THE CORRELATION BETWEEN ATTENDANCE AND PARTICIPATION WITH RESPECT TO STUDENT ACHIEVEMENT IN AN ONLINE LEARNING ENVIRONMENT

by

Joseph Anthony Rapposelli

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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DEDICATION

This study is dedicated to my family:

To my wife Christina, for her love, patience, and encouragement. Because of her support and all of her efforts of keeping the family together for the past few years, I was able to achieve my educational goals. I absolutely could not have done this work without her, and mere words cannot express the love and gratitude I have for her.

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THE CORRELATION BETWEEN ATTENDANCE AND PARTICIPATION WITH RESPECT TO STUDENT ACHIEVEMENT IN AN ONLINE LEARNING ENVIRONMENT

ABSTRACT

The recent and rapid growth of technology during the last several years has dramatically increased the number of new online degree programs and courses in the United States. As a result, enrollment into these online programs and courses has also increased. The United States Distance Learning Association (USDLA) estimated there was a total of 12.2 million enrollments in college-level credit-granting distance education courses in 2006–07. A study by the Department of Education (2011) found that from 2000 to 2008, the percentage of undergraduates enrolled in at least one distance education class expanded from 8% to 20%. A Survey of Online Learning by the Babson Survey Research Group (2011) revealed that the number of students taking at least one online course has now surpassed 6 million. Now nearly one-third of all students in higher education are taking at least one online course. With the recent increase in online education programs, many learning institutions are focused on student retention and graduation rates. This study sought to gather evidence from online distance education students that would lead to general conclusions about relationships between online attendance, participation, and student achievement variables using a quantitative research design. A simple random sample was drawn from the accessible population of students taking undergraduate online distance education courses at Wilmington University during the fall semester of 2012. The sampling frame included students registered in courses offered from every academic department at the university. The sample used in this study was 548 undergraduate online students from 34 online courses. This study identified a small effect size between volume of participation (R^2 = .088) and student achievement in online learning. Furthermore, this study identified a small

effect size between students' attendance and student achievement within online classes (R^2 = .154). The findings of this study are consistent with previous research that determined there is a positive relationship between student attendance and participation and student final grade achievement (Nichols, 2003; Roby, 2004; Snell & Mekies, 1995). The findings of this research may assist schools and online administrators focus on student attendance and participation within online learning environments, which may be used as a performance indicator for student achievement.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE: INTRODUCTION

Online learning can be described by using different phrases such as distance learning, e-learning, mobile learning, computer-based training (CBT), web-based training (WBT), instructor-led training (ILT), online training, online learning, blended learning, classroom training, or webinars. Whichever way is used to describe it, online learning is a popular and productive way in which learning takes place. Current literature and studies by the United States Distance Learning Association (USDLA) and the Sloan Consortium (2012) indicate that student enrollment continues to grow at an astounding pace in these online learning programs at colleges and universities around the world. The growing demand for this method of learning has led to a growth in supply.

Distance learning has been able to grow in strength and attractiveness through the growth of media and the increased ease of access that came over time (Fritts & Casey, 2010). It is clear that distance-learning technologies are revolutionizing course delivery and providing new opportunities for many institutions and organizations. Internet-based distance learning has quickly become an attractive solution for delivering academic education as well as technical training or continuing education requirements, in large part because it includes a dimension that traditional methods cannot—the ability to deliver instruction in an asynchronous mode (Meine, & Dunn, 2009).

Due to the increasing enrollment and popularity and the questions surrounding the quality and rigor of online learning (Lowenthal, & Leech, 2008), this study investigated if a correlation exists between the frequency of student attendance, participation, and student achievement in an online learning environment. In the online learning environment, the faculty and administrators monitor and quantify student attendance and participation in lieu of face-to-face meetings. This

study is important due to the recent growth in online academic programs in higher education. Many higher education institutions, such as Wilmington University, have incorporated attendance policies and regulations to ensure students take an active role in the responsibility of shared learning. A standard procedure for monitoring attendance in most face-to-face facilitated courses and programs is measured by monitoring regularly scheduled classes, completion of assignments, and making-progress toward completing the course curriculum. The ability to predict a student's academic performance could be useful in many ways to administrators and faculty associated with university-level distance learning (Simpson, 2006).

Background

Although Internet technology has propelled the method of online learning, the origins of distance education can be traced back to the early 1900's. The Universities of Pennsylvania and Chicago were the first to utilize the United Postal Service to introduce universal free delivery of educational resources (Prewitt, 1998). Today, many universities, colleges, secondary, and elementary schools as well as business and career schools, have recently taken advantage of this new method of online education. Distance education has evolved from correspondence schools to delivery mechanisms such as independent study, computer-based instruction, computer-assisted instruction, video courses, videoconferencing, Web-based instruction and online learning (Beldarrain, 2006). Since the conception of the World Wide Web, web-based education is quickly becoming a new method for best practices in teaching (Pritchard, 2006). Studies by the Sloan Consortium (2007) have indicated the following growth of online education programs:

- Almost 3.5 million students taking at least one online course during the fall; a nearly 10 percent increase over the number reported the previous year.

- The 9.7 % growth rate for online enrollments far exceeds the 1.5 percent growth of the overall higher education student population.
- Nearly 20 percent of all U.S. higher education students were taking at least one online course in the fall of 2006.

According to the United States Distance Learning Association (USDLA), there is currently over 3.5 million college students are taking online course and/or earning online college degrees. A study by USA Today (Marklein, n.d) found that more than 6.7 million students took at least one online class in fall 2011, up about 9% from the previous fall. At the secondary school level, over 700,000 high school students are taking one or more courses online, and nearly 40 states have established statewide or state-lead virtual schools. The study, "Going the Distance: Online Education in the United States, 2011," reports that more than 6.1 million students took at least one online class during fall 2010—a 10.1 percent increase over the year before. Allen and Seaman (2011) indicate that the growth from 1.6 million students taking at least one online course in fall 2002 to the 6.1 million for fall 2010 translates into a compound annual growth rate of 18.3 percent for this time period. The fact that the nation's military has demonstrated the successful utilization of the Internet to deliver asynchronous instruction on a global scale demonstrates the potential of the medium (Meine, & Dunn, 2009). See Table 1 for a summary of the detailed listing of online enrollment since 2002:

Table 1

Online Enrollment Statistics for 2002

Fall	Total enrollment	Annual growth rate (total enrollment)	Students taking at least one online course	Online enrollment increase over previous year	Annual growth rate online enrollment	Online enrollment as a % of total enrollment
2002	16,611,710	N/A	1,602,970	N/A	N/A	9.60%
2003	16,911,481	1.80%	1,971,387	368,427	23.00%	11.70%
2004	17,272,043	2.10%	2,329,783	358,386	18.20%	13.50%
2005	17,487,481	1.20%	3,180,050	850,267	36.50%	18.20%
2006	17,758,872	1.60%	3,488,381	308,331	9.70%	19.60%
2007	18,248,133	2.80%	3,938,111	449,730	12.90%	21.60%
2008	19,102,811	4.70%	4,606,353	668,242	16.90%	24.10%
2009	19,525,750	2.20%	5,579,022	972,669	21.10%	28.60%
2010	19,641,140	0.60%	6,142,280	563,258	10.10%	31.30%

A study by the U.S. Department of Education (2011) determined that in 2009, the five postsecondary institutions with the highest enrollment were University of Phoenix, Online Campus, with 380,232 students; Kaplan University, with 71,011 students; Arizona State University, with 68,064 students; Miami-Dade College, with 59,120 students; and Ohio State University, with 55,014 (Appendix C). In higher education, increased student enrollment translates into increased tuition and revenue. Tuition rates for colleges and universities nationwide range from $300-$800 per credit hour. As shown in Table 2, a study by U.S. News (2011) identified tuition costs (per credit hour) and retention rates for online programs at popular universities:

Table 2

Tuition Costs and Retention Rates

2010 Academic Year	Phoenix	Walden	Drexel	Liberty
$ per Credit	$546	$805	$605	$304
New Student Retention	47%	43%	43%	64%

If the growth of distance learning programs continues in this direction, schools and administrators must address the preparedness of both students and faculty. Students should possess basic technical skills and teachers must be prepared to incorporate technology into their teaching strategies. The rapid development of technology has also changed the ways students learn and has shifted students' role towards self-directed exploration in the online learning environment (Hungwei, Heng-Yu, Chien-Hsin, & Ling, 2009).

Problem Statement

Attendance (or lack of attendance) is often a key predictor for early warning signals of student performance and achievement. Literature indicates that regular attendance is an important factor in a student's success at school. Roby (2004) cited attendance as an important variable in measuring academic performance. Research further suggests there is a statistically significant relationship between student attendance and student achievement (Nichols, 2003; Roby, 2004). Similar research reveals that student achievement is affected in a negative way by absenteeism (Dekalb, 1999). In a related study, Snell and Mekies (1995) discovered that students who attended classes 95% of the time were significantly more likely to earn a grade of an A or B. Their study further concluded that attendance and academic performance are strongly related. The problem administrators' face with the rapid increase in online program enrollments is the

preparedness of the faculty to quickly identify potential ‘at-risk’ students that may result in excessive dropout rates. A possible solution to this dilemma may be the ability of school administrators to implement an early warning system that can identify potentially ‘at-risk’ students in their online programs using student attendance data. Dupin-Bryant (2004) has recommended continued quantitative studies in online learning as one way of identifying variables that might help to distinguish between individuals who complete online courses from those who do not. This strategy could help instructors and administrators develop and refine systems that serve at-risk students. With the growing demand for online learning, schools must be prepared to offer and support such programs.

Purpose Statement

The purpose of this correlational study is to determine if student attendance and participation have an effect on student achievement in an online learning environment at Wilmington University. This study will also seek to determine if measured attendance in online learning programs can be used as a performance indicator for student achievement. The independent variables of interest will be student attendance and participation which will be generally defined as the student activity within the school’s Learning Management System. The dependent variable in this study will be the final letter grade (for the course) received by the student. For this study, the letter grade will be converted to a numeric value using the Wilmington University Quality Points grading scale (See Appendix A). The significance of this study is to provide a benchmark for educators in gauging the measurable attendance and participation of online students. Furthermore, these benchmarks may assist administrators in establishing minimum quantifiable student participation levels required to successfully complete

online courses. The results of this study may assist schools in the preparation and support of students for online learning.

Significance of the Study

Research by Campisi and Finn (2011) has indicated that collaborative learning enhances academic achievement. Research by Davies and Graff (2005) suggest that what needs to be investigated is whether online interaction has any tangible benefits in terms of improving student learning as measured by final grades on a course. If online participation in discussion forums is an effective learning aid, then it is expected that those students who proportionately spend more time in communication/group areas should achieve better module grades (Davies & Graff, 2005). However, there is a lack of literature that provides insight into quantifying student engagement within online learning. Despite the popularity of current technologies, relatively little research has examined their relative influence on objective measures of student learning (DeNeui & Dodge, 2006). What has not been adequately addressed to date is whether students learning at a distance are receiving a similar experience in terms of time spent on the course activities (Brown & Green, 2009).

Student engagement is a vague term and is often discussed in relation to student achievement. This area becomes even more difficult to determine within an online learning environment. Traditional classrooms with face-to-face interaction have both a qualitative and quantitative measurable value. However, online learning must rely on student participation using both synchronous and asynchronous communication tools. Educators often have a difficult time tracking the engagement level of online students, who—unlike traditional students—do not interact with their professors and fellow students every day in class (Carter, 2012).

Asynchronous communication occurs when transmission takes place at different times.

Asynchronous online discussion forums are a key component of the online courses (Long, Marchetti, & Fasse, 2011). These tools include email and discussion boards and are often the core components of collaboration in an online learning environment. Bourne (1998) suggests that this type of asynchronous discussion activity accounts for 40% of the overall course experience. A benefit of asynchronous approaches is that there may be more significant participation by all students than would occur in a classroom, which is constrained by time (Cassiani, 2001). Research by Brown and Green (2009) found there has been little or no recent examination of the time students spend participating in asynchronous courses.

Synchronous communication occurs when collaboration takes place at the same time such as within chat rooms, web conferencing or virtual classrooms. These tools require simultaneous communication between students and teachers. Brown and Green (2009) found that distance courses that employ synchronous communication, such as video conferencing or teleconferencing, could be compared to traditional classroom instruction relatively easily in terms of the time spent by students in course participation.

Research shows that online participation is necessary to ensure successful course completion (Klemm, 1998; Rovai & Barnum, 2003; Swan, Shea, Fredericksen, Pickett, & Pelz, 2000). Davies and Graff (2005) further suggested the need for additional research into whether online interaction has any tangible benefits in terms of improving student learning as measured by final grades on a course. Newman-Ford et al. (2008) believes it would be interesting to conduct a further study identifying the usage rates of the Blackboard virtual learning environment by students with poor attendance, to establish whether lack of physical attendance is replicated by lack of engagement with other learning materials.

Research Questions

Numerous studies (Gatherer & Manning, 1998; Grabe & Christopherson, 2005; Riggs & Blanco, 1994) highlight the link between class attendance (as one measure of engagement) and performance. These findings corroborate the importance of attendance as a predictor of performance and provide evidence for a need for integrated blended learning designs. However, recent studies cited by Stewart, Stott, & Nuttall (2011) have examined relationships between attendance, online learning and performance and found the findings inconclusive. The proposed research questions for this study include the following:

Research Question 1: What is the nature and strength of the relationship between student participation (volume) and actual student achievement in online learning?

Research Question 2: What is the nature and strength of the relationship between the frequency of student attendance and actual student achievement in online learning?

Statement of the Hypotheses

Hypothesis 1

H_1: There is a positive relationship between the volume of student participation and student achievement in an online learning course and the final course grade.

Hypothesis 2

H_2: There is a positive relationship between the frequency of student attendance and student achievement in an online learning course and the final course grade.

Identification of Variables

The criterion variable in this study was the final grade in the course received by the students. Online courses at Wilmington University vary in the amount of total points available to students. Final grades were calculated by the total points achieved by the student during the seven-week course. A percentage was calculated by dividing the total amount of points earned

by the total points available to students for the duration of the course. The final percentage was converted to a numeric number according to the quality point total as outlined in the Wilmington University Grading Scale (See Appendix A). The range for student final grades is 0.0 thru 4.0.

In order to facilitate online learning, Wilmington University utilizes an electronic platform as their learning management system. The Blackboard System maintains this data in the grade-book feature of the learning Management System (LMS). An LMS provides an array of tools and functions to support teaching and learning, usually including course management tools, online group chat and discussion, homework collections and grading, and course evaluation (Hsui-Ping, & Shihkuan, 2008). The majority of LMSs are web-based to facilitate anytime, anywhere access to learning content and administration (Black, Beck, Dawson, Jinks, & DiPietro, 2007). Instructors determine the final grades according to the Wilmington University (WU) undergraduate grading scale (Appendix A) and final grades are submitted to the WU Registrar. Letter grades are assigned a certain number of quality points (Appendix A), and those quality points are multiplied by the number of credits a course is worth to determine the final letter grade. The data received from Wilmington University included the final letter grade as student achievement. Therefore, this study will utilize and illustrate the quality points equivalent to the letter grade received by the student.

There were two predictor variables used in this study. The focus of this study was strictly the quantitative element of student attendance and participation. The first predictor variable was the number of times (volume) the student logged into the Learning Management System (LMS) and accessed course content or materials. The volume of participation was determined by the total number of ‘clicks’ or ‘hits’ by the student in the LMS within the 49 days of the leaning period. A day is defined as a calendar day (24 hours) from 12:00 a.m. thru 11:59 p.m. Length of

time within the LMS will not be a consideration in this study. The second predictor variable identified student attendance. Student attendance was determined by the number of days (frequency) the student logged into the Learning Management System (LMS). The second predictor variable was the frequency (number of days) the student logged into the LMS. All data was obtained through the reporting tools associated with the LMS. The courses used in this study and offered by Wilmington University, were facilitated completely online. Wilmington University utilizes Blackboard's LMS to facilitate all distance learning courses. Students are issued a user identification number and password upon registration into the distance learning program. Upon enrollment, students had 24/7 access to all course materials. The duration of all Wilmington University online courses is seven weeks (49 consecutive days). Similar research (Marston, 1988) captured each student's data at the end of a given period of time and used regression equations for each set of student data were calculated.

The predictor variables that were used in this study were the volume of student participation and the frequency of student attendance in the selected online course. The duration of all Wilmington University online courses is seven weeks (49 consecutive days) and the frequency of student attendance will be determined by the number of days the student signed into the learning management system. For example, if the student signed into the course (via the learning management system) on 32 of the 49 days, the student would have attended 65.3% of the available time. The volume of student participation was determined by the total number of 'clicks' or visits to course content (via the learning management system) the student made during the duration of the course. Research conducted in the early eighties found researchers that measures academic integration that predicted course completion in distance education (Bernard & Amundsen, 1989; Sweet, 1986). Davies and Graff (2005) identified previous research that

identified the beneficial effects of online participation in terms of widening student involvement and improving the quality of online discussions as well as research on the beneficial effects of online interaction in terms of fostering an online community.

Stewart, Stott, and Nuttall, (2011) found levels of attendance and online access serve as important predictors of performance and attendance. These findings corroborate conclusions elsewhere that class and online participation measures serve as significant predictors of performance (Rafaeli & Ravid, 1997; Grabe & Christopherson, 2008), in particular signifying the relative importance of class attendance. In studies that tried to predict student success in online learning programs, Simpson (2006) found that in any higher education system it is important to attempt to predict the chances of any new student's success. With the ability to predict the performance of new and existing online students, administrators will be able to easily and quickly identify predicted poor performers.

Attendance and participation variables were obtained through the reporting feature of the Blackboard Learning Management System. The totals of these variables will be measured against the student's final grade for the course to determine the possible strength of correlation. Studies conducted by Stewart, Stott, and Nuttall, (2011) monitored student attendance data expressed as the percentage of the student attendance and the percentage of classes attended. In these studies, online participation was recorded using the Course Statistics reporting tool in the Blackboard LMS. The amount of time students spent in the LMS was taken as indicative of levels of students' online engagement. Research into online student attendance and participation by Stewart, Stott, and Nuttall, (2011) utilized the 'Course Statistics' reporting tool available through the Blackboard LMS. The reporting tool logged a 'hit' each time a folder, page or item was accessed by a student within these areas. The Blackboard reporting tools also calculated the

total volume of logged accesses by each student and provided a report capturing the total number of navigation clicks, folders, items or links accessed by each student. However, this data provided no information on what was being accessed, for how long or how it was used, but it does give an indicator of the volume of activity and when students were accessing the learning resources. Stewart et al. (2011) found this data was a reliable comparison of behavior over the duration of the modules and it did provide an insight into the spread of usage—how regularly students were accessing resources online. The reporting feature of Blackboard identified the daily student activity within the LMS. Total 'clicks' are identified for each student enrolled in an online course. Specific content areas visited by each student further identify this data. Wang and Newlin (2000) counted total website hits on the home page to assess if students were interacting with the course and found that total hits on the home page in the first week were positively correlated with student grades, suggesting that monitoring activity can serve as a reliable indicator of performance. Previous research (Baugher, Varanelli, & Weisbord, 2003; Biktimirov & Klassen, 2008) has found that hit consistency in a web-augmented course was positively associated with course grade. Syler et al. (2006) found that hits within content areas and greater student usage of tools in content areas positively affected students' final course grades. Research by Grandzol and Granzol (2010) studied whether frequency and intensity of interaction in a course is a meaningful measure of student achievement. Their research focused on measuring time (spent within LMS) as a student performance indicator and found that learner-learner interaction was significantly. They further suggested that requiring student interaction just for the sake of interaction might lead to diminished completion rates. Arbaugh (2008) concluded the interactions of students in areas such as discussions are a necessary for student learning in the online environment. Grandzol and Grandzol (2010) hypothesized that greater frequency of

interaction among learners contribute to successful student completion of online courses. However, their research indicates that increased levels of interaction, as measured by time spent, actually decrease course completion rates.

Definitions

Asynchronous communication – communication that allows people to communicate at each person's own convenience and own schedule. The basic asynchronous tools include email, bulletin boards, news forums and weblog (Chiu, et.al, 2010).

Blended Learning - is a form of distance learning that aims to integrate online activity with face-to-face learning (Howatson-Jones, 2012).

Learning Management System- is an electronic platform, similar to a website, where resources and information are uploaded for students to view electronically (Howatson-Jones, 2012).

Online Learning - Online learning provides a means of delivering flexible education as well as increasing the scope of academic programs (Howatson-Jones, 2012).

Synchronous communication - enables real-time communication between individuals. Such tools include text chat rooms, audio/video conferencing and shared whiteboards (Chiu, et.al, 2010).

Virtual Learning Environment - is an electronic platform, similar to a website, where resources and information are uploaded for students to view electronically (Howatson-Jones, 2012).

Assumptions and Limitations

Assumptions

All courses in this study were similarly designed with course content and student activities. Traditional instructional activities such as presenting information, managing course materials, and collecting and evaluating student work can be completed online using an LMS (Hsui-Ping, & Shihkuan, 2008). The pedagogy and structure of all Wilmington University

distance learning classes contained the following course materials and content areas that students navigate through in order to complete course requirements:

- Announcements – weekly messages regarding course materials that are posted by the teacher throughout the course.
- Syllabus, course outline and tentative timeline of assignments.
- Reading assignments – Attached files, web links, videos, and text readings.
- Assignments – Weekly assignments (to be graded).
- Grading rubrics – Grading schemas for all assignments.
- Discussion board – Links to the weekly discussion board assignments.
- Email and Roster tools.
- Faculty contact information.
- Library Resource links – Student resources.
- Blackboard Resources – tutorials and 24/7 help instructions.

All Wilmington University courses consist of similar activities. Classes were facilitated through the Blackboard LMS and delivered asynchronously. Throughout the seven-week course, students were required to complete weekly reading, view online articles, submit assignments and projects, view video and actively participate in weekly discussion (written) boards or voice (vocal) boards. The criteria for discussion boards required students to submit at least three written posts, one initial post to the question and two additional replies to peers. Students were requested, but not required, to submit their three posts to each weekly discussion on separate days. Grading of assignments were consistent by using a standardized, course specific rubric. Every student entering the online program received technical training on the tools and features of the Learning Management System. Successful completion of a pre-requisite Blackboard Student

Orientation course was required prior to being accepted into and enrolling in the online program.

Limitations

The major limitation that existed was the scope of this study was only for one period of time at one institution. However, given the scope and volume of this study, the correlations established should prove to be useful for school administrators at other colleges and universities. Other online programs may require more (or less) student engagement. Wilmington University is an open-enrollment institution and all applicants are accepted. Gender should not be a limitation since the sample will consist of all new students enrolled in the online program. Prior technical knowledge and computer skills will vary by student but should not skew the data contained in this summary. All distance learning students enrolled in this program successfully completed a mandatory Learning Management System training overview prior to beginning a class. This pre-requisite training session is designed to familiarize students with the tools and features of the LMS that will be used in the actual online courses. All students were required to have access to uninterrupted Internet service.

The design of this study as well as the selection of participants will minimize the influence of confounding variables. Wilmington University follows an 'open enrollment' process that accepts all applicants who have successfully completed their high school diploma requirements. Students are randomly assigned into classes (section) upon receipt of student registrations and according to the enrollment procedure. This randomization of applicants ensures diversity within each class roster. Student enrollment is not controlled for characteristics such as gender, age, religion, location, previous knowledge or technology experience.

Student achievement and course grading criteria, although outlined by course rubrics, may vary by instructor. Student achievement is defined as actual scholastic performance as

determined by tests of achievement (Phillipson & Tse, 2007). A summary by the Association for the Study of Higher Education (ASHE, 2005) found that college grading problems include grade increase, grade inflation, grade compression, and grading disparity. The report further determined that many explanations of grading disparity exist, including the impact of the labor market, the differences in grading philosophies, the match between subject areas and student interest, and the differences in student abilities. Not only do employers and graduate school admissions officers continue to consider college grades an indicator of student performance; educational researchers also have constantly used student GPAs as a measure of academic performance or achievement (Milton, Pollio, & Eison, 1986). Johnson (2009) found that there is an assumption that infers competence is based on a sound understanding of the grading criteria. For results to be interpreted in a valid manner it is important that there is transparency about how grades are determined. It is widely recognized that measures need to be taken to ensure that assessment decisions are consistent across these contexts.

The ASHE (2005) identified different strategies to adjust grading disparity, which have been proposed, but how effective they are in achieving policy goals is still unclear. Grading disparity deserves a more serious consideration by administrators and the faculty. Additional research has determined that unless outcomes are specified to an absurd degree, assessors will need to use their professional judgment to evaluate the standard, making the process more subjective rather than being a straightforward measurement activity (Wolf 1995; Oates, 2004)

Literature identified other variables that may influence online student success. Arbaugh (2008) included instructor online teaching and subject matter experience, student age, gender, prior student experience with online courses, number of student credit hours, and whether the course was required or elective. Prior research has also identified areas such as; student

perception of content usefulness (Davis & Wong, 2007), GPA (Klassen & Biktimirov, 2007) and student motivation (Eom, Wen & Ashill, 2006).

A possible limitation to this study could be the accessibility to the Internet and other technology tools by students enrolled in online courses. Research indicates (Cull, Reed, & Kirk, 2010) that a benefit to online learning is the convenience of access and time constraints. The self-paced nature of online courses allows students to fit the work time into their schedule. In particular, online students desire a flexible schedule to achieve their educational goals through self-paced learning while juggling the other demands on their time. However, not all students may have the same availability to these technologies for the duration of the course. For example, Wilmington University actively seeks and supports military personnel within the online program. Many military personnel are stationed around the world including active combat zones. Besides the physical time difference, 24/7 accessibility may be limited to students in the military. These factors may have a negative impact on the quantitative presence of these students within the course management system.

Research (Young Ju, Kyu Yon, & Su Mi, 2012) identified many other variables related to student achievement that could be used as meaningful predictors: self-efficacy, intrinsic value, test anxiety, perceived usefulness and ease of use, and learning flow. Another cofounding variable that may impact this study is the different motivation levels of online instructors. Prior research (Renninger, Cai, Lewis, Adams, & Ernst, 2011; Artino, 2008) indicates teacher motivation in online learning may have an impact on student participation and engagement. This study may not capture the different teaching styles of online faculty. Although the course design and pedagogy of the Wilmington University's online courses are outlined by the course syllabus, many undergraduate faculty members have the flexibility to add content and other activities to

their courses. This may increase the amount of required student participation and presence.

CHAPTER 2: LITERATURE REVIEW

The literature concerning online education is somewhat contradictory with reports of both positive and negative learning outcomes (Lim, Kim, Chen, & Ryder, 2008). The existing literature provides a foundation for the research of this study. A study by Simpson (2005) suggests that more than 70% of recently published articles are mainly about e-learning developments. The evolution of technology has dramatically increased the demand for online learning. Technical advances combined with the desire of flexibility and convenience has forced learning institutions to develop and offer non-traditional learning methods. A review of the literature indicates the opportunities and considerations school administrators must be aware of in offering such programs. A further review of the literature will identified a gap in the research relating to student attendance, participation and achievement in an online learning environment. In previous literature, the predictor of student performance that has received the most attention is class attendance, and the results have been very consistent. In many studies (Roby, 2004; Chan & Shum, 1997), class attendance was found to have a positive association with student performance. In an online learning environment, research by Cheung and Kan (2002) found that the more online tutorials that students had attended, the greater their tendency to receive a passing grade in the course. There has been a small amount of prior research (Cheung & Kan, 2002) that that found student attendance in online learning courses seemed to exert a negative influence on performance. Additional research has cited attendance as one of the academic performance variables and concludes that student achievement is affected in a negative way by absenteeism (Roby, 2004; King, 2000).

Theoretical Framework

The theoretical framework of this issue can be seen in the constructivism theories and practices of the Swiss psychologist Jean Piaget. Constructivist learning arose from Piagetian and Vygotskian perspectives emphasizing the impact of constructed knowledge on the individual's active and reflective thinking. Piaget believed that human inquiry is embedded within the individual child, who constructs knowledge through his or her actions on the environment (Pass, 2007). Constructivism is a psychologically-oriented approach to learning that emphasizes individual and collaborative meaning construction (Wilson, 2002). Cognitive theory suggests more interaction in learning environments leads to improved learning outcomes and increased student satisfaction (Grandzol & Grandzol, 2010).

Vygotsky's social development theory of learning and curriculum can also be applied to this issue. Vygotsky felt that social interaction plays a fundamental role in the process of cognitive development (Vygotsky, 1978). The major theme in Vygotsky's socio-cultural theory of learning is that human intelligence originates in the society's learning environment, and the individual's growth in cognition occurs first through interpersonal rather than intrapersonal situations (as cited in Hungwei, 2009). Students learn through interaction and curricula should be designed to emphasize interaction between learners and learning tasks. Since the beginning of history, human beings have formed communities that accumulate collective learning into social practices (Allen 2005). Developing communities is essential to increasing collaboration within learning environments. The increased recognition of the value of active learning is supported by a growing body of evidence demonstrating the effectiveness of incorporating active learning techniques in the classroom (Campisi, 2011). Research conducted by Pass (2007) has also examined the similarities of Piaget and Vygotsky's pedagogical theories.

Literature strongly suggests that moving forward with online learning requires a more constructivist approach to teaching. This approach to learning emphasizes the social context of learning and the importance of the interaction between learners, their peers, and teachers (Vygotsky, 1978). According to this theory, learning does not take place in isolation. Research by Hines and Pearl (2004) reveals that high dropout rates are associated with courses with little interaction, which supports Vygotsky's theory. Studies conducted by Gillingham (2009) found that within the constructivist paradigm, research has highlighted interactivity in the online environment as central to the learner's effective construction of new conceptual understandings. Online instruction can be designed to foster collaboration among peers in the form of bulletin boards, chat rooms, and threaded discussions, thus following a constructivist design of content delivery (Summers, Waigandt, & Whittaker, 2005). When used appropriately, technology can foster student engagement in the learning process, which many students find beneficial and research has shown to decrease attrition, enhance learning outcomes, and improve student satisfaction (Revere & Kovach, 2011). Wilson (2002) found that constructivism is a psychologically-oriented approach to learning that emphasizes individual and collaborative meaning construction.

This review and meta-analysis of literature for this study focused on Web-based instruction only (i.e., eliminating studies of video and audio-based tele-courses, video broadcast seminars or stand-alone, computer-based instruction). This study synthesizes tools, methods and best practices for engaging online students through effective course design and technology integration. First, the manuscript will identify how these tools are currently utilized to engage students in an online environment using traditional technologies that are easily integrated into online course management systems, such as discussion boards, chat sessions, blogs, and wikis.

Existing literature is synthesized to provide a background for understanding the effectiveness and benefits of these technologies. Furthermore, this analysis will explore the effects these tools have on student engagement in an online learning environment. A simple search for literature relating to 'Distance Learning' in EBSCO host resulted in over 4,900 'peer-reviewed' articles. One of the oldest references to distance learning discovered in this literature research revealed a study conducted by Carr (1962), which studied 26 school children that were participating in a homebound tele-teaching program. Tele-teaching was a system by which groups of homebound children were given full time instruction via the telephone. The program provided nearly the same educational opportunities for the homebound that were available to pupils able to attend classes. One notable item identified in Carr's literature research was the first person to receive a high school diploma, college and graduate degrees via telephone instruction was from 1941-1950. This student was also the first telephone-schooled attorney-at-law. Technical advances have allowed distance learning to continue to progress.

There has been extensive research conducted on the correlation between student engagement and student achievement in face-to-face formatted classes. However, little research has been completed that focus strictly on these variables within an online learning environment. Many variables have been hypothesized to be related to retention in online distance education courses (Dupin-Bryant, 2004). Many studies have provided insight into the strength of the relationship between these variables. However, a majority of the literature has focused on the quality of student collaboration and engagement verses the quantitative amount. Furthermore, minimal research focused on the correlation of these variables to student achievement within an online learning environment. While there has been studies in literature that connect student engagement with student achievement, there seems to be very few controlled studies that find

clear links between them in an online learning environment. The focus of this study is to determine if there is a relationship between student engagement and student achievement and not to compare online learning programs to the traditional face-to-face programs.

An overwhelming body of research indicates that the quality of online learning is, in general, is as good as that of face-to-face learning. The Chronicle of Higher Education (2010) has identified numerous studies, including a large 2010 study by the Department of Education, which shows that online learning is equal to or perhaps slightly better than classroom education. However, prior research indicates (Hiltz & Turoff, 2005) that 10%–20% of students still prefer the face-to-face environment and believe they learn best in that environment. In research relating to online retention, Lorenzetti (2005) found students generally reported that demands of life prohibited successful completion of a course. Additional research revealed students also withdrew because of inaccurate expectations of the online course. Further research by Lorenzetti (2005) suggests between two-thirds and three-quarters of the students who withdrew from an online course report that they are likely to try again. The literature review of this study will focus on the quantity of student engagement and how that effects student achievement in an online learning environment.

Profile of a Distance Learning Student

Today's idea of learning has shifted from 'anytime and anywhere' to 'all the time and everywhere'. The most significant benefit is that distance learning provides an environment for learning that is time and place-independent. This provides opportunities for individuals who would otherwise not have opportunities for learning (Hsiung & Deal, 2013). The major needs of online students are convenience, access, flexibility, and availability (Bocchi, Eastman, & Swift, 2004). Although data previously included in this study indicates an alarming increase and

demand for online education, school administrators as well as students should realize that online courses might not be suitable for everyone. Although many students believe that online courses offer more convenience and flexibility than traditional courses, these classes often require as much as or more dedication and time-management skills than typical traditional classroom learning. Studies by Dupin-Bryant (2004) support the idea that students who have adequate computer training in relevant technologies are more likely to complete online courses since the computer technologies are less likely to impede the learning process. Research by Mahoney (2006) discovered the profile of an online student is one who is often older, works full time and balances family and school responsibilities. As shown in Table 3, The Illinois Online Network (2012) has identified several characteristics required by online learners:

Table 3

Online Learner Characteristics

Characteristic	Description
1. Be open-minded about sharing life, work, and educational experiences as part of the learning process.	Introverts as well as extroverts find that the online process requires them to utilize their experiences. This forum for communication eliminates the visual barriers that hinder some individuals in expressing themselves. The online environment should be open and friendly.
2. Be able to communicate through writing.	In the Virtual Classroom, nearly all communication is written, so it is critical that students feel comfortable in expressing themselves in writing.
3. Be Self-motivated and self-disciplined.	With the freedom and flexibility of the online environment comes responsibility. The online process takes a real commitment and discipline to keep up with the flow of the process.
4. Be willing to "speak up" if problems arise.	Many of the non-verbal communication mechanisms that instructors use in determining whether students are having problems (confusion, frustration, boredom, absence, etc.) are not possible in the online paradigm.

5. Be willing and able to commit to 4 to 15 hours per week per course.	Online is not easier than the traditional educational process. In fact, many students will say it requires much more time and commitment.
6. Be able to meet the minimum requirements for the program.	The requirements for online are no less than that of any other quality educational program. The successful student will view online as a convenient way to receive their education – not an easier way.
7. Accept critical thinking and decision making as part of the learning process.	The learning process requires the student to make decisions based on facts as well as experience. Assimilating information and executing the right decisions requires critical thought; case analysis does this very effectively.
8. Have practically unlimited access to a computer and Internet Service.	The course content and interaction are engaged by computer through the Internet. The student must have access to the necessary equipment.
9. Be able to think ideas through before responding.	Meaningful and quality input into the virtual classroom is an essential part of the learning process. Time is given in the process to allow for the careful consideration of responses.
10. Feel that high quality learning can take place without going to a traditional classroom.	An online student is expected to: • Participate in the virtual classroom 5-7 days a week • Be able to work with others in completing projects • Be able to use the technology properly • Be able to meet the minimum standards as set forth by the institution • Be able to complete assignments on time • Enjoy communicating in writing.

Source: Illinois Online Network (2012)

There are a myriad of reasons why students choose to enroll in online learning programs rather than the traditional classroom setting format. For many students, studying online is the best or only option for furthering their education (Lorenzetti, 2005). Studies by Wilkins and Barrett (2000) found that many people taking distance-learning classes are non-traditional students (e.g., single parents, older students) who are less able to take face-to-face classes than traditional students because of jobs and/or family obligations. Bocchi et al. (2004) suggested that

online programs need to profile their students in an effort to retain online learners. In time and academic performance studies by Romero and Barbara (2011), literature indicated that students engaged in e-learning (and distance learning in general) are often adult learners who have work and family constraints. Learners of all ages and stages may be part of an information learning network through the use of blogs or social networking (Cook, 2012). In addition, research by Lorenzetti (2005) found the average age of online students is three years older than the average age of on-campus students. Gender may also influence online learning. Bocchi et al. (2004) discovered a study at the University of Central Florida that found women were 8% more likely than men to succeed in online courses by completing the course with a grade of C or better.

Ideally, online learning communities should make it possible for learners to connect with people in a variety of geographic locations (Hines & Pearl, 2004). Dabbagh (2007) found that current distance learning programs include more socially mediated online learning activities that de-emphasize independent learning and emphasize social interaction and collaboration. Research on profiles of distance learners conducted by Kircher (2001) found the following characteristics to be common traits of a typical online learner:

- Manages and allocates time appropriately
- Prefers linear learning style
- Displays technology skills
- Can deal with technology and its frustrations
- Is an active learner
- Highly motivated, self-directed, and self-starting
- Depends on nature of instructional methods (group vs. individual tasks)
- Has appropriate writing and reading skills for online learning

Motivation is important in distance education because students should be able to work independently without face-to-face interaction, to be good at time management, and to be responsible for their own learning. This requires a higher degree of motivation to learn than it would in a traditional classroom setting (Mahle, 2011). In studies completed by Mahle (2011), distance learning students who indicated a higher level of interactivity had significantly higher scores than students who showed a low-level of interactivity. Further results from these studies indicated that interactivity within distance learning programs has an effect on knowledge retention. Students who are characterized as the most successful in an online learning environment tend to be motivated, independent, and organized with good self-regulation strategies (Summers, et al., 2001). The Illinois Online Network (2012) states that online asynchronous education gives students control over their learning experience, and allows for flexibility of study schedules for non-traditional students; however, this places a greater responsibility on the student. In order to successfully participate in an online program, student must be well organized, self-motivated, and possess a high degree of time management skills in order to keep up with the pace of the course.

Research by Ryan (2011) found that a common misconception by students new to online learning is that it is easier and less rigorous than traditional face-to-face classes. Additional research (Cull, Reed, & Kirk, 2010) found that students might enroll in online courses because they feel they will be easier and require less of their time. So before the course even begins, these students may be prone to disengagement. It is a misconception to think that a student can learn the online course material in less time than would be required in a traditional class or that online classes are less intellectually demanding than traditional classes (Ryan, 2001). Research by Bocchi, Eastman, and Swift (2004) found that to be successful as an online learner, one needs to

have the self-discipline, initiative, motivation, commitment, time management skills, and organization skills to work independently and to finish the job without need of prompting. This study further identified the major needs of online students are convenience, access, flexibility, availability, and anytime/anywhere learning. Students realize their own learning styles and what level of participation is needed to successful complete course requirements. Research by Uhlig (2002) found that students must be willing and able to dedicate daily or at least weekly time to their online courses. Students also stated that online learning required more time and commitment for the duration of the courses. Some researchers suggest that online learning equals or exceeds that of classroom learning (Bocchi, Eastman, & Swift 2004; Loreenzetti, 2005; Rice, 2000; Rosenbaum, 2001).

Learning Objectives and Strategies

The Sloan Consortium (Sloan-C) has recognized outstanding work in the field of online education since 2001. The Sloan C's (2001) five pillars of quality in online education: student satisfaction, access, learning effectiveness, faculty satisfaction, and institutional cost effectiveness. Mestre (2010) defined learning objects as items that are used in order to enhance and enrich students' learning experiences. Learning objects are reusable digital entities, such as electronic texts, multimedia content, animations, images, etc., which can be used for a learning resource (Morris, 2011). Online faculty and course developers implement these objects into the course content in order to engage students in the learning environment. Mastre (2010) identified some common examples of learning objects such as; online modules, tutorials, games, blogs, research guides, narrated PowerPoints, podcasts, photos, images, cartoons, diagrams, quizzes, surveys, and videos. Further research by Mastre (2010) indicated that online learners prefer multiple paths to information and become more engaged through interactive learning

opportunities. Brindley, Walti, and Blaschke, (2009) state “Quality learning environments include opportunities for students to engage in interactive and collaborative activities with their peers; such environments have been shown to contribute to better learning outcomes, including development of higher order thinking skills” (p. 2). Similar research studies by Salmon (2000) determined the key areas that increase student engagement include:

a) Access and motivation: setting up system and accessing
b) Online socialization: sending and receiving messages
c) Information exchange: searching, personalizing software
d) Knowledge construction: conferencing
e) Development: providing links outside closed conferences

A variety of learning techniques have been implemented in order to increase student engagement. In the absence of face-to-face interaction, educators are using a variety of collaboration tools to increase student engagement. New learning environments, such as Web-based instruction, require proactive and active learning to construct knowledge and skills (Haihong, 2009). As new technologies emerge, instructional designers and educators have unique opportunities to foster interaction and collaboration among learners, thus creating a true learning community (Beldarrain, 2006). Current research suggests that an online collaborative learning environment can positively affect students' performance on problem solving group projects (Hungwei, 2009). Studies by Jahnke (2010) indicated social interaction and emotional awareness was recognized as much a part of the learning process as engagement in academic tasks.

Several studies have been conducted regarding student engagement in online learning. Instructor led interaction is vital to developing student engagement. Findings by Newman-Ford,

Fitzgibbon, Lloyd, & Thomas (2008) have shown that rates of learning and attendance are an accurate indicator of students' future academic success. Studies by Davies and Graff (2005) showed the beneficial effects of online participation in terms of widening student involvement, improving the quality of discussions compared with traditional face-to-face interactions, as well as research on the beneficial effects of online interaction in terms of fostering an online community. They conducted studies that determine if online interaction has any tangible benefits in terms of improving student learning as measured by final course grades. Their studies focused on measured student participation and student achievement. These studies examined online learning programs to determine if they promote student-centered learning and encourage wider student participation. Results indicated that students who failed also consistently ranked lowest in terms of activity within the learning management system (LMS). This suggests that greater activity, as measured by LMS usage, is likely to lead to a better performance in terms of module grade (Davies & Graff, 2005). Furthermore, their findings revealed that students achieving high or medium passing grades engaged more actively with the course, as measured by LMS access, than students achieving low passing grades. Similar studies by Yu-Chu (2010) indicated that online learning communities promote active participation, increase academic achievement, contribute to knowledge creation, and improve learner cognitive abilities. Making teacher-to-student and student-to student connections is vital to creating a solid learning environment in the online classroom (Cook, 2012).

Defining Student Interaction and Engagement

In any learning environment, many educators believe student interaction and engagement is vital to the learning process. Interaction has been identified as one of the major constructs in distance education research (McIsaac & Gunawardena, 1996; Moore, 1989; Saba, 2000; Wagner,

1994). Because interaction is important to the learning process, it needs to be measurable. Leong (2011) found that learners learn most effectively when they are actively engaged as opposed to passively reading or listening. Quantitative emphasis on the importance of class attendance for academic success has been shown to improve both the attendance and educational performance of some students by emphasizing the relationship between attendance and grades (Newman-Ford et al., 2008). Studies (Rungtusanatham et al., 2004; Arbaugh & Rau, 2007) have indicated that interaction among participants is vital to the learning process in online courses and have investigated interaction using both qualitative and quantitative analyses and the findings consistently indicated that interaction is vital to learning. Swan (2002) found that students who had higher levels of interaction with content, interaction with their instructor, and interaction among other students had higher reported levels of satisfaction and learning. Percentage of course grade based on discussion and the frequency of instructor feedback led to higher levels of both measures. In order for online learning to be successful, developing a sense of community should have benefits for learning activities. Research by Jianfei, Tregonning, and Keenan (2008) found that social interaction between online learners was a key factor in achieving positive learning outcomes. Interactivity in Web-based instructional environments is considered to play a significant role in student learning (Mahle, 2011). Studies on online engagement and participation by Jiyeon (2012) found online students more actively participated in discussion as time went on, and demonstrated high participation. Further research by Jiyeon (2012) recommended two-way interaction for achieving sustainable discussion and promoting higher phase of knowledge construction. In an extensive study regarding collaborative learning, Iqbal, Kousar, and Ajmal (2011) concluded that collaborative learning creates a sense of belonging for

online students and is likely to enhance students' motivation and engagement. Their research also determined the following benefits of collaborative learning:

1. Collaborative learning encourages competition among students.
2. Collaborative learning encourages the students to ask questions about their queries and the problems they encounter.
3. Collaborative learning motivates students by confronting them during group discussions with their classmates.
4. Collaborative learning is suitable strategy/technique in distance learning system to adult students.
5. Collaborative learning motivates the individual's participation in distance education.
6. Discussion in collaborative learning on any related topic of the content is fruitful.
7. Learning process through Collaborative Learning can be improved by interaction.
8. Collaborative learning helps students to relate new learning to their prior experiences.
9. Positive interdependence of collaborative learning leads to common responsibility.
10. Students work at their own pace in collaborative learning.
11. Collaborative learning encourages dialogue among students.
12. Collaborative learning promotes individual accountability.
13. Technology accessible to all participants in collaborative learning.
14. Discussion in collaborative learning helps to achieve the objectives.
15. Collaborative learning provides the chance to the distance learners to have knowledge about the new trends.
16. Collaborative learning utilizes multiple competencies of the individual students to achieve educational goals.

17. Presentation of course in collaborative learning builds students' self-esteem.
18. Presentation of course in collaborative learning builds confidence in students.

However, literature with opposing views suggests that online instructors should pay more attention to the quality of interaction rather than the quantity. Research has indicated that mandatory participation might lead to a psychological burden and have some unintended side effects (Bullen, 1998).

A learning management (or course management) system (LMS) is a technology-driven platform that allows teachers to engage more students in exciting new ways, reaching them on their terms and devices—and connecting more effectively, keeping students informed, involved, and collaborating together. Through this innovative technology, schools are able to build a better education experience. The purpose of using an LMS within learning strategies is to utilize the right set of tools to deliver a more effective learning experience for students. For example, Blackboard's Collaborate platform "offers a more collaborative, interactive learning experience that constantly evolves that will keep everyone engaged like never before" (Blackboard, 2012).

In order to facilitate online learning environments, learning institutions have incorporated Learning Management Systems (LMS) into their distance learning programs. LMSs such as Blackboard, Moodle (2009), Sakai (2009), and WebCT (2009) are commonly and successfully used in e-learning. They aim to support teachers in creating and managing online courses (Graff, 2009). These learning management systems provide students with a portal to obtain and transfer resources between peers and teachers. Learning Management Systems also allow synchronous and asynchronous communication to take place between students and teachers as well as peer-to-peer engagement. A Learning Management System is the backbone that glues all phases tight in an online pedagogical setting. These are powerful platforms that allow instructors to post course

related materials and interact with students through asynchronous discussion boards and/or synchronous online chat sessions (Revere & Kovach, 2011). The goal is to develop a sense of community for students that will encourage and enhance student engagement. For example, studies by Davies and Graff (2005) show that online discussions encourage more reticent individuals to participate to a greater extent. LMSs are an important means through which distance-based learning can be delivered, but they are also central to the blended learning solutions now adopted in many education systems, whereby learners can access a range of materials electronically to supplement more traditional modalities of learning through books and face-to-face meetings with teachers (Unwin, 2010).

In a virtual setting, interaction can take place either synchronously or asynchronously. Technologies traditionally used to promote learner-centered engagement and peer interaction includes discussion boards, chat sessions, blogs, wikis, group tasks, and peer assessment (Revere & Kovach, 2011). Research on the benefits of online collaboration tools conducted by Ashley and Kaplan (2003) from the Center for Association Leadership (ASAE) determined the usefulness of these tools and features within an online learning environment. Synchronous tools enable real-time communication and collaboration in a "same time-different place" mode. These tools allow people to connect at a single point in time, at the same time. Synchronous tools possess the advantage of being able to engage people instantly and at the same point in time. Synchronous collaboration may be enhanced by incorporating software suites such as Elluminate Live or Wimba that support real-time communication and collaboration (Murphy, Rodríguez-Manzanares, & Barbour, 2011).

Another form of collaboration is conducted using asynchronous tools. In an asynchronous learning environment, the teacher and students are separated in time and space and are, therefore,

geographically and temporally independent and diverse (Murphy, Rodríguez-Manzanares, & Barbour, 2011). Asynchronous tools enable communication and collaboration over a period of time through a "different time-different place" mode. These tools allow people to connect together at each person's own convenience and own schedule. Asynchronous tools are useful for sustaining dialogue and collaboration over a period of time and providing people with resources and information that are instantly accessible, day or night. A benefit of asynchronous approaches is that there may be more significant participation by all students than would occur in a classroom, which is constrained by time (Cassiani, 2001). Online discussion boards are a popular type of asynchronous communication tools. Discussion boards promote student engagement and peer interaction by providing (1) a mechanism for students to increase their knowledge through student driven content and/or (2) a forum for peer review and exchange that creates a supportive climate within online classes (Revere & Kovach, 2011). Table 4 identifies some of the online collaboration tools identified by the Center for Association Leadership (ASAE):

Table 4

Online Collaboration Tools and their Users

Tool	Useful for
Synchronous Tools	
Audio conferencing	Discussions and dialogue
Web conferencing	Sharing presentations and information
Video conferencing	In-depth discussions with higher-touch interactions
Chat	Information sharing of low-complexity issues
Instant messaging	Ad hoc quick communications
White boarding	Co-development of ideas
Application sharing	Co-development of documents
Asynchronous Tools	
Discussion boards	Dialogue that takes place over a period of time
Web logs (Blogs)	Sharing ideas and comments

Messaging (e-mail)	One-to-one or one-to-many communications
Streaming audio	Communicating or teaching
Streaming video	Communicating or teaching
Narrated slideshows	Communicating or teaching
"Learning objects"(Web-based training)	Teaching and training
Document libraries	Managing resources
Databases	Managing information and knowledge
Web books	Teaching and training
Surveys and polls	Capturing information and trends
Shared Calendars	Coordinating activities
Web site links	Providing resources and references

Kearsley (1998) claims that the "single most important element of successful online education is interaction and web-based instruction among participants" (p. 23). Moore (1989) concluded that interactive dialogue to be a crucial component of distance education environments. Moore (1989) distinguished between three types of student interaction in distance education: (1) student-student interaction, (2) student-teacher interaction, and (3) student-content interaction. Although student-teacher interaction is important to the learning process, this study will focus on student-student interaction and student-content interaction in distance education. With the enhancement of new technologies, students are able to collaborate (asynchronous) through technology tools such as; correspondence, email, discussion boards, journals and blogs. Through technology, interaction and collaboration are now attainable in either asynchronous or synchronous learning networks (Beldarrain, 2006). In reviewing the literature, Stewart, Harlow, and DeBacco, (2011) found that interaction among students and between the students and the instructor is essential for success in higher education (Berge, 1999). Similarly, Lytle (2011) stated that quality online degree programs promote student participation in classes, allowing them opportunities to readily interact with their instructors and fellow classmates. Research by Summers et al. (2005) found that students need to interact with the instructor and each other

electronically to gain a personal sense of organization and interpretation of content. Nagel, Blignaut, and Cronjé (2009) discovered the establishment of an online community is widely held as the most important prerequisite for successful course completion and depends on an interaction between a peer group and a facilitator. Additional research shows that online participation is necessary to ensure successful course completion (Klemm, 1998; Rovai & Barnum, 2003; Swan, Shea, Fredericksen, Pickett, & Pelz, 2000). However, research by Beldarrain (2006) proposes that although interaction may display presence, learners can interact without ever feeling the sense of belonging to the group. Summers, et al. (2000) also discovered that students who may not have developed appropriate strategies for self-regulation may find that online courses do not meet their needs and may subsequently drop the course; as a consequence, online courses have been associated with much higher rates of attrition than face-to-face courses.

Schools at all levels are interested in determining the predicted probability of success for new students.

There has been an abundance of research that has focused on the quality and benefits of interaction and collaboration between students and teachers. Stewart, Harlow, and DeBacco (2011) refer to studies by Daniel and Marquis (1979) indicate that a goal of distance educators should be to create a balance between independent study and interactive learning activities (as cited in Stewart, Harlow, & Debacco, 2011). Further research by Stewart, et al. (2011) found that student-student interaction is critical for learning environments based on constructivist principles and for building collaboration skills:

> Deep and meaningful formal learning is supported as long as one of the three forms of interaction (student-teacher; student-student; student-

content) is at a high level. The other two may be offered at minimal levels or even eliminated, without degrading the educational experience. (p. 4)

Regardless of the formatted structure, all modalities of learning require some degree of participation, interaction and engagement. The flexibility of online learning allows the student to 'attend' peer-to-peer activities at their convenience through the use of synchronous and asynchronous tools. This study will focus on the volume and frequency of student participation rather than the quality of the interaction. As previously stated, this study placed an emphasis on the constructivist approach to teaching and learning that believes that student interaction is necessary to provide effective learning in an online environment. In similar studies of online learning and student achievement, Gillingham (2009) found that it is 'participation' rather than 'interaction' that is important, with participation being defined as both passive (reading) and active (posting).

The American Public University System (APUS) guide, educate and support more than 100,000 distance learners studying in 50 states and more than 100 countries. The APUS consists of two institutions; American Public University and American Military University. Research by Carter (2011) found the APU and AMU (2010) student retention strategies have determined that if a student's test scores are dropping, participation numbers are low, and disengagement is evident through various statistics, the numbers suggest that student might not last much longer at APUS. The finding indicate educators often have a difficult time tracking the engagement level of online students, who—unlike traditional students—don't interact with their professors and fellow students every day in class.

Benefits of Online Collaboration

Today's colleges are challenged to provide online learning programs that will engage students with course content as well as with other students. Learning is enhanced through collaboration from diverse student populations (Howatson-Jones, 2012). It is crucial that students have ample opportunities to participate in discussions in order to be engaged in online courses (Leong, 2011). Hiltz and Turoff (2005) have identified several benefits of online learning programs in higher education:

- The value to the student is the flexibility of being able to integrate education with the demands of work and family.
- The value to the instructor is being able to treat all students equally, and to prepare and deliver the materials of the course as a single entity.
- The value to the organization does not have to duplicate any administrative or support function as a separate entity for distance learning.
- The growing competitive environment in higher education and the need to provide quality online instruction is a matter of long-term survival.

Making teacher-to-student and student-to student connections is vital to creating a solid learning environment in the online classroom (Cook, 2012). The engagement of students in an online course is especially important because without intentional engagement of students, little, if any, learning will take place (Revere & Kovach, 2011). When learners are able to interact with their classmates and instructor, it may give rise to a perception that they are part of a community of learners (Drouin, 2008). Research studies by Fengfeng and Chellman (2006) supports the belief that in order for a student to learn, he or she must collaborate with others. Studies by Long, Marchetti and Fasse (2011) explored the quantity of interaction in online courses found that

students enrolled in online courses with more interaction outperformed students in online courses with less interaction. To prevent students from feeling isolated, online courses must provide students with opportunities for interaction with faculty members, other students, and course content (Bocchi, Eastman, & Swift, 2004).

There is increasing demand for online delivery options that make the course more widely available, especially those that use best practices in student engagement (Dunlap, Furtak, & Tucker, 2009). Rybarczyk (2007) found that distance learning programs typically employed technology as an integral component for content delivery and a tool for interaction. Through his research at North Carolina University, Rybarczyk (2007) found that a synchronous distance-learning environment could foster opportunities for students to interact, and generate increased engagement with course content in the classroom. This is supported by Martin and Scheetz (2011) who indicated class discussions and interactions are often strengthened by the exchange of knowledge and different perspectives brought in by professional and personal experiences. Since learning occurs with the instructor and students separated by time or location, collaborative learning can be either asynchronous or synchronous. Similar findings were reported by Revere and Kovach (2011) that found successfully engaging students, coupled with a learner-centered approach, has been shown to decrease attrition, while fostering peer interaction through group assessments has been shown to increase student performance and enhance course satisfaction.

Literature researched by Beldarrain (2006) reported that distance education practitioners and researchers have always been concerned with how much interactivity a distance course could provide for students, since interaction is considered a necessary ingredient for a successful learning experience. Studies by Mason (2011) identified the impact of student collaboration in online discussion board forms conducted in a virtual learning environment (VLE). Mason (2011)

discovered that discussion forums are clearly powerful learning tools, but only if students engage with them. Hilton III, Graham, Rich, & Wiley (2010) analyzed asynchronous and synchronous online e-learning classes at the post-secondary level. They concluded that, while the two forms complemented each other, asynchronous e-learning better supported cognitive participation such as increased reflection, but synchronous e-learning better supported increased motivation. Rybarczyk (2007) further concludes that to facilitate communication, students should be familiar and comfortable with other students since they will be communicating with each other on a regular basis during case discussions. In a similar study conducted by the Great Plains Distance Education Alliance (GPDEA), Martin and Scheetz (2011) identified the importance of a collaborative environment for instructors and students in distance education. Martin and Scheetz (2011) found that one of the strengths of distance-education classes is the high level of interaction it allows. All these student learning experiences enhance not only the education of the students who were directly involved but also the education of other students (Martin & Scheetz, 2011). Although studies by Mason (2011) and Rybarczyk (2007) focused on the low level and quality of student engagement, this proposal focused on the measurable, quantitative volume of participation rather than a qualitative analysis of the engagement. Wagner, Schober, and Spiel (2008) conducted studies and published findings relating to the time factor and academic performance. These studies analyzed the relationship between time-on-task spent and academic performance and revealed a positive relationship between performance and the quantity of time allocated by postsecondary learners. Research reveals a positive correlation between students' learning behaviors such as participating in online activities and their learning outcomes (Chang, 2012). Numerous studies highlight the link between class attendance (as one measure of engagement) and performance. For example, Riggs and Blanco (1994) analyzed data and found a

negative correlation between percent absence and examination score, which suggested the value of monitoring attendance, and identifying students at risk for poor performance. Morris et al. (2005) examined student participation in asynchronous online courses and its relationship to achievement. Their analysis revealed that a major percent of the student achievement was accounted for by student participation measures. Rafaeli and Ravid (1997) examined the correlations between student achievement and online usage behavior measured and found a positive correlation between student achievement and the amount of reading of online resources. Grabe et al. (2005) also examined the relationships among the frequency of access to online materials, examination performance and class attendance. Data on use of online materials were gathered from the log maintained by the server which found that students who viewed online materials performed better in examinations.

Although several studies have identified a meaningful relationship between student engagement and student achievement, additional research has found there may not be a strong correlation between the two factors. For example, studies by Fengfeng and Chellman (2006) found that the inherent nature of online learning environments, which rely heavily on collaboration, can be in direct conflict with the learner's need to act independently from a solitary perspective. Similar studies by Davies and Graff (2005) reveal students who interacted and participated more with online discussions did not necessarily achieve higher grades. Additionally, there have been a number of studies that have examined the relationship between student participation in online courses and grades and found no significant relationship between the two (DeNeui, & Dodge, 2006). Martin and Scheetz (2011) found that direct contact between students and the teacher is perhaps the most important shortcoming in distance-education classes. Studies by Mason (2011) found that the poor level of participation was probably caused by

inadequate explanation, motivation, and moderation by the teacher. There are many factors that must be considered by educators in developing and providing quality online programs. Distance learning teachers must focus on fostering student engagement and the promotion of critical thinking. Research by Mahoney (2006) found that regardless of their age or stage, all students enrolled in a class want to feel connected to their teacher, as well as to the material they are learning. Real learning can occur when learning activities, course design, and course interactions are used purposefully in one's attempt to build a strong online learning community (Cook, 2012). It is critically important that students understand the self-commitment and time-management skills required for the successful completion of online learning programs. Preparation and commitment are two characteristics required by students as they continue their academic journey. According to Martin and Scheetz (2011), it is imperative that students demonstrate proficiency with computers skills prior to the beginning of online learning. In researching online learner competencies, Hong and Jung (2011) examined a three year study of developing and validating the measure of online learning success, the Test of Online Learning Success (Kerr et al. 2006), which reveals computer literacy is one of the most important factors predicting online learners' success along with reading and writing skills, independence and motivation.

Trends in Distance Learning

In online courses, traditional classroom instruction is replaced by instruction that takes place over the Internet. The instruction is typically asynchronous, which means that students and faculty do not need to log-in to the course at the same time. Faculty-student and student-student interactions take place in these online formats. With the rapid advancement of technology, instructors have an array of tools and features that encourage student engagement and collaboration. Research by McKee (2010) found that distance education technologies and

practices have undergone radical transformations during the past 50 years and are considered by many to be the leading edge of academic opportunity for postsecondary institutions. Web 2.0 methods have introduced interactive networking concepts that enliven educational activities with greater personalized meaning and socialized connectivity (McKee, 2010). Morris (2011) describes the evolution of the Web as semantic, which allows computers to understand the meaning of information as opposed to simply displaying information. Additional research by Morris (2011) found that current Web 3.0 tools support learning by interacting with learners and instructors, and collaborating with other agents enabling the flow of content and information in an interactive learning environment.

Distance learning programs are currently growing in all levels of education. Due to the student demand for online education, many major colleges and universities throughout the country have begun to offer programs via distance learning. In higher education, many for-profit online universities such as, Walden, Capella, DeVry, and the University of Phoenix® have become major players in the online education industry. The Sloan Foundation, which represents over 2,500 colleges and universities, reported that in 2008, twenty-two percent of American college students took at least one web-based class in the fall 2007 semester, or 3.94 million students. That marked an increase of 12.9 percent from the fall 2006 semester. During the same period, overall higher-education enrollment increased by only 1.2 percent, according to the report, which surveyed officials from more than 2,500 colleges and universities. In 2012, The Sloan Consortium reported that the overwhelming majority of the 4.6-million online students in higher education— over 82 percent — are undergraduates. This is up from about 3.9 million the previous year. From 2002 to 2006 online enrollments increased from 9.7 to 19.8 percent of total enrollments nationwide and this growth is projected to continue its increase at least through 2012

(Allen & Seaman, 2011).

Although a majority of programs are in higher education, there has been a dramatic increase of virtual schools at the K-12 level. The National Center for Education Statistics (2008) estimated that the number of K-12 public school students enrolling in a technology-based distance education course grew by 65 percent in the two years from 2002-03 to 2004-05. More recent research completed by Picciano and Seaman (2009) estimated that more than a million K–12 students took online courses in school year 2007–08. According to the 2010 edition of *Keeping Pace with K-12 Online Learning*, state-led online education programs now exist in 39 states (Appendix B). Furthermore, these state-led online programs had a combined 450,000 course enrollments during the 2009-10 school year, an increase of nearly 40 percent over the previous year. A report from the U.S. Distance Learning Association (USDLA) indicates that online learning may also help reduce high school dropout rates, enable more students to graduate on time, and provide new opportunity for young men and women who have been sent to detention centers or experienced other life challenges.

As online distance education becomes prevalent in higher education institutions, identifying variables that help to distinguish between individuals who complete online courses from those who do not will help instructors and administrators develop and refine systems that serve at-risk students (Dupin-Bryant, 2004). Leong (2011) determined that instructor variables, such as communication, feedback, preparation, content knowledge, teaching methods, encouragement, accessibility, and professionalism; technical issues; and interactivity were the most important factors. Carter (2012) believes that by identifying patterns of performance using an approach that applies predictive analytics, school administrators may be able to help practitioners and students alike spot barriers to success before they become problems.

Online Retention

Anecdotal evidence and individual institution studies suggest online distance education course-completion and program-retention rates are low (Carr 2000; Phipps & Merisotis 1999). Research by Leong (2011) found the dropout rates for online learning courses to be 10–20% higher than for traditional courses (Carr, 2000; Frankola, 2001). Student achievement and success is vital to the retention of new and existing online students. The retention of students in online learning programs should be comparable to the retention rates of face-to-face formatted classes. Studies by Boyle, Jinhee, Ross, and Simpson (2010) have found that while distance education is probably the fastest growing area of education, it still suffers one fundamental weakness: the high drop-out rate experienced by its students as compared with the drop-out rate of students in conventional education. Kearsley (1998) reported student attrition rates as high as 50 percent in some distance learning programs. Simpson (2006) suggests that an institution may pay a high price for student drop-out in reductions in government grants, as well as loss of student fee income and increased expenditure on recruitment to replace withdrawn students. Many variables have been hypothesized to be related to retention in online distance education courses (Dupin-Bryant, 2004). Morris, Wu, and Finnegan (2005) examined studies conducted by the University System of Georgia who examined students enrolled in their fully online, lower division, undergraduate courses. System records indicate that over a five-semester period, approximately 30% of enrolled students dropped an online course by the end of the semester. In a similar study conducted at United Kingdom Open University (UKOU), a majority of online students withdraw between course start and their first assignment (Simpson, 2003). Nationwide, less than three-fourths of two-year career college students return to school after their first year, according to research released by the nonprofit Imagine America Foundation. Just fifty-seven

percent of public community college students return after one year, and sixty-eight percent return after a year at a private institution, according to the research (Carter, 2012).

Accreditation

With the rapid increase of distance learning programs being offered by colleges and universities, a major concern is the need for evaluation strategies which assess the effectiveness of the online courses (Seok, 2007). As accountability has become an integral part of reforms in higher education, colleges and universities are participating in institutional accreditation processes and/or accreditations (Wood, 2006). According to a 2002 report from the Council for Higher Education Accreditation, of the 5,635 accredited learning institutions, 1,979 offered some form of distance education (CHEA, 2002). Prior research (Snell, 2012) found that many distance learning schools are not at a level of education excellence. A fundamental conflict in devising standards for distance learning is whether distance learning programs should even have separate guidelines (Gellman-Danley, (1997).

Accreditation is this country's primary form of higher education quality review (Eaton, 2001). In the United States, accreditation is the oldest and best known seal of collegiate quality. Accreditation verifies compliance with certain predetermined, common standards of excellence; it can protect an institution from unwarranted criticism and, to the extent that the faculty is involved, provide the stimulus for the improvement of courses and programs; it promotes internal unity and cohesiveness; students are in an improved position when it comes to judging various institutions and programs; and a college or university may more accurately ascertain the value and equivalency of transfer credits (Head & Johnson, 2011). It has dual purposes of fostering quality improvement and providing quality assurance and is considered to be the cornerstone of self-regulation (Baker, 2002). Lezberg (1998) defines accreditation as “a status

granted to educational institutions found to meet or exceed stated criteria of institutional quality" (p. 27). Literature (Epstein, 2012) supports the purpose of accreditation is to maintain academic standards and can be considered as an assurance of quality (Robinson, 2004). For some, there is a preconception that distance learning programs are inherently inferior (Gellman-Danley, 1997). Accreditors have begun to review distance learning offered by both traditional institutions and the new providers of higher education-the corporate universities, virtual institutions, and unaffiliated Web-based courses and programs that now dot the higher learning landscape (Eaton, 2001). Evaluators must ask whether distance learning is part of the broader institutional plan and then delve into faculty, staffing, and other related issues (Gellman-Danley, 1997).

However, accreditation is a voluntary process for institutions of higher education (Robinson, 2004). Recognition and accreditation are conducted by two agencies; United States Department of Education (USDOE) and the Council for Higher Education Accreditation (CHEA). In March 1996, CHEA was formed and now oversees all regional accrediting agencies and coordinates the work to advance self-regulation though accreditation (Gellman-Danley, (1997).

There are two different types of accrediting agencies and each considers the accreditation of distance education programs differently (Robinson, 2004). Typically, regional accreditation has been reserved for academically-oriented, non-profit institutions. Regional accreditation is a primary mechanism for quality assurance and a major avenue for self-improvement (Baker, 2002). An institution that achieves regional accreditation has demonstrated that each of its programs has met a level of quality that reflects upon the quality of the entire institution. Literature by Robinson (2004) outlined the 6 regional accrediting agencies and their Websites are:

- Middle States Association of Colleges and Schools (MSA), www.css-msa.org ;
- New England Association of Schools and Colleges (NEASC), www.neasc.org ;
- North Central Association of Colleges and Schools (NCA-HLC), www.ncahigherlearningcommission.org ;
- Northwest Association of Schools and Colleges (NASC), www.nwccu.org ;
- Southern Association of Colleges and Schools (SACS), www.sacs.org ;
- Western association of Schools and Colleges (WASC), www.wascweb.org;

Nationally accredited institutions are predominantly for-profit and offer vocational, career, or technical programs; ITT Technical Institute, Everest University, and Kaplan Career Institute. For distance learning programs, the Department of Education recognizes the Distance Education and Training Council (DETC) as general in nature and national in scope. National accreditation usually focuses on an entire institution that has a narrowly focused mission or delivery model rather than on institutions with a large variety of different programs (Robinson, 2004). According to the CHEA Web site there are currently 6 recognized national accrediting agencies within the United States and they are:

- Accrediting Association of Bible Colleges (AABC)
- Accrediting Commission of the Distance Education and Training Council (DETC)
- Accrediting Council for Independent Colleges and Schools (ACICS)
- Association of Advanced Rabbinical and Talmudic Schools (AARTS)
- Association of Theological Schools in the United States and Canada (ATS)
- Transnational Association of Christian Colleges and Schools Accreditation Commission (TRACS)

Higher education is moving into a hybrid period in which distance-and site-based environments overlap and interact. Accordingly, accreditors are working to bring these distance-learning practices into the accreditation community--as long as these practices reflect basic accreditation requirements (Eaton, 2001). As distance learning courses and programs become more numerous, community college leaders and accreditors are faced with the challenge of assuring quality (Gellman-Danley, (1997). Distance education students must be exposed to the same quality and quantity of instruction as provided to students in traditional brick-and- mortar classrooms (Ulmer, Watson, & Derby, 2007).

Faculty Training

Today, we see a new paradigm in which distance learning integrates a number of communication technologies that did not exist just a few years ago. (Hsiung & Deal, 2013). The success of electronic, web-based, courses (e-courses) depends not only upon the schools and universities, but also on the faculty and adjunct instructors who teach these courses (Cook, Ley, Crawford, & Warner, 2009). Literature reveals that the nontraditional, distance-delivered courses pose particular issues for faculty members who choose to teach in such a program. Among these issues are compensation, administrative support, technology, innovation, time demands, workload, and promotion and tenure (Singleton & Session, 2011).

As the faculty role shifts to encompass that of course administrator or manager, the selection and training of faculty becomes critical to the success of the distance learning program (Gellman-Danley, 1997). In A Faculty Development Program for Nurse Educators Learning to Teach Online Faculty (2010), online faculty acknowledged that teaching online effectively is a skill that can be learned, but that time is needed to prepare for a successful online experience. This program identified a need many previously trained online faculty requested additional,

ongoing training so their skills would not diminish prior to their online teaching duties. This program further discovered that many previously trained online faculty members requested additional, ongoing training so their skills would not diminish prior to their online teaching duties.

Middle States Commission identifies distance learning and the use of distributed learning as catalysts for faculty innovation in helping learners achieve their educational goals. The commission emphasizes the need for substantive support to faculty to manage a distance learning course, including "access to computers, fax machines, and long distance telephone lines" (Commission on Higher Education, 1996, p. 4). Research by Singleton and Session (2011) determined that faculty development, support, and training were rated as the fifth major postsecondary education concern. Their study further revealed that because there is an increased demand for teacher–student interaction, online educators must adapt to being accessible to students by learning to interact in new ways. In a study by the Sloan Consortium, it was determined that online learners want interactivity, digital tools and an engaging experience. It's imperative for faculty to constantly update their skills to provide students with a rich, quality experience.

A primary strategy for the delivery of successful distance education programming for higher education faculty members is centered upon making sure that the technological components needed for the program are all in place and that users will be trained to work with hardware and software alike (Ulmer, Watson, & Derby, 2007). Their research also reveals that a dedicated and committed faculty presence is seen as one of the key elements needed for success in distance education. Evaluators must ask whether distance learning is part of the broader institutional plan and then delve into faculty, staffing, and other related issues (Gellman-Danley,

1997). Distance Learning programs should increase training opportunities for faculty members, particularly in the form of workshops offered through Webinars (Fritts & Casey, 2010). Research (Leong, 2011) suggests that being a good instructor and having reliable technology equipment are critical in online environments.

Summary

With the rapid increase of online learning, many studies have been conducted to determine if there is a correlational relationship between student achievement and other variables. Morris, Wu, and Finnegan (2005) conducted extensive studies in attempts to determine a relationship between student retention and several independent variables such as; age (Lorenzetti, 2005), gender (Ahmadi & Raiszadeh, 1990), demographics (Carr, 2000; Kember, 1989), and high school GPA (Diaz, 2002; Murtaugh, Burns, & Schuster , 1999). Similarly, research by Dupin-Bryant (2004) determined that prior educational experience, including cumulative grade point average, class rank, and number of previous courses completed online related to student success and retention. However, little research is available that studies the correlation between attendance /participation and student achievement.

In the future, the knowledge base that will be called on to help retain students and foster success in online courses will come from continued research that seeks to identify variables that may facilitate or impede persistence in distance education environments (Dupin-Bryant, 2004). Literature available on distance learning programs illustrates the importance of increasing student engagement in online learning environments. These differences in findings establish a need for additional studies into the strength of these variables and how they affect student achievement. This study attempts to quantify both elements and determine if there is a relationship between them and student achievement.

CHAPTER 3: METHODOLOGY

This chapter will explain the methodology of the study. This project was developed to study the relationship between student attendance and participation and student achievement within an online learning program. Does a relationship exist between student attendance, participation and student achievement in an online learning environment? To determine if a relationship exists between these two variables, a study was conducted at Wilmington University, a private, open-enrollment University located in Wilmington, Delaware.

Research Design

This project is a quantitative, non-experimental correlation study that will attempt to determine the nature and strength of the relationship between student attendance, participation, and student achievement within an online learning environment. "In non-experimental quantitative research, the researcher identifies variables and may look for relationships among them but does not manipulate the variables" (Ary, Jacobs, Razavieh, & Sorensen, 2006, p. 29). Non-experimental research differs from experimental research in that researchers are not able to control the data in non-experimental research studies. Researchers must simply take the data as they are presented and sort out the data (Kerlinger & Lee, 2000).

Research Questions and Hypotheses

This project uses a bivariate correlation method that will examine the relationship between two variables and the final achievement of online students.

Research Question 1: What is the nature and strength of the relationship between student participation (volume) and actual student achievement in online learning?

Research Question 2: What is the nature and strength of the relationship between the frequency of student attendance and actual student achievement in online learning?

Hypothesis 1

H_1: There is a positive relationship between the volume of student participation and student achievement in an online learning course and the final course grade.

Hypothesis 2

H_2: There is a positive relationship between the frequency of student attendance and student achievement in an online learning course and the final course grade.

A correlation study was chosen for this project in order to establish which variables have a reasonable chance of being important determinants of the educational phenomenon being studied. This design will analyze the data gathered to determine the correlation coefficient.

Participants

The sample population identified for this study consists of 548 online students enrolled in the Wilmington University online program during the fall semester of 2012. The courses and participants selected for this study were from online courses within the undergraduate program at Wilmington University. The online courses consist of seven (7) week modules, which total 49 consecutive days of instruction. Participants were selected from the online courses that were offered in the course catalog during the fall of 2012. A random sample of 34 courses encompassing 548 participants from the undergraduate online program was provided to the researcher by Wilmington University. Data analysis was based on dead data from the concluded fall 2012 semester at Wilmington University. All student activity was captured through the school's Blackboard learning management system. Student names were kept anonymous from the researcher at all times. Information was obtained through the Blackboard Learning Management System using auto-generated student identification numbers to protect the identity of the participants.

Setting

The school selected for this study is Wilmington University (WU) located in Wilmington, Delaware. WU is an open-enrollment four-year university that services non-traditional students over the age of 18. A high school diploma or GED is required before acceptance into the undergraduate program. The Commission on Higher Education of the Middle States Association, a non-governmental, nationally recognized organization whose members comprise approximately 500 collegiate institutions, accredits Wilmington University. The Middle States Commission on Higher Education accredits institutions of higher education in Delaware, the District of Columbia, Maryland, New Jersey, New York, Pennsylvania, Puerto Rico, the U.S. Virgin Islands, and other locations abroad. Schools must meet the established academic standards established by the accrediting agency or risk the possibility of probation or the dissolution of the program. Therefore, it is imperative for administrators to implement an 'early warning system' that may identify potential 'at-risk' students.

Originally founded in 1968 as Wilmington College, Wilmington University is a private, non-profit university that offers diverse bachelor's, master's, and doctorate degree programs as well as professional certificate programs. Wilmington University currently has several locations in the tri-state of Delaware, New Jersey and Maryland. Delaware Campuses are located at Brandywine, New Castle, Georgetown, Rehoboth Beach, Dover, the Dover Air Force Base, and the Wilson Graduate Center. Sites in New Jersey include Burlington, Cumberland, Salem and McGuire-Dix-Lakehurst. Recent locations in Maryland include Cecil and the Aberdeen Proving Ground. Wilmington University is dedicated to the success of online students. Wilmington University online students have access to the same support services as our on-campus students,

delivered in an accessible online format, including: advising, tutoring, library resources and more (Wilmington University, 2012).

Beginning in 2007, Wilmington University established their current distance learning program offering students the opportunity to complete many of their classes in a completely online format. For the first time in their 40-year history of the school, students had the option to attend classes on campus or complete a course completely online. The benefits of online learning are clearly outlined in Wilmington University's Student catalog (2012), which states, "Wilmington University Online degrees are specifically designed for students whose lives and schedules require a more flexible college experience. Classes are 100% online with flexible scheduling and individualized pacing" (p.2). This option allowed students to attend courses without ever setting foot on campus for a scheduled class. In the fall 2007 semester, approximately 40 face-to-face classes (800 available seats) were converted from a face-to-face formatted structure into a completely online formatted course. From that time, enrollment for online courses has continued to increase at Wilmington University.

During the fall semester of 2010, Wilmington University offered twenty complete online programs including 320 completely online formatted courses. For the fall 2010 semester, there were a total of 5,817 online enrollments into the distance learning program. Wilmington University now offers more than 600 online classes with approximately 12,000 available seats. With the rapid increase in online students, faculty and administrators at Wilmington University must be prepared to monitor the attendance, engagement, participation and achievement of these new 21st century learners.

Instrumentation

Student participation, attendance, and achievement levels were retrieved through Blackboard, the Learning Management System (LMS) used by the school. An LMS is a product designed to support faculty with different content areas, teaching philosophies and instructional styles (Black, 2007). Used as a learning portal, the LMS provides various ways for student collaboration using synchronous and asynchronous communication tools such as discussion boards, web-conferencing, virtual (real-time) classrooms, chats and email features. Courses are also equipped with standard assignments, quizzes, reading assignments, grade books, and learning resources. LMS reporting tools capture the frequency (in days) those students logged into the system. The student-tracking tool in the LMS provides a quantitative view of student activity in the course (Nagel, 2009). Volume of participation was calculated by the total number of clicks a student has within the LMS for the total 49 days of the course. Frequency of attendance will be operationally defined as the total number of days (out of the total 49 days) the student has logged into the LMS. Prior research identifies the prototypic online attendance record for university online learning utilizes a secure, web-based virtual learning and communication environment which delivers teaching resources, monitors student activity and provides summative and formative assessment for students. Each student's activity within the environment is recorded after the student logs in and includes the time of access to a resource, the computer used and any data entered. Therefore, the system provides a unique opportunity to record attendance without the need for signatures or face-to-face interaction (Wheeler et al., 2006). For this study, a representative at the university anonymously retrieved and matched data against students' final grade in the course. The final grade was calculated by the accumulation of submitted and graded assignments for each student. Total points for each student were calculated

and averaged to produce a final percentage score. This final grade percentage (0-100%) was matched against the grading schema established by Wilmington University (Appendix A) to produce a final achievement numeric grade. Grading rubrics were included in each class and were available to instructors and students to ensure consistency in grading.

Procedures

The researcher met with the Wilmington University's Blackboard administrator to receive the data necessary for this study. The Wilmington University's Blackboard administrator provided the random selection of online undergraduate students enrolled at Wilmington University during the fall 2012 semester. Using the reporting tools available through the LMS, student attendance, participation and achievement information applicable for this study was extracted and provided to the researcher devoid of any personal identifiers. All information was extracted and downloaded to a Microsoft Excel spreadsheet by the Wilmington University Blackboard Administrator. The LMS administrator compiled the data needed and stripped the data of all personal identifiers prior to giving it to the principal investigator. Finally, the data was assessed using the Statistical Package for the Social Sciences (SPSS) 21 and zero-order correlation analyses were used to evaluate the two research questions.

Data Analysis

The quantitative data analyzed in this study were retrieved and collected from the Blackboard Learning Management System by Wilmington University. The LMS administrator at Wilmington University provided the researcher data for randomly selected online courses. Specific information required for this study included student activity within the distance learning course, student attendance, and final grades for a random sample of the total population of officially enrolled online undergraduate students at Wilmington University during the Block I

session of the Fall 2012 semester. A Wilmington University administrator retrieved data from the Blackboard LMS. Student data was provided to the researcher stripped of any student personal identifying information by the Wilmington University administrator prior to forwarding the remaining data to the researcher. At no time was the researcher aware of student identity or personal information. Data was collected from Wilmington University's Blackboard Learning Management System. The correlation design for the research was selected to enable the study to determine if a "relationship between variables" exists (Gay & Airasian, 2003). For this study, a random sample of 548 undergraduate students enrolled in online courses at Wilmington University during the Fall 2012 semester was provided to the researcher by Wilmington University.

For the purposes of this study, the Wilmington University administrator through the Blackboard LMS reporting tools obtained the daily volume and frequency of student activity. This study was limited by the data enabled by the course management program. For example, the amount of time students spent within the learning management system was unavailable. The Blackboard administrator converted the final numeric letter grades to the quality points scale provided by Wilmington University. Using Microsoft Excel spreadsheet and SSPS software, the following data was tabulated for each student:

- Predictor Variable #1 – Total volume of 'clicks' within the LMS. This information illustrated the participation for each student for the duration of the course.
- Predictor Variable #2 – Frequency of daily activity (# of days out of 49). This information identified the frequency of attendance for each student for the duration of the course.

- Criterion Variable – Final grade. This information identified the total achievement by the student upon completion of the course. The final letter grades were converted to the equivalent quality points as outlined in the Wilmington University Grading scale where a grade of A = 4.0, A- = 3.7, B+ = 3.3, B = 3.0, B- = 2.7, C+ = 2.3, C = 2.0, C- = 1.7, D+ = 1.3, D = 1.0, D- = 0.7, and F = 0.0.

Using the statistical and data analysis tools available through Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) scatter plot charts, histograms, and correlation analyses were conducted between the variables of interest. The slope of each student's performance on an equal interval chart was used to predict student performance. The Pearson product-moment correlation coefficient (or Pearson correlation coefficient) is a measure of the strength of a linear association between two variables and is denoted by *r*. Basically, Pearson's *r* is a number that represents strength and direction of the relationship between two variables. The Pearson's *r* is a descriptive statistic that describes the linear relationship between two or more variables, each measured for the same collection of individuals. In similar correlational studies (Stewart, Stott, & Nuttall, 2011) that measured patterns of student achievement, a correlation analysis was utilized to establish relationships in the variables. The numeric value of the Pearson's *r* indicates the strength of the linear relation between two variables. It can range from –1 to 1 and the closer the value is to the absolute value of 1, the stronger the linear relation between two variables (Odom & Morrow, 2006). Prior research (Basaran, 2013; Voss, 2009) in education supports this correlation testing method. A small *p*-value signifies that the probability is small that the relationship between variables can purely be assigned to chance.

A correlation can be either positive or negative. With a positive correlation, individuals who score high (or low) on one measure tend to score similarly on the other measure. The

scatter plot of a positive correlation rises. With negative relationships, an individual who scores high on one measure tends to score low on the other (or vise verse). The scatter plot of a negative correlation falls.

The correlation analyses used in this study measured the strength of an association between two variables. From the data in this study, scatter plots chart were developed and the Pearson Correlation coefficient was calculated for each analysis. The value of Pearson correlation coefficient could fall between -1.0 and +1.0 with a 0.0 indicating no correlation. A Pearson correlation test was used to determine if the correlation coefficient is sufficiently strong to indicate a significant relationship between the variables (student participation and engagement) and the student's final course grade. The coefficient of determination (r^2) is a mathematical calculation of the square of a correlation coefficient (r). The coefficient of determination reveals the amount of shared variance between the two variables. It should indicate how accurate or inaccurate the prediction was, in comparison with the actual values. In this study, the coefficient of determination was calculated (r^2) to indicate the percentage of variance held in common by the two variables. In similar studies, Roby (2004) used common variances for correlating student attendance and student achievement by using the coefficient of determination. This calculation gives a more accurate representation of the variance between school attendance and student achievement of students in the study than using only Pearson's *r* exclusively. To determine the coefficient of determination in this study, the square of the correlation coefficient was calculated.

Using regression analyses, the following factors will be determined:

- ***r*** **-**value (correlation coefficient) – Pearson *r* correlation is widely used in statistics to measure the degree of the relationship between linear related variables. Usually, the r-value

is discussed in terms of its effect size (small, medium or large) based on Jacob Cohen's *Statistical Power Analysis for the Behavior Sciences* (1988) and Andy Field's (2009), *Discovering Statistics Using SPSS*. According to Cohen (1988), the effect size is low if the value of *r* varies around 0.1, medium if *r* varies around 0.3, and large if *r* varies more than 0.5. Based on these guidelines, an effect size r value closer to 1.0 is desirable.

- ***p***-value - the probability of finding a relationship between variables as extreme or more extreme than the calculated value if the null hypothesis were true (Wright, 1997). The p-value is just a measure of how reliable the finding is, measured as a probability. Based on these guidelines, a p-value less than .5 is desirable.
- r^2-value (coefficient of determination) - is the square of the measure of association which indicates the percent of overlap between the predictor variables and the criterion variable, It also is the calculation of the accuracy of a model. According to Cohen (1988), a large effect size would be r =.50, which would equate to an r^2 of .25. Based on these guidelines, an r - value greater than .5 is desirable.

Correlation is a measure of linear association (not causation): How nearly a scatterplot follows a straight line. Generally accepted practice indicates that two variables are positively correlated if the scatterplot slopes upwards; they are negatively correlated if the scatterplot slopes downward. The objective of correlational research is to investigate and identify possible relationships between variables within one group. Table 5 illustrates the strength of association provided by the correlation coefficient (*r*).

Table 5

Strength of Correlation Coefficient

Strength	Correlation Coefficient (*r*)
Small	.1 to .3
Medium	.3 to .5
Large	.5 to 1.0

This study adopts the historical data research design, which was deemed suitable because the study gathered information that already existed among the population understudy, and the researcher did not consciously or deliberately manipulate any of the variables of interest in the study (Oladipo, Arigbabu, & Kazeem, 2012). This test determined whether the two variables co-vary; whether, as one variable increases, the other variable tends to increase or decrease. In this study, the correlation coefficient indicated how student attendance and participation can predict performance. Similar studies by Stewart, Stott, and Nuttall (2011) found there was a strong association between students' attendance and performance. Furthermore, their research also confirmed the level of Blackboard use correlates with student performance ($r^2 = 0.446$, $p < 0.01$). There was also a relationship between the level of Blackboard use and attendance, which was statistically significant and positive in direction ($r^2 = 0.299$, $p < 0.01$). These findings corroborate existing research (Riggs & Blanco, 1994; Grabe & Christopherson, 2008) on the positive association between attendance and performance. Findings by these case studies have confirmed the importance of attendance as an indicative predictor for student performance (Stewart, Stott, & Nuttall, 2011, p.64).

To determine the influence these identified independent variables may have on student grade achievement, a correlation analysis was conducted. A correlation analysis is a technique to

investigate some correlation of relationship and direction of one variable with other variable (Byung Young, Soo Young, & Gyung Ju, 2008).

CHAPTER FOUR: FINDINGS

Literature suggests that understanding engagement as an indicator of student learning potential is critical to understanding learning outcomes (Popkess, 2011). Research by Roby (2004) suggests there is a statistically significant relationship between student attendance and student achievement. The purpose of this study was to investigate the relationship between selected independent variables and grade achievement of online undergraduate students at Wilmington University. This chapter includes the demographics, assumption testing and the results of the data analyses conducted for this study. The first section presents a discussion of the assumptions and data analysis and concludes with the results of the study.

Data Analysis

Inferential statistics were used to draw conclusions from the sample tested. The Statistical Package for the Social Sciences (SPSS) was used to code and tabulate scores collected from the survey and provide summarized values where applicable including the mean, central tendency, variance, and standard deviation. Demographic statistics were provided including count and percent statistics. Zero-order correlation analyses were used to assess the two research questions. The research questions were:

Research Question 1: What is the nature and strength of the relationship between student participation (volume) and actual student achievement in online learning?

Research Question 2: What is the nature and strength of the relationship between the frequency of student attendance and actual student achievement in online learning?

Table 6

Study Variables and Statistical Test Used to Evaluate Two Research Questions

Research Question	Criterion Variable	Predictor Variable	Statistical Test	Sig.
1	Student Achievement	Volume of Participation	Correlation	< .001
2	Student Achievement	Student Attendance	Correlation	< .001

Prior to analyzing the two research questions, data hygiene and data screening were undertaken to ensure the variables of interest met appropriate statistical assumptions. Thus, the following analyses will follow a similar analytic strategy in that the variables will be first evaluated for univariate, normality, linearity, and homoscedasticity. Subsequently, zero-order correlation analyses were run to determine if any relationships existed between variables.

Demographics

The sample population for this study consists of 548 online students enrolled in the Wilmington University online program during the fall semester of 2012. The histogram in Figure 1 contains the distribution points of the volume of participation from students in this study. This data illustrates a mound-shaped pattern that is positively skewed towards the lower end of the distribution for Volume of Participation. That is, 93.2% (n = 511) of the participants' number of clicks were less than the middle value for the variables' overall number of clicks (Minimum = 55 and Maximum = 3938) and the mean score was 961.51.

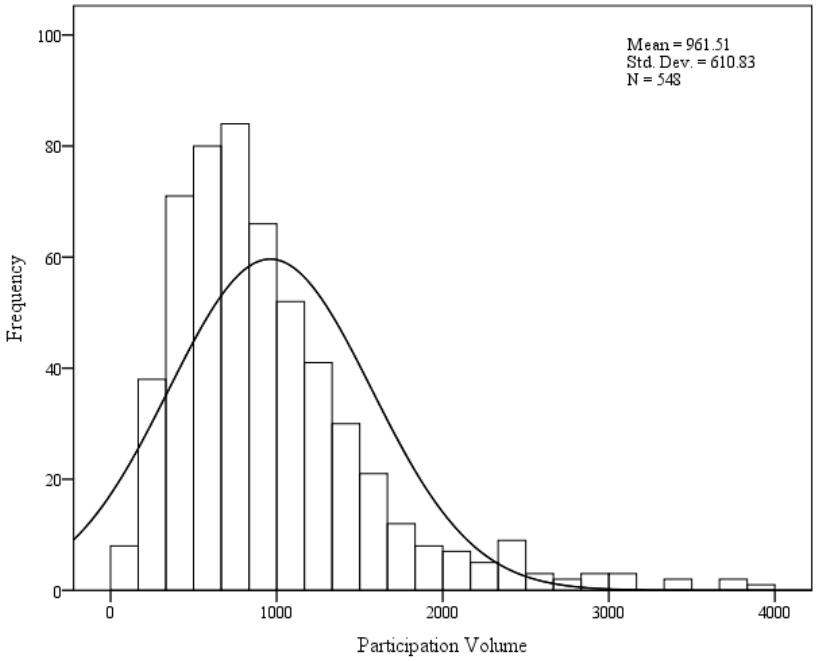

Figure 1. Histogram of Volume of Participation. Figure 1 contains the distribution of participation for students in this study.

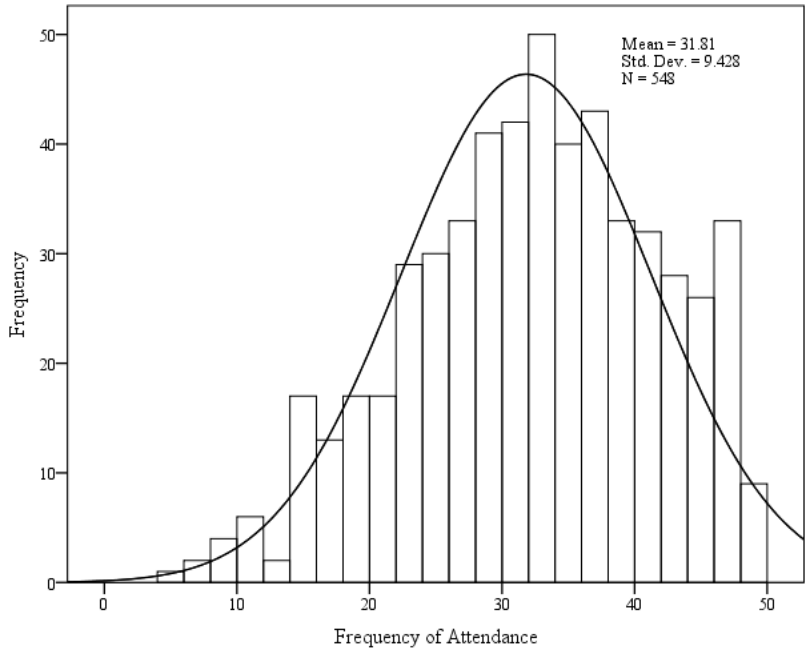

Figure 2. Histogram of Student Attendance. Figure 2 contains the distribution of attendance for students in this study. This data also illustrates a mound-shaped pattern that is slightly negatively skewed. Specifically, the average number of days that students attended class was 31.8 within a 49 day period with a standard deviation of 9.4.

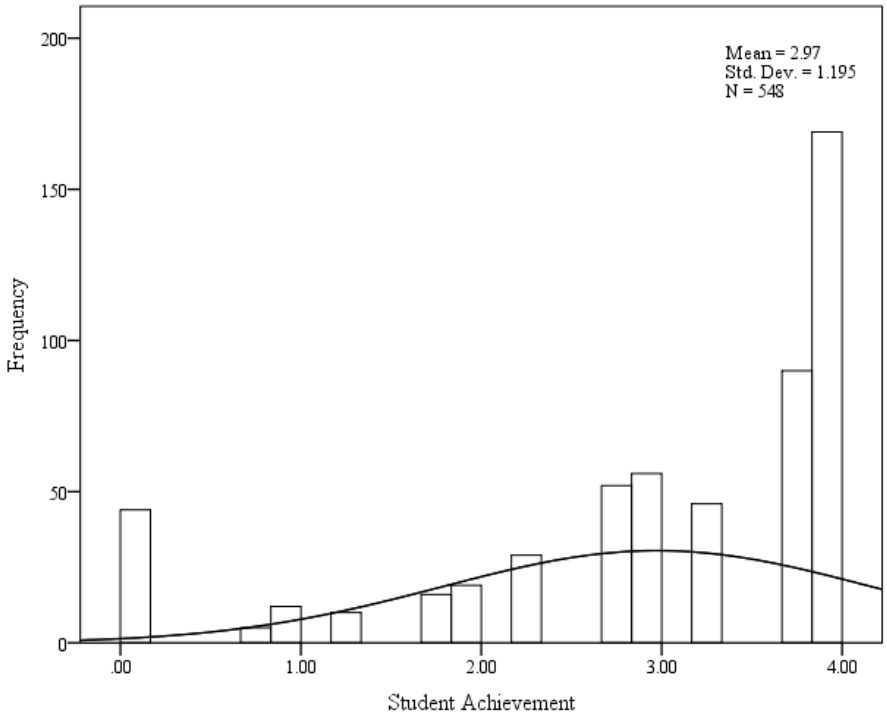

Figure 3. Histogram of Student Achievement. Figure 3 contains the distribution of the final achievement from students in this study.

The final assessment reflects the 0.0 – 4.0 grading scale as outlined in the Wilmington University grading scale (Appendix A). This distribution shows that an unusual number of students received high grades. That is, 8.9% of participants had a final achievement score between 0.0 and 0.99 (n = 49), 6.9% had a score between 1.0 and 1.99 (n = 38), 18.2% of participants had a score between 2.0 and 2.99 (n = 100), and 65.9% of the participants had a final achievement score between 3.0 and 4.0 (n = 361). The mean final achievement score for all 548 participants was 2.97.

Hypotheses 1 and 2

Hypotheses 1 and 2 used two zero-order correlation analyses to test whether or not a significant relationship existed between student participation, attendance and actual student achievement in online learning. Specifically, the predictor variable for Hypothesis 1 was

students' participation rate (Volume of Participation) and was measured by the number of clicks each student recorded within the LMS. And the predictor variable for Hypothesis 2 was student attendance (Student Attendance) and was measured by the percentage of days each participant attended class within a 49 day period. The criterion variable for Hypotheses 1 and 2 was actual student achievement in online learning (Student Achievement). Student achievement was measured by the quality point scale equivalent to the letter grade received (Sadler, 2005, Sopchak, 1958; Toth & Montagna, 2002). The final letter grades were converted to the equivalent quality points as outlined in the Wilmington University Grading scale where a grade of *A* = 4.0, *A*- = 3.7, *B*+ = 3.3, *B* = 3.0, *B*- = 2.7, *C*+ = 2.3, *C* = 2.0, *C*- = 1.7, *D*+ = 1.3, *D* = 1.0, *D*- = 0.7, and *F* = 0.0.

Data Cleaning

Before the hypothesis was assessed, the data were screened for missing data and univariate outliers. The data were screened for univariate outliers by transforming raw scores to z-scores and comparing z-scores to a critical value of +/- 3.29, $p < .001$ (Tabachnick & Fidell, 2007). Z-scores that exceed this critical value were more than three standard deviations away from the mean and thus represented outliers. Gravetter and Wallnau (2008) state that outliers can have dramatic effects on results obtained from correlation analyses, especially with small sample sizes. The distributions were evaluated and eight cases with univariate outliers were found and removed from the analyses. Missing data were examined using frequency counts and none were found within the distributions. Thus, for Hypotheses 1 and 2, 548 responses from participants were received and 540 were evaluated by the regression models ($n = 540$). Descriptive statistics for the criterion and predictor variables are displayed in Table 7.

Table 7

Descriptive Statistics of the Criterion and Predictor Variables used in Hypothesis 1 and 2

Variable	*n*	Mean	Std. Deviation	Skew	Kurtosis	Min	Max
Volume of Participation	540	924.93	534.293	1.173	1.495	55.00	2929.00
Student Attendance	540	0.64	0.190	-0.325	-0.444	0.10	0.98
Student Achievement	540	2.96	1.199	-1.268	0.689	0.00	4.00

Note. $n = 540$

Tests of Linearity, Homoscedasticity, and Normality

Before the Hypotheses 1 and 2 were analyzed, basic parametric assumptions were assessed. That is, for the criterion (Student Achievement) and predictor variables (Volume of Participation and Student Attendance) assumptions of normality, linearity, and homoscedasticity were evaluated. Linearity and homoscedasticity of variance were evaluated using scatterplots and generally did not met assumptions – see Figures 4 and 5 for scatter plots of standardized predicted Volume of Participation scores standardized residual Student Achievement scores and standardized predicted Student Attendance scores standardized residual Student Achievement scores standardized residuals.

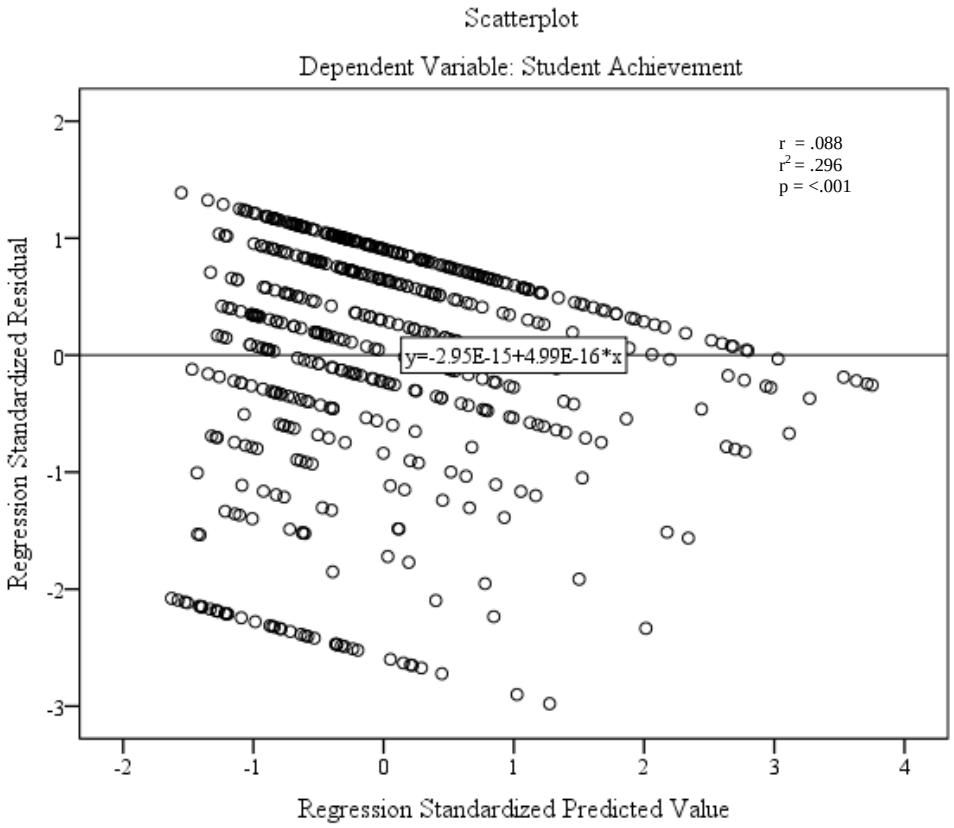

Figure 4. Scatterplot of Volume of Participation standardized predicted values and Student Achievement standardized residuals showing non-linearity between variables. Figure 4 illustrates the standardized residual divided by its standard error. Standardizing is a method for transforming data so that its mean is zero and standard deviation is one. If the distribution of the residuals is approximately normal, then 95% of the standardized residuals should fall between -2 and +2.

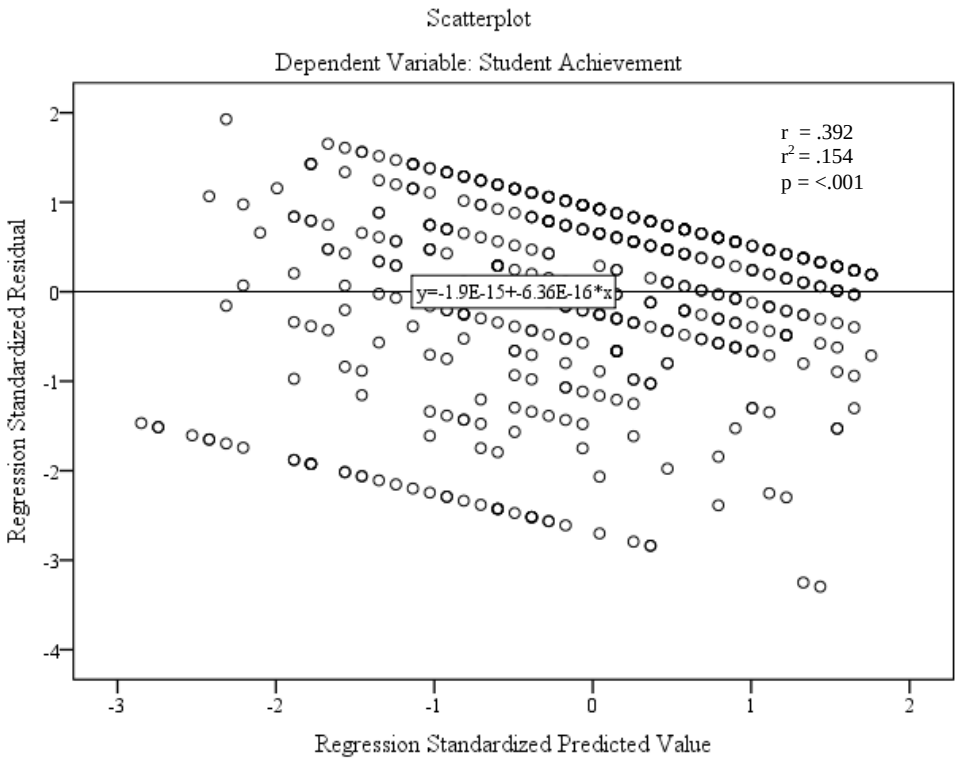

Figure 5. Scatterplot of Volume of Attendance standardized predicted values and Student Achievement standardized residuals showing non-linearity between variables. Figure 5 illustrates the standardized residual divided by its standard error. Standardizing is a method for transforming data so that its mean is zero and standard deviation is one. If the distribution of the residuals is approximately normal, then 95% of the standardized residuals should fall between -2 and +2.

To statistically test the assumption of normality, the skew coefficients were divided by the skew standard error (0.105) resulting in a z-skew coefficient for all variables. This technique was recommended by Tabachnick and Fidell (2007). Specifically, *z*-skew coefficients exceeding the critical value of ±3.29 ($p < .001$) may indicate non-normality. Thus, based on the evaluation of the z-skew coefficients, two variables (Volume of Participation and Student Achievement) exceeded the critical value (*z-skew* = 11.171 and -12.076 respectively). Kurtosis was also

evaluated using the same method and the Volume of Participation distribution was found to be significantly kurtotic (*z-kurtosis* = 7.119). Although these distributions were significantly skewed and/or kurtotic, the Central Limit Theorem states that with sufficiently large enough sample sizes ($n > 100$) the distributions will be approximately normally distributed (Tabachnick & Fidell, 2007). Therefore, the variables were conditionally assumed to be normally distributed and no transformations of variables were conducted. Skewness and kurtosis statistics are presented in Table 8.

Table 8

Skewness and Kurtosis Statistics of the Criterion and Predictor Variables

Variable	*n*	Skewness	z-skew	Kurtosis	z-kurtosis
Participation Volume	540	1.173	11.171	1.495	7.119
Student Attendance	540	-0.325	-3.095	-0.444	-2.114
Student Achievement	540	-1.268	-12.076	0.659	3.138

Note. Std. error of skewness = 0.105, Std. error of kurtosis = 0.210

Correlation Analysis of Hypothesis 1

Null Hypothesis 1 ($H_0 1$): There is not a positive relationship between the volume of student participation and student achievement in an online learning course and the final course grade. *Alternative Hypothesis 1* ($H_A 1$): There is a positive relationship between the volume of student participation and student achievement in an online learning course and the final course grade.

Using SPSS 21, correlation analysis was performed to assess the relationship between the volume of student participation and student achievement in an online learning course. Results indicated there was a statistically significant relationship between the number of clicks and student achievement, *Pearson's r* = .296, $p < .001$. Thus, the null hypothesis for Research

Question 1 was rejected in favor of the alternative hypothesis. Figure 6 displays a scatterplot of scores used in Hypothesis 1. The correlation coefficient measures the association between the two variables. A positive correlation indicates a positive association between the variables (increasing values in one variable correspond to increasing values in the other variable). In this study, there was a statistically significant relationship between the volume of participation and student achievement. The coefficient of determination represents the percent of the data that is the closest to the line of best fit. For example, if r = 0.296, then r2 = 0.088, which means that 8.8% of the total variation in student achievement can be explained by the linear relationship between the volume of participation and student achievement (as described by the regression equation). The other 91.2% of the total variation in student achievement remains unexplained.

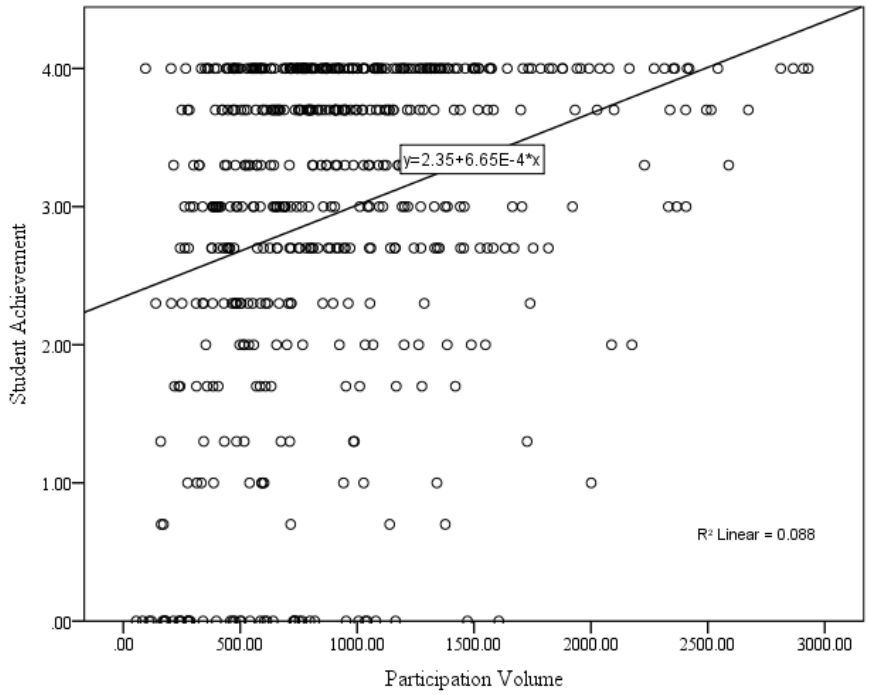

Figure 6. Scatterplot of Participation Volume and Student Achievement. Figure 6 illustrates the distribution of student participation verses student achievement.

Correlation Analysis of Hypothesis 2

Null Hypothesis 2 ($H_0$2): There is not a positive relationship between the frequency of student attendance and student achievement in an online learning course and the final course grade. *Alternative Hypothesis 2* (H_A2): There is a positive relationship between the frequency of student attendance and student achievement in an online learning course and the final course grade.

Correlation analysis was performed to assess the relationship between frequency of student attendance and student achievement in an online learning course. Results indicated there was a statistically significant relationship did exist between students' attendance percentage and student achievement, *Pearson's r* = .392, $p < .001$. Thus, the null hypothesis for Research Question 2 was rejected in favor of the alternative hypothesis. Figure 7 displays a scatterplot of scores used in Hypothesis 2. The correlation coefficient measures the association between the two variables. A positive correlation indicates a positive association between the variables (increasing values in one variable correspond to increasing values in the other variable). In this study, there was a statistically significant relationship between the frequency of attendance and student achievement. In fact, the findings of this study reveal that the frequency of attendance has a stronger significance on student achievement than does the volume of participation. The coefficient of determination represents the percent of the data that is the closest to the line of best fit. For example, if r = 0.392, then $r^2 = 0.154$, which means that 15.4% of the total variation in student achievement can be explained by the linear relationship between the volume of participation and student achievement (as described by the regression equation). The other 84.6% of the total variation in student achievement remains unexplained.

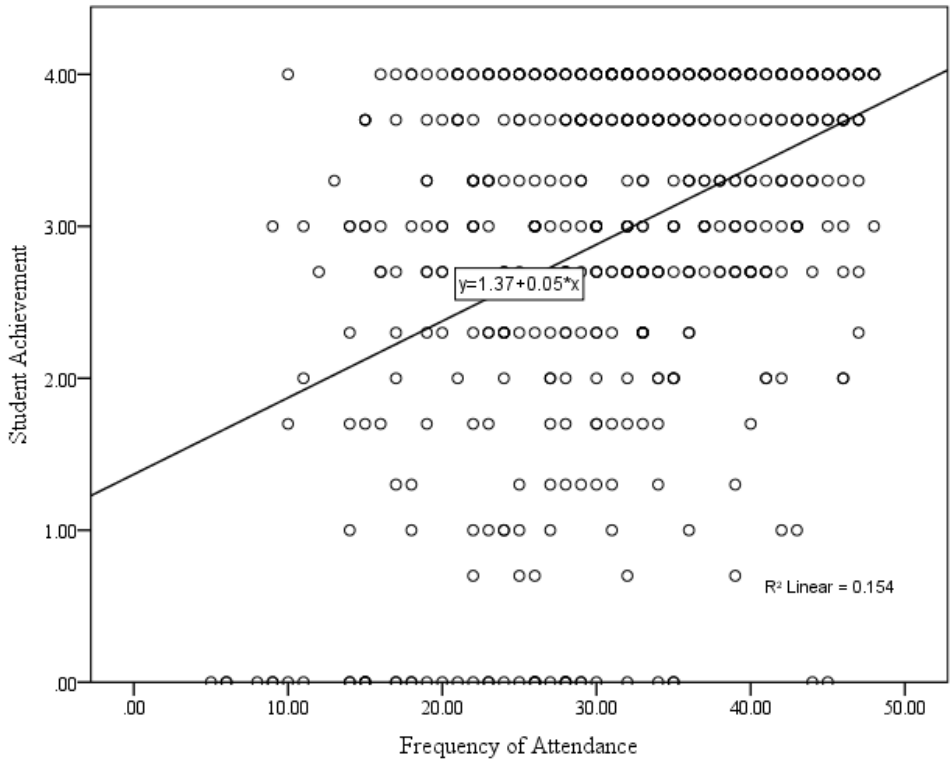

Figure 7. Scatterplot for Frequency of Attendance and Student Achievement. Figure 7 illustrates the distribution of student attendance verses student achievement.

Exploratory Multiple Regression Analysis

An exploratory analysis was conducted using multiple regression analysis to test if a significant relationship existed between actual student achievement in online learning and student participation and attendance. Results from the multiple regression analysis indicated that a significant relationship did exist between student achievement and a model containing two predictor variables (Volume of Participation and Student Attendance), $R = .393$, $R^2 = .155$, $F(2, 537) = 49.181$, $p < .001$ (two-tailed). Further, 15.5% ($R^2 = .155$) of the variance observed in student achievement scores was due to a model containing students' attendance and volume of participation. Displayed in Table 9 is a model summary of the exploratory multiple regression analysis.

Table 9

Model Summary Generated from the Exploratory Multiple Regression Analysis

Source	R	R^2	Standard Error	F	Sig
Omnibus Model	.393	.155	1.104	49.181	< .001

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	*t*	Sig.
(Constant)	1.399	0.173		8.067	< .001
Volume of Participation	< .001	< .001	0.040	0.720	.472
Student Attendance	2.292	0.351	0.364	6.524	< .001

Note. Dependent variable = Student Achievement

The contribution of each predictor variable, when the other was controlled for, was evaluated using the standardized Beta for each coefficient. Student attendance made the only significant, unique contribution in explaining the criterion variable (Beta = 0.364, $p < .001$). That is, there was a significant, positive relationship between student attendance and student achievement scores, after removing the shared variance associated with student participation. There was no significantly unique relationship between volume of participation and student achievement after controlling for student attendance ($p = .472$).

A zero-order correlation analysis (Table 10) was conducted to assess the relationship between predictor variables and found that a significant relationship did exist between volume of participation and student attendance (*Pearson's r* = .703, $p < .001$).

Table 10

Zero-order Correlation Analysis of Criterion and Predictor Variables used in Exploratory Multiple Regression Analysis

Variable	Pearson's Correlation Coefficient		
	Student Achievement	Participation Volume	Attendance Percentage
Student Achievement	1.000	.296*	.392*
Participation Volume		1.000	.703*
Attendance Percentage			1.000

*. Correlation is significant at $p < .001$ level (2-tailed).

The zero-order correlation is a component of the multiple regression analysis to show the individual correlations between variables. In this case, there was a strong correlation (Pearson's $r = .703$, $p < .001$) between predictor variables (Volume of Participation and Student Attendance), suggesting multicollinearity. This helps explain why Volume of Participation was significantly related to student achievement in the linear regression model for Hypothesis 1 but did not have a significant relationship with student achievement after controlling for attendance.

Summary

Table 11 contains the summary of variables and statistical tests used in this study. The results of this study support the researcher's alternative hypothesis that the volume of student participation did have a significant relationship with student achievement (Hypothesis 1 $p < .001$, *Pearson's r* = .296). This study also identified a statistically significant relationship between students' attendance and students' achievement (Hypothesis 2 $p < .001$, *Pearson's r* = .392). That is, as students' volume of participation and attendance increase, so, too, does their

performance (Student Achievement). According to Cohen's (1988) effect size guidelines, this illustrates a small effect or weak correlation between student achievement and the volume of participation (r = 0.296) and between student achievement and the frequency of attendance (r = 0.392) (Roby, 2004). The results of this study also support the researcher's hypothesis that the frequency of student attendance does have a positive effect on student achievement and, therefore, hypothesis two (H_2) was also accepted. Surprisingly, a correlation coefficient for this area identified a stronger relationship between the frequency of attendance and student achievement. The values of R = .392, R^2 = .154 indicate a positive linear relationship between the frequency of student participation and actual student achievement. A $p < .001$ indicates strong evidence against the null hypothesis in favor of the alternative. The extremely low p-value indicates a very small probability that this result is due to chance and gives evidence that there is in fact a relationship between these variables.

Table 11

Summary of Variables and Statistical Test Used to Evaluate Two Research Questions

Research Question	Criterion Variable	Predictor Variable	Statistical Test	Sig.
1	Student Achievement	Volume of Participation	Correlation	< .001
2	Student Achievement	Student Attendance	Correlation	< .001

CHAPTER FIVE: DISCUSSION, CONCLUSIONS, & RECOMMENDATIONS

Introduction

This final chapter provides an overview of the (a) a summary of the findings, (b) a discussion of the findings and the implications in light of the relevant literature, (c) an outline of the study limitations and recommendations for future research, and (d) the primary findings. The study was conducted to determine if selected variables had an impact on student achievement of undergraduate online students at Wilmington University. This study investigated if a correlation exists between the frequency of student attendance, participation, and student achievement in an online learning environment. Due to the recent growth in online academic programs in higher education, the results of this study should be important and useful to higher education institutions, administrators, faculty and students involved with online learning programs. Previous research (McIsaac & Gunawardena, 1996; Moore, 1989; Saba, 2000; Wagner, 1994) identified interaction as a major construct in distance education research. Studies (Leong, 2011) have found that learners learn more effectively when they are actively engaged. Other studies (Newman-Ford et al., 2008) emphasize the importance and relationship between attendance and educational performance. Further studies (Rungtusanatham et al., 2004; Arbaugh & Rau, 2007) consistently found that interaction is vital to learning. A similar study by Swan (2002) found that students with higher levels of interaction had higher reported levels of satisfaction and learning. This literature confirms that developing a sense of community and student interaction for online learning to be successful. Furthermore, research reveals a positive correlation between students' learning behaviors such as participating in online activities and their learning outcomes (Chang, 2012). Several studies (Chang, 2012; Morris et al, 2005; Riggs & Blanco, 1994) reveal a positive correlation between class attendance and student performance highlight the link between class

attendance (as one measure of engagement) and performance. Similar studies by Rafaeli and Ravid (1997) found that measurable attendance had a positive influence on student achievement. Additional research by Grabe et al. (2005) found that students who accessed and viewed online materials performed better on assessments. The results of this study affirm the aforementioned findings.

Research Questions

The research questions that framed this study were:

Research Question 1: What is the nature and strength of the relationship between student participation (volume) and actual student achievement in online learning?

Research Question 2: What is the nature and strength of the relationship between the frequency of student attendance and actual student achievement in online learning?

Data for this study were collected and submitted to the researcher by Wilmington University. A random sample of 34 courses encompassing 548 participants from the undergraduate online program was provided to the researcher by Wilmington University. Participants selected for this study were from the online courses within the undergraduate program at Wilmington University during the fall of 2012. Eight univariate outliers existed, thus a total of 540 participants were used to assess Research Questions 1 and 2.

Summary of Research Findings

The Statistical Package for the Social Sciences (SPSS) 21 was used to analyze data for two research questions. Correlation analyses were used to answer Research Questions 1 and 2. Full details of these analyses were presented in Chapter 4, with key findings summarized in this section.

Research Question 1

Null Hypothesis 1 ($H_0$1): There is not a positive relationship between the volume of student participation and student achievement in an online learning course and the final course grade.

Alternative Hypothesis 1 (H_A1): There is a positive relationship between the volume of student participation and student achievement in an online learning course and the final course grade.

Statistical testing using zero-order correlation analysis was performed to assess the relationship between student participation (as defined by volume of clicks in LMS) and student achievement in an online learning course. The results indicate there was a statistically significant positive relationship between the number of clicks and student achievement ($r = .296$, $r^2 = 0.088$ and $p < .001$). Thus, the null hypothesis for Research Question 1 was rejected in favor of the alternative hypothesis.

Research Question 2

Null Hypothesis 2 ($H_0$2): There is not a positive relationship between the frequency of student attendance and student achievement in an online learning course and the final course grade.

Alternative Hypothesis 2 (H_A2): There is a positive relationship between the frequency of student attendance and student achievement in an online learning course and the final course grade.

Statistical testing using zero-order correlation analysis was performed to assess the relationship between frequency of student attendance and student achievement in an online learning course. Results indicated there was a statistically significant positive relationship did

exist between students' attendance percentage and student achievement (r = .392, r^2 = .154 and p < .001). Thus, the null hypothesis for Research Question 2 was rejected in favor of the alternative hypothesis.

Conclusions and Implications

For this research, student attendance and participation were identified by the students' activity within the Blackboard LMS. Similar research that focused on student achievement within online learning environments utilized data retrieved from learning management systems that identified student attendance and participation (Wheeler et al., 2003; Johnson, Hurtubise, Castrop, French, Groner, Ladinsky, & Mahan, 2004). The results of this study indicate that both attendance and participation have a positive influence on student achievement. These findings support prior research relating to student achievement in online learning (Iqbal, Kousar, & Ajmal, 2011; Matuga, 2009). These results further reveal that the frequency of student attendance has a bigger impact on their final grade than does the volume of online participation.

Being involved with the development and facilitation of online courses for the past several years, the researcher was surprised by the findings of this study that may suggest minimal participation and attendance is required by students in order to successfully complete an online course at Wilmington University. Scatterplot charts (Figures 6 & 7) contain the distribution of the volume of participation and frequency of attendance. A review of the scatterplot for the volume of participation (Figure 6) indicates many students received high grades with only minimal participation. In fact, student received high grades at various levels of participation although no student that accessed their class less than 2,000 times received a poor grade. These results may suggest that an online student at Wilmington University can be successful in completing online course with minimal online participation.

The results of this study identify a possible area of concern to school administrators and teachers as well as students of online programs. These results suggest there may be the lack of online student collaboration and engagement needed to be successful in online courses which would reflect negatively on the reputation and academic rigor of Wilmington University.

Hypothesis 1

The results from this study conclude that in our population of students from the Wilmington University online program, participation (via number clicks in LMS) has a positive and meaningful relationship with grades. Findings from Hypothesis 1 support previous studies by McIsaac and Gunawardena, (1996), Moore, (1989), Saba (2000), and Wagner's (1994). These findings suggest that a relationship exists between interaction and student performance. Cheung and Kan (2002) cited prior literature that consistently noted a reliable predictor of student performance is class attendance. Their research found a positive association between student performance and attendance.

As evidence from the histogram in Figure 1, participation is an important aspect of online learning. The average volume of participation from this study was approximately 925 clicks within the course during the 49 day semester. The scatterplot illustrated in Figure 6 shows the distribution of the volume of student participation and reflects an $r^2 = 0.088$. This result indicates that the volume of participation has a small but positive effect on student achievement. Although this distribution is slightly skewed to the right, the data are appropriate for statistical methods.

Hypothesis 2

The findings of this study are consistent with other research studies that suggest that attendance is strongly related to achievement (Longstaffe, 2009). Findings from Hypothesis 2 support previous research by Cheung, & Kan (2002) that suggests a reliable predictor of student

performance is class attendance. Their research found a positive association between student performance and attendance. Cheung, & Kan, (2002) cited supporting research that found that as online student attendance increased, the greater their tendency to receive a passing grade in the course.

The data from this research suggests that the frequency a student accesses his/her online course does have an influence on final grade achievement. In fact, it appears that the frequency of attendance has a greater impact on student achievement than does the volume of online participation. Figure 7 illustrates the distribution of frequency of student attendance in this study. A review of the frequency of student attendance within the online courses of this data suggests the importance of online student attendance and engagement. Figure 7 indicates an $r^2 = .0154$ which suggests a moderate relationship with student achievement. The histogram (Figure 1) of the frequency of student attendance indicated the average student accessed their account approximately 65% of the days available. This finding is consistent with the evidence in the literature (Cheung & Kan, 2002; Longstaffe, 2009;Matuga, 2009) that concluded attendance was positively related to student performance at a significant level.

Recommendations for Further Research

Overall, the results of the research conducted in this study may have important implications for online students, teachers, administrators and institutions. As online learning becomes a more viable option for higher education learners, determining which variables impact the success of online students may assist online faculty and administrators in designing and delivering online courses. In addition, the research results may assist the selected institution in designing academic programs and students support services which may identify struggling students in a timelier manner as well as help online students continue to achieve. The

information that was collected and analyzed from this study may alert school administrators to revisit their online program attendance policies and practices. The literature review section of this manuscript identifies prior research that emphasizes the importance of student attendance and participation on student achievement in online learning environments. The findings of this study support earlier research completed in this area. Although this study did not specifically investigate the similarities and equivalence between face-to-face courses and online courses, these results establish a starting point for future research in these areas. Prior research (Hiltz & Turoff, 2005) has indicated that learning effectiveness in online or blended courses is equal to or better than in entirely face-to-face courses. A concern to school administrators and accreditation agencies should be the effectiveness of distance learning programs. Accreditation has without question been the major driver of assessment in higher education for the past decade.

This overview study of online attendance and participation and its relationship to student achievement provides an initial forum for discussion and further research. Continued studies may provide additional information that may lead to strategies for improving student academic achievement in online learning environments. In viewing the current and future impact of computing in higher education, we must assume the technology of online learning will produce learning systems of a blended nature that are far better than the prior "gold standard" of the face-to-face class (Hiltz & Turoff, 2005). This project may serve as a model for higher education online programs targeting an emerging population of online learners. In addition to models for higher education, this research may also serve to inform higher education administrators and faculty on successful methods of development and design of online courses. Based on the findings from this study, further research related to the influences of attendance and participation on student achievement in online learning environments is recommended for future studies.

Although this study included a relatively large sample size (n=548), future studies may include a larger sample size as well as including additional schools from different locations. Additional research could also focus on the qualitative participation of online learners as well as measurable time allotted to student activity within online learning environments or learning management systems. Equally important research may focus on the comparison of student achievement in online classes verses face-to-face formats of the same course. Continued research should provide educators with greater insight into the development, design and facilitation on online learning programs and how student attendance and participation have an impact on student achievement.

The results from this study found that attendance and participation did share a relationship with students' final outcome in an online learning environment. Specifically, this study found approximately 16% of students' final assessment can be related to attendance and participation in online learning. Conversely, 84% of the variance of students' final assessment remains unexplained. Future studies may focus on other possible variables of the 84% unexplained variance that could influence student achievement such as; learner control, self-regulation, prior subject knowledge, prior college academic achievement, student technical competence, and faculty teaching methods. In addition, future research may include an analysis of the interpersonal verses intrapersonal learners and the success of these learners in academic learning enviornments.

Recommendations for Practice

The results of this study identify a possible inequity in student attendance and participation requirements between the two differently formatted academic programs at Wilmington University. As distance learning courses and programs become more numerous, college leaders and accreditation agencies are faced with the challenge of assuring quality

(Gellman-Danley, 1997). From the results of this study, universities and administrators should gain valuable insight into the design, development, and implementation of online learning programs. For example, if students enrolled in face-to-face courses are required to meet for a specific amount of time each semester (35 classroom hours each block at Wilmington University), shouldn't online students follow similar academic requirements? These results should also underscore the importance of course development to ensure students are active and engaged in online learning programs.

This study may also reveal that the online program at Wilmington University is an effective teaching method and meets the needs of the student. For example, a review of the histogram of student achievement (Figure 4) indicated the mean grade to be approximately 3.0 with a majority of students receiving a final grade of 'A' (4.0). This may indicate that through this online learning environment, students succeed as a result of the 24/7 accessibility to course materials and content.

These results should also be valuable to students of online learning programs. Students considering enrolling into online learning programs should reference this material when selecting a potential online learning program. These results may validate the academic rigor and success of the Wilmington University online program. Conversely, students should also consider the possibility that online learning programs that require minimal attendance and participation may be inferior in quality than other methods of instruction or academic programs. Future research could examine similar online learning programs at other higher education schools and compared to the finding of this study.

Limitations

The limitations of the study include the selection of participants. Due to the participants being selected from a single university, the distribution may not be a fair representation of the entire population (all students taking online courses). As results may accurately represent those from Wilmington University, they might not specifically represent other students taking online courses across the US. Limitations of this study include the data collection and accuracy of the data. All data was collected and submitted to the research by Wilmington University. This study's model was developed based on the assumption of the most prevalent form of online courses, that is, predominantly asynchronous text-based and facilitated through the use of a learning management system, such as Blackboard. Although learning management systems are functionally similar, this study may not be comparable with other online learning environments at other learning institutions. In addition, this study was limited to a convenient sample of students enrolled in online courses at Wilmington University during the fall semester of 2012 and may not be representative of the online student population.

Another limitation of this study that must be noted is the consistency of online teaching methods and strategies by the instructors of the online courses at Wilmington University. A search of literature shows a lack of consistency in the facilitation of online learning programs. Meyer (2101) found online faculty members indicated that teaching online took less time while others indicated it took more time. As a result, there is no one uniform approach to the organization or delivery of distance education programs (Murphy, Rodríguez-Manzanares, & Barbour, 2011). The quality of learning and teaching online, because of its time and place independence, depends a great deal on the quality of the communication between learners and teachers, as well as among learners (Naidu, 2013).

It is important to note that there may be the existence of other cofounding variable that may influence both participation and attendance of online students. For example, participation in online learning activities is contingent on collaboration with and from other classmates. A variation in the amount of peer collaboration may have an impact on student participation volumes. Attendance volumes may also be affected by student availability. For example, online students with full-time employment may have a limited amount of time to access course materials.

Summary

There has been astounding growth over the past few years in the areas of online learning. Due to this rapid growth, schools, administrators, faculty and students need to understand all aspects of the unique environment of online learning. This study sought to determine if student attendance and participation have an effect on student achievement in the online learning environment at Wilmington University. Data collection was conducted by Wilmington University and submitted to the researcher for statistical testing. Zero-order correlation analysis model testing was used to determine the results.

The results of this study indicate there is a positive relationship between the volume of participation and student achievement ($p < .001$). Furthermore, the results of this study indicate even a stronger relationship between the frequency of attendance and student achievement in an online learning environment. Although the results of this study are based on data collected from one university, they have offered some insights on factors related to the performance of students enrolled in distance learning programs. The importance of this issue warrants future research, which should generate a better understanding of the factors influencing student performance and achievement in online and distance learning programs. Based on the finding of this study,

attendance and participation are important factors relating to student achievement in online learning. This supports previous research cited in this manuscript that validates the importance of student engagement in student achievement. Specifically, an online presence from learners is vital to student success in online learning environments.

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Appendix A – WU Undergraduate Grade Scale

Table 12

Wilmington University Undergraduate Grade Scale

Grade	Numeric Equivalent	Quality Points
A	95-100	4.00
A-	92-94	3.67
B+	89-91	3.33
B+	86-88	3.00
B-	83-85	2.67
C+	80-82	2.33
C+	77-79	2.00
C-	74-76	1.67
D+	71-73	1.33
D+	68-70	1.00
D-	65-67	0.67
F	< 65	0.00

Appendix B – Online student enrollment data for K-12

Table 13

Summary of Full-Time Online School Enrollment by State

State	2008-09	2009-10	2010-11	Δ% 2008-09 to 2009-10	Δ% 2009-10 to 2010-11	2 year Δ% 2008-09 to 2010-11	% of Students in FT Online Schools
Arizona	30076	30338	36814	+1%	+21%	+22%	3.89
Arkansas	500	500	500	0%	0%	0%	0.10
California	10502	15000		+43%			0.25
Colorado	11641	13093	15314	+12%	+17%	+32%	1.88
Florida	1079	2392	4000	+122%	+67%	+271%	0.16
Georgia	4300	5010	5000	+17%	-0.2%	+16%	0.30
Hawaii	500	500	1500	0%			0.83
Idaho	3611	4709	5223	+30%	+11%	+45%	1.92
Indiana		200	470		+135%		0.05
Kansas	5399	4000	4891	-26%	+22%	-9%	1.05
Massachusetts		220	318		+45%		0.05
Michigan			800				0.06
Minnesota	5042	8248	9559	+64%	+16%	+90%	1.19
Missouri		700	700		0%		0.08
Nevada	4603	6256	7122	+36%	+14%	+55%	1.70
Ohio	27037	31852	31142	+18%	-2%	+15%	1.78
Oklahoma	1100	2500	4456	+127%	+78%	+305%	0.68
Oregon		3861	4798		+24%	+20%	0.88
Pennsylvania	22205	24603	28578	+11%	+16%	+29%	1.64
South Carolina	1981	5781	7690	+192%	+33%	+288%	1.07
Texas	1650	4500	4500	+173%	0%	+173%	0.09
Utah	500	1475	1572	+195%	+7%	+214%	0.28
Washington	13000	16003	17786	+23%	+11%	+37%	1.82
Wisconsin	3100	3927	4328	+27%	+10%	+40%	0.50
Wyoming	100	807	964	+7.1%	+19%	+864%	1.11

Appendix C – Top 20 Universities by Enrollment (Fall 2009)

Table 14

Enrollment of the 20 Largest Degree-granting University Campuses in Fall 2009

Rank[a]	Institution	State	Total enrollment
1	University of Phoenix, Online Campus	Arizona	380,232
2	Kaplan University	Iowa	71,011
3	Arizona State University	Arizona	68,064
4	Miami Dade College	Florida	59,120
5	Ohio State University, Main Campus	Ohio	55,014
6	Houston Community College	Texas	54,942
7	Strayer University	DC	54,325
8	University of Central Florida	Florida	53,401
9	University of Minnesota, Twin Cities	Minnesota	51,659
10	University of Texas at Austin	Texas	50,995
11	University of Florida	Florida	50,691
12	Texas A&M University	Texas	48,702
13	Michigan State University	Michigan	47,071
14	Ashford University	Iowa	46,835
15	Northern Virginia Community College	Virginia	46,619
16	Lone Star College System	Texas	46,504
17	Liberty University	Virginia	46,312
18	University of Washington, Seattle Campus	Washington	45,943
19	Pennsylvania State University, Main Campus	Pennsylvania	45,185
20	Tarrant County College District	Texas	44,355

a. U.S. Department of Education, National Center for Education Statistics. (2011). *Digest of Education Statistics, 2010* (NCES 2011-015)