Curriculum, plans, and processes in instructional design: International perspectives*. Mahwah, NJ: Lawrence Erlbaum Associate.

Schlosser, L. A., & Simonson, M. (2003). Distance education: Toward a definition and glossary terms.   Retrieved September 14, 2004, from http://www.aect.org/intranet/Publications/Disted/Disted.asp

Seidman, A. (2004-2005). Defining Retention. *Journal of College Student Retention, 6*(2), 29-135.

Shale, D. G. (1982). Attrition: A case study. In J. S. Daniel, M. A. Stroud & J. R. Thompson (Eds.), *Learning at a distance: A world perspective* (pp. 113-117). Edmonton, Canada: Athabasca University / International Council for Correspondence Education.

Shedd, J. M. (2003). The History of the Student Credit Hour. *New Directions for Higher Education, 122*(summer), 5-12.

Shin, N., & Chan, J. K. Y. (2004). Direct and indirect effects of online learning on distance education. *British Journal of Educational Technology, 35*(3), 275-288.

Simonson, M., Smaldino, S., Albright, M., & Zvacek, S. (2000). *Teaching and Learning at a Distance: Foundations of Distance Education*. Upper Saddle River, NJ: Prentice-Hall.

Simpson, O. (2003). *Student retention in online, open and distance learning*. London & Sterling, VA: Kogan Page.

Simpson, O. (2004). The impact on retention of interventions to support distance learning students. *Open Learning, 19*(1), 79-95.

Sims, R. (2006). Online distance education: New ways of learning; new modes of teaching (Editorial). *Distance Education, 27*(2), 135-138.

Smith, P. (2005). Distance education: Past contributions and possible futures. *Distance Education, 26*(2), 159-163.

Sriwongkol, T. J. (2002). *Online learning: A model of factors predictive of course completion rate as viewed by online instructors.* Unpublished doctoral dissertation, University of South Alabama, Mobile, Alabama.

Sweet, R. (1986). Student dropout in distance education: An applicaiton of Tinto's model. *Distance Education, 7*(2), 201-213.

Tait, J. (2004). The tutor/facilitator role in student retention. *Open Learning, 19*(1), 97-109.

Tallman, F. D. (1994). Satisfaction and completion in correspondence study: The influence of instructional and student-support services. *The American Journal of Distance Education, 8*(2), 43-57.

Taylor, J. C. (1986). Student persistence in distance education: A cross-cultural multi-institutional perspective. *Distance Education, 7*(1), 68-91.

Taylor, J. C., & al., e. (1986). Student persistence in distance education: A cross-cultural multi-institutional perspective. *Distance Education, 7*(1), 68-91.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*(1), 89-125.

Tinto, V. (1987). *Leaving college: Rethinking the causes and cures of student attrition.* Chicago, IL: The University of Chicago Press.

Tinto, V. (1997). Classrooms as communities: Exploring the educational character of student persistence. *The Journal of Higher Education, 68*(6), 599-623.

Tresman, S. (2002). Towards a Strategy for Improved Student Retention in Programmes of Open, Distance Education: A Case Study from the Open University UK. *International Review of Research in Open and Distance Learning, 3*(1), 11.

U.S. Department of Education. (2006). *A Test of Leadership: Charting the Future of U.S. Higher Education*. Washington, D.C., Retrieved Feb. 1, 2007 at http://www.ed.gov/about/bdscomm/list/hiedfuture/index.html.

U.S. Department of Education, Office of Postsecondary Education, & Office of Policy Planning and Innovation. (2005). *Third Report to Congress on the Distance Education Demonstration Program, February 2005*. Washington, DC, 20006. Retrieved January 10, 2006 from http://www.ed.gov/programs/disted/DEDP-thirdreport.pdf.

Van Ness, B. F., Van Ness, R. A., & Adkins, R. L. (2000). Student performance in Principles of Finance: Differences between traditional and Internet settings. *Financial Practice and Education, Fall/Winter*, 160-166.

Vonderwell, S. (2003). An examination of asynchronous communication experiences and perspectives of students in an online course: a case study. *Internet and Higher Education, 6*, 77-90.

Vonderwell, S., & Zachariah, S. (2005). Factors that influence participation in online learning. *Journal of Research on Technology in Education, 38*(7), 213-230.

Wedemeyer, C. A. (1971). University programs. In O. MacKenzie & E. L. Christensen (Eds.), *The changing world of correspondence study* (pp. 51-59). University Park, PA: The Pennsylvania State University Press. (Original work published 1963).

White, C. (2005). Contribution of distance education to the development of individual learners. *Distance Education, 26*(2), 165-181.

Wilkinson, T. W., & Sherman, T. M. (1990). Perceptions and actions of distance educators on academic procrastination. *The American Journal of Distance Education, 4*(3), 47-56.

Wong, A. T., & Wong, S. C. P. (1978-1979). The relationship between assignment completion and the attrition and achievement in correspondence course. *The Journal of Educational Research, 72*, 165-168.

Woodley, A. (1982). Reducing the drop-out rate in advanced courses. In J. S. Daniel, M. A. Stroud & J. R. Thompson (Eds.), *Learning at a Distance: A World Perspective*. Edmonton, Canada: Athabasca University / International Council for Correspondence Education.

Woodley, A. (2004). Conceptualizing student dropout in part-time distance education: Pathologizing the normal? *Open Learning, 19*(1), 47-63.

Woodley, A., & Parlett, M. (1983). Student drop-out. *Teaching at A Distance, 24*(Autumn), 2-23.

Wright, N., & Tanner, M. S. (2002). Medical students' compliance with simple administrative tasks and success in final examinations: Retrospective cohort study. *British Medical Journal, 324*(29June), 1554-1555.

Zvacek, S. M. (2004). Distance education. In A. Kovalchick & K. Dawson (Eds.), *Education and technology: An encyclopedia* (Vol. 1, pp. 219-229). Santa Barbara, CA: ABC-CLIO.

Appendices

Appendix A: IRB Approval Letter

VirginiaTech

DATE: January 22, 2007

MEMORANDUM

TO: David (Mike) Moore
             Juhong Liu

FROM: Carmen Green

SUBJECT: **IRB Exempt Approval:**   "An Exploration of Factors Related to the Completion of Distance Education Coursework", IRB # 07-026

I have reviewed your request to the IRB for exemption for the above referenced project. I concur that the research falls within the exempt status.   Approval is granted effective as of January 22, 2007.

As an investigator of human subjects, your responsibilities include the following:

1.   Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.

2.   Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

Appendix B: Equations Generated from Multiple Regression and Logistic Regression Analyses

Multiple Regression Equations:

$\hat{Y}_1$ (completion measured by subsequently completed assignments)

$= 0.035 - 0.008(\text{credit hours}) + 0.977(\text{required assignments})$

$- 0.955 \,(\text{initially submitted assignments}) + 0.000 \,(\text{initially earned points})$

$+ 0.000 \,(\text{duration of incomplete status})$ Equation 1

$\hat{Y}_2$ (completion measured by subsequently earned points)

$= 959.349 - 18.953(\text{credit hours}) + 2.875(\text{required assignments})$

$+ 2.085(\text{initially submitted assignments}) - 1.006(\text{initially earned points})$

$- 0.061(\text{duration of incomplete status})$ Equation 2

Logistic Regression Equations:

$\text{Log odds} = 0.060(\text{credit hours}) - 0.085(\text{required assignments})$

$+ 0.208(\text{initially submitted assignments}) + 0.000(\text{initially earned points})$

$- 0.007(\text{duration of incomplete status}) + 3.983$ Equation 3

$\text{Predicted probability} = e^{\log\text{ odds}} / (1 + e^{\log\text{ odds}})$ Equation 4

Appendix C: Outputs of the Multiple Regression Analysis on Subsequently Completed

Assignments

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.968	.936	.936	.910	.936	1455.911	5	496	.000

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6034.523	5	1206.905	1455.911	.000(a)
	Residual	411.168	496	.829		
	Total	6445.691	501			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	.035	.145		.243	.808	-.250	.321			
	Credit hours (X_1)	-.008	.050	-.002	-.160	.873	-.106	.090	.276	-.007	-.002
	Required assignments (X_2)	.977	.015	.961	66.818	.000	.948	1.006	.603	.949	.758
	Initially submitted assignments (X_3)	-.955	.030	-.819	-32.051	.000	-1.013	-.896	-.422	-.821	-.363
	Initially earned points (X_4)	.000	.000	-.021	-.895	.371	-.001	.000	-.552	-.040	-.010
	Duration of incomplete status (X_5)	.000	.000	-.003	-.240	.810	.000	.000	.145	-.011	-.003

Appendix D: Outputs of the Multiple Regression Analysis on Subsequently Earned Points

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.933	.871	.870	91.072	.871	671.076	5	496	.000

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27829782.232	5	5565956.446	671.076	.000(a)
	Residual	4113862.973	496	8294.079		
	Total	31943645.204	501			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	959.349	14.543		65.964	.000	930.775	987.923			
	Credit hours (X_1)	-18.953	5.004	-.065	-3.788	.000	-28.784	-9.122	.023	-.168	-.061
	Required assignments (X_2)	2.875	1.462	.040	1.966	.050	.002	5.748	-.130	.088	.032
	Initially submitted assignments (X_3)	2.085	2.979	.025	.700	.484	-3.769	7.939	-.773	.031	.011
	Initially earned points (X_4)	-1.006	.034	-.978	-29.277	.000	-1.073	-.938	-.930	-.796	-.472
	Duration of incomplete status (X_5)	-.061	.019	-.054	-3.217	.001	-.099	-.024	.218	-.143	-.052

Appendix E: Outputs of the Logistic Regression Analysis

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	780.921	5	.000
	Block	780.921	5	.000
	Model	780.921	5	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	507.083	.567	.757

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
								Lower	Upper
Step 1	Credit hours (X_1)	.060	.135	.198	1	.656	1.062	.815	1.383
	Required assignments (X_2)	-.085	.036	5.554	1	.018	.919	.857	.986
	Initially submitted assignments (X_3)	.208	.148	1.971	1	.160	1.231	.921	1.644
	Initially earned points (X_4)	.000	.002	.048	1	.827	1.000	.996	1.003
	Duration of incomplete status (X_5)	-.007	.000	216.565	1	.000	.993	.992	.994
	(Constant)	3.983	.447	79.271	1	.000	53.667		

Appendix F: Summary of Chi-Square Tests for

Credit Hours, Required Assignments, and Duration of Incomplete Status

		Value	df	Asymp. Sig. (2-sided)
Credit Hours	Pearson Chi-Square	.895	2	.639
	Likelihood Ratio	.895	2	.639
	Linear-by-Linear Association	.406	1	.524
	N of Valid Cases	933		
Required Assignments	Pearson Chi-Square	12.193	2	.002
	Likelihood Ratio	12.320	2	.002
	Linear-by-Linear Association	7.835	1	.005
	N of Valid Cases	933		
Duration of Incomplete Status	Pearson Chi-Square	679.326(a)	3	.000
	Likelihood Ratio	873.091	3	.000
	Linear-by-Linear Association	609.319	1	.000
	N of Valid Cases	933		

Appendix G: Summary of Means and Standard Deviations

	Status	N	Mean	Std. Deviation
Subsequently submitted assignments (Y_1)	Completed	502	5.61	3.587
	Unfinished	431	.85	2.054
Subsequently earned points (Y_2)	Completed	502	720.78	252.507
	Unfinished	431	61.76	153.402
Required assignments (X_2)	Completed	502	8.45	3.528
	Unfinished	431	8.70	3.197
Initially submitted assignments (X_3)	Completed	502	2.71	3.079
	Unfinished	431	.80	1.611
Initially earned points (X_4)	Completed	502	218.62	245.568
	Unfinished	431	67.36	145.069
Duration of incomplete status (X_5)	Completed	502	207.75	223.550
	Unfinished	431	975.68	411.643

Appendix H: Collinearity Diagnostic Tests

	Tolerance	VIF
Credit hours (X_1)	.870	1.150
Required assignments (X_2)	.622	1.608
Initially submitted assignments (X_3)	.197	5.083
Initially earned points (X_4)	.233	4.300
Duration of incomplete status (X_5)	.908	1.101

Collinearity Diagnostics

Model	Dimension	Eigen value	Condition Index	Variance Proportions					
				(Constant)	Credit hours (X_1)	Required assignments (X_2)	*Initially submitted assignments* (X_3)	Initially earned points (X_4)	Duration of incomplete status (X_5)
1	1	4.401	1.000	.00	.01	.00	.00	.00	.01
	2	.983	2.116	.00	.01	.00	.03	.04	.19
	3	.368	3.458	.01	.09	.02	.01	.04	.64
	4	.118	6.098	.05	.14	.26	.20	.28	.02
	5	.090	7.003	.28	.72	.10	.14	.03	.11
	6	.039	10.585	.66	.03	.61	.62	.60	.03

Appendix I: Independent t-test Results on Initially Submitted Assignments

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*
Equal variances assumed	176.619	.000	11.578	931	.000	1.908	.165
Equal variances not assumed			12.092	779.207	.000	1.908	.158

Appendix J: Independent t-test Results on Initially Earned Points

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*
Equal variances assumed	182.570	.000	11.216	931	.000	151.257	13.485
Equal variances not assumed			11.637	831.079	.000	151.257	12.998