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UNIVERSITY OF OKLAHOMA

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FACTORS CONTRIBUTING TO THE SUCCESSFUL COMPLETION OF ONLINE ALGEBRA I COURSES BY SECONDARY STUDENTS

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

In partial fulfillment of the requirements for the

Degree of

Doctor of Education

By
WILLIAM JASON SIMEROTH
Norman, Oklahoma
2007

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FACTORS CONTRIBUTING TO THE SUCCESSFUL COMPLETION OF ONLINE ALGEBRA I COURSES BY SECONDARY STUDENTS

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF EDUCATIONAL LEADERSHIP AND POLICY STUDIES

BY

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DEDICATION

I would first like to thank Jesus Christ, my Lord and Savior. If it were not for the grace of God, I don't know where I would be today. The eternal hope and constant reassurance that I am provided through Christ has kept me going and rescued me from many situations. Christ has exceedingly blessed my life and He continues to grow me spiritually, making me a better person.

Aside from Christ, the most important thing in my life and the very fiber of my being is my wife Julie (LOML). I owe to you my life, love and devotion. You are from heaven my answer and the world in which I dwell. Thank you, Julie for always being a positive driving force in my life, loving me and encouraging me. You spent countless hours watching the children, fixing dinners, carpooling, reading my papers, editing, critiquing and giving excellent suggestions. Your name belongs on the author page as much as mine, because you complete me. I Love You.

I want to also thank my children. The time I had to spend away from you was not pleasant for any of us. When you hugged me and say daddy don't go to work it's Saturday, it was devastating. You two were real troopers, and now it's over and we can go back to hanging out together like we are supposed to.

Mom and Dad, as I think of the time and effort you put into my life without asking for anything in return, I am almost embarrassed. I hope and pray that in some small way the completion of this journey gives you a sense of

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accomplishment. You taught me integrity, hard work and responsibility and your sacrifices have paid off. Thank you for your love and enduring patience over my lifetime.

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ACKNOWLEDGEMENTS

I wish to express sincere appreciation to Dr. Jeffery Maiden, the chair of my committee. Thank you for your wisdom, guidance, patience, and willingness to put up with my endless emails and requests for meetings. I would also like to thank the members of my doctoral committee: Dr. John Chiodo, Dr. Melani Mouse, Dr. Gregg Garn, and Dr. Courtney Vaughn. I have always appreciated the knowledge and advice that each of you each have given me over the years in the classroom, workplace and as my doctoral committee.

Advanced Academics deserves recognition for their willingness to provide me with the data used in this study. It is my hope that the information provided here will benefit all parties. I have both personal and professional relationships with the company and have been pleased with them in both aspects.

Finally, I would like to acknowledge the support and encouragement I have received from my co-workers. Everyone with whom I work has been extremely positive and helpful during this endeavor. I have repeatedly heard the phrase, “you do whatever you have to do to make this happen and we will help you in any way we can”.

My deepest thanks.

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Expanded Features
Unlimited Pages
PDF Complete Documents

TABLE OF CONTENTS

LIST OF TABLES viii

ABSTRACT ix

CHAPTER I

Introduction 1

Background of the Study 2

Statement of the Problem 6

Purpose of the Study 7

Significance of Study 8

Nature of the Study 9

Research Questions 10

Theoretical Framework 11

Definition of Terms 13

Limitations 14

Summary 14

CHAPTER II – LITERATURE REVIEW

Introduction 16

History of Distance Education 17

What was Distance Education 18

Genesis of Distance Education 20

No Significant Difference Theory 23

Current Distance Education Use 33

Online Instruction 34

Studies of Online Secondary Students 38

Summary 45

Click Here & Upgrade
Expanded Features
Unlimited Pages
PDF Complete Documents

CHAPTER III – METHODOLOGY

Introduction 49
Design 50
Research Questions 51
Context 53
Data Collection and Design 56
Participants 56
Methodology 59
Methodological Assumptions 61
Summary 62

CHAPTER IV – RESULTS

Introduction 64
Research Questions 65
Study Group Composition 67
Analysis of Selected Variables 70
Research Question One Results 71
Research Question Two Results 74
Research Questions Three Results 75
Additional Findings 78
Summary 80

CHAPTER V - SUMMARY, CONCLUSIONS, RECCOMENDATIONS

Introduction 82
Summary 84
Conclusions 88
Connection to Theory 93

Click Here & Upgrade
Expanded Features
Unlimited Pages
PDF Complete Documents

Time Spent Online 94
Reason for Enrollment 96
Implications 98
Policy Recommendations 98
Practitioner Recommendations 99
Recommendations for Future Research 100
Summary 102

REFERENCES 105

Click Here & Upgrade
Expanded Features
Unlimited Pages
PDF Complete Documents

LIST OF TABLES

TABLES

1. Study Group Composition 69

2. Descriptive Statistics for Selected Variables 71

3. Correlations for Student Performance – Time Online 73

4. Correlations for Student Performance – Type of Student 75

5. Correlations for Student Performance – Reason for Enrollment 77

6. ANOVA Source Tables 78

7. Correlations for Student Performance – Additional Findings 79

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Expanded Features
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PDF Complete Documents

ABSTRACT

Distance education provides prospects for students to either complement traditional forms of education or take the place of it altogether. Apart from why students choose distance education options, it remains that distance education/online courses offer opportunities for students to carry on their education.

Whether the online option will be a positive experience for the student depends on many variables. A portion of these variables may be readily affected by school officials and teachers and others dealing with the individual. Student ability and motivation are difficult if not impossible to control and directly related to the success of all instructional processes.

By being able to identify a variety of factors which contribute to the success of students in online courses, these factors can be used to aid students, parents and school districts in determining which students are better equipped to enroll in these courses. To that end the following research questions were examined in this study:

Research Question #1: Is there a relationship between the amount of time students spend online with the course and their performance in the course? For this research question, the correlations were not significant and none of the null hypotheses were rejected.

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Research Question #2: Is there any significant difference in the performance of students enrolled in public schools in comparison with students who are home schooled?

As evidenced by the data, there was no significant difference in the success of home school students when compared to students enrolled in public schools, for both dependent variables.

Research Question #3: Is there any statistically significant difference in the achievement rate of students who enrolled in the Algebra I course for the following reasons:

a. Need to make up missing credits
b. Desire to get ahead (accelerated learning)
c. Desire to take regular school classes online

The results of the comparison showed that the students who enrolled to accelerate succeeded at a significantly higher rate when compared with the other two reasons for enrollment, on both dependent variables. Having noted significance, both null hypotheses for research question three were rejected.

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CHAPTER 1

INTRODUCTION

This study focuses on the factors contributing to the successful completion of online courses taken by secondary Algebra I students. Studies have shown that online students are dropping out of online courses almost twice as often as their traditional classroom counterparts (Diaz 1999). In order to reverse this trend, it is imperative to understand what factors contribute to the successful completion of online courses for secondary students. The current study will reveal characteristics of students that will be valuable both for counselors and students considering the online option.

The community of K–12 education has seen explosive growth over the last decade in online learning programs. While elementary and secondary students have learned through the use of electronic distance learning systems since the 1930s, the development of online distance learning schools is a relatively new phenomenon (Cavanaugh, Gillan, Kromrey, Hess and Blomeyer, 2004). To date, however, no nationally representative study has examined technology-based distance education availability, course offerings, and enrollments in the nation's elementary and secondary schools.

Online virtual schools may be ideally suited to meet the needs of stakeholders calling for school choice, high school reform, and workforce preparation in 21st century skills. Whether online learning becomes the norm in

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education or remains an auxiliary to existing approaches is a matter that only time will resolve.

As with almost all of the educational initiatives in our era, online education can be tied to No child Left Behind Act of 2001 (USDE, 2002). In direct response to this legislation, school districts began the long overdue emphasis on reducing drop out rates. This desire to reduce the drop out rate underlies the rationale for establishing an online community of educators. Early researchers found that student dropout rates were higher in online courses than they were for the traditional classroom setting at the college level, and this trend appears to be replicating itself at the high school level (Diaz 2000). Carr (2000) notes comparable drop out and failure rates between VHS courses and other types of distance learning programs.

BACKGROUND OF THE STUDY

Researchers have found higher drop out rates for students in online courses than for those in traditional classroom settings at the college level (Ridley, 1995; Diaz 1999). Over the last five to ten years the expansion of distance education opportunities for high school students has vastly increased. The following statistics attest to the prevalence of distance education in the Unites States public school system (NCES, 2004).

- During the 2002–03 12-month school year, about one-third of public school districts (36 percent) had students in the district enrolled in

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distance education courses. This represents an estimated 5,500 out of a total of 15,040 public school districts.

- A greater proportion of large districts than medium or small districts had students enrolled in distance education courses (50 vs. 32 and 37 percent, respectively). In addition, a greater proportion of districts located in rural areas than in suburban or urban areas indicated that they had students enrolled in distance education courses (46 compared with 28 and 23 percent, respectively).
- A greater proportion of districts located in the Southeast and Central regions had students enrolled in distance education courses than did districts in the Northeast and West (45 and 46 percent compared to 21 and 32 percent). The proportion of districts with students enrolled in distance education courses was lower in the Northeast than in other regions (46 percent).
- A smaller proportion of districts with the lowest poverty concentration had students enrolled in distance education courses than did districts with higher concentrations of poverty (33 compared to 42 percent for both districts with medium or high poverty concentration).

These new options are providing schools and individuals with cost and time effective opportunities to complete the high school experience by graduating. No Child Left Behind (USDE, 2002) will accept nothing less, so the demand for alternatives continues to increase. Opportunities for adults involved in higher

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learning the distance education field have existed for many years. Priorities that adults place on time and flexibility have been addressed by distance education, providing advanced educational opportunities for higher education (Huang, 1997). Providing learners in both higher education and secondary education an opportunity to complete their degrees and reap the benefits of various levels of diplomas was paramount to the continued success of our educational system.

However, the vast majority of recent studies in distance education focus on the experiences of adult learners almost to the point of neglecting the blossoming opportunities in secondary education. With the federal and state governments increasing the demands and retribution for those not making significant progress, retention of students was a priority. Under the best of circumstances learning is a daunting task, this challenging task requires motivation, planning, and the ability to analyze and apply the information being taught. Distance education provides a method to increase the graduation rate of students. Studies in both secondary and higher education have concentrated their efforts on such things as student outcomes, locus of control and academic achievement, ignoring the drop out rate of enrollees. As early as 1971 Latter and Wedell had stated the dropout rate for full time courses in higher education could reach 70%.

Successful students have traits that allow them to overcome obstacles and complete academic courses with a positive outcome. Identifying of a variety of factors contributing to the success of students in online courses better serves

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students and educational agencies and can aid students, parents, and school districts in recognizing those students better equipped to enroll in these courses. With this information, online services, guidance counselors and public schools will be able to better serve a larger and more diverse student population.

Public education systems have been making efforts since their inception to deliver high quality education to every student that walks through their doors. School environments are changing on a yearly if not daily basis. Government regulations and No Child Left Behind (USDE, 2002) have placed unparalleled requirements for reporting and improving on public schools. High school dropout rates are but one of the specific areas that state and federal governments are focusing on to increase the effectiveness of public education. In order to reduce the drop out rate, school districts are forced to think outside the box to provide services that will compel students who may otherwise drop out to stay in school. One such method of student retention was online education.

Parents and students alike are often frustrated with the intensity and self-discipline needed to successfully complete an online course. By identifying factors that contribute to completion of online courses, an instrument may be developed for students with an inclination towards enrolling in this type of educational format. With this information, online services, site administrators, guidance counselors and public schools will be able to better serve a larger and more diverse student population. Information that can enable educators to

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properly assess online student characteristics will better serve students, reduce failure rates, and ulitmately reduce the drop out rate among high school students.

Very little information was available about k-12 online education, because it was a relatively new area. However, Roblyer & Quinn's (2001) study identified three predictors of course completion: technology skills, academic expectations, and internal locus of control (a student's realization that events which occur are a result of his or her own actions). When researchers decide to focus on what it takes to be a successful online student, the number of successful students in online schools will increase (Diaz, 2000).

STATEMENT OF THE PROBLEM

The primary role of the student was to learn. Under the best of circumstances, this challenging task requires motivation, planning, and the ability to analyze and apply the information being taught. In a distance education setting, the process of student learning becomes even more complex (Schuemer, 1993).

School districts across the country are increasing offerings of online education courses (Green, Lewis, Setzer, 2005). Course additions include offering courses not otherwise available at the school, offering Advanced Placement or college-level courses, and addressing growing populations. Additional needs being addressed are limited space, reducing scheduling conflicts for students, permitting students who failed a course to take it again, meeting the needs of specific groups of students, and generating more district revenues.

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A majority of schools indicated that offering courses not available and meeting the needs of special groups (at risk students included) were the emphasis for implementation of distance education. Since 1990, secondary event dropout rates in traditional classrooms for all income groups stabilized, with the rates for low-income youth varying between 10 and 13 percent and the rates for middle and high-income youth fluctuating between 4 and 6 percent and 1 and 3 percent, respectively (NCES 2004-076). According to a study conducted by the Distance Education and Training Council (2004), the average graduation rate from online high schools was 53%. With an average cost of $385 for a course, this can be a very expensive endeavor.

The deficit of research involving secondary students is staggering. Furthermore, the studies that have been completed are based on satisfaction and comparisons with traditional classroom students.

PURPOSE OF THE STUDY

It was imperative to understand the issues involved with emerging opportunities for educating students online and what factors contribute to the successful completion of online courses for secondary students. This study will explore the data available to determine factors among secondary online students that lead to successful completion of the course. The focus of this study will be secondary students who have chosen to enroll in a distance education/online course for high school credit. Because this is a relatively new field of research, existing data are quite sparse.

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SIGNIFICANCE OF THE STUDY

There have been numerous studies involving higher education, and these results have been extrapolated to some extent to address the pre-college learner. In fact, these speculations may hold some relevance for that level of education (Cavanaugh, 1999). Considering that the majority of research in the area of distance education has focused on adult or higher education, further research into the K-12 arena is greatly needed.

Findings from this study will add to the research conducted in the field of online/distance education for secondary level students. As stated earlier the bulk of research in this area has been focused on higher learning institutions. These studies also focus their attention on areas such as student-teacher interaction and student satisfaction. My study will be focused in a new direction for this type of research by focusing on quantitative data, used to unearth the factors that are directly related to the successful completion of these online courses.

It was further proposed that these results will aid students, educators and parents in the decision to enroll in these courses. By more clearly identifying the criteria that will enable a student to successfully complete the course all of the parties will be better served. Students will experience success on a more frequent basis and educational staff will be able to more effectively advise students on taking online courses or adhering to the more traditional setting.

Findings of this study may effectively assist both parents and educational institutions with the proper allocation of financial resources as well as time

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management. Having avoided paying tuition for courses that will never be completed and having rescued the time that may have been exhausted in unsuccessful efforts will be a key to student achievement.

NATURE OF THE STUDY

For this study, students who have completed an online Algebra I course will be studied in order to determine factors contributing to the successful completion of the online course. The data set includes a group consisting of 237 students randomly selected from an online company that enrolls students across the nation. The student data analyzed consisted of the reason for enrollment, home school or public school, time spent online, and their final grade.
The majority of these students were anticipated to still be enrolled or recently graduated from high school - college students are not the focus of the study. All of the students in the study were been enrolled in an Algebra I online course. Data were obtained from a for profit online company which provides accredited curriculum delivered over the Internet and offers more than 60 courses correlated to state standards in core and elective areas such as language arts, math, science, and social studies.

Data were collected for a cross-section of Algebra I students and analyzed to determine factors contributing to the successful completion of the online course from the data provided by the online company. In order to facilitate the completion of this study, students who had completed an online Algebra I course were identified.

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Participants in the study include a variety of students from across the country. Enrollment consists of students from a wide range of socio-economic levels, large and small school populations, home school, working students, accelerated learners, and ethnicities, who have completed the online Algebra I course. All of the students were using the same curriculum developed by certified teachers, regardless of their geographical location or the district in which they were enrolled.

The data design was a non-randomized convenience sample. This method was chosen because of the topic addressed in the study. By using a non-randomized descriptive study, I was able to focus the scope on only those students who have completed the course during on academic semester as defined by the online company with which they were enrolled.

Furthermore, the convenience sampling aspect of the study was appropriate in relation to the participants needed to complete this study. By focusing on a group of students with known characteristics pertinent to the study, a variety of outliers or confounding variables can be eliminated. In this instance, the study will focus on Algebra I students enrolled in an online course.

RESEARCH QUESTIONS

1. Is there a relationship between the amount of time students spend online with the course and their performance in the course?
2. Is there any significant difference in the performance of students enrolled in public schools in comparison with students who are home schooled?

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3. Is there any statistically significant difference in the achievement rate of students who enrolled in the Algebra I course for the following reasons:
    a. Need to make up missing credits
    b. Desire to get ahead (accelerated learning)
    c. Desire to take regular school classes online

THEORETICAL FRAMEWORK

While there was an abundance of studies that relate to how those involved in adult or higher online education perceive the reasons for success or failure. The opposite was true for studies that examine how or why secondary students succeed in an online setting.

When one considers the ever-changing makeup of our country's youth, coupled with the constraints of No Child Left Behind (USDE, 2002), educators are faced with ever increasing challenges. Virtual high schools are increasingly popular solutions for meeting these challenges. Roblyer and Marshall (2003) indicate that these VHS programs are created and facilitated by a variety of institutions. Some are established and operated within current school facilities, others are designed by local school districts, while still others are launched by state education departments and cooperating universities. Not far behind the traditional educational institutes are the entrepreneurs who have started the "for-profit" organizations not affiliated with any type of educational agency.

While there is no shortage of literature supporting the academic effectiveness of the synchronous distance education models of the past, the K-12

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virtual school phenomenon was so new and has developed so hastily that there was currently little practical data available to testify to its effectiveness. Russo (2001) found that because of the lack of research data evaluating the effectiveness of online instruction and because of the high costs and complex logistics of developing online programs, questions have surfaced about the appropriateness of online learning for students in elementary and secondary schools.

To date, small amounts of asynchronous electronic instruction research that have been completed for K-12 have been quantitative. Wang and Newlin (2000) concluded that most reports on the characteristics of successful online students have relied primarily on "anecdotal" evidence. Another study that addresses both the qualitative and quantitative aspects of online instruction was the Alberta Online Consortium (AOC) (2001) report entitled "Student Achievement and Performance Levels in Online Education Research Study." The AOC study was relevant because it compares the success of students completing online courses to those who completed the same course in the conventional classroom. In addition, the study used uniform assessments for both methods of instruction.

Every level of education was being inundated with instructional technology. Textbook companies are forced to include technological supplements to their time-tested textbooks or teachers will not even consider them. Students have access to online tools supplied by both the educational institution and publishers. Software companies are competing fiercely to provide school districts

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with programs designed to help individual students achieve greatness. Clearly, all of these advances are classroom-based initiatives.

Online education was a completely separate entity that has taken on a meteoric rise in acceptability by the public, private, and home school arenas. Content and delivery improves on a daily basis. However, the vitally important question still remains, "How can we identify the factors present in students that will predict success in an online course?"

DEFINTION OF TERMS

Asynchronous Communication

Method of interaction with the online environment that are not distributed in real-time or "live" (Notar et al., 2002).

Distance Education

The process and techniques used to deliver instruction to a remote learner in a situation where the instructor and students are separated by time and location (Smith 2000a).

Online Learning/Instruction

Conducting a class partially or entirely via the Internet (Ko, Rosen, 2004).

Synchronous Communication

Real time or "live" communication methods, which may include such activities as video or web conferencing, as well as text chatting (Notar et al., 2002).

Virtual School

An educational organization that offers K-12 courses through Internet or web-

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based methods (Beard, 2003).

LIMITATIONS

This study did not address the age or family circumstances that directly reflect a student's educational efforts. By limiting the study to the data collected by the institution providing the information, there will inevitably be factors that are not studied which may or may not contribute to the success or failure of the student.

Availability of the students to be given a survey to determine learning styles or other follow-up surveys was yet another limitation of the study. Although the students are required to have an email address to enroll in the course, for privacy reasons the online company was not at liberty to share those with the researcher.

Another limitation for the study is the distinction between time spent online and actually instructional time. The hours represented in this study are hours logged in without verification of time on task.

While it was assumed that the students provided accurate information to the instructional institution upon enrollment, it may not have always been the case. All of the information regarding the reasons for enrollment that are not confirmed by the for-profit online company was assumed to be accurate.

SUMMARY

Online education is not a fad that will disappear along with beta discs and 8-track tapes - it is a growing reality in education. During the 2002-03 school

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year, approximately one-third of public schools in the Distance Education and Training Council (2004) membership had students in the district enrolled in one form of distance education or another.

While the reasons for offering online courses, such as more advanced placement offerings, providing courses not offered at school, and avoiding scheduling conflicts are all valid, success was not a guarantee. Of those students mentioned in the previous paragraph, fifty-five percent were taking computer courses using asynchronous computer based instruction (DETC, 2004). Average tuition of these online courses was $385 per student and the average completion rate was 69%. By any standards, paying these steep prices and only having a 69% completion rate was a problem. This disappointing return on investment provides the justification for this study, which seeks to reveal the quantifiable qualities held in common by successful online students.

Chapter II is a literature review focusing on articles, research documents and journals that detail the history of distance education and the research relative to secondary students. Chapter III examines the quantitative elements within the methodology of this research. Chapter IV will present an analysis of the data from this research in quantitative form. Finally, Chapter V combines all of the previous work into a summarization and discussion of the results with recommendations for future research.

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CHAPTER II

LITERATURE REVIEW

INTRODUCTION

Researchers have found that student dropout rates are higher in online courses than they are for the traditional classroom setting at the college level, and this trend appears to be replicating itself at the high school level (Ridley, 1995; Diaz 1999). Given the *social* (self esteem, misplaced students, isolation); *economic* (public dependency, crime, additional programs in public schools); and *political* (tax dollars, elections, cost of public welfare system) issues involved with the emerging opportunities of educating students online, it was imperative to understand what factors contribute to the successful completion of online courses for secondary students.

By being able to identify a variety of factors which contribute to the success of students in online courses, these factors should be used to aid students, parents, and school districts in determining which students are better equipped to enroll in these courses. With this information, online services, guidance counselors, and public schools will be able to better serve a larger and more diverse student population.

In order to better understand the concept of online instruction this review of literature includes a discussion of the following topics.

- History of Distance Education

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The history of distance education was a factor that comes from the earliest of written to the most modern, internet based formats. The media used in instruction as well controversy involving the appropriateness of online instruction was fundamental for proceeding with the study.

- Current Distance Education Use

Once the history has been documented the natural progression is that of what is currently being used. This section will detail the programs that are being utilized across the country in higher education and secondary institutions and the increased emphasis on using technology, online instruction, at all levels of education.

- Studies of Online Secondary Students

In an effort to shed light on the effectiveness of online courses for secondary students a search for relevant studies was conducted through a variety of methods. This portion of the study will shed some light on the few studies that have been conducted and their reliability. The information available was sparse and to a large extent anecdotal, hence the need for a data driven, quantitative study.

HISTORY OF DISTANCE EDUCATION

The primary role of the student is to learn. Under the best of circumstances, this challenging task requires motivation, planning, and the ability to analyze and apply the information being taught. In a distance education setting, the process of student learning becomes even more complex for the following reasons (Schuemer, 1993):

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- Many distance education students are older and have jobs and families. They face the challenge of juggling their time and resources accordingly, so as not to neglect or overemphasize any one aspect of their lives.
- Distance students have a variety of reasons for taking courses. Some students are taking courses to receive a higher degree and improve their job prospects. Many are simply interested in broadening their education and have no aspirations of receiving a degree. In either case, distance students are typically more motivated than traditional students.
- Distance learners are usually isolated, which eliminates the competition with other students in the classroom. Distance education students are also deprived of the immediate supervision and assistance of their educators in the event that difficulties arise.

What was Distance Education?

Having taken the student learner and the influx of technology and distance education into the public schools into consideration, it was vital to this study to determine what distance education is and how it is delivered. "The plethora of terms that describe related or similar phenomena makes it more difficult to absorb the relevant literature on the subject" (Belanger and Jordan, 2000). Distance education is a process that goes further than emulating learning practices that have traditionally occurred in the classroom and are now made available through the Internet. Some of the terms used to describe distance education cited by Belanger and Jordan include: open learning, distance education, distance training, distance

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learning, virtual learning, virtual universities, computer mediated education, computer mediated training, open learning environments, tele-learning, asynchronous leaning networks, and finally, web-based instructional systems.

Barker (2000) further adds to the research with the definition of distance education as the delivery of live instruction between sites, or to numerous sites, via the use of technology, which allows student and teacher to interact. In yet another attempt to define distance education, Keegan (1988) details four definitions endeavoring to narrow the field into one universally acceptable definition taken from the concepts of the French government, Holmberg, Peters, and Moore. After reviewing work done by Holmberg, Peters, and Moore, Keegan developed the following six factors utilized in creating a universal definition (Keegan, D. 1996).

1. Separation of instructor and learner.
2. Influence of an educational organization.
3. Utilization of technical media to connect the teacher and student, and also to describe the educational content of the course.
4. Effective dialogue is made possible via two-way communication, between teacher and student.
5. Occasional meetings are made available.
6. Radical separation of distance education from other pedagogical methods.

Other authors have disagreed with this definition, claiming that it was too limiting and does not allow for the possibilities of advancements certain to be

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made in technology, both synchronous and asynchronous. Online learning environments can supplement or complement a traditional face-to-face learning environment or provide a complete learning package that requires little face-to-face contact. By providing different ways of learning and the construction of a potentially richer learning environment, distance learning can provide fresh approaches to learning, cater to different learning styles, and allow greater diversity in, and access to learning.

Genesis of Distance Education

Origins of distance education can be tracked to a Swedish newspaper in 1833 offering "Composition through the Medium of the Post" (Hanson, 1999). Perhaps the most familiar form of distance education is a correspondence course, in which all coursework was assigned and completed through mail. While correspondence courses are still offered, in this contemporary technologically advanced society it is usually not associated with distance education by the general public.

Technological advances have brought about a variety of new ways to communicate and educate. Educators have been quick to capitalize on these advances in order to continually advance distance education opportunities (Hanson, 1999). One of the first media used following print was radio during the 1920s, closely followed by the use of instructional television to broadcast college credit courses in the 1950s. Technology continued to advance with the placement of satellites, and these were then used to facilitate the widespread use of

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instructional television during the 1980s. During this time such remote locations as Alaska developed a state educational satellite system that offered up to six hours of instructional television daily to 100 villages.

Instructional television quickly gained popularity due to its ease of use and many advantages over traditional correspondence courses. Willis (1993) identifies four advantages of instructional television (ITV).

- The medium is familiar. Most people who are going to attend college have at one time or another viewed a television.
- Motion and visuals can be combined in a single format. This allows for actual illustrations of complex concepts. Visual simulations can be used to further the understanding of a topic.
- Time and space can be collapsed. Through ITV, events can be broadcast from remote sights across the world as they occur.
- It has proven to be very effective for introducing, summarizing and reviewing concepts.

The goal for the teacher when conducting an ITV lesson is to reduce the physical gap between instructor and student through the appropriate use of technology and effective teaching methods. If careful planning takes places when preparing the ITV lesson, this gap can be effectively bridged. Making extra efforts to find ways of showing rather than telling can further improve the instructional effectiveness of an ITV lesson.

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Opportunity for live, two-way, high quality audio and video teleconferencing emerged in the educational system with the onset of fiber optics (Tompkins, 1993). Teleconferencing was considered the norm for distance education, providing educational resources to students who may not have had the opportunities available to them in their local school district. Interactive instructional audio tools for the distance educator include telephones, audio conferencing, and short-wave radio. This type of distance education can take the form of audio only, but it may also be supported by enhanced image or data transmissions, as well as audio conferencing. Distance education in this structure was typified by two major limitations: the initial cost of set up is expensive, and students and teachers alike are required to be at specific locations on a predetermined schedule (Willis, 1993). In spite of the high initial cost to set up the fiber optic system, the educational benefits and the long-term savings of teleconferencing surpassed the drawbacks when it was initially put to use (Tompkins, 1993).

The full implementation of the Internet vastly improved the quality of synchronous distance education by increasing the potential for interaction along with collaborative work among students (Smith, 2000a). With the onslaught of instructional material on the Internet, it encouraged, if not demanded, the development of a new form of distance education described as asynchronous instruction. Asynchronous instruction does not require the instantaneous participation of all students and instructors and is most commonly accomplished

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using Internet tools (Smith, 2000a). Secure websites, blackboards, and email are examples of primary sources of communication between student and instructor as well as student to student.

Asynchronous instruction has obvious advantages and disadvantages (Smith, 2000a). The first advantage is that students may choose their own instructional time frame and gather learning materials as needed. Another key advantage of asynchronous instruction is the ease of access: anyone with a reliable Internet connection can participate. A disadvantage of asynchronous instruction is that students do not always have the ability to receive instant feedback.

As more and more online courses and programs proliferate, the questions of quality and comparability of such instruction naturally arise. Perhaps the most ubiquitous topic of discussion relating to distance education is the comparison of online students to traditional classroom students, which has been coined the no significant difference theory. Beginning with the work of T. L. Russell in 1999 with his book *The No Significant Difference Phenomenon*, multiple studies researching the issue have taken place. The following section details the some of the earliest research into distance education that would be paramount to the studies of online students.

No Significant Difference Theory

With any new educational initiative, questions regarding student success naturally arise. As early as the 1900's, when correspondence courses began to

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increase in popularity, the very question of how well students could learn when they were not in the traditional classroom environment began to surface. Those in opposition to the movement were quick to support the traditional face-to-face method as the undying and unimpeachable standard to which all educational practices should be held. Naturally, the innovators of these new technologies were quick to disagree with those conclusions and were determined to prove their approach could in fact deliver courses of equal quality. As a result, the No significant difference theory was born (Russell, 1999).

Through a series of media comparison studies, researchers have been contrasting the results of traditional classroom students to distance/online students in an attempt to identify which system of delivery is the superior mode of teaching. To many, Thomas Russell was considered the creator of the no significant difference theory. Russell has compiled research studies dating back almost 80 years to support the fact that there was no difference in student outcomes when the methodology and materials were comparable.

In 1996, Dr. Walter Ryan embarked on a study that was designed to compare the differences in learner outcomes of an advanced math course offered through a senior high school that was presented in both a distance education format as well as a traditional setting. Underlying his study, as with others, was the claim that there was in fact no significant difference in student achievement between the two varied delivery systems.

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Audiographic systems were used in the online course. This is a combination of audioconferencing and a telewriter and monitor used to draw and convey graphical images (Ryan, 1996). All of the students were expected to complete the daily work, end of unit exams, one midyear and one final exam. Distance education mathematics courses were treated identically to the traditional classroom courses.

Participants in the study were students in classes taken from 1992-1995. A total of 315 distance education students' data were used for the study. In order to obtain some validity, the Newfoundland Public Exam Division of the Department of Education randomly generated the same number of traditional students from the same time span listed previously.

Student data was then compiled in the following areas and addressed in terms of the no significant difference theory:

- Group Means
    - No significant difference in the achievement level of distance education versus traditional classroom setting – significance level 0.26.
- College Attendance
    - No significant difference in the participation rates in post-secondary education of distance education versus traditional classroom setting – significance level 0.51.
- Postsecondary Calculus Course Enrollment

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- No significant difference in the number of post secondary calculus course enrollment of distance education versus traditional classroom setting – significance level 0.72.

- Postsecondary Calculus Pass Rate
  - No significant difference in the pass rate of distance education versus traditional classroom students enrolled in post secondary calculus – significance level 0.72.

Simply stated, there are no significant differences in achievement results from the learners placed in an online learning environment. Students who studied advanced mathematics in the Newfoundland and Labrador school system achieved at the same level in their secondary course and participated, enrolled, and achieved at comparable levels in postsecondary calculus, as did traditional classroom students.

The Schuman and Sims study (1999) included students enrolled in five different undergraduate courses were assessed on their ability to learn the course material. Likewise, students enrolled in the same traditional courses were also assessed in their comprehension. Both groups participated in a test-retest study to measure their knowledge of the material. Online and traditional students were given a pretest and a posttest to determine their growth and understanding. Forty graduate students were enrolled in the online version of the class, while 59 undergraduates were enrolled in the traditional classroom setting during the duration of the study.

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Pretest results showed that the online students' average score was 40.7 while their counterparts scored 27.64, perhaps indicating that the online students were better prepared upon beginning the course. Posttest scores reveal results that were very similar. Online students scored an average of 77.8, while the traditional students scored 77.5. The authors clearly stated that, according to their study, the subject comprehension of online students was equal to that of the traditionally-based classroom students. In the discussion of the effectiveness of online versus classroom delivery methods, the majority of studies use an outcome-based measurement to validate or dispute the claim of no significant difference.

To this point the studies cited have been taught by the same teacher, and the instructor was well aware of the study that was taking place and the students involved. Could this knowledge have possibly led to some bias in the grading or reporting of achievement? In 2002 a study was developed that would compare two identical classes, one online and one in the traditional classroom, with a "blind" study.

An instrument was developed to administer and evaluate two groups of students and eliminate any bias that he may have towards the online or traditional students. Students in both classes were subjected to the same educational elements (Fallah, Ubell, 2000):

- Course Content – textbook, reading, homework assignments and quizzes were identical.

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- Instructor – the same instructor was teaching both classes.
- Examinations – the same midterm and final were given to both groups of students.
- Venue and Proctoring – all students were required to take exams on campus

Blind Study Procedure – the tests were mixed together and the names were removed and assigned a number prior to the instructor grading the tests. After grading was completed, the names and numbers were matched and a grade was assigned to each student. Results from the study showed that campus-based classes achieved a mean score of 68.7, and the online course earned a mean score of 74. Results from this study further served to validate the no significant difference theory.

One might think that the debate over this theory would be confined to educators, but that was not the case. Politicians have also voiced their interest and concern over whether or not online courses are able to provide quality education as well as socialization skills. In May 2000, the House of Representatives Science Subcommittee expressed deep concerns over how content was taught and learned online (Johnson, 2002).

In response to this concern, Johnson (2002), professor at Mesa Community College, conducted a study of a biology course taught with both types of delivery methods, BIO 100. The online class would have the same course requirements as the traditional classroom, including everything from monitored

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discussions to experiments. Students' textbooks, cd rooms and weekly quizzes were identical, however, a new component entered the scene. When students needed to view items with a microscope, the online course is required to view micrographs. Assessments for the students were also a common factor determined by performance on their midterm and final exams. In order to have an adequate and comparable number of students for the study, two semesters of the online course were combined for a total of 54, while only one course of traditional students totaling 50 was used.

All of the students were expected to master identical content objectives. Data for the study would be gathered from the pre and post-tests from following areas for analysis in the no significant difference theory:

- Biology
- Graphing Skills
- Reasoning Ability
- Attitudes Toward Science

Results from the study showed that there was no significant difference between online classes and traditional classes. The means for the two groups, online – M=32.57, versus traditional – M=31.15, supported the author's initial theory. Furthermore, there was no significant difference in the course grades either. The online group scored 81.86, and the traditional group scored 78.46. In respect to the other identifiers in the study, the results were very similar and no significant difference was found in any of the areas listed below:

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- Reasoning Ability – online – M=9.66, traditional – M=8.56.
- Graphing Skills – online – M=7.35, traditional – M=6.77.
- Attitude Toward Science – No significant difference was noted in either groups' interest in or perceived ability to succeed in biology in either the pre or post-test.

Again, the author was very diligent in pointing to the assessment results as evidence that there is no significant statistical difference in the end result of the students' achievement level. In fact, the online students appeared to duplicate the experience of the on-campus students in gradually developing the ability to design and conduct controlled experiments (Johnson, 2002), an area that was initially of great concern.

Having provided ample research to support the no significant difference theory, I would be remiss in not mentioning that there is opposition to the research that has been presented. The Institute for Higher Education Policy (IHEP) published a study questioning the effectiveness of distance education for the National Education Association and the American Federation of Teachers. Several conclusions were drawn by the IHEP that were in direct opposition to the no significant difference theory (Carey, 2001). The following issues were raised regarding the research that had previously been conducted on the effectiveness of distance education compared to the traditional method of delivery (Phipps, Merisotis, 1999):

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1. Of the hundreds of articles written on distance learning, only a small percentage contains original, quantitative research.
2. Most of these studies are methodologically flawed in one or more of the following ways:
    a. There was no attempt to control for extraneous variables, which in turn limits the ability to demonstrate cause and effect.
    b. Subjects are not randomly selected and thus the ability to generalize from these studies was compromised.
    c. The validity and reliability of the instruments used to measure student outcomes and attitudes are questionable.
    d. "Reactive effects" (feelings of students and faculty) are not controlled.
    e. Reported outcomes are for single courses and not for programs.
    f. Differences among students are not taken into account.
    g. Dropout rates for online courses are not explained or taken into consideration.
    h. Student learning styles relating to technology are not considered.
    i. There are no theoretical or conceptual frameworks utilized.

An Alberta Online Consortium (AOC) (2001) report entitled "Student Achievement and Performance Levels in Online Education Research Study" furthered the anti-NSD campaign. The AOC study is relevant because it compared the success of students completing online courses to those who completed the

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same course in the conventional classroom. In addition, the study used uniform assessments for both methods of instruction.

Conclusions drawn by the AOC are in direct opposition to the immense number of studies that have found no significant difference in the success of students who completed online education courses presented in an asynchronous format (Maushak, 2000). The AOC study found that in several cases students who completed online courses performed significantly lower on standardized achievement tests than did the traditional school students (AOC, 2001). The study also found that a smaller percentage of virtual school students participated in the standardized tests than did traditional school students. Though the AOC study found that results were considerably lower for online students in most cases, student results on standardized achievement tests had improved in the past four years. Scores of online education students are now comparable to the scores of traditional school students in many areas.

In spite of the initial and, to some extent, current doubt and criticism of the online educational community, it still flourishes. A variety of entities are creating and marketing online courses. Public schools are using these companies for educational support, credit recovery, advanced courses and to increase average daily attendance to receive more state funding. There seems to be no way to stop the ever increasing push for more distance education delivery in public, private, higher education and K-12 institutions. According to the research presented here,

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there is no need to halt the advance in the light of the no significant difference theory.

CURRENT DISTANCE EDUCATION USE

Enormous progress has been made toward achieving a national technology infrastructure designed to support effective technology use in elementary and secondary public schools. The recent attention aimed nationally at the influx of online companies and the opportunities they provide for educational opportunities outside of traditional schools, has increased the level of need for accurate research in this area.

To date, the majority of studies research in distance education has been focused in the area of higher education. However, greater emphasis is being placed on using technology at all educational levels, so the effort to involve distance education in public schools is becoming more prevalent. The National Center for Education Statistics reports the following information:

- During the 2002–2003 12-month school year, over one-third of public school districts (36 percent) had students in the district enrolled in distance education courses. This represents an estimated 5,500 out of a total of 15,040 public school districts (Setzer and Lewis, 2005).
- A greater proportion of districts located in rural areas than in suburban or urban areas indicated that they had students enrolled in distance education courses (Setzer and Lewis, 2005).

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- An estimated 8,200 public schools had students enrolled in distance education courses during the 2002–2003 12-month school year. This represents approximately 9 percent of all public schools nationwide (Setzer and Lewis, 2005).
- The percentage of schools with students enrolled in distance education courses varied substantially by the instructional level of the school. Overall, 38 percent of public high schools offered distance education courses, compared with 20 percent of combined or ungraded schools, 24 percent of middle or junior high schools, and less than 1 percent of elementary schools (Setzer and Lewis, 2005).
- Among all public schools with students enrolled in distance education, 76 percent were high schools, 15 percent were combined or ungraded schools, 7 percent were middle or junior high schools, and 2 percent were elementary schools (Setzer and Lewis, 2005).

Online Instruction

Online instruction can be organized to utilize numerous forms of methodology. Typically, the online instructor will prepare and post lessons, along with links to texts, video or other ancillary components, to a secure website for students to access using the Internet (Smith. 2000a). Distance education students will use these resources provided by the teacher to fulfill their obligations as students and then return the completed work to the teacher via the Internet. This work may consist of any number of formats including documents, spreadsheets,

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and slideshow presentations. Even video presentations can be completed and returned to the instructor for review. Instructors, college professors or teachers will then grade the work and return the material to the student with any necessary corrections or explanations. Although Email was often used as the primary communication tool, several other communication methods may be used to facilitate the learning process including chat rooms, instant messaging, and the telephone.

The most common sources of online curriculum are locally developed courses and courses developed by course providers or for-profit companies (Texas Education Agency, 2002). Some online high school courses or "Virtual High School" programs are created within existing "brick and mortar" schools, while others are obviously totally separate. They can be developed and administered by different entities such as school districts, state departments of education, and the constantly emerging university special projects (Roblyer, Marshall, 2002-03). Districts that develop courses internally make use of local teachers and technology specialists in order to facilitate the proper alignment to state curriculum requirements. Courses developed by local educational agencies are often provided for students who are currently enrolled in the school at little or no cost to the student. Corporate providers or for-profit companies are also used to provide curriculum, and the schools must ensure that course curriculum aligns with state standards. Many of these for-profit organizations hire teachers or curriculum specialists from districts in which they intend to market their product.

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Financial implications must be considered when a school district is determining whether to invest their resources with a profit-oriented institution or develop their own courses and allow out-of-district students to enroll. A school district that accepts a student on a transfer and enrolls him or her in online courses receives the state funding for that student. Although tuition charges for online courses vary, the most common price tag of an online course is $395, according to a study by the Texas Education Agency in 2002.

Interest in developing the full potential of technology to impact education has grown tremendously in the past decade. Evidence of this increased interest was the development of the United States Web-Based Education Commission (WBEC) in 1998 (U.S. Web-Based Education Commission. 2000). The WBEC was established by Congress to explore policies and educational issues surrounding the use of the World Wide Web in the area of education. The commission, consisting of leaders from Congress and experts in the education and technology fields, was charged with recommending specific public policies to help realize the educational promise of the Internet for learning. At its conclusion, the WBEC presented its findings to the President and Congress in December 2000. The WBEC decided that the question was not if the Internet can be used to transform learning in new and powerful ways. Neither was the question whether we should invest the time, energy and money required to implement instructional technology. The question is, how can we afford not to?

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In addition to the WBEC's wholehearted support, numerous other organizations believe that online instruction holds great promise, including the National Association of State Boards of Education (NASBE) and the Southern Regional Education Board (SREB). NASBE released a report in 2001 avowing that e-learning is revolutionizing facets of the educational system, including:

- How and what students learn
- The concept of school
- Teacher - student relationships
- Educational and pedagogical processes

According to the NASBE report, online learning is bound to improve American education, and it should be universally implemented as soon as possible (National Association of State Boards of Education. 2001). An SREB report titled *Web Courses for High School Students: Potential and Issues*, gives a picture of how web-based courses show potential in meeting the academic needs of many high school students and provides a list of key questions to direct state education leaders in the emergence of valuable programs (Thomas, 2000).

Online school advocates believe that online learning is the cure that can help address a wide variety of diseases crippling school systems today. Among these debilitating elements are teacher shortages, limited course offerings, drop out rates, home-schooling, lack of Advanced Placement classes, increased demands for individualized learning, charter schools, poor teacher quality, and a lack of physical space (Russo, 2001). Harvard University's Professor of Learning

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Technologies, Christopher Dede, worries that too many online education programs are being developed without thinking about why. Dede (2000) believes that superintendents need to understand that online programs are a component of an educational plan as opposed to an educational-technology plan. "The starting point is not technology: the starting point is education" (Russo, 2001).

Drawing momentum from the WBEC and other reports calling for the development of technologies to both improve the quality of, and provide access to, quality education for all students, online programs have increased rapidly in recent years. Clark (2001) estimates that approximately 30,000 high school students have taken a course online as of October, 2001 and predicted that more than 50,000 students will enroll in an online course during the 2001-2002 school year. Clark further identified 14 states that had a planned or operational state-level virtual school in place in 2001. A local example of this increase was Texas. During the 1998-1999 school year, 247 high school students were reported to have completed an online course in Texas. This number grew to 412 for the 1999-2000 school year and 755 for the fall semester of the 2000-2001 school year. These enrollment totals represented a 66% increase in online courses completed by Texas students over a two-year period from the 1998-1999 to the 2000-2001 school year (Texas Public Education Information System. 2002).

Studies of Online Secondary Students

Online/distance learning is fast becoming a household word and has taken its place among common terms, such as home schooling and correspondence

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courses. Theory relating to distance learning, and particularly online learning, is in the early stages of development (Carey, 2001). Despite its growing popularity, questions remain about the appropriateness of online learning for students in elementary and secondary schools. There is currently a lack of research data on online learning effectiveness, high costs, and complicated logistics of developing online programs (Russo, 2001). This lack of theory is understandable, given that online distance learning has been developed relatively recently, while other forms of distance learning, such as interactive television and correspondence courses, have existed longer. Students participating in computerized distance education delivery modes are new to the distance education arena.

While an abundance of studies relate to how those involved in adult or higher online education perceive the reasons for success or failure, the opposite is true for studies that examine how or why secondary students succeed in an online setting. Serving to fill this void, Roblyer and Marshall (2002-03) have authored a study on this topic. The goal of their study was to create a tool that would predict the following:

- Identify which high school students would be likely to succeed in a VHS course.
- Provide a basis for counseling and support for other students interested in becoming online learners to aid in their success.

Roblyer and Marshall begin with a discussion of the growth of the virtual high school (VHS) movement in the United States. When one considers the ever-

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changing make up of this country's youth, coupled with the constraints of No Child Left Behind, educators are faced with increasing challenges. Virtual high schools are growing in popularity as solutions to meet these challenges. The study's authors state that these VHS programs are created and facilitated by a variety of institutions. Some are established and operated within the current school facilities, others are designed by local school districts, while still others are launched by state education departments and cooperating universities. Not far behind the traditional educational institutes are the entrepreneurs who have started the "for-profit" organizations not affiliated with any type of educational agency.

Beginning with a brief explanation of the background of the study, Roblyer and Marshall clearly stated that the bulk of studies in this area were primarily based on anecdotal evidence. According to the authors, the majority of the students who achieved academic success had some, if not all, of the following characteristics (Roblyer and Marshall, 2002-03).

- Self motivation
- Prior experience with technology
- Positive outlook toward course content and distance learning format
- Self-confidence in academic endeavors

Roblyer and Marshall ultimately developed a list of nine characteristics they believed would accurately predict a student's outcome in online courses:

1. Internal versus external locus of control
2. Internal versus external motivation

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3. Self-confidence/self-esteem
4. Responsibility
5. Degree of experimentation
6. Time management
7. Ability to set goals
8. Achievement motivation
9. Self-reported computer technology skills

The authors then proceeded by developing the following research questions:

1. Can the instrument they were developing discriminate reliably between successful and unsuccessful students in VHS courses?
2. Do any factors or student characteristics that can be changed through counseling correlate with student success in online courses?
3. Can findings from the instrument yield a model for predicting success of high school students in distance environments?

As the authors have stated, prior to this paper the research had provided only anecdotal evidence for secondary school online students. In order to study the phenomenon of VHS students, the efforts to create a survey that could answer the three research questions above would prove to be invaluable for future studies. Add to this the value to counselors and parents and the study could play a major role in providing appropriate educational settings for high school students. Roblyer and Marshall's research expansion into the secondary school arena set the stage for further studies in this level of online education. Focusing solely on

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secondary courses is no longer the trend in online education, the genre is expanding to envelop all levels.

Developing courses for the entire spectrum of K-12 education is a movement that is being replicated in online education development. Beard (2003) designed an instrument to provide an inside look at the various activities in secondary online schools and the current trends that are revealing themselves. Beard combined survey results, school profiles and a brief review of context factors, all of which were designed to further identify the latest developments in education and online courses. For this study, Beard defined a "virtual school" as an educational organization that offers K-12 courses through Internet or web-based methods (Beard, 2003).

To develop a framework for categorizing the trends in virtual high schools, Beard (2003) conducted a survey of 44 virtual high schools in the United States, all of which were operational in 2001 and held regional accreditation or were recognized by state departments of education. Of the 44 schools surveyed and the 33 schools represented in the survey, the following percentages were developed.

- 100 percent offered high school courses.
- 51 percent offered junior high or middle school courses.
- 27 percent offered elementary courses.

Enrollment numbers are a concern to institutions providing online access, and the CEO of Apex Learning, a for-profit company, estimates that about 30,000

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high school students have taken an online course as of 2003 (Beard, 2003). Estimates from Beard's survey were considered "ballpark" numbers by the author. From the 33 responding schools, 21,000 students enrolled in a virtual/online course and 28,000 were expected to enroll the following year. Beard then goes on to estimate that there would be approximately 38,000 students in all of the 44 schools that were initially involved in the study.

Survey questions regarding curriculum were also provided to gather additional data. Although results indicated a focus on supplemental high school curriculum, 9 out of 10 schools were offering regular core classes. Advanced placement courses were reportedly offered by 1/3 of respondents and about 60 percent said they would have offerings in the future.

Beard's research identified the latest trends in online education, but did not attempt to evaluate the more intrinsic aspects of virtual learning. Tunison and Sackney addressed this topic in their case study "On-line Secondary School Conditions and Practices" (2003). Similar to Roblyer and Marshall's study, they focused solely on secondary students. This case study was two-fold: the first was to examine the nature or construct of instruction in an online setting, and the second was to examine the community that develops within the virtual school environment. It was determined that the online course, which was intended to provide an innovative and notably different instructional setting when compared to a traditional classroom, actually remained very similar in terms of the

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pedagogy being used. Tunison and Sackney (2003) were very detailed in their efforts to explain the results of their case study.

Using the case study method allowed for an accurate depiction of real life actions and perceptions of both faculty and students in the context of the online school. By concentrating the study in two distinct areas, perception of the faculty and perception of the students, Tunison and Sackney attempted to gain detailed insight into the nature of instruction and the nature of the community in a virtual high school. Results of the study will be difficult to generalize to the public because the study took place in one educational setting, Crestview Cyberschool. Fourteen faculty members, 4 administrators and 151 students were participants in the study. Data were collected via a survey comprised of a series of online questions accompanied by a Likert scale along with a few open-ended questions. Student acceptance of their role is the theory that most researchers have consistently referred to as paramount to success in an online course. The authors spend a minimal amount of time detailing the idea espoused by the students that they are aware of their need to accept this role of self-motivating and accountability and enjoy being in that position.

To their credit, the teachers realized they had not used the media available to create an inquiry-based learning environment that provided for collaboration among students. In what appears to be in direct opposition to this, the same teachers were convinced that instruction was better in the online classroom. This phenomenon was based on the promptness of feedback and the interactions

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between student and teacher which, according to 72 percent of the students, was not as frequent but more meaningful. Instructional strategies were found to play a major role in the creation of a learning environment, either positively or negatively, as evidenced by the following results from the student survey:

- 86% of the students liked to work alone.
- 30% of the students enrolled in these courses to avoid the interaction.
- 84% of the students graded the technology in their courses as poor.
- 81% were subjected to text that was simply presented and boring

SUMMARY

A review of existing literature relating to the factors contributing to the successful completion of online secondary students was presented in this chapter, which was divided into three broad areas. The first of the three sections of this chapter was the history of distance education, which was paramount to understanding where we are currently. To begin this section of the chapter, a discussion of how to define distance education was needed to lay the foundation for the study. This discussion was then supported by the following topics:

- Genesis of Distance Education
- No Significant Difference Theory: by separating this section into studies that support the theory and those that refute the theory, the validity of both sides can be evaluated by the reader.

The second section of the Literature Review Studies deals directly with studies on the current use of distance education. Current research into the online

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school phenomenon was relatively new and has developed so hastily that there was yet little practical data available that can testify to its effectiveness, especially at the secondary level. Russo (2001) found that, because of the lack of research data evaluating the effectiveness of online instruction and because of the high costs and complex logistics of developing online programs, questions have surfaced about the appropriateness of online learning for students in elementary and secondary schools.

A study of online secondary students comprises the final section of this literature review. To date, small amounts of research have been completed for K-12, and a majority of the current research has been found to be qualitative. Wang and Newlin (2000) concluded that most reports on the characteristics of successful online students have relied primarily on qualitative, "anecdotal" evidence.

Evident in this paper and in other literature related to distance education was its long and useful record of serving students. Students who cannot or choose not to involve themselves in a traditional school setting are turning in increasing numbers to online education. Distance education provides students the opportunity to either complement traditional forms of education or replace it altogether. Wang and Newlin (2000) found that students choosing online courses exhibited a higher external locus of control (the belief that events are determined by external circumstances) than those choosing traditional courses. This speaks directly to the motivation of certain secondary students for enrolling in an online

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course. Regardless of why students choose distance education options, the fact remains that distance education/online courses offer opportunities for students to continue their education.

Whether the online option will be a positive experience for the student depends on many variables. Some of these variables are readily affected by school officials, teachers, and others dealing with the individual. Student ability and motivation are difficult, if not impossible, to control and directly relate to the success of all instructional processes.

Many critics of the current state of traditional education claim that strategies have not changed to meet the needs of our students. We often hear critics saying that you could magically transport a teacher from 20 or 30 years ago into a classroom of today and they would never miss a beat. However, the educational technology that was revolutionizing online instruction can never be described as stagnant. Technology is constantly evolving in multiple ways.

Every level of education is being inundated with instructional technology. Textbook companies are forced to include technological supplements to their time-tested textbooks or teachers will not even consider them as an option. Students have access to online tools supplied by both the educational institution and publishers. Software companies are fiercely competing to provide school districts with programs designed to help individual students achieve greatness. Clearly, all of these advances are classroom-based initiatives. Online education is a unique entity that has taken on a meteoric rise in acceptability by the public

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school, private school, and home school arenas. Content and delivery improves on a daily basis. Still the challenge remains, how to identify the factors present in students that will predict success in an online course.

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CHAPTER III

DESIGN AND METHODS

INTRODUCTION

This study focused on secondary students who had chosen to enroll in a distance education/online Algebra I course for high school credit. Because this is a relatively new field of research, existing data are quite sparse. There have been numerous studies involving higher education, and these results have been extrapolated to some extent to address the pre-college learner (Cavanaugh, 1999). These findings that are attributed to higher education may hold some relevance for secondary students as well. Yet, the fact remains that the majority of research in the area of distance education has focused on adult or higher education and further research into the K-12 arena was greatly needed.

Findings from this study will principally add to the research conducted in the field of online/distance education for secondary level students. As stated earlier the bulk of research in this area has been focused on higher learning institutions. These studies also focus their attention on areas such as student-teacher interaction, learning style, and student satisfaction. The current study will be focused in a new direction for this type of research by focusing on quantitative data, used to unearth the factors that are directly related to the successful completion of these online courses.

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DESIGN

For this study, students who have completed an online Algebra I course were studied in order to determine factors contributing to the successful completion of the online course. A study group consisting of 237 students randomly selected from an online company that enrolls students across the nation constituted the data set. Student data to be analyzed consisted of the reason for enrollment, home school or public school, time spent online, and their final grade. A majority of these students were expected to be currently enrolled or to have recently graduated from high school - college students were not the focus of the study.

All of the students in the study have completed Algebra I in an online format. Student data have been obtained with the cooperation of a for-profit company which provides accredited curriculum delivered over the Internet. This company is an independent learning institution that is designed to serve as an option for students to gain high school credits for a variety of reasons. Course offerings of more than 60 courses correlated to state and national standards in core and elective areas such as language arts, math, science, and social studies are provided to students and school districts across the country.

Students used in this study were located in a large number of different cities/school districts across the country. Upon identifying a variety of factors that contribute to the success of students in online courses, this critical information can be used to aid students, parents and school districts in

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determining which students are better equipped to enroll, and succeed, in these courses. With this information, online services, guidance counselors, and public schools will be able to better serve a larger and more diverse student population.

RESEARCH QUESTIONS

The following research questions were examined, and the following hypotheses tested, in this study:

1. Is there a relationship between the amount of time students spend online with the course and their performance in the course?

Null Hypothesis 1: There is no statistically significant relationship between the percent students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Alternative Hypothesis 1: There is a statistically significant positive relationship between the percent students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Null Hypothesis 2: There is no statistically significant relationship between the letter grade students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Alternative Hypothesis 2: There is a statistically significant positive relationship between the letter grade students earn in an online Algebra 1 course and the amount of time students spend online in the course.

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Null Hypothesis 3: There is no statistically significant relationship between student passage of an online Algebra 1 course and the amount of time students spend online in the course.

Alternative Hypothesis 3: There is a statistically significant positive relationship between student passage of an online Algebra 1 course and the amount of time students spend online in the course.

2. Is there any significant difference in the performance of students enrolled in public schools in comparison with students who are home schooled?

Null Hypothesis 4: There is no statistically significant difference in the percent students earn in an online Algebra 1 course between public school students and home schooled students.

Alternative Hypothesis 4: There is a statistically significant difference in the percent students earn in an online Algebra 1 course between public school students and home schooled students.

Null Hypothesis 5: There is no statistically significant difference in the letter grade students earn in an online Algebra 1 course between public school students and home schooled students.

Alternative Hypothesis 5: There is a statistically significant difference in the letter grade students earn in an online Algebra 1 course between public school students and home schooled students.

3. Is there any statistically significant difference in the achievement rate of students who enrolled in the Algebra I course for the following reasons:

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a. Need to make up missing credits

b. Desire to get ahead (accelerated learning)

c. Desire to take regular school classes online

Null Hypothesis 6: There is no statistically significant difference in the percent students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

Alternative Hypothesis 6: There is a statistically significant difference in the percent students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

Null Hypothesis 7: There is no statistically significant difference in the letter grade students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

Alternative Hypothesis 7: There is a statistically significant difference in the letter grade students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

CONTEXT

Advanced Academics, Inc., is headquartered in Oklahoma City, Oklahoma, and partners with schools throughout the nation to deliver web-based course instruction with highly qualified teachers. This online instruction is delivered through a proprietary technology platform specifically designed for secondary education. Advanced Academics products and services are usually bundled and sold to schools or school districts as a complete end-to-end online

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learning solution for grades 7-12. The only resource the school needs to provide is an administrator to coordinate the program and approve student enrollments.

Advanced Academics provides comprehensive services including website/portal development and hosting, school branding, enrollment marketing to recruit students into the program, counseling services as well as all the components of the end-to-end solution (technology, content, teaching, 24/7 support).

Since its inception, Advanced Academics has implemented online learning programs in more than 300 schools across 27 states. They have taught approximately 40,000 courses to more than 15,000 students. Their products and services provide schools with the capability to extend their reach by serving students at lower costs, improving at-risk student performance, expanding curriculum offerings, improving student retention and relieving pressure to perform under local and federal accountability standards. In addition to serving full time students, many schools use the program for students that may be missing credits or that simply have scheduling conflicts. Advanced Academics has also been utilized in “drop-out recovery” efforts with school districts.

In 2002, the Company received regional accreditation as a diploma-granting institution from the North Central Association Commission on Accreditation (NCA) and national accreditation from the Commission on International and Trans-Regional Accreditation (CITA). Their strategy is not to replace or compete with schools, but to enable them to serve more students. In

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addition to NCA/CITA, the company's products and services have been reviewed and approved by a number of state education agencies.

Advanced Academics Inc. course developers are formally trained in instructional design. All of their courses are developed according to state academic standards and include instructional content, as well as assessments—based on Bloom's Taxonomy—that test a wide range of student knowledge and skills. These courses align with state assessment standards by analyzing academic standards for each state to create terminal objectives for each course. Advanced Academics Inc. separates each terminal objective into enabling objectives, which then combine with instructional content and appropriate assessments to help students obtain a level of learning that will allow them to meet state academic requirements.

Advanced Academics Inc. provides high quality secondary school curriculum taught by certified teachers and supported by an advanced technology platform specifically designed to support online learning for secondary education. Currently, their online learning services are being utilized across the country for alternative learners, dropout recovery, missing credits, scheduling conflicts, advanced learning, and many other students. Advanced Academics Inc. is an independent learning institution designed to serve as an option for students to gain high school credits for a variety of reasons, serving school districts across the state and country.

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DATA COLLECTION AND DESIGN

The data design was a non-randomized convenience sample. This method was chosen because of the topic addressed in the study. By using a non-randomized descriptive study, I was able to focus the scope on only those students who have completed the course during one academic semester as defined by the online company with which they were enrolled.

Furthermore, the convenience sampling aspect of the study was appropriate in relation to the participants needed to complete this study. By focusing on a group of students with known characteristics pertinent to the study, a variety of outliers or confounding variables can be eliminated. In this instance, the study will focus on students enrolled in an online Algebra I course.

PARTICIPANTS

This study was conducted using students who completed an online Algebra I course with an Oklahoma-based online educational program.

- The number of students who completed the online course was sufficient to provide a minimum size group large enough to allow the application of statistical analysis when data was disaggregated based on the variables put forth in the dissertation questions.
- The Oklahoma-based company maintains a database for students enrolled from school districts across the country. Curriculum used by the company for student instruction was identical for all students enrolled.

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- The data will be released to the researcher conducting the study after signing a letter of confidentiality and identifying the students only by a created identification number.

Data were collected for a cross-section of Algebra I students and analyzed to determine factors contributing to the successful completion of the online course from the data provided by the online company. In order to facilitate the completion of this study, students who had completed an online Algebra I course were identified. In accordance with No Child Left Behind, each state is required to test and report students in the areas of reading and mathematics. Algebra I is the course most commonly assessed and reported in educational settings.

Oklahoma has a state-mandated Algebra I End of Instruction (EOI) Test. Current legislation does not require students to pass the test, only to show on their transcript that they have taken the test. Oklahoma EOI tests are segmented into four levels of performance standards: Advanced, Satisfactory, Limited Knowledge, and Unsatisfactory. The Oklahoma Department of Education uses a benchmark of 70 percent of the items answered correctly to obtain a satisfactory level of performance, as does the Texas Education Agency on their End of Course Exam. Therefore, a level of 70 percent was established for this study as the minimum benchmark of what would be considered a successful completion of the online course. This base line needs to be established so that the students enrolled in the Algebra I online course from other states could be analyzed using the same criteria. While other states may have different requirements for proficiency

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exams following the completion of a course, each student's data used in this course was based on the same curriculum and grading scale regardless of his or her geographical location.

Participants in the study include a variety of students from across the country. Enrollment consists of students from a wide range of socio-economic levels, large and small school populations, home school, working students, accelerated learners, and ethnicities who have completed the online Algebra I course. All of the students were the same curriculum developed by certified teachers, regardless of their geographical location or in which district they were enrolled. In this study, all of the students will hold in common the following characteristics.

- Time Spent Online: Measured in hours.
- Percentage/Grade Earned: This was the students final grade, 70 percent was the benchmark established for the study.

Accompanying these like characteristics will be additional data that will allow for a more in depth study of student success factors.

- Type of Student: Students were separated into one of two groups – Public School Students and Home School Students.
- Reason for Enrollment: Students were separated into one of three groups - Need to make up missing credits, Want to get ahead (accelerated learning), Want to take regular school classes online.

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METHODOLOGY

The purpose of this study was to determine the factors that contribute to the successful completion of online courses by secondary students, with a focus on Algebra I. Researchers have found that student dropout rates are higher in online courses than they are for the traditional classroom setting at the college level, and this trend appears to be replicating itself at the high school level (Diaz 2002). Given the *social* (self esteem, misplaced students, isolation), *economic* (public dependency, crime, additional programs in public schools), and *political* (tax dollars, elections, cost of public welfare system) issues involved with the emerging opportunities of educating students online, it was imperative to understand what factors contribute to the successful completion of online courses for secondary students. The methods used in this study were designed to resolve the following questions related to the research topic:

What are the factors that contribute to the successful completion of online Algebra I courses by secondary students?

1. Is there a statistically significant relationship between the amount of time students spend online with the course and their final grade in the class?

For this research question I used various correlation coefficients. The Pearson Product Correlation, and Point-Biserial were used in determining the variable combinations.

2. Is there any significant difference in the performance of students enrolled in public schools in comparison with students who are home schooled?

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A t-Test for Independent Means was used to analyze the second research question. The purpose was to determine if students who are home school students will have a greater success rate in the online course than those enrolled in public school.

3. Is there any statistically significant difference in the achievement rate of students who enrolled in the Algebra I course for the following reasons:
    a. Need to make up missing credits
    b. Desire to get ahead (accelerated learning)
    c. Desire to take regular school classes online

In this question there was a series of three averages instead of two, initiating the need a One-Way ANOVA with a Tukey Post Hoc Test (designed to perform a pairwise comparison of the means) to analyze this research question.

Two of the methods I have chosen for my study were used in a similar study conducted by You Mi Suh (2004) in order to determine student satisfaction with web and interactive television courses. For example, a One-Way ANOVA is used to determine the relationship in regard to the effect of demographic variables with 3 subsets: (1) all respondents, (2) an Interactive Television Delivery Group, and (3) a group of Web Delivery respondents. Suh also used multiple regression analysis to analyze the responses to open-ended questions from all respondents.

In order to further support my methodology choices, I refer to the following study: *Cognitive Style and Self-Efficacy: Predicting Student Success in Online Education*, by Monica DeTure (2004). This study was designed to more

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closely identify learner attributes that could be used to predict success for online students. DeTure used an ANOVA to analyze the descriptive statistics, followed by a Post Hoc test to determine the correlation between the results of two tests and cognitive styles that impact student performance.

Finally, a study of the effectiveness of online teaching is the focus of a dissertation study written by Roger W. Minier (2002). This was intended to examine the effectiveness of online classes by analyzing the performance of teachers in an online environment. A T-Test was used to test the hypothesis that teacher participants will have greater cognitive gain in the use of instructional technology when they participate in an online course as opposed to a traditional classroom laboratory setting.

METHODOLOGICAL ASSUMPTIONS

It was assumed that the students enrolled in the online course have represented themselves and their vital information correctly and have not embellished their enrollment documents. In the case of students enrolled in a public school the information was provided by the Local Education Agency and was a matter of record at the school district. Home school students' information was taken from records provided either by the parent, legal guardian, or student responsible for enrollment and tuition.

This study defines mastery level at 70 %, the benchmark that was set by the Oklahoma Department of Education. While not all states have the same level of defined proficiency, 70% was chosen for this sample group. All students were

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instructed using the same curriculum and were graded by the same instructor, therefore setting a standard mastery score for all students was acceptable.

By partnering with a "for profit" company, the study group was obtained without any identifiable information and remains so throughout the scope of this study. All of the data gathered was achieved without psychological or physical harm to any of the subjects.

Being able to identify a variety of factors that contribute to the success of students in online courses will prove extremely beneficial to educators at all levels. These factors can be used to aid students, parents and school districts in determining which students are better equipped to enroll in these courses. With this valuable information, online services, guidance counselors, and public schools will be able to better serve a larger and more diverse student population.

SUMMARY

This chapter detailed the methods and procedures adopted to conduct the study focusing on a description of the overall research design and procedures. Criteria established for the dissagregation of the data was established to improve the reliability of the study. Data collection, design, participants, methodology, and methodological assumptions have all been included to clarify and validate the study.

In addition a section title, Context, has been included to further emphasize the need for this particular study. By detailing the ever increasing reliance on for-profit companies, such as Advanced Academics Inc., by public schools, the need

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for identification of factors leading to the success of students was of paramount importance.

A non-randomized descriptive convenience sample was chosen because of the topic addressed in the study. By using a non-randomized descriptive study the scope was focused on those students who have completed the course during on academic semester as defined by the online company with which they were enrolled.

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CHAPTER IV

RESULTS

INTRODUCTION

The purpose of this study was to determine the factors that contribute to the successful completion of online Algebra I courses by secondary students. Researchers have found that student dropout rates are higher in online courses than they are for the traditional classroom setting at the college level. Given the *social* (self esteem, misplaced students, isolation), *economic* (public dependency, crime, additional programs in public schools), and *political* (tax dollars, elections, cost of public welfare system) issues involved with the emerging opportunities of educating students online, it is imperative to understand and identify what factors contribute to the successful completion of online courses for secondary students. This study was intended to reveal characteristics of successful online students that will be valuable both for counselors and students considering the online option.

Contained within this chapter are the data as compiled from the information provided by an online for-profit company and the subsequent analysis of said data with the presentation of the results. The $p<.05$ level has been employed in the determination of significance. Representation of the data in this chapter will be in the form of narratives, graphs and tables using a non-randomized descriptive convenience sample. Following the restating of the research questions, the null and alternative hypotheses, data tables and narratives detailing the subject group and specific research questions will be presented.

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RESEARCH QUESTIONS

The following research questions were examined, and the following hypotheses tested, in this study:

1. Is there a relationship between the amount of time students spend online with the course and their performance in the course?

Null Hypothesis 1: There is no statistically significant relationship between the percent students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Alternative Hypothesis 1: There is a statistically significant positive relationship between the percent students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Null Hypothesis 2: There is no statistically significant relationship between the letter grade students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Alternative Hypothesis 2: There is a statistically significant positive relationship between the letter grade students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Null Hypothesis 3: There is no statistically significant relationship between student passage of an online Algebra 1 course and the amount of time students spend online in the course.

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Alternative Hypothesis 3: There is a statistically significant positive relationship between student passage of an online Algebra 1 course and the amount of time students spend online in the course.

2. Is there any significant difference in the performance of students enrolled in public schools in comparison with students who are home schooled?

Null Hypothesis 4: There is no statistically significant difference in the percent students earn in an online Algebra 1 course between public school students and home schooled students.

Alternative Hypothesis 4: There is a statistically significant difference in the percent students earn in an online Algebra 1 course between public school students and home schooled students.

Null Hypothesis 5: There is no statistically significant difference in the letter grade students earn in an online Algebra 1 course between public school students and home schooled students.

Alternative Hypothesis 5: There is a statistically significant difference in the letter grade students earn in an online Algebra 1 course between public school students and home schooled students.

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3. Is there any statistically significant difference in the achievement rate of students who enrolled in the Algebra I course for the following reasons:

   a. Need to make up missing credits
   b. Desire to get ahead (accelerated learning)
   c. Desire to take regular school classes online

Null Hypothesis 6: There is no statistically significant difference in the percent students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

Alternative Hypothesis 6: There is a statistically significant difference in the percent students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

Null Hypothesis 7: There is no statistically significant difference in the letter grade students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

Alternative Hypothesis 7: There is a statistically significant difference in the letter grade students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

Study Group Composition

Students who have completed an online Algebra I course were studied in order to determine factors contributing to the successful completion of the online course. A study group, consisting of approximately 237 randomly selected students constituted the data set. Student data analyzed consisted of their reasons

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for enrollment, whether students were enrolled in home school or public school, time spent online, and their final grade.

A majority of these students were expected to be currently enrolled or to have recently graduated from high school - college students were not the focus of the study. All of the students in the study have completed Algebra I in an online format. Student data were obtained with the cooperation of a for-profit company which provides accredited curriculum delivered over the Internet. This online education provider is an independent learning institution designed to serve as an option for students to gain high school credits for a variety of reasons. Offerings of more than 60 courses correlated to state and national standards in core and elective areas such as language arts, math, science, and social studies are provided to students and school districts across the country via the online company. The data presented in Table 1 describes the study group.

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Table 1 *Frequency Counts for Selected Variables (N = 237)*

Variable	Category	*n*	%
Race/Ethnicity			
	American Indian	22	9.3
	Asian	2	0.8
	Black	27	11.4
	Hispanic	12	5.1
	Native Hawaiian	1	0.4
	No Answer	42	17.7
	None of the above	12	5.1
	White	119	50.2
Gender			
	Females	132	55.7
	Males	105	44.3
Grade Level			
	7th grade	6	2.5
	8th grade	40	16.9
	9th grade	62	26.2
	10th grade	64	27.0
	11th grade	39	16.5
	12th grade	26	11.0
When Course was Taken			
	Middle (7th or 8th grade)	46	19.4
	High School (9th to 12th grade)	191	80.6
Type of Student			
	Home School	104	43.9
	Public School	133	56.1
Reason to Enroll			
	Accelerate	65	27.4
	Make up Missing Credits	69	29.1
	Want to have school online	103	43.5
Letter Grade (Percent Earned) [a]			
	F Grade (0 - 59%)	35	14.8
	D Grade (60 - 69%)	70	29.5
	C Grade (70 - 79%)	70	29.5
	B Grade (80 - 89%)	45	19.0
	A Grade (90 - 100%)	17	7.2
Did they pass the course			
	Did not pass	105	44.3
	Passed the course	132	55.7

[a] Percent Earned: *M*ean= 68.18, *Standard Deviation* = 15.36.

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Analysis of Selected Variables

Additional descriptive data are included in Table 2. These include school variables measured on a subsample of students (public school), (n = 133, representing 56.1% of the sample) and student variables measured on the whole sample (N = 237). Variables of the whole sample include days enrolled, percent earned, hours of time spent online and letter grade.

This data set is for the combined groups of home school and public school students in all economic and geographic categories. In the realm of the public school (N=133), various percentages for ethnicities are represented and displayed, the largest ethnic group of participants being Caucasian. Also prominent in the variables addressed for public school students are those of student enrollment and district population. As noted earlier, one of the advantages of online education is the ability to provide services to any size district. This is evident in the numbers presented here with average enrollments ranging from 123 to 42,461 and district populations from 840 to 298,492.

When the entire sample group was analyzed the following data sets were valuable to consider prior to answering the research questions. The mean number of days enrolled in the online algebra course was 122.33 with the corresponding low of 30 and high of 459. Percentage earned in the course follows with the mean grade at 68.18 percent with a low of 18 and a high of 96 percent. The mean number of hours spent online was 30.98 hours with a low of 0 and a high of 250 hours. Time spent on line will be addressed further in research question number

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one. Finally, letter grades presented here for all students begin with a mean score of 1.74, a low of 0 and a high of 4 when measured on the following scale: 0 = *"F", 1= "D", 2= "C", 3= "B",* 4 = *"A"*

Table 2

Descriptive Statistics for Selected Variables

Variable	*n*	*Mean*	*SD*	Low	High
School - Average Enrollment	133	17,176.85	17,717.85	123	42,461
School - Percent Caucasian	133	0.49	0.23	0.13	0.89
School - Percent African American	133	0.19	0.15	0.00	0.36
School - Percent Asian	133	0.01	0.01	0.00	0.08
School - Percent Hispanic	133	0.10	0.10	0.00	0.27
School - Percent Native American	133	0.20	0.22	0.04	0.88
School - District Population	133	116,457.39	126,135.77	840	298,492
Poverty Rate	133	0.16	0.05	0.04	0.25
Average Days Absent Per Student	133	11.56	2.70	6	15
Days Enrolled	237	122.33	69.49	30	459
Percent Earned	237	68.18	15.36	18	96
Hours of Time Spent Online	237	30.98	26.25	0	250
Letter Grade	237	1.74	1.14	0	4

[a] Grade: 0 = *"F", 1= "D", 2= "C", 3= "B"* , 4 = *"A"*

Research Question 1 Results

Research Question #1: Is there a relationship between the amount of time students spend online with the course and their performance in the course?

Research question one was designed to determine the relationship between the amount of time a student spends on line once logged in to the course and their

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final grade in the class. To determine the extent of this relationship, specific correlations were calculated using Pearson Product Moment Correlation. For this research question, more of the correlations were not significant and none of the null hypotheses were rejected.

Null Hypothesis 1: There is no statistically significant relationship between the percent students earn in an online Algebra 1 course and the amount of time students spend online in the course. (r = .07)

Null Hypothesis 2: There is no statistically significant relationship between the letter grade students earn in an online Algebra 1 course and the amount of time students spend online in the course. (r = .05)

Null Hypothesis 3: There is no statistically significant relationship between student passage of an online Algebra 1 course and the amount of time students spend online in the course. (r = .11)

Additionally, Table 3 contains correlations for the student performance metrics combined with other variables.[1] A higher percentage earned in the course was related to being a student at a school with a lower percentage of African-American students, a lower percentage of Hispanic students, and a higher percentage of Native American students. On an individual level, a higher percentage earned in the class was related to being in an earlier grade level (middle school) when taking the course.

[1] For Table 3 correlation coefficients were calculated using the Pearson, phi – coefficient or point biserial, depending upon the variable.

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Table 3

Correlation Coefficients for Selected Variables with Student Performance Variables (N = 237)

Variable	Percent Earned		Letter Grade [a]		Passed Course [b]	
Percent Earned	1.00					
Letter Grade for Course [a]	.94	**	1.00			
Passed Course [b]	.78	**	.84	**	1.00	
Race/Ethnicity [c]	-.08		-.06		-.04	
Gender [d]	-.03		.02		.04	
School - Average Enrollment (*n* =133)	-.13		-.13		-.12	
School - Percent Caucasian (*n* =133)	-.09		-.11		-.04	
School - Percent African American (*n* =133)	-.24	**	-.24	**	-.20	*
School - Percent Asian (*n* =133)	-.03		-.06		-.05	
School - Percent Hispanic (*n* =133)	-.17	*	-.16	*	-.15	
School - Percent Native American (*n* =133)	.34	**	.36	**	.24	**
School – District Population (*n* =133)	-.13		-.13		-.12	
Poverty Rate (*n* =133)	-.11		-.10		-.14	
Average Days Absent Per Student (*n* =133)	-.14		-.11		-.11	
Grade Level	-.18	**	-.22	**	-.15	
When the Course was Taken [e]	-.34	**	-.39	**	-.29	**
Days Enrolled	.13	*	.11		.07	
Hours Spent on the Course	.07		.05		.11	

* $p < .05$. ** $p < .01$.
[a] Grade: 0 = *"F", 1= "D", 2= "C", 3= "B"* , 4 = *"A"*
[b] Course: 0 = *Failed (0 – 69 percent)* 1 = *Passed (70 percent or higher)*
[c] Race: 0 = *Other* 1 = *Caucasian*
[d] Gender: 0 = *Female* 1 = *Male*
[e] Course Taken: 0 = *Middle School (7th or 8th grade)* 1 = *High School (9th to 12th grade)*

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Research Question 2 Results

Research Question #2: Is there any significant difference in the performance of students enrolled in public schools in comparison with students who are home schooled?

Research question two was designed to determine the statistical significance of students' success based on their enrollment status. The 237 participants in the study consisted of two separate groups - home school and public school students. Table 4 displays the t-test results for independent means comparing student performance with the student's learning environment. Results for students were analyzed on the basis of percentage earned and letter grade for a more complete and accurate analysis.

As evidenced by the data, there was no significant difference in the success of home school students when compared to students enrolled in public schools, for both dependent variables. When analyzed on a 0 to 100 percent grading scale the difference in the average was only .87% higher for public school students. The same holds true when utilizing a 0 to 4.0 scale. Analysis showed that public school students score merely .02 higher on a 4.o scale. Therefore, neither of the null hypotheses for research question two were rejected.

Null Hypothesis 4: There is no statistically significant difference in the percent students earn in an online Algebra 1 course between public school students and home schooled students. ($t = .14$, $p = .66$)

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Null Hypothesis 5: There is no statistically significant difference in the letter grade students earn in an online Algebra 1 course between public school students and home schooled students. (t = .14, p = .89)

Table 4

Comparison of Student Performance Based on Type of Student.

t-tests for Independent Means (N = 237)

Performance Metric	Type of Student	*n*	*Mean*	*SD*	*t*	*p*
Percent Earned	Home School	104	67.69	14.98	0.44	.66
	Public School	133	68.56	15.70		
Letter Grade [a]	Home School	104	1.73	1.07	0.14	.89
	Public School	133	1.75	1.20		

[a] Grade: 0 = *"F"*, *1= "D"*, *2= "C"*, *3= "B"* , 4 = *"A"*

Research Question 3 Results

Research Question #3: Is there any statistically significant difference in the achievement rate of students who enrolled in the Algebra I course for the following reasons:

d. Need to make up missing credits

e. Desire to get ahead (accelerated learning)

f. Desire to take regular school classes online

Research question three was designed to determine the statistical difference, if any, in the achievement rate of students enrolled in the online algebra based course on their reason for enrollment. Students were asked to

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choose why they were enrolling in the online course from the three choices listed above. Twenty eight percent wished take accelerated classes, 43 percent wanted to take their regular school classes online and 29 percent needed to make up missing credits.

Table 5 displays the One Way ANOVA tests used to examine research question number three. Student results were analyzed on the basis of percentage earned and letter grade, using a One Way ANOVA with a Tukey Post Hoc test. The results of the comparison showed that the students who enrolled to accelerate succeeded at a significantly higher rate when compared with the other two reasons for enrollment, on both dependent variables. Having noted significance, both null hypotheses for research question three were rejected.

Alternative Hypothesis 6: There is a statistically significant difference in the percent students earn in an online Algebra 1 course among students who enrolled for the course for various reasons. ($F = 5.97$, $p = .003$)

Alternative Hypothesis 7: There is a statistically significant difference in the letter grade students earn in an online Algebra 1 course among students who enrolled for the course for various reasons. ($F = 7.89$, $p = .001$)

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Table 5

Comparison of Student Performance Based on Reason for Enrolling.

One Way ANOVA

Tests with Tukey Post Hoc Tests (N = 237)

Metric	Reason	*n*	*Mean*	*SD*	*F*	*p*
Percent Earned [a]	1. Accelerate	65	72.60	16.29	5.97	.003
	2. Make up Missing Credits	69	63.63	14.28		
	3. Want to have school online	103	68.43	14.74		
Letter Grade [b]	1. Accelerate	65	2.12	1.21	7.89	.001
	2. Make up Missing Credits	69	1.36	0.95		
	3. Want to have school online	103	1.76	1.14		

Grade: 0 = *"F"*, *1= "D"*, *2= "C"*, *3= "B"* , 4 = *"A"*

Percent Earned: 0 to 100%

[a] Tukey post hoc test: 1 > 2 (p = .002); 1 = 3 (p = .19); 2 = 3 (p = .10)

[b] Tukey post hoc test: 1 > 2 (p = .001); 1 = 3 (p = .10); 2 = 3 (p = .06)

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Table 6

Anova Source Tables

Percent Earned

	Sum of Squares	df	Mean Square	F	P
Between Groups	2702.794	2	1351.397	5.966	.003
Within Groups	53006.342	234	226.523		.
Total	5706.137	236			

Grade Earned

	Sum of Squares	df	Mean Square	F	P
Between Groups	19.410	2	9.705	7.888	.000
Within Groups	287.889	234	1.230		
Total	307.300	236			

Additional Findings

Table 7 displays the Chi-Square Test comparisons for course passing rate based on selected variables not addressed in the previous research questions. No significant differences in the passing rate were found based on race/ethnicity, gender or type of student. Evident in the data however is the distinct difference in the passing rate of middle school versus high school students.

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Table 7

Comparison of Pass Rate Based on Selected Variables.

Chi-Square Tests of Significance (N = 237)

		Failed		Passed	
		n = 105		*n* = 132	
Variable	Category	*n*	%	*n*	%
Race/Ethnicity [a]					
	Others	50	42.4	68	57.6
	Caucasians	55	46.2	64	53.8
Gender [b]					
	Females	61	46.2	71	53.8
	Males	44	41.9	61	58.1
Grade When Taken [c]					
	Middle (7^{th} or 8^{th} grade)	7	15.2	39	84.8
	High School (9^{th} to 12^{th} grade)	98	51.3	93	48.7
Type of Student [d]					
	Home School	46	44.2	58	55.8
	Public School	59	44.4	74	55.6
Reason to Enroll [e]					
	Accelerate	19	29.2	46	70.8
	Make up Missing Credits	41	59.4	28	40.6
	Want to have school online	45	43.7	58	56.3

[a] χ^2 (1, N = 237) = 0.36, p = .55.

[b] χ^2 (1, N = 237) = 0.44, p = .51.

[c] χ^2 (1, N = 237) = 19.57, p = .001.

[d] χ^2 (1, N = 237) = 0.00, p = .98.

[e] χ^2 (2, N = 237) = 12.39, p = .002.

No significant differences in passing rate were noted based on race/ethnicity (p = .55), gender (p = .51) or type of student (home school versus public school) (p = .98). Students who took the course in their 7^{th} or 8^{th} grade

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year had a significantly higher (p = .001) passing rate (84.8% versus 48.7%). The student's reason for enrolling was associated with significantly different passing rates (p = .002). Passing the course was highest for those students who took the course to accelerate (70.8%) as compared to those students who wanted to have school online (56.3%) or had to take the course to make up missing credits (40.6%).

SUMMARY

Chapter IV provides the statistical results for the study to determine the factors that contribute to the successful completion of online courses by secondary students. Data from 237 students enrolled in an Algebra I online course were used to statistically analyze the following three research questions.

Research question one was addressed using various correlation coefficients. This was done to more accurately ascertain any relationships related to the research question, two additional correlations were used. There were no significant differences found for this research question.

Research question two was addressed using a t-test for independent means. This test was utilized in order to determine if students who are home schooled would have a greater success rate in the online course than those enrolled in public schools. Again, there were no significant differences found for the research question.

Research question three was addressed using a one way ANOVA test to examine the significance of achievement rates between groups. Data for this

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research question being a series of three averages instead of two, initiated the need for the one way ANOVA to avoid the inherent errors in performing multiple t-tests. This analysis was coupled with a Tukey Post Hoc test which evaluates all pairs for differences between means and all possible combinations of means. Statistical differences were found for this research question between the students groups of those who enrolled to accelerate their and learning (variable 1) and those who enrolled to make up missing credits (variable 2).

Finally a variety of additional findings were evaluated by using a chi-square test comparing course passing rates on selected variables. Among these variables were race/ethnicity, gender and type of student. Chapter V includes the summary, conclusions and recommendations based on the findings presented in Chapter IV.

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CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

INTRODUCTION

The previous chapter presented the results of the data analysis. Chapter V includes a summary of the findings, conclusions that place the findings in context with the relevant literature, recommendations for practitioners, and future research.

This study focused on identifying the factors contributing to the successful completion of online courses taken by secondary Algebra I students. Studies have shown that online students are dropping out of online courses at almost twice the rate of their traditional classroom counterparts (Diaz 1999). In order to reverse this unfortunate trend, it is imperative to understand what factors contribute to the successful completion of online courses for secondary students.

The primary role of the student is to learn. Under the best of circumstances, this challenging task requires motivation, planning, and the ability to analyze and apply the information being taught. In a distance education setting, the process of student learning becomes even more complex (Schuemer, 1993). Enrolling in an online course has become what some districts feel to be an answer to a variety of educational issues, hence, school districts across the country are increasing their offerings of online education courses (Green, Lewis, Setzer, 2005). Course additions include offering courses not otherwise available in local school districts, and offerings of Advanced Placement or college-level

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courses in order to offer a resolution to the challenge of appeasing accelerated students.

Needs being addressed through online course offerings include limited space constraints, reducing scheduling conflicts for students, permitting students who failed a course to repeat it, meeting the needs of specific groups of students, and generating more district revenues. All of these issues have propelled the growth of online learning in secondary schools.

The increased dropout rate in secondary schools is an area of concern that has fostered the enlistment of online educational services as a solution. Although since 1990 secondary dropout rates in traditional classrooms for all income groups have stabilized, the level at which students are failing to complete high school is still not acceptable, as witnessed by the demands placed on public schools by No Child Left Behind (USDE, 2002) legislation. The emphasis placed on online education as a remedy is misplaced and has fallen short of expectations. A study conducted by the Distance Education and Training Council (2004) confirms that 47 percent of those students enrolled in an online high school did not graduate.

Higher education has utilized the online environment for many years, and secondary education has more recently begun the process of expanding the virtual classroom as opposed to the traditional brick and mortar variety. Because it is a relatively new frontier, very little information is available about k-12 online education. Therefore, the deficit of research involving secondary students is not

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surprising. The relatively few studies that have addressed secondary online issues were fairly limited in scope and quality. Completed studies in online education courses are based on satisfaction surveys and comparisons with traditional classroom students, and the vast majority of these very few studies have been qualitative not quantitative. When researchers decide to focus their efforts on determining what it takes to be a successful online student, the number of successful students in online schools will increase (Diaz, 2000).

SUMMARY

Chapter IV provided the statistical results for the study to determine the factors that contribute to the successful completion of online courses by secondary students. Data from 237 students enrolled in an online course with a for profit company were used to statistically analyze three research questions. The purpose of this study was to use quantitative methods to investigate the factors that contribute to the successful completion of online Algebra I courses by secondary students. Researchers have found that student dropout rates are higher in online courses than they are for the traditional classroom setting at the college level, and this trend appears to be replicating itself at the high school level (Diaz 2002). Given the *social* (self esteem, misplaced students, isolation); *economic* (public dependency, crime, additional programs in public schools); and *political* (tax dollars, elections, cost of public welfare system) issues involved with the emerging opportunities of educating students online, it is imperative to understand what factors contribute to the successful completion of online courses for

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secondary students The following research questions were examined, and the following hypotheses tested, in this study:

1. Is there a relationship between the amount of time students spend online with the course and their performance in the course?

Null Hypothesis 1: There is no statistically significant relationship between the percent students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Alternative Hypothesis 1: There is a statistically significant positive relationship between the percent students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Null Hypothesis 2: There is no statistically significant relationship between the letter grade students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Alternative Hypothesis 2: There is a statistically significant positive relationship between the letter grade students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Null Hypothesis 3: There is no statistically significant relationship between student passage of an online Algebra 1 course and the amount of time students spend online in the course.

Alternative Hypothesis 3: There is a statistically significant positive relationship between student passage of an online Algebra 1 course and the amount of time students spend online in the course.

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2. Is there any significant difference in the performance of students enrolled in public schools in comparison with students who are home schooled?

Null Hypothesis 4: There is no statistically significant difference in the percent students earn in an online Algebra 1 course between public school students and home schooled students.

Alternative Hypothesis 4: There is a statistically significant difference in the percent students earn in an online Algebra 1 course between public school students and home schooled students.

Null Hypothesis 5: There is no statistically significant difference in the letter grade students earn in an online Algebra 1 course between public school students and home schooled students.

Alternative Hypothesis 5: There is a statistically significant difference in the letter grade students earn in an online Algebra 1 course between public school students and home schooled students.

3. Is there any statistically significant difference in the achievement rate of students who enrolled in the Algebra I course for the following reasons:
    a. Need to make up missing credits
    b. Desire to get ahead (accelerated learning)
    c. Desire to take regular school classes online

Null Hypothesis 6: There is no statistically significant difference in the percent students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

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Alternative Hypothesis 6: There is a statistically significant difference in the percent students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

Null Hypothesis 7: There is no statistically significant difference in the letter grade students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

Alternative Hypothesis 7: There is a statistically significant difference in the letter grade students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

Statistical analysis of the research questions was conducted using a range of quantitative methods. Research question one used a Pearson Correlation Coefficient to analyze the preponderance of the data. In order to more accurately ascertain any relationships related to Research Question One, two additional Pearson correlations were utilized; a phi coefficient correlation and a point biserial correlation. Research question two was analyzed using a t-Test for independent means in order to determine if students who are home schooled would have a greater success rate in the online course than those enrolled in public schools. Research question three utilized a one way ANOVA test to examine the significance of achievement rates between groups. This analysis was coupled with a Tukey Post Hoc test which evaluated all pairs for differences between means and all possible combinations of means.

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As noted earlier, researchers have found higher dropout rates for students in online courses than for those in traditional classroom settings at the college level (Ridley, 1995; Diaz 1999). Over the last five to ten years the expansion of distance education opportunities for high school students has vastly increased. Diaz (2000) also states that students are dropping out of online courses at almost twice the rate of traditional classrooms at the post-secondary level. This study was followed closely by the declaration that this trend appears to be replicating itself at the high school level. Carr (2000) supports that claim by noting that the drop out rates in VHS and other types of distance learning programs are escalating.

CONCLUSIONS

Results of this study are intended to add to the limited knowledge base used by administrators, faculty, and researchers in online education design and policy construction. With the proliferation of web-based course offerings, it becomes increasingly important to understand why some students succeed in this environment while others do not. A presentation of the conclusions for each of the three research questions addressed within the study begins this section. Following that will be a discussion of the overall conclusions that relate to the literature appropriate to online secondary students.

Research question one asked, “Is there a statistically significant relationship between the amount of time students spend online with the course and their performance in the class?” Based upon the results the study, the

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correlation was not significant, therefore none of the null hypotheses were rejected. Underlying the results for this research question is the definition of time on task versus time on line. The students in this study were not monitored to determine how much of the time logged in was actually instructional time. Students may have logged in to the program and then ventured in to a variety of internet based endeavors that had absolutely nothing to do with the course. This issue is addressed later in the implications portion of the study.

Null Hypothesis 1: There is no statistically significant relationship between the percent students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Null Hypothesis 2: There is no statistically significant relationship between the letter grade students earn in an online Algebra 1 course and the amount of time students spend online in the course.

Null Hypothesis 3: There is no statistically significant relationship between student passage of an online Algebra 1 course and the amount of time students spend online in the course.

Additionally, statistical analysis of interest was found when analyzing this question. A higher percentage earned in the course was related to being a student at a school with a lower percentage of African-American students, lower percentage of Hispanic students and a higher percentage of Native American students. Furthermore, a higher percentage earned in the course was related to

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being in an earlier grade level, specifically middle school (7th and 8th grade) as opposed to high school (9th through 12th grade), when taking the course.

Research question two asked, "Is there any statistically significant difference in the performance of students enrolled in public schools in comparison with students who are home schooled?" Prior to conducting the study, this researcher had assumed that home school students would succeed at a statistically higher rate than their public school counterparts. This assumption was based on research related to parental involvement having a positive effect on student achievement. However, Results revealed that home school students averaged a score of 67.69 percent while the public school students averaged 68.56 percent. No significant differences were found between the two groups of students for their percent earned in the class or their final grade in the course. Again neither of the null hypotheses were rejected.

Null Hypothesis 4: There is no statistically significant difference in the percent students earn in an online Algebra 1 course between public school students and home schooled students.

Null Hypothesis 5: There is no statistically significant difference in the letter grade students earn in an online Algebra 1 course between public school students and home schooled students.

Students classified as home school students are often stereotyped as being very studious with a large amount of adult supervision and high expectations. The results from this study that show the public school students succeeding at just

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slightly higher rates contradict this view. Students who are home schooled are done so for a variety of reasons, academic acceleration is not always the reason of choice for parents. A large portion of these students may have been withdrawn from public schools to avoid punishments such as short or long term suspensions or possible legal charges. Others may have been removed from school by parents that are angry at the central or site administration or classroom teachers. These students may or may not receive adequate instruction after leaving school, results from this study serve as evidence that these students are not receiving the instruction that is typically associated with home school students.

Research question three asked, "Is there any statistically significant differences in the performance rate of students who enrolled in the Algebra I course for the three different reasons (need to make up missing credits, desire to get ahead-accelerated learning or desire to take regular school classes online)?" It may be argued, of course, that the results for academic achievement are simply a function of the self-selecting process (courses designed for high level students only) for students who wished to enroll in advanced courses that were not offered at their grade level or in their district. In order to adequately answer this question, the averages for all three groups had to be determined, followed by the testing of all pairs for differences between means and all possible combinations of means. Analysis of the data showed that significant differences were found for students who enrolled to accelerate their learning.

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These students had significantly higher percentage scores than those who were attempting to make up missing credits. This corroborated research predictions that a student's internal motivation (reason for enrolling), would be an indicator of online course success. Likewise, students who enrolled to accelerate their learning had significantly higher final grades in the course than those who enrolled to make up missing credits. For research question three , both of the null hypotheses were rejected.

Alternative Hypothesis 6: There is a statistically significant difference in the percent students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

Alternative Hypothesis 7: There is a statistically significant difference in the letter grade students earn in an online Algebra 1 course among students who enrolled for the course for various reasons.

The results from research question three should come as no surprise to anyone, accelerated students traditional perform better in brick and mortar schools and should also do so online. As educators it is imperative that we find ways to support all students, regardless of their educational setting. If public schools continue to partner with online companies, allowing high school credit for courses taken online, a support line must be in place. This responsibility falls on both the public school system and the online company. Allowing students to fail is not acceptable and interventions must be in place when a student begins to fall behind in the online course. These interventions will only be effective however if the

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LEA and the online company have a working relationship in which they communicate with each other and more importantly with the student. It is easy for a faceless, voiceless student to be dropped from a class or regarded as a failure. If phone conversations and/or in person meetings are scheduled between online instructors, or if distance prohibits, a school counselor and a student name then becomes a person and a relationship is formed.

CONNECTION TO THEORY

Theory relating to distance learning, and particularly online learning, is still in the early stages of development (Carey, 2001). Despite its growing popularity, serious questions remain regarding the appropriateness of online learning for students in elementary and secondary schools. Higher education has dominated the research that has been conducted to gain insight into the characteristics of students enrolled in online courses. Wang and Newlin (2000) concluded that most reports on the characteristics of successful online students have relied primarily on qualitative, "anecdotal" evidence.

Roblyer and Marshall (2002-03) developed a list of characteristics they believed would accurately predict a student's outcome in online courses. Within their research they generated the following list of nine factors that influence the success of online students. The three factors that directly support the research conducted in this study are responsibility, time management and achievement motivation:

1. Internal versus external locus of control

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2. Internal versus external motivation
3. Self-confidence/self-esteem
4. Responsibility
5. Degree of experimentation
6. Time management
7. Ability to set goals
8. Achievement motivation
9. Self-reported computer technology skills

Time Spent Online

Time management and achievement motivation were analyzed in two of the three research questions within this study. Time management, represented as hours spent online while enrolled in the course, did not show a statistically significant relationship to success.

Valasek (2001), documented via student survey the average time spent online by college students (n=66) at 8.6 hours per week. "A" students (n=16) were above the mean for number of hits and posts, while students with final grades in the "B" or "C" range were well below the mean. The amount of time actually spent online was determined using the figures given by students on a survey and must assessed accordingly. Actual time totals may show some variance if tracked by the university technology department. Again it is vital to draw attention to the fact that this study was performed on students enrolled in higher education, as much of the studies in this field have been.

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Valasek further states that the most frequent comment from persisting students in this study was that they were surprised that the course work required so much time. Accordingly, the greatest number of withdrawals from the course was because of the time requirements.

Slater (2001) provided evidence that the total amount of time spent online was a significant factor in the study of successful student characteristics. The high school students involved in that qualitative study were held to high expectations and strongly encouraged to complete the assignments. Students were given very rigid time limits to complete assignments. "Well, you need those limits. Without them, no one would actually do the work. You need boundaries to keep them focused on the work." This quote from a student is provides support for the results arrived at within this study that time spent on line does not have a significant relationship to successful coursework. The grading scale for this course was a pass fail grading scale, even so, only sixty eight percent of those who enrolled in the course received a passing grade, thirty two percent either failed or withdrew.

In order to address the lack of quantitative research in online education, Wang and Newlin (2000) analyzed a group of online higher education students and meshed the two factors of motivation and time spent online. Their study concluded that the higher the number of hits on the course website, the higher the students' internal locust of control was, resulting in a higher grade percentage earned in the course.

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Reason for Enrollment

Wales (2003), studying secondary honors students and their performance in Advanced Placement courses, contributed data worthy of note to the accelerated enrollment and motivation topic. Her data showed that students who enrolled in courses as a graduation requirement performed at the same level as those who enrolled in the courses simply for personal interest. The study revealed that no relation existed between the reason for enrollment and the grade received. However, in my study, there was a significant correlation to those students that enrolled to accelerate their studies having a higher percentage of success than the students making up credits or taking all their high school courses at home.

Motivation is a consistent variable in the studies involving online education. A person with more of this motivation has more reasons, or more important reasons, for taking the course (Kennedy, 2000). The variable of motivation in the literature refers to a variety of factors, including time and schedule, interest in subject, job and family considerations, and needing to make up credits.

Certain characteristics differentiate successful secondary and elementary distance learners from unsuccessful ones. Specifically, students that are more successful in their coursework have a higher internal locus of control. That is, believing that his or her behavior is guided by his or her personal decisions and efforts (Cavanaugh, et. all 2004). A student who possesses this internal locus of control is better able to remain on task while online and experienced greater

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success. According to the authors, effective online programs for younger learners and secondary students include frequent teacher contact with students and parents.

Achievement motivation also appeared as significant in the success of online students in Valasek's study. Slater's study of ninth grade students enrolled in an online course with accompanying results adds further support the idea that success related directly to the student reasons for enrolment. The majority of students who participated in her study and were successful and indeed displayed a very high level of motivation. Their motivation, however, was external rather than internal. These students were motivated by the opportunity to earn additional credits (accelerate their learning). This characteristic was corroborated by the research results presented in this study. Students enrolling to accelerate their learning achieved a higher level of success than the other groups.

Lary (2002) also determined that a significant relationship exists between course success and the student's reasons for taking an online course. The author assessed seven different reasons for enrollment, however, only one of those variables was discussed in the findings. Students enrolling to "learn at their own pace," representing twenty seven percent of the study group, experienced significantly lower levels of success in online courses. These data relates directly to time on task and motivation. Students participating in Lary's study spent a greater amount of time online than did students enrolled for other reasons. Interestingly, the amount of time spent online did not equate to success, mirroring the results from the Algebra I students analyzed in research question one. It also

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aids to the adds validity to the data that significantly links the relationship between reasons to enroll (accelerate learning) and success in the course.

Among the additional findings to surface in this study was that of middle school (7th and 8th grade) students succeeding at a higher percentage than high school (9th – 12th grade) students. Again, the factor of motivation is prevalent for those students predominantly because Algebra I at the middle school is an accelerated course. Wojciechowski and Palmer (2005) also analyzed age differential theory at the university level. Their study found that the age of the student proved to be of significance when examined in relation to the final grade received in the course. However, their study of adult learners revealed that overall the younger the student, the lower the grade. This supposition was also supported by Willis (1992), who found that students most likely to succeed in a course administered entirely on line were between the ages of thirty and fifty.

IMPLICATIONS

Policy Recommendations

Having taken into consideration the literature presented and the findings from the current study, the following recommendations may prove to be advantageous for policy considerations.

1. Any state that allows an online company to offer courses that will be recognized for high school credits should have a curriculum approval process in place.

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2. Local Education Agencies (LEA) need to have in place a means by which they monitor the progression of their students.
3. Professional development requirements must be established by state or local education agencies for educators employed by online companies. Continuing education is required for all traditional classroom teachers to increase their effectiveness in student learning. This should also be the case for online teachers who are assuming some, if not all, of the educational duties previously performed by traditional classroom instructors.
4. Online companies should have curriculum specialist(s) or teacher(s) on staff able to demonstrate knowledge of the standards for each of the states being served by the company.

Practitioner Recommendations

Having taken into consideration the literature presented and the findings from the current study, the following recommendations may prove to be advantageous for practitioner considerations.

1. Instructors should have built into their course a way to monitor what the students are doing while online. Data from this study have shown that the more time a student spends online does not automatically translate into higher grades and being a successful student.
2. Online instructors or companies should contact LEA instructors to inquire about local standards and timelines for completion. This type of

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communication is generally between administration and sales personnel of the company. Teacher-to-teacher or teacher-to-curriculum specialist contact should be made to address lesser known issues that may arise.

3. Online instructors should have in place a plan in which they contact the student ether through email or more preferably a phone call when they fall below a certain level of course completion of percentage.
4. School counselors must make frequent inquiries regarding the status of students currently online. Without follow up from counselors, students may be neglecting their duties or feel disconnected from their LEA and fall behind on graduation requirements.

Recommendations for Future Research

The study focused on three main components of students enrolled in online courses: type of enrollment (home school or public school), amount of time spent online and reasons for enrollment. These study findings raised additional questions concerning unaddressed issues that may prove worthy of future studies. Following is a list of research considerations that would prove beneficial to the future development of successful strategies for students and courses.

1. Knowledge of a student's GPA prior to enrolling in the online course could help predict his or her success in the course. With background knowledge of prior academic achievements or lack thereof, the data may provide a basis for recommendations on enrollment.

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2. Future studies may also include the variable of prior experience in online courses in conjunction with success rate.
3. According to the data, public school students who enrolled to accelerate their learning passed at a higher rate than home school students enrolled for the same reason. Focusing future research on the variety and effectiveness of the curriculum developed and used by online companies prior to the online course may reveal beneficial information.
4. The current study did not take into consideration the socio-economic status of the students. This, along with many other factors, contributes to the success or failure of a student. Data should be collected from the public school enrollment information, if made available, to determine economic status of students.
5. The current study identified that online Algebra I students who passed the course were passing with a high "D" average (68.1 percent). Future studies may determine the correlation between the students' online results and state mandated test results.
6. Research could focus on the online curriculum, alignment with specific state standards and the results of criterion referenced tests.
7. Further research may also choose to focus on the success rates of specific ethnicities and gender.

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8. Another consideration for future studies in this area should employ a mixed methods approach, combining qualitative with quantitative research.

The complexity of online learning requires a thorough research study in order to predict success and benefit students. These future research considerations have been developed from information that appeared in the data analysis that was not directly tied to a research question. With the ever increasing enrollment in online education courses at the secondary level, researchers must continue to focus their efforts on what makes students successful. This research study is one of the very few efforts made to analyze the data from online education in a quantitative fashion. Because qualitative data alone may not be sufficient in furthering the relevant research to increase student achievement, a more balanced quantitative research approach is warranted. It is the duty of both online education agencies and local education agencies to optimize the use of available information in order to increase the success rates of online students.

SUMMARY

Chapter V began with a brief synopsis of the study including the research questions and corresponding hypothesis and study procedure for the study. Following were conclusions, connection to theory and a section on implications, including policy and practitioner recommendations as well possibilities for future research. These studies were designed to aid in the understanding of the issues involved with emerging opportunities for educating students online and identify

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the factors that contribute to the successful completion of online courses for secondary students. Secondary students who had chosen to enroll in an online course for high school credit were the focus of this study. Because this is a relatively new field of research, existing data was quite sparse.

Prior to this study, very little quantitative information was available about k-12 online education. Successful students have traits that allow them to overcome obstacles and complete academic courses with a positive outcome. Identifying the variety of factors contributing to the success of online students better serves students and educational agencies serving them. Once these success factors are more clearly defined, they can be used to identify students better equipped to successfully complete an online course.

The data were analyzed for research question one using a correlation coefficient, augmented with phi coefficient and point biserial analysis. Research question two was analyzed using a t-Test for independent means to determine significance. Research question three used a one way ANOVA test to examine the significance of achievement rates between groups coupled with a Tukey post hoc test evaluating the combination of results from the ANOVA.

Results of this study provide a glimpse into the underlying reasons why students may or may not be successful in online courses. Differences in the success rates of home school and public school students were not found to be significant. Similarly, the amount of time a student spent online proved insignificant to the success of the students. The success rate of students enrolling

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to advance their learning, however, proved to be statistically significant when compared against those who enrolled to make up credits or take their courses solely online.

This study and future studies will begin to fill the void of research, knowledge and application in this area and will aid students, educators and parents in deciding who should enroll in online courses. By being able to more clearly identify the criteria needed to successfully complete an online course, students will more frequently experience success. Additionally, educational staff will be able to more effectively advise students when deciding whether to enroll in an online course or continue in the more traditional classroom setting.

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