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FACTORS RELATING TO THE SUCCESS OR FAILURE OF COLLEGE ALGEBRA INTERNET STUDENTS: A GROUNDED THEORY STUDY

by

Christine Walker

A dissertation submitted in partial fulfillment
of the requirements for the degree

of

DOCTOR OF EDUCATION

in

Education
(Curriculum and Instruction)

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Logan, Utah

2008

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ABSTRACT

Factors Relating to the Success or Failure of College Algebra Internet Students: A Grounded Theory Study

by

Christine Walker, Doctor of Education

Utah State University, 2008

Major Professor: Janice L. Hall
Department: Education

The purpose of this grounded theory study was to discover the factors that contribute to the success or failure of college algebra for students taking college algebra by distance education Internet, and then generate a theory of success or failure of the group of College Algebra Internet students at one Utah college.

Qualitative data were collected and analyzed on students' perceptions and perspectives of a College Algebra Internet course that they took during the spring or summer 2006 semesters at a bachelor's degree-granting college in Utah. The participants were chosen from any of the six sections, and purposeful sampling was applied. Interviews played a major role in data collection. Each interview took place in person and was taped and later transcribed for analysis.

The outcomes showed that one theme emerged as the catalyst for success for a College Algebra Internet student, that of self-responsibility. Four other themes found in

the data helped, but were not necessary for success. Many enrolled based upon past experiences with personal environmental factors. It also helped to have a solid mathematical background, a good attitude, and a strong structural support network. However, those participants who prioritized and devoted their time to enriching their mathematical skills and staying focused on the goal had the most success in the course regardless of any other factor. By setting aside time and staying completely devoted to the course from the very beginning established, above all else, a successful outcome.

Motivation to continue in this path occurred either from an outside influence or by an innate drive to be successful in the course.

(258 pages)

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However, I have one unique person whom this work would not have been possible without and that is my husband, who so willingly tore out walls, reframed a new addition, ran electrical wiring, plumbed, sheet rocked, painted, tiled, sanded, installed, and every other thing a home remodel required while I buried myself in this work. Besides my wonderful husband are my support network that consists of my beautiful, smart, and wonderful children, Alan, Ashley, Britney, Hunter, and Austin. Throughout this entire process, they cleaned, cooked, laundered, and any other odd jobs they could find to ease the household burden from Mom.

Finally, my extended family as well needs a special recognition. My parents, in-laws, brothers, and sisters, I thank each of you for your love, support, and encouragement

as I embarked on this wild ride. It has been quite an experience and I share this important piece of work with you.

Christine Walker

CONTENTS

Page

ABSTRACT iii

ACKNOWLEDGMENTS v

CHAPTER

I. INTRODUCTION 1

Statement of the Problem 3
Purpose Statement 4
Theoretical Framework 4
Need for the Study 9
Research Questions 10
Limitations 10
Delimitations 11
Definition of Terms 12
Significance of the Study 12
Organization of the Study 13

II. REVIEW OF THE LITERATURE 14

Defining Distance Education 15
Features, Flexibility, and Growth with Respect to Distance Education 20
Historical Views on Models of Dropout 25
The Complex Phenomenon of Dropout 34
National Goals and Expectations, and Success and Failure Rates of College Algebra 35
Recent Research on Mathematics via Distance Education 38

III. METHODOLOGY 42

Research Design 43
The Setting 44
The Course 47
The Participants 50
Data Collection 52
Data Analysis 56
Trustworthiness 59
Summary 61

Page

IV. STUDENT STORIES 63

Participant One: Brenda 64
Participant Two: Ben 73
Participant Three: Chad 81
Participant Four: Adam 87
Participant Five: Kent 94
Participant Six: Ann 106
Participant Seven: Paul 114
Participant Eight: Linda 122
Participant Nine: Becky 132
Summary 151

V. CORE CATEGORY AND SUBCATEGORIES 152

Mathematical Self-Esteem–(Self-Confidence and Attitude) 153
Mathematical Preparation and Ability–(Mathematical Foundation Developed During Elementary, Secondary, and Post-Secondary Schooling) 159
Structural Support Network 167
Mathematical Environment–(Course Atmosphere/Comfort Ability) 175
Self-Responsibility–(Prioritization/Motivation-Dedication) 185
What Does It All Mean? 198
Summary 205

VI. SUMMARY, DISCUSSION, AND RECOMMENDATIONS 206

Introduction 206
Summary 206
Discussion 212
Recommendations for Further Research 221

REFERENCES 223

APPENDICES 238

Appendix A: Initial Letter and Consent Form 239
Appendix B: Student Interview Information Form and Questions 243

VITA 248

CHAPTER I

INTRODUCTION

In the past decade, and with the accessibility and exponential growth of the World Wide Web (WWW), colleges, universities, and educators across the nation have seen an explosion of requests to develop courses and, in some cases, entire programs through distance education (Blumenstyk, 1998; DeMoulin, 2005; Gibson & Herrera, 1999; Institute of Higher Education, 1999; Johnstone, 2007; Lorenzetti, 2008; Mathews, 2005; Matthews, 1999; Simonson, 2006; Trenholm, 2007).

Representing a response, corporations and education publishing companies have designed textbooks containing all encompassing internet software packages to accommodate the growing need of distance education. As a result, the number of distance education course offerings and the enrollments has increased dramatically during the past several years (Arbaugh & Benbunan-Fich, 2006; Caton & Pinelli, 2002; Gubernick & Ebeling, 1997; Hall, 1990; Harlow & Baenan, 2002; Martins & Kellermanns, 2004; Matthews, 1999; National Center for Educational Statistics [NCES], 1999, 2003). Many companies, as seen by *Thinkwell* and others are advancing rapidly to stages of live video streaming of all coursework, eliminating paper copies, CD's, and all other hands-on devices in favor of a complete inclusive "Internet" package (Pearson, 2008; Thinkwell, 2008; Wiley, 2008).

The problem plaguing distance education has been the high turnover in enrollment with dropout ending in failure of the course with distance education learners to be higher than that of on-campus learners (Hall, 1990; Institute of Higher Education,

1999; Levy, 2007; Liu, Gomez, Khan, & Yen, 2007; Osborn, 2001; Rovai, 2003; Stillson & Alsup, 2003; Xenos, Pierrakaes, & Pintelas, 2002). Some findings indicate dropout and failure rates of 30-50% in distance education courses in comparison to the on-campus learners of only 5-15% (Carr, 2000; Gilbert, 2000; Hall; Stillson & Alsup; Tollefson, Usher, Croker & Morrissey, 2003; Wang & Wu, 2004).

In the same decade came a consensus from the mathematical community that higher education was situated at the intersection of two major crossroads in our society. A need exists, now more than ever, for a well-educated citizenry and for a workforce, within the United States, adequately prepared in the areas of mathematics, science, engineering, and technology (American Mathematical Society [AMS], 2008; American Mathematical Association of Two Year Colleges [AMATYC], 1995; Mathematical Association of America [MAA], 2008; National Council of Teachers of Mathematics [NCTM], 2000, 2008; National Research Council [NRC], 2001). The mathematical community held firm to the belief that introductory college mathematics, termed college algebra for most institutions, holds the promise of opening new avenues to future learning, fulfilling careers and gaining employment, and playing a critical role in people's lives by improving our nation's vitality and progression (AMS; AMATYC; Foundations for Success, 2001; MAA; NCTM, 2000; NRC).

Today, the mathematics course college algebra is a general education requirement in most colleges and universities and, in some cases, an unconditional admission to undergraduate programs. Although, nationwide, almost half of the students who enroll in mathematics college algebra courses at colleges and universities fail or fail to complete

the course (Summerlin, 2003; Toubassi, 1999; Utah Valley State College [UVSC], 2007; Weinstein, 2004). As such, college algebra has become a barrier that prevents many otherwise successful students from advancing in their chosen fields of study (Hembree, 1990; House, 1995; NRC, 2001).

Colleges and universities responded to failure rates in college algebra by focusing their attention on the development of a variety of learning environments in which students may enroll. Because of the explosive growth of the Internet, college algebra as a required course was one of the first math courses to be considered for this transition. Combining the high dropout rate of distance education courses with the high failure rate of college algebra courses has had a deadly effect on the pass rate of math courses across the nation, especially the College Algebra Internet courses (Office of Institutional Research, 2005-2007; Stillson & Alsup, 2003).

Statement of the Problem

Presently, there is no research-based guidance for students or institutions as to which format of course offering could provide College Algebra Internet students with the best opportunities for success. In fact, during the review of distance education research commissioned by the IHE (1999, 2000) and updated by Mayes (2004), both groups found that there was a wide variance of achievement within the distance learning groups with a wide variety of factors (IHE, 2000; Mayes; Merisotis & Phipps, 1999), enunciating that "while there are a variety of experience-based recommendations…there is a lack of solid research" (Mayes).

Purpose Statement

A gap exists in the research as to what factors contribute to the success or failure of a student enrolled in a college algebra course by distance education Internet with no face-to-face interaction. Thus, the purpose of this grounded theory study was to discover the factors that contribute to the success or failure of college algebra for students taking college algebra by distance education Internet, and then generating a theory of success or failure of the group of College Algebra Internet students at one Utah College.

Theoretical Framework

For people to participate fully in society, they must know basic mathematics. To function in today's job market; students must learn to become good mathematical problem solvers and critical thinkers. Citizens who cannot reason mathematically are deprived of opportunities and are incompetent in everyday tasks (AMS, 2008; Foundations for Success, 2001; MAA 2008; NCTM, 2008; NRC, 2001; White House, 2007). The technologies used in homes and the workplace are all built on mathematical knowledge. Many educational opportunities and good jobs require higher levels of mathematics, and the mathematics students need to learn today is not the same mathematics that their parents and grandparents needed to learn (NCTM, 2000; The 2000 Standards are the latest from NCTM, an update is expected in 2009). Mathematical topics arise in newspaper and magazine articles, popular entertainment (like the new TV series "Numbers"), and everyday conversation.

Importance of Basic Mathematical Skills

The NRC (2001) pointed out that "jobs that contribute to this world economy require workers who…are prepared to absorb new ideas, to adapt to change, to cope with ambiguity, to perceive patterns, and to solve unconventional problems. It is these needs, not just the need for calculation (which is now done mostly by machines), that makes mathematics a prerequisite in so many jobs" (p. 1). According to the NRC, the number of mathematically based occupations was about twice the number for all other occupations.

The NCTM (2000) in their *Principles and Standards for School Mathematics* document concurred that

> the level of mathematics needed for intelligent citizenship has increased dramatically…all careers require a foundation of mathematical knowledge, some are mathematics intensive…. In this changing world, those who understand and can do mathematics will have significantly enhanced opportunities and options for shaping their futures. Mathematical competence opens doors to productive futures. A lack of mathematical competence keeps those doors closed. (pp. 4-5)

Since basic mathematical skills are essential in personal as well as in employment arenas, problems in this area have grim social and economic implications. When otherwise capable students avoid the study of mathematics, their career options are limited, diminishing the country's resource base in science and technology (American Educational Research Association [AERA], 2006; Hembree, 1990; Kirsch, Braun, Yamamoto, & Sum, 2007; Lemonick, 2006; White House, 2007). Deficiencies can occur in any academic area, but students seem especially susceptible to failures in mathematics (AERA; Blackner, 2000; Kirsch et al.; White House). Problems that begin in the public education setting continue into the higher educational setting with colleges and

universities reporting that the majority of their students need mathematics remediation (Office of Educational Research, 2005-2007).

Demand for College Algebra in Various Environments

Colleges and universities are responding to this epidemic by offering college algebra in a variety of learning environments in which students may enroll. Because of the explosive growth and popularity of the Internet, most of the development has been focused on distance education that relied on Internet communication technologies (Blackner, 2000; Borba, 2005; Schmit, 1998). College algebra, as a required course was one of the first math courses to be considered for this transition to a distance education course (Steig, 1999). In addition, the changing needs and lifestyles of students have supported the development and use of distance education in college algebra, free from constraints of time and place to provide a variety of programs and functions in order to help students achieve their academic goals.

Researchers have also found that some of the pressures for higher education to offer education anytime or anywhere are often driven by marketing considerations; to remain competitive; allow access to students who remain a distance from the instructional site; have limited time to access the instruction; transportation limitations and expenses; personal physical disabilities; traditional students who are ready to try something different; and, nonschool-related commitments such as children at home and jobs (DeMoulin, 2005; Gibson & Harris, 2008; Gibson & Herrera, 1999; Gubernick & Ebeling, 1997; Johnstone, 2007; Matthews, 1999; Nasseh, 1997; Rintala, 1998;

Trenholm, 2007; Weems, 2002).

In response to demands from the public, money constraints for higher education, and the accessibility of the WWW, one of the most visible initiatives has been the virtual university involving a consortium of 21 colleges and corporations in 17 states and Guam. Former Utah governor Michael O. Leavitt and Roy Romer of Colorado formed the Western Governors University when they were looking for a new venture to offset political pressures from some communities to expand campuses. In Utah, the nine public colleges are already at or near their capacity, with head-count enrollments in the 2-year institutions increasing by more than 34,000 students, an increase just in the 2004 year of 156% and an overall head-count enrollment growth increasing to 64,000 students, an 85% increase (Bracco & Martinez, 2005; Utah System of Higher Education [USHE], 2003-2004).

Representing a response, corporations and education publishing companies have designed textbooks containing all encompassing Internet software packages to accommodate the growing need of distance education. Microsoft, IBM, and software designers such as PLATO, Houghton Mifflin, Prentice Hall, Thinkwell, and a proliferation of other multibillion dollar industries would like nothing better than to see technology take on a much larger role in higher education to make more money (Maddux & Johnson, 2001; Yushau & Bokhari, 2004).

Increase in College Algebra Enrollment Paralleling Dropout Rates

As a result, the number of distance education course offerings and the enrollments

has increased dramatically during the past several years (Arabaugh & Benbunan-Fich, 2006; DeMoulin, 2005; Gubernick & Ebeling, 1997; Hall, 1990; Johnstone, 2007; Martins & Kellermans, 2004; Matthews, 1999; NCES, 1999, 2003; Trenholm, 2007). However, the problem plaguing distance education has been the high turnover in enrollment with dropout ending in failure of the course of distance education learners to be higher than that of on-campus learners (Hall, 1990; IHE, 1999; Levy, 2007; Liu et al., 2007; Osborn, 2001; Rovai, 2003; Stillson & Alsup, 2003; Xenos et al., 2002). Some findings indicate dropout and failure rates of 30-50% in distance education courses in comparison to the on-campus learners of only 5-15% (Carr, 2000, Gilbert, 2000; Hall; Stillson & Alsup; Tollefson et al., 2003; Wang & Wu, 2004). A student dropout and failure rate in distance education is a recognized major problem that has social, economic and educational implications (AERA, 2006; Carr; Hall; Kirsch et al., 2007; Osborn; Thompson, 1999).

In 1999 and then again in 2000, The IHE commissioned a panel to undertake a thorough review of the distance education literature, including everything from original research to how-to articles to policy papers. In 2004, the Appalachian Collaborative Center for Learning, Assessment, and Instruction in Mathematics (ACCLAIM) commissioned a review of the literature with a restriction to post–1990 articles with mathematics distance education as its focus. Both groups determined to find answers to several key questions: What are the findings of the research on the effectiveness of distance education? Are there gaps in the research that require further investigation and information? What does the literature suggest for further research? What are best

practices? (IHE, 1999, 2000; Mayes, 2004). The IHE panel and the ACCLAIM representative Mayes identified several gaps in the research where specifically it did not adequately explain why the dropout and failure rates of distance learners were higher. In a number of studies, evidence indicated that a higher percentage of students participating in a distance-learning course tended to drop out before the course was completed compared to the traditional classroom. It was a disturbing outcome for both groups and one in which they felt deserved further research (Carnevale & Olsen, 2003; IHE, 1999, 2000; Maye; Merisotis & Phipps, 1999).

Need for the Study

As a direct result, many campuses across the nation, including UVSC, a theoretical solution was met with appropriate prerequisites for enrollment in college algebra which included successful completion of the previous mathematics course, intermediate algebra, or equivalents SAT or ACT scores (Adams, 2004; Summerlin, 2003). Although this helped to determine mathematical preparation, it had little value in determining dropout, failure, or completion rates. Nationwide, almost half of the students who enroll in mathematics college algebra courses at colleges and universities fail or fail to complete the course (Summerlin; Toubassi, 1999; Weinstein, 2004). At UVSC it is common knowledge that most students will retake college algebra a minimum of two times (R. Loveridge, personal communication, January 2005).

Therefore, colleges and universities responded to failure rates in college algebra by focusing their attention on the development of a variety of learning environments in

which students may enroll. Because of the explosive growth of the Internet, college algebra as a required course was one of the first math courses to be considered for this transition. Currently any student who meets prerequisites to take college algebra at UVSC is allowed to register for any mode of instruction, from traditional to Internet. Combining the high dropout rate of distance education courses with the high failure rate of college algebra courses has had a deadly effect on the pass rate of math courses across the nation and at UVSC, especially the College Algebra Internet courses (Office of Institutional Research, 2005-2007; Stillson & Alsup, 2003).

Research Questions

The research questions for this grounded theories research study are: What theory explains the phenomenon of success or failure of College Algebra Internet students? What are the primary factors that helped in progressing in the course? What are the primary factors that hindered progress or were barriers that impeded progress or even stopped progress in the course? What caused these factors? How did these factors hinder progress and completion, or eventual success in the course? What strategies were used to overcome these factors? What were the consequences of the strategies used?

Limitations

The study was limited to:

1. The size, design, and make-up of the course. At UVSC, students are not randomly assigned to a type of delivery method for the College Algebra Internet course.

It is based upon number of credit hours completed, so early registrants are those who have completed more credit hours at the institution and they are free to select from the Internet or traditional college algebra. Some late registrants may have chosen the Internet college algebra as a last resort although their choice would have been a traditional setting.

2. The quality of the College Algebra Internet course. The software package utilized at UVSC has not been evaluated by comparison to other Internet college algebra courses at other institutions. Although, in 2003 the researcher and the college algebra course were recognized by the Utah Continuing Education Association Region West, for the course production of the online college algebra as part of the Aviation Bachelor of Science Online Degree for its innovative programming outreaching to locations outside of Utah.

3. One software package from one particular company that was adopted by the Academic Vice President of UVSC.

Delimitations

The study was delimited to:

1. Students enrolled in College Algebra Internet only in the spring 2006 and summer 2006 at Utah Valley State College.

2. The participants enrolled in the College Algebra Internet courses only.

3. The computer-based Internet instruction at a distance only including the textbook,

4. Study guide, homework, syllabus, solutions manual, and software package

used by all students in the College Algebra Internet course.

Definition of Terms

1. *Internet Course* – was used in this study as a combination of computer-assisted instruction, email, and WebCT instruction. Communication between instructor and students was by Internet through WebCT, email, discussion board, phone, or in person. Homework, quizzes, and study exercises were performed on-line through the software package on a personal computer at home. Exams were either administrated by proctors at the student's site off-campus or on-campus at the classroom testing center.

2. *Success* – when referring to success rate of students for this study it meant completing the Math 1050 college algebra course with a grade C- or better.

3. *Failure* – when referring to failure rate of students for this study it meant students who received a W, I, E, UW, or a grade D+ and below.

Significance of the Study

Discovering a theory for success of prospective College Algebra Internet students could allow guidance counselors, distance education, and mathematic departments a method to advise students to enroll in the type of instruction best suited for each individual, assess student needs, and predict the at-risk population in the distance learning environment. By identifying a theory about methods that students have found successful, educators can begin to use these methods in other online mathematics courses as ways to improve the success rates in a college algebra distance education Internet course.

Organization of the Study

This study is presented in a six-chapter organizational format. The first chapter provided a general overview, the foundation and statement of the problem, the purpose of the study, the limitations and delimitations, and the definitions of terms that will be used throughout the study. Chapter II will review relevant literature and will provide background for the study. Methodology will be discussed in Chapter III with information about the setting, the course, the participants, the data collection procedures, and the procedures for analysis of the data. Chapter IV contains the student stories in an attempt to capture the experiences of each participant. An analysis of the data will be presented in Chapter V, which revealed that students were influenced by four distinct subcategories and one core category. The constructions of the major theme or core category and the subcategories were pieced together based on the participant interviews, participant transcripts, researcher memos, journal entries, with Chapter VI containing the summary of the dissertation, discussion, and recommendations for further research.

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of this literature review is four-fold; to understand the origins, and various evolving definitions of distance education, to discuss distance education with respect to the features, flexibility, and growth, to analyze the features and explanations for dropout and resulting failure rates in distance education, and to review the national goals and expectations, and success and failure rates of college algebra students in higher education with a focus on college algebra implemented through distance education Internet.

There is a good deal of research dealing with distance education, with a wide variety of definitions. Most of what is happening in the name of distance education is simply traditional pedagogy and traditional structures of higher education with the addition of new technology. Varieties of terms appear in the literature, such as e-learning, flexible learning, open learning, and so on. All this is part of distance education, and none of it alone is distance education. Therefore, it is important to understand what is meant by "distance education." For the reason that technology is evolving, the definitions of what distance education is, continues to change.

There is an impressive amount of writing that concludes that distance education is viable and effective. Most of the studies conclude that regardless of the technology used, distance education courses compare favorably with classroom-based instruction and enjoy high student satisfaction. Regardless, distance education has one primary obstacle, the exceptionally high dropout and resulting failure rates of students.

Currently on college and university campuses across the nation, college algebra has become a general education requirement for most baccalaureate degree programs. While more students are being required to enroll in college algebra, dropout and failure rates exceeding 50% are not uncommon on college campuses (Berry, 2003; Duncan & Dick, 2000; Office of Institutional Research, 2005-2007; Parker, 2005). Combining dropout rates in distance education courses with dropout and failure rates in college algebra courses, colleges and universities are facing a challenge of epidemic proportions. The literature is the key to understanding the dropout and failure rates of college algebra.

Defining Distance Education

Within the last two decades, and with the current explosion of technology; the availability and accessibility of personal computers; the Internet and the WWW, distance education has taken on a new role in higher education. According to the NCES (2003), in the academic year 2000-01, 90% of public 2-year and 89% of public 4-year institutions offered distance education courses, which is 31% more than the 1997-98 statistics. Public institutions were more likely to offer distance education courses than were private institutions. College-level, credit-granting, distance education courses at either the undergraduate (48%) or graduate/first-professional level (22%) were offered by 55% of all 2- and 4-year institutions. In the 12-month academic year, there were an estimated 3,077,000 enrollments in all distance education courses with an estimated 2,876,000 enrollments in college-level, credit-granting distance education courses, and 82% of these at the undergraduate level. Of the institutions that offered distance education courses in

the academic year, 51% offered between 1-30 courses and 49% offered between 31-100 distance education courses. Saba (2005) estimated that with the recent growth of the field, the number of students who receive part or all of their education at a distance could be well over six million and if current trends continue it would be just a matter of time before distance education becomes the dominant form of teaching and learning.

The Internet and two video technologies were most often used as primary modes of instructional delivery for distance education courses. The majority (90%) reported that they offered Internet courses using asynchronous computer-based instruction (which occurs when students and teachers do not have person-to-person direct interaction at the same time or place [IHE, 1999]), and 43% offered Internet courses using synchronous computer-based instruction (which occurs when teacher and student are present at the same time during instruction–even if they are in two different places [IHE]), whereas 48% used CD-ROM or multi-mode packages. Furthermore, 88% of institutions indicated plans to start using or increase the number of Internet courses using asynchronous computer-based instruction in the next 3 years as the primary mode of instructional delivery.

The most recent Sloan Consortium report confirms the impact of online education. According to this report, 40%-60% of schools with traditional courses also offer online courses and programs. One indication that online courses are now a regular activity of institutions of higher education is the role of core faculty in online instruction. The report *Growing by Degrees* (Allen & Seaman, 2005) indicated that two thirds of online courses are taught by regular faculty, a percentage that is higher than the

percentage of regular course taught by core faculty. Enrollments in online courses have increased to about 2.4 million from 2 million in 2003. Growth has been continuous and has often exceeded the expectations of organizational planners. It is now being viewed as a normal activity of colleges and universities (Simonson, 2006).

Evolution of the Definition of Distance Education

Distance education previously referred to as distance learning or correspondence learning (Bernard et al., 2004) has evolved over the years with its earliest beginnings in the 1800s. The early stages were denoted by correspondence courses consisting of written materials sent to learners and completed assignments returned via mail delivery systems (Matthews, 1999; Pierre, 1998). A group of self-directed learners converging in Chautauqua, New York, decided to project their teaching beyond its point of origin, which later became a national book club, as well as a correspondence education movement (Pitman, 2003).

Over the years, attempts have been made by a number of researchers to define this new and quickly developing field of education. Various definitions of distance education have been proposed but the fundamental concept of distance education found in many of the definitions has been the separation of teacher and learner by distance and time. Holmberg (1980) described distance education as an educational strategy where principle learning occurs “without students’ and tutors’ [teachers] meeting personally and without any class-room teaching” (p. 107). The distinguishing feature in distance education is that the learner is at a distance from the teacher for most or even all of the time during the

teaching-learning process.

Keegan (2000) proposed a set of five characteristics that has been widely quoted in professional publications and is one of the classical references to the definition of distance education:

1. The quasi-permanent separation of teacher and learner throughout the length of the learning process (this distinguishes it from conventional face-to-face education);

2. The influence of an educational organization both in the planning and preparation of learning materials and in the provision of student support services (this distinguishes it from private study and teach-yourself programmes);

3. The use of technical media–print, audio, video, or computer–to unite teacher and learner and carry the content of the course;

4. The provision of two-way communication so that the student may benefit from or even initiate dialogue (this distinguishes it from other uses technology in education); and

5. The quasi-permanent absence of the learning group throughout the length of the learning process so that people are usually taught as individuals and not in groups, with the possibility of occasional meetings, either face-to-face or by electronic means, for both didactic and socialization purposes.

Current Updates to the Definition of Distance Education

As distance education progressed other authors proposed updates to the earlier definitions of distance education. Rumble (2001) extended the former definition to

indicate that the distance education process must include a teacher, one or more students, a course or curriculum, where the student, teacher and institution that sponsor the instruction are physically separated. He also indicated that learning is accomplished in the physical absence of the teacher. Most recently, Rekkedal and Qvist-Eriksen (2003) added the following adjustments to incorporate the idea that Online Education a subset of distance education (anytime, anyplace) "can occur through the use of computers and computer networks to unite the teacher and learners and carry the content of the course with the provision of two-way communication via computer networks so that the student may benefit from or even initiate dialogue" (p. 1).

Taylor (2001) and Rumble (2001) described this progression of distance education as a rough continuum of increased flexibility, interactivity, delivery of materials and access through four generations in which the first and second generations evolved through the latter part of the 1960's. The "third generation" (IHE, 1999) was heralded in by Hypertext, teleconferencing, videoconferencing broadcast by TV/Radio, progressing to the "fourth generation" characterized by flexible learning (e.g. Internet-accessible courses, Interactive Multimedia, Internet based access to WWW resources, and computer mediated communication). Taylor added a "fifth generation" to this model composing of online interactive multimedia, Internet-based access to Web resources, where there is a high degree of learner control, two-way communication (through individual or group e-mail, website with discussion boards, chat rooms, etc.), which all provide a greater flexibility in learning.

Moore and Anderson (2003), and other pioneers in the field of American distance

education, have a twofold definition that describes distance education. Distance Education is a planned activity that occurs in a different place from teaching and therefore merely surfing the Web is not distance learning. Second, distance education requires “special” methods and techniques that are distinct from methods and techniques of other kinds of educational endeavors with changes in the organization structure and pedagogical methods.

The most recent conceptualization of the field that defines distance education comes from Moore and Kearsley (2005). They defined distance education in social terms; specifically, the transaction between the learner and the teacher and among learners. They define distance education as a social and psychological phenomenon. It is measured by the independence that the learner requires in the teaching and learning process and the requisite structure that the instructor or the instructional institution must bring to bear to ensure that learning objectives have been met by students.

Features, Flexibility, and Growth with Respect to Distance Education

Researchers (Brand, 1995; Braun, 2008; Carswell, Thomas, Petre, Price & Richards, 2000; Coombs & Rodd, 2001; Gibson & Harris, 2008; Goodwin, Miklich & Overall, 1993; Keegan, 2000; Kim-Rupnow, Dowrick & Burke, 2001; Motiwalla & Tello, 2000) described factors that make distance education such a popular mode of learning. Distance Education provides educational opportunities to those constrained by geography, employment status, constraints of space and time, offering flexibility in the curriculum and content of materials. It allows access to higher education for those who

might otherwise not have access (e.g., those individuals whose work schedules make it difficult to take campus-bound courses, those with disabilities, or responsibilities that keep them house-bound, or whose who live a long way from any college campus). Distance education increases access to higher education with flexible scheduling of personal time (Gibson & Harris, 2006; Jenkins & Downs, 2003), a convenient location (home or office), individualized attention by instructor, less travel, and increased time to think about, and respond (via email or discussion boards) to questions posed by the instructor or other classmates (Matthews, 1999).

Some of the developments that led to the growth of distance education include greater accessibility and affordability of personal computers, longer work schedules, and a stronger demand for "just in time" learning that better accommodates an active lifestyle (Anderson & Jackson, 2000; Jenkins & Downs, 2003; Robinson & Doverspike, 2006).

Other advantages include increased access to the professor, an overall increase in student participation, and an improved ability to apply the course material to new concepts (Romeo, 2001). Smith, Smith, and Boone (2000) found that students had significantly more participation in the online discussion (100%) versus the traditional classroom (77-82%), implying that the online discussion provided the student with a level of control and comfort that afforded increased participation. As for student academic outcomes, the students performed equally under both conditions (Meyer, 2002; Neuhauser, 2002; Rovai, 2002; Young, 2006; Young, Cantrell, & Shaw, 2001).

Documented Findings on Features and Flexibility

Shea, Motiwalla, and Lewis (2001) surveyed distance education coordinators from 250 higher education institutions to investigate the problems and issues faced by administrators managing distance education program, to determine to who distance education programs should be targeted. The study found two characteristics that students liked best. They were "convenience" and "no fixed class location," referring to the flexibility of "anytime, anyplace" learning. In a study comparing online instruction and traditional, Cooper (2001) found similar results with online students citing "convenience" and "flexibility" as the primary reason for choosing to take the online course. Again, there was "no significant difference" in the grade distribution at the end of the course.

Similar results were documented by Goodwin and colleagues (1993) who examined the perceptions and attitudes of students and faculty towards computer-mediated learning. The students reported that they chose distance education because of the flexible schedule and preferred not to commute and "enjoyed the luxury of not having to commit to a specific class meeting time."

In a research project carried out by Coombs and Rodd (2001) qualitative evaluation of students participating in an Integrated Masters Program determined that the most important quality-related issue was that of improved student access to education. The students who completed the distance education course indicated that they would not have enrolled in the traditional course because of various social commitments. Higher education learning opportunities were realized through the distance education course. The students reported that the major advantage of the distance education course was the

opportunity of working in their chosen venue, on their own, time, and at their own pace. A finding reiterated by Tollefson and colleagues (2003) in their study of distance education Bachelor of Science Nursing students.

Motiwalla and Tello (2000) conducted an exploratory study of Internet-based distance education programs to determine the effectiveness of a distance education model on student satisfaction. The researchers found that the students had a positive experience with their courses, appreciated the flexibility of being able to access course material any time and any place, and were satisfied with quality and course content.

In a project comparing student outcomes in an undergraduate research course taught using both distance education and traditional instruction, Leasure, Davis, and Thievon (2000) concluded that the distance education courses helped to bring out methods of communication that were not traditionally found in traditional classrooms, the students immersed themselves more in the distance education course, and that there was "no significant difference" in the outcomes of the two course delivery methods.

Carswell and colleagues (2000) examined student's experiences with an Internet course to determine what real gains there might be and found that students taking the distance education course via Internet had a range of abilities and backgrounds and were very similar to students in the traditional courses. The study also determined that the Internet student experiences were favorable because of the following factors. The students appreciated the turnaround time of assignments, the timely feedback and an increased interaction with the instructors and the other students.

Kim-Rupnow and colleagues (2001) examined case studies that correlated to

students with disabilities taking a distance education course. The results demonstrated that distance education substantially increased access to higher education for individuals with disabilities, those who would not have otherwise sought out higher education opportunities.

As the questions for this study were being researched, there existed substantial amounts of publications, reports, and data that suggest that there is "no significant difference" when comparing traditional (face-to-face) instruction with distance education and online learning, with respect to students perceptions and outcomes (Meyer, 2002). The question of why some students successfully study through distance education while others do not is becoming increasingly important as distance education moves from a marginal to an essential role in higher education (Powell, Conway, & Ross, 1990). One of the foremost reasons for providing distance education is to offer access to students who normally would not be able to participate in higher education. If a substantial number of students fail to complete their courses or just fail, the notion of access becomes meaningless. This being the case, the focus of the study needed to include the exceptionally high dropout and resulting failure rates of distance education students.

Features and Explanations for Dropout and Resulting Failure Rates in Distance Education

As distance education courses and enrollments continue to increase dramatically, course completion rates remain low when compared to traditional face-to-face courses. The critical question in higher education is, "Why?" The topic of student dropout and resulting failure rates is a complex phenomenon with no single easy way of solving the

problem and due to its proliferation, the concern for this problem is higher than in conventional education (Belawati, 1995).

Historical Views on Models of Dropout

To gain an understanding of dropout in distance education, a historical view of the models of dropout is in order. The more prominent and widely cited views of dropout can be traced back to Tinto (1975). In his model, Tinto regarded persistence for student completion of higher education courses largely as an outcome of the students' academic and social integration at the college or university. According to his model, personal characteristics and student histories that students bring with them to the college or university become integrated into the academic and social systems of the institution.

Tinto (1975) defined academic integration in terms of scholarly achievement, including the student's involvement with intellectual activities and service offered by the institution. Social integration is defined by the students' participation in the extra-curricular activities of the college campus life and the frequency and quality of contact with faculty members. To no surprise, Tinto determined that the higher the level of academic and social integration the student achieves, the less likely the student would be to dropout, or the more interactions with the social and academic environments of the school the higher the completion of educational goals and institutional commitment. His model of dropout shows that the student's family background (social status, values, expectations), individual attitudes (sex, race, ability), and precollege schooling (GPA and academic and social attainments) all have an impact on college performance and student

dropout. These factors interact with the individual's goal commitments and institutional commitment (Tinto, 1993).

Kennedy and Powell (1976) studied withdrawal behavior for students enrolled in the British Open University system. The researchers formed a "descriptive model" to explain dropout that falls within two categories of variables: dropout caused by the combination of student characteristics, and their life experiences. Student or personal characteristics show little or no change, such as motivation, educational background, educational self-concept, personality, aptitude, and state of adult development. On the other hand, life circumstances, change faster and include items such as health, finances, occupational changes, support from the institution, family relationships, and peer relationships.

Following up on Tinto's (1975) model, Terrenzini and Pascarella (1980) conducted studies in dropout in higher education and confirmed the findings of Tinto that indicate that students come to a particular institution with a range of background characteristics (gender, race, academic ability, secondary school performance, and social status) and goal commitments (the highest degree a student expects to earn and the importance of earning that degree). These background characteristics and goal commitments influence how well the student will perform in college. They also found that characteristics focusing on intellectual or course related matter contributed the most to persistence in college. In 1983 and again in 1986, Pascarella and his associates (Pascarella & Chapman, 1983; Pascarella, Smart, & Ethington, 1986) tested the validity of the model in several different settings and found that the effect of academic integration

on dropout was stronger than the effect of social integration for students in commuter colleges. Although typical for a distance education student, the study still focused on the non-traditional student (those who do not live in the college residence and must commute to class) who still received instruction in face-to-face classes.

In a follow-up model to Tinto (1975), Bean and Mezner (1985) felt that Tinto's model did not distinguish between traditional and non-traditional students. Although non-traditional students are assumed to be distance education students, the model proposed by Bean and Mezner were non-traditional students in the sense that they still received instruction via face-to-face but were in an age bracket older than 24, did not reside on campus, or was part-time. This still not account for distance education students as defined by Keegan (2000).

Revision of Historical Views on Models of Dropout

Kember (1989) determined that the previous models needed considerable modification if they were to be applied to a distance education student. Kember felt that the background characteristics and external environment in Tinto's (1975) model needed to be broadened to include the student's individual situation, their family life, employment situation, and other measures of educational background assuming that since distance education students study away from the institutions, these characteristics have greater importance in the students' life.

The outcomes found by Kember (1989) were demonstrated by those students who were unable to reconcile the demands of distance education courses with their personal

lives therefore were more likely to dropout, or the student who worked hard all semester only to receive a low grade were more likely to dropout or fail. Unfortunately, Kember felt that the model left many unanswered questions about this complex problem, and should be viewed as an initial step in identifying relevant constructs rather than as a predictor of outcomes.

Following Kember's (1989) model of dropout from distance education, Kember, Lai, Murphy, Siaw, and Yuen (1992) developed an instrument to describe and examine student dropout in distance education. The Distance Education Students' Progress (DESP) Inventory contained 54 items plus 18 background variables. The inventory was designed to measure four dimensions of distance education student's learning experiences, academic accommodation, academic incompatibility, emotional support and external attribution. According to the model, students are not predestined by their entry characteristics to fail, succeed or drop, rather, the progress of students is influenced by the quality of the course, the academic support environment, and the degree to which the student is able to mesh the demands of academic study with work, family, and social needs. The model also suggested that student's without the traditional entry qualifications can succeed in distance education, however, students who are unable to reconcile the demands of distance education with their personal lives were more likely to dropout. Lastly, the student who works hard during the semester only to receive a low grade was more likely to drop out than those receiving higher grades (Kember, Lai, & Murphy, 1994).

Thompson (1999) used the concepts of the Kember and colleagues (1992) DESP

Inventory to study fourth year Bachelor of Education students taking distance education. She sought to determine if any scales or sub-scales derived from the DESP Inventory might be used as predictive tools for dropout. She found that the items in the DESP Inventory were useful in developing a model of persistence in distance education when the outcome variables are defined as GPA. However, the Inventory was only moderately useful in determining which students might withdraw from the distance education course.

Based upon four theoretical models of dropout (Billings' Model of Correspondence Course Completion, Tinto's Model of Student Persistence, Kennedy and Powell's Descriptive Model, and Kember's Model), Osborn (2001) developed a framework of dropout. She produced and tested an instrument based upon three general areas in understanding student's decision; they were entry characteristics, social integration, and academic integration. The study found that student's dropout was due to unforeseen circumstances such as illness, family problems, or changes at work at a rate that exceeds the dropout rate for traditional (face-to-face) student's population.

Ever-Changing Views on Models of Dropout

For Rovai (2003), Tinto's (1975), and Bean and Metzner's (1985) models were used to synthesize a composite model to better explain dropout among nontraditional students that enrolled in a distance education course. He found that there was no simple formula that ensured persistence, or no single attribute that determined dropout. Rovai suggested that deficiencies in academic preparation, funding for college, inadequate child care arrangements, or non-negotiable works schedules were predictors for dropout. Essential elements of success were students' involvement in and attachment to their

school, a creation of a learning community to each other and the institution, frequent contact with faculty, and good instruction design and pedagogy were all elements of persistence. A final suggestion he proposed was an initial face-to-face residency to help integrate students' into the institution.

Generally, reducing dropout is a major challenge in the field of distance education. In the Chronicle of Higher Education, Carr (2000) reported that dropout rates around the country for distance education was as high as 50% with rates often 10-20 percentage points higher than in traditional courses. At Tyler Junior College in Texas, the distance education course completion rate was 58% in comparison to traditional course completion rate of 71%. Professors and students cited dropout reasons as marriages, job changes, pregnancies, and other personal and professional transitions. An interesting fact that Carr found was that distance education courses contained more than half traditional students, those in their teens or early 20's who were attending on campus courses concurrently. Similar results reported by Guernsey (1998) who found that a surprisingly large proportion of traditional students (local and younger than expected) are easing their schedules by taking distance education courses.

Recently, at a large European University, Coombs and Rodd (2001) developed and delivered a Higher Education course with the goal to provide remote learners with the opportunity to take a masters degree course. Out of the original sixteen participants, four actually completed the course with only two who submitted the final assignments. Student dropout was the major issue (75%) facing the researchers with reasons cited by the students as lack of accessibility to suitable hardware, and participant's employments

pressures. One surprising discovery was that some of the students found that the challenge of mastering the technology was far greater than expected and felt that they could not handle the technology and content together. This concurs a similar finding of a long-term evaluation case study conducted by Chyung (2001) where students cited hardware and/or software incompatibility.

Unfortunately some institutions learned this lesson the hard way. A group of organizations that included Columbia University, the University of Massachusetts, the American Film Institute, the British Library, Cambridge University Press, the London School of Economics, the National History Museum in London, the New York Public Library, RAND, the Science Museum in London, the University of Chicago, the Victoria and Albert Museum, and the Woods Hole Oceanographic Institution, established an online, for-profit higher education institution called Fathom.com. Columbia University provided most of the initial investment for this "digital consortium," which amounted to $30 million. The venture's target market was individual learners who were interested in learning about a variety of subjects. Between 1999 and 2003, more than 65,000 students registered in 2000 courses offered by Fathom.com. Eventually, however, on March 31, 2003, the company folded. Commenting about its demise, Dr. Ann Kirschner, CEO of Fathom.com, said: "The average consumer still doesn't understand what online learning really is" (Mitchell, 2003).

High student dropout rates (35-50%) at Wright State University in Dayton, Ohio in the Internet distance education course motivated O'Brien and Renner (2002) to conduct a study to determine and hopefully amend the high dropout rate. Findings

included factors that would positively influence retention such as, comfort level with the technology, since the lack of familiarity with the delivery system was a huge issue, and trust with the online faculty generating trust in the online environment.

Applying Kennedy and Powell's (1976) model, Kemp (2002) sought to investigate the relationship between persistence, life events, external commitments, and resiliency in an undergraduate distance education course. A correlational design was used in the study, along with a survey to assess these predictors. The dropout rate was found to be 53% with the following variables having no significant contribution; gender, previous distance education experience, life events, family, personal, home, community, and financial commitments. These findings in large part are inconsistent with most other research that suggests that external commitments are related to dropout. The only external commitment that was significantly correlated was work commitments.

Recent Research on Models of Dropout

Recent findings are indicating that the historical models of dropout focused on personal circumstances are not addressing the high dropout rates today; instead, findings are indicating epistemological factors, which include problems with course material and content. Rausch (as documented by Lorenzetti, 2004) surveyed students who enrolled in an online course during the 2001-2002 academic years, particularly those who had dropped the course between the twelfth class day and the mid-term. Students who had dropped were specifically asked the question of why they dropped out. The survey responses fit into four categories: (a) situational factors, such as job, family, or home life changes, which the university has little or no control over; (b) institutional factors, or

difficulties within the university; (c) dispositional factors, which include students attitudes towards the distance education course; and (d) epistemological factors, which includes problems with the course material or content. Rausch believed that dropout could be addressed by good academic advising, specifically to determine if the students are ready for distance education study with respect to rigor and content, or which, if any, online course is suitable for a particular student.

Bailey (as cited in Carr, 2000), the director of institutional research at Tyler, said he believed colleges were moving toward a point where students may be matched with a particular delivery medium based on their learning styles and on their lives. Clark (1999) made a point that although the complexity and flexibility of multi-media instructional environments can be beneficial it may also bring a large and almost unrecognized danger. Evidence suggested that learning benefits from multimedia and hypertext research, yet, can also cause learning problems for some learners. Clark suggested that learner control and accommodating learner styles may help to increase learning in multi-media instructional environments.

Schaik, Barker, and Beckstrand (2003) agreed with research findings that indicated that there was no significant difference in learning outcomes between courses taught by regular classroom instruction, and (similar) courses delivered by distance education, although the dropout and subsequent failure rates were higher. The researchers and the National Postsecondary Education Cooperative (2004) both suggested that based upon the data, the high dropout rate could be due to the lack of prerequisite domain knowledge. They urged future researchers to shift focus from comparisons of

distance education courses and traditional, to a central focus of dropout rates within distance education courses, and to consider matching students with course content and course delivery methods before a student enrolls in a distance education course.

The Complex Phenomenon of Dropout

The value of a college education, both to the individual and society in general is evident with respect to future jobs, annual earnings for college graduates, and benefits to society, such as greater productivity, increased charitable giving, community service, and enhanced quality of civic life (IHE, 1999). The role of technology, with its increased access to the WWW opens up many opportunities for students to participate in higher education, yet, offering distance education courses with high dropout rates seems to be back-pedaling. The literature on this subject contains a plethora of references that conclude that distance education compares favorably with traditional (face-to-face) classroom instruction. However, an analysis of the literature just shows that dropout is a complex phenomenon, which lacks a construct of prediction.

From the student's perspective, Bajtelsmit (1991) indicated that the negative effects of dropout are loss of opportunity for personal and career advancement, lowered self-esteem, and increased likelihood of future disengagement. It is a serious problem that so many distance education students choose not to continue towards a goal that they have chosen for themselves. It has been said that there is a risk of the open door becoming a revolving door where students are encouraged to enroll in a course just to find themselves unable to complete it. It then becomes imperative to find out more about

the experiences of students that lead them to withdraw or persist with their study.

National Goals and Expectations, and Success and Failure Rates of College Algebra

For people to participate fully in society, they must know basic mathematics. To function in today's job market, students must learn to become good mathematical problem solvers and critical thinkers. Citizens who cannot reason mathematically are deprived of opportunities and are incompetent in everyday tasks (NRC, 2001). The technologies used in homes and the workplace are all built on mathematical knowledge. Many educational opportunities and good jobs require higher levels of mathematics, and the mathematics students need to learn today is not the same mathematics that their parents and grandparents needed to learn (NRC, 2001). Mathematical topics arise in newspaper and magazine articles, popular entertainment (like the new TV series "Numbers" on the CBS Network), and everyday conversation (NCTM, 2006).

National Goals and Expectations

The NRC (2001) pointed out that jobs that contribute to this world economy require workers who are prepared to absorb new ideas, to adapt to change, to cope with ambiguity, to perceive patterns, and to solve unconventional problems. It is these needs, not just the need for calculation (which is now done mostly by machines), that makes mathematics a prerequisite in so many jobs. According to the NCTM, the NRC, and countless other national math organizations the number of mathematically based occupations is about twice the number for all other occupations and rising (Chanter &

Welsh, 2000; Flick & Lederman, 2004; Saffer, 1999).

The National Council of Teachers of Mathematics (NCTM) in their *Principles and Standards for School Mathematics* document (2000) concurs:

> The level of mathematics needed for intelligent citizenship has increased dramatically…all careers require a foundation of mathematical knowledge, some are mathematics intensive…. In this changing world, those who understand and can do mathematics will have significantly enhanced opportunities and options for shaping their futures. Mathematical competence opens doors to productive futures. A lack of mathematical competence keeps those doors closed. (p. 4-5)

Dropout and the Resulting Effect

Since basic mathematical skills are essential in personal as well as in employment arenas, problems in this area have grim social and economic implications. The Arkansas Department of Higher Education estimated that if Arkansans had the average education and associated income of the U.S., state revenues and the budget could be from $2 to $7 billion more each year (Beene, 2003). When otherwise capable students avoid the study of mathematics, or cannot complete their required college mathematics, their career options are limited, diminishing the country's resource base in science and technology (Parker, 2005).

Deficiencies can occur in any academic area, but students seem especially susceptible to failures in mathematics (Blackner, 2000; Cortes-Suarez, 2005; Parker, 2005; Rouse, 2005). Problems that begin in the public education setting continue into the higher educational setting with colleges and universities reporting that the majority of their students need mathematics remediation (Berry, 2003; Data Subcommittee, 2006; Parker, 2005). In a study conducted at North Arkansas College (Berry), data were found

that indicated that a student taking a fourth year of rigorous high school math (something more advanced than Algebra 2) was more likely to attend and succeed in college math, even if they placed into a remedial course. Pedersen's (2004) dissertation, and the Parker (2005) and Cortez-Suarez (2005) studies also corroborated similar findings.

College Algebra's Transition to Distance Education

Currently on college and university campuses across the nation college algebra has become the general education quantitative literacy requirement for associates and baccalaureate degree programs. Students who have difficulty with college algebra are faced with having to extend enrollment periods or drop out of college altogether (Berry, 2003; Blum, 2007; Cortez-Suarez, 2005; Knoop, 2003; Parker, 2005). However, while more students are being required to enroll in college algebra, dropout and failure rates exceeding 50% are not uncommon on college and university campuses (Berry; Cortez-Suarez; Data Subcommittee, 2006; Duncan & Dick, 2000, Parker; UVSC, 2006d). It has also been documented that almost half of the students who take remedial mathematics courses and college algebra fail to succeed on their first attempt (Data Subcommittee; Rouse, 2005; UVSC). Therefore, college algebra has become the barrier to students' educational and career goals (Berry; Cortez-Suarez; Duncan & Dick; Parker, 2005).

Colleges and universities are responding to this epidemic by offering college algebra in a variety of learning environments in which students may enroll to meet the needs of a larger population of college algebra students. Because of the explosive growth and popularity of the Internet, much of the development has been focused on distance

education that relied on Internet communication technologies and the tools available to educators to design a variety of learning environments for college algebra (Blackner, 2000; Brodwater, 2005, Hagerty & Smith, 2005; Lorenz, 2003; Schmit, 1998; Smith, Ferguson, & Caris, 2003).

College algebra, the quantitative literacy general education requirement was one of the first math courses to be considered for this transition to a distance education course (Brodwater, 2005; Lorenz, 2003; Smith et al., 2003; Steig, 1999). In addition, the changing needs and lifestyles of students have supported the development and use of distance education in college algebra, free from constraints of time and place to provide a variety of programs and functions in order to help students achieve their academic goals.

Recent Research on Mathematics via Distance Education

Perez and Foshay (2002) promoted the idea that since developmental mathematic students are not successful in traditional classrooms that it might be possible to develop new distance education formats that could successfully meet the students' needs. They formed a consortium that included eight participating colleges that implemented a distance education course developed by the PLATO Web Learning Network (Academic Systems, 1994-2002). At the end of the project the completion rate was 48% with a list of factors that were found to be critical in lowering the dropout and failure rates. They were; easy access to the Internet and easy navigational courseware, technical support, individualized instructional format, student counseling, frequent contact with students, oriented faculty in technology, and institutional support.

Summerlin (2003) in his doctoral dissertation examined the academic effectiveness of Internet-based mathematics instruction for community college students. Results of the study showed a statistically significant difference between the traditional methods of study yielding a much greater completion rate in comparison with the distance education course students with a much larger dropout and failure rate. In round numbers the Internet population began with 200 students with an immediate 20% withdrawal rate before the census date. At the end of the study only 21 students were successful in completing the course objectives. Summerlin determined that one of the most important aspects of the literature that needs to be addressed is "a qualitative study is needed to look at the reasons for such a large drop out and failure rate by the Internet students. If specific reasons can be identified, and changes made to enhance the Internet course, it might be possible to increase both efficiency and effectiveness" (p. 87).

As a way to explore the effectiveness of teaching basic algebra at a university, Stillson and Alsup (2003) utilized an online, interactive learning system to examine the ability of technology to help students complete their mathematics coursework. While the participants felt like they learned more using the system, more students dropped the course during that study semester than in the previous two years with a higher percentage of failure rate than in the traditional courses. The instructors observed that several students gave up because of the roadblocks they experienced from the online learning system. In particular, the authors determined that the use of technology is important yet students need to know how and when to use it.

To ease financial pressure and appease mathematics reform, Hagerty and Smith (2005) adopted web-based software in a college algebra course and compared the results to courses taught traditionally. The students attended a traditional class, but their text assignments were replaced with Internet based assignments. A few weeks into the semester, one of the groups requested that the class be changed back to the text-based approach. Although the students who used the web-based software showed a higher drop/withdrawal/failure rate, they showed significant improvement, both short-term and long-term in comparison to the traditional courses.

Last, from a different point of view Smith and colleagues (2003) examined the instructor experiences of teaching distance education courses versus the classroom. They interviewed, by email and telephone, 22 college instructors who taught in both formats. Disciplines involving reading, writing, and discussion seemed well suited to distance education, whereas the mathematics instructors and students were far from satisfied. Predominately the reasons cited were lack of a communication tools mathematically in the web-based format.

Despite the enormous amounts of literature involving research about the dropout rate and success and failure rates of college algebra students in traditional courses in higher education, or in comparison courses with distance education students, or in developmental mathematics courses in community colleges, there is still very little information available in the educational literature about the dropout, success and failure rates of distance education courses, specifically in teaching the Internet college algebra courses. Therefore, this section hopefully provided some insight into what research has

been accomplished into the area of dropout and success and failure rates in college algebra distance education courses in higher education. In fact, a review of the literature did not produce any comparable studies and found no published quantitative or qualitative studies on the dropout, failure, and success rates of college algebra distance education specifically Internet only students.

CHAPTER III

METHODOLOGY

The purpose of this grounded theory study was to discover the factors that contribute to the success or failure of college algebra for students taking college algebra by distance education Internet, and then generating a theory of success or failure of the group of college algebra Internet students at one Utah college.

While there are studies that reveal statistically significant quantitative results recognizing various factors that influence or contribute to success or failure in distance education courses such as individualized attention by the instructor, less travel, and increased time to think about, and respond (via email or discussion boards) to questions posed by the instructor or other classmates, increased access to the professor, an overall increase in student participation, and an improved ability to apply the course material to new concepts (Brand, 1995; Carswell et al., 2000; Coombs & Rodd, 2001; Goodwin et al., 1993; Keegan, 2000; Kim-Rupnow et al., 2001; Motiwalla & Tello, 2000), none produce any comparable studies or published quantitative or qualitative studies on the dropout, failure, and success as described by the student in a college algebra Internet course. Thus, the goal of this study was to capture those stories and experiences of the college algebra distance education Internet student only and then determining what factors lead to success in a College Algebra Internet course. Implications then extend to advising prospective College Algebra Internet students at one Utah institution and further adding to the research on failure rates in distance education courses, more specifically, College Algebra Internet students.

Qualitative data was collected and analyzed on students' perceptions and perspectives of a college algebra internet course that they took during either the spring or summer 2006 semesters. The research questions that guided this study, as stated earlier, were: What theory explains the phenomenon of success or failure of college algebra Internet students. What are the primary factors that helped in progressing in the course? What are the primary factors that hindered progress or were barriers that impeded progress or even stopped progress in the course? What caused these factors? How did these factors hinder progress and completion, or eventual success in the course? What strategies were used to overcome these factors? What were the consequences of the strategies used?

Research Design

The research design for this study was a grounded theory study with the purpose of discovering and generating a theory, the theory being emergent, discovered in the data (Creswell, 1998). The implications of the discovered theory infers that practice will need to change in advising prospective College Algebra Internet students, or at the very least, recommendations will be made to all College Algebra Internet instructors to guide their practice in advising prospective students on how to be successful.

The term "grounded theory" derives from the fact that the data and representation is taken to be based in a theory that is "grounded" (i.e., is faithful to the local circumstances and the participant's interpretations of those circumstances). Thus, the important distinction to make is that the theory does not come from outside, but arises

from the data itself, hence, grounded. Glaser (1992) would say that grounded theory sets out to find what theory accounts for the research situation with the aim to discover the theory implicit in the data.

According to Creswell (1998), the participants are in a situation in which they interact or engage in a process in response to a phenomenon (the success or failure of the college algebra Internet course). A grounded theory approach is then the study of how the participants act or react to this phenomenon.

This grounded theory began with a research situation, a natural setting (the college algebra Internet course). The task of the researcher was to understand what was happening there, and how the participants managed their roles. In this study, interviews and conversations were the main source of information from which the theory was developed as recommended by Creswell (1998) that the researcher collect primarily interview data from the field (see Appendix B for Interview Form and Questions).

The Setting

This study was conducted at a bachelor's degree-granting college in Utah. At the time of the study, the Utah System of Higher Education (USHE) consisted of 10 public colleges and universities governed by the Utah State Board of Regents, assisted by Board of Trustees. The system included two major research/teaching universities, two metropolitan/region universities, two state colleges, three community colleges, and a college of applied technology (USHE, 2006a).

The college is located in a rapidly growing county. The county is situated

approximately 44 miles south of Salt Lake City, and is the 2nd largest county, in terms of population, in the state (Utah County Online, 2006).

UVSC is the fastest growing institution in the Utah System of Higher Education. The number of students has increased by 72% in the last 10 years. During the past ten years, the number of FTE students has increased by 108% while the number of faculty (regular, part-time and adjunct) has grown by 80% (USHE, 2006b). The actual fall headcount for 2006-07 academic year was 24, 487 which was the 3rd largest in the state with only a 1, 064 difference with the 2nd largest institution. The USHE has projected, based upon history and future predictions that UVSC will continue to grow at a 2.8% average annual change projecting UVSC to be the largest institution in the state by the year 2013 with an enrollment of 32,360. By 2018, USHE predicts that UVSC will reach 37,310 and by 2023, it will be approximately 43,800, which will be 10,000 larger than any other state institution (USHE, 2006c).

UVSC is situated in the heart of Utah County, with the name Utah Valley becoming synonymous with Utah County and is used interchangeably throughout the state. With a population of over 400,000, it is the second largest county in the state and includes over twenty incorporated cities. The college serves primarily the Mountainland Region of students with Utah County residents compromising approximately 70% of its enrollment.

The College was established when the Utah State Legislature passed an appropriation of $100,000 for the biennium of 1936-38 for vocational education. Over the years, the institution has evolved from a vocational college of a few hundred to a state

college of over 24,000. The vision and mission has changed to reflect the needs of the community and region. Now, in 2006 UVSC offers over 32 4-year Baccalaureate programs (UVSC, 2006a).

> UVSC is a state college comprised of two interdependent divisions. The lower division embraces and preserves the philosophy and mission of a comprehensive community college, while the upper division consists of programs leading to baccalaureate degrees in areas of high community demand and interest. UVSC is dedicated to providing a broad range of quality academic, vocational, technical, cultural, and social opportunities designed to encourage students in attaining their goals and realizing their talents and potential, personally and professionally. The College is committed to meeting student and community lower division and upper division needs for occupational training; providing developmental, general, and transfer education; meeting the needs for continuing education for personal enrichment and career enhancement; and providing diverse social, cultural, and international opportunities, and student support services. (p. 6)

As a rapidly evolving commuter campus in a continually growing community, UVSC has needed to change its vision to encompass the high growth rate and needs of the community. The 2005 Vision Statement was as follows: "Utah Valley State College is committed to maintaining the responsiveness and flexibility of its historical mission, while becoming a highly respected state college offering a comprehensive range of baccalaureate degrees and programs" (UVSC, 2006b). By fall 2008, in response to community needs for graduate courses and degrees as a metropolitan university, UVSC will become Utah Valley University.

In April of 2005, an analysis of the strengths, weaknesses, opportunities and threats to the institution was published with recommendations to expand distance education in response to accreditation findings and community comment (UVSC, 2006c). Since the community has and will continue to play a significant role in the growth of UVSC, the institution is taking this recommendation seriously, to "enhance learning

beyond traditional lecture format…and explore a variety of ways to deliver education, especially with technology" (p. 4). Otherwise, private, non-profit, and for-profit institutions will respond to the community educational needs (UVSC, 2006c).

The Course

The College Algebra Internet was a 16-week semester course, with students taking their final exam during the 17th week of the semester. It was designed by the researcher but over the years had grown and expanded to a point that the researcher recruited a colleague to help teach some of the sections.

The students were required to have a PC computer with Internet access. Each student registered purchased a license and the materials necessary for the course. The student then logged on using a designated username and password and the database kept track of the student's progress.

The program was an interactive mathematics program that was instructor-guided, and learner-centered program, developed and designed by Academic Systems (Academic Systems, 1994-2002). The program combined the traditional model-learner, instructor, and text, combined with a new element, the computer-mediated instruction and assessment.

The course consisted of four units (each unit is two regular chapters in the paper textbook), and a comprehensive final exam. The units are studied through the virtual learning environment website. The program purchased by each student contained a paper textbook and a collection of CD's designed for viewing the lessons online. Every chapter

consisted of a multimedia lesson and took place primarily on a computer using text, sounds, graphics, animation, and video. The program accommodates students' individual learning styles. It allows students to control the pace and the order of instruction within a lesson, with recommendations from the program.

The tests and the final examination were developed by the researcher with some items coming from the notebook and test bank designed by the Academic Systems company (Academic Systems, 1994-2002) that accompanied the course package. A structured timeline for unit completion, quizzes, and tests were incorporated in the course. The unit tests occurred approximately every 3-4 weeks with study guides available on the course website. The unit tests were available in the classroom testing center on campus or proctored at a site available for the off-campus student by an approved proctor, determined by the Distance Education Center on campus. The unit tests were open-ended questions very similar to the problems in the paper textbook.

The students communicated with the instructors in a variety of ways; e.g. email, phone, phone messages, in person, and the discussion board on the courses' website. The instructors responded to these forms of communication within two days with the exception of holidays and weekends. There was also available to the students a free, drop-in, peer-tutoring math lab available to all students taking UVSC math courses. The Internet students could call directly into the Math Lab to receive peer tutoring when studying at home. It was a Live Tutorial that could be watched or a means to submit questions.

The college algebra course was part of the general education requirement for a

variety of disciplines. Students in college algebra courses at this college were expected to learn the concepts and know their applications without any dependence on graphing utilities, books, notes, or any aid in any form. Thus, the students were not allowed to use graphing calculators or calculators of any sort on their chapter tests and the final examination as mandated by the Department of Mathematics. The learning goals for the online college algebra course were that students (a) gain a thorough understanding of basic concepts, (b) develop problem-solving skills, (c) develop graphing techniques, and (d) connect the content in this course with that of subsequent courses and their future professions.

The online college algebra course met the same standards as its traditional counterpart; therefore, the main topics of the face-to-face college algebra. Topics covered were equations and inequalities, coordinates and graphs, functions, polynomial and rational functions, exponential and logarithmic functions, systems of equations and inequalities, matrices and determinants, conic sections, sequences and series, and counting and probability.

The online college algebra course used the WebCT system of course delivery for presentation of material, management of communications, and administration. The various components of this course were as follows:

Announcements: Announcements included weekly information critical to the success in the course. Announcements occupied the main frame upon entry to the course.

Course Information: Course information displayed descriptive information about the course.

Assignments: Assignments were comprised of homework, tests, and quizzes posted by the instructor.

Staff Information: Staff information provided background and contact information on the course instructor and the Distance Education Service Center.

Communication: Course users communicated through the "discussion board" which allowed users to take part in an ongoing discussion through the use of chat features. Thus, it was a means for interaction among the members of the class, rather than a physical space.

Tools: The tools that were used in the course were a digital drop box, the personal information page, a course calendar, a grade check option, a syllabus, a link to the Academic Online homepage, a study guide for each exam, critical online resources, a schedule, an introduction (getting started) page, and a contract to be signed, designed to prevent attrition from the course.

The Participants

UVSC followed a 3-semester fiscal year. The non-overlapping semesters included a fall, spring, and summer session. Each semester the researcher and her colleague taught a total of six college algebra Internet courses. The colleague taught sections X01 and X03. While the researcher taught sections, X02, X04, X51 (designed for the distance aviation students), and YX1 (a course designed for the Western Governor's University).

The participants were chosen from any of the six sections of the Internet college

algebra courses offered in the spring 2006 and again summer 2006 with an approximate combined enrollment of 200 students. The principles of purposeful sampling were applied to the data. A part of the purposeful sampling was to get a wide diversity where the subjects exhibited the greatest differences in characteristics and background preferably a balance between male and female students. As the theory emerged, the researcher tried to find students or re-interview students to disprove or challenge the growing theory or to confirm or disconfirm the emerging theory. Merriam (2001) explained, "purposeful sampling is based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (p. 61).

In the fall 2006 semester an initial letter (Appendix A) with a consent form was mailed home to each prospective participant explaining the focus and the intent of the research and asked them to complete the consent form indicating their willingness to participate. The letter also contained a self-addressed stamped envelope that the prospective participants could send the consent form back in. The prospective participants were assured that their participation would be kept confidential and the results would not be released in any individually identifiable form without their prior consent, unless required by law. The participants were also assured that their participation would be voluntary, and that they could withdraw from the study at any time. In that case, all of the information about them would be removed from the research records or destroyed.

In a grounded theory study, Creswell (1998) recommended selecting "individuals

who have…participated in a process that is central to the grounded theory study" (p. 114). Creswell also recommended that the group needs to have rapport with the researcher in order to disclose detailed perspectives about the process. The goal then was to create the sample from the researcher's students or her colleagues to create a homogeneous sample since the syllabus, exams, and methods of communication are the same for the researcher and her colleague.

Data Collection

Creswell (1998) stated that interviews should play the major role in the data collection in a grounded theory study. He explained that researchers need to rely on interviews to best capture the experiences of the individual in their own words. Following the initial letter that was sent home during the fall 2006 semester, the researcher received back in the mail eleven consent forms. At this time the researcher got in touch with each of the participants either by phone or email and set up an interview time that was conducive to their schedule.

Data gathering then began during the spring and summer 2007 semesters and was gathered in individual interviews conducted by the researcher. The interviews ranged in length of time from one hour to three hours. Each interview was conducted in private, either in the researcher's office or in the home of the participation, with confidentially assured at the beginning of each interview. At the beginning of each interview the participants were apprised that they had a choice to discuss whatever seemed most significant, could refuse to answer any questions, and could take a break or end the

interview at any time.

During this time two of the candidates failed to show for their interviews and repeated attempts to contact them failed. The researcher then sent out an email to each of the summer 2006 prospective participants and this resulted in three more candidates that were willing to participate. The three candidates were specifically chosen based upon their grade result in the Internet course. The researcher's goal was to interview roughly the same amount of successful and nonsuccessful College Algebra Internet students.

The nature of the interview was comprised of either a telephone interview, an email response or a one-on-one interview determined by the participant's proximity and time in relation to the researcher. The researcher encouraged each participant to meet for a face-to-face interview, yet due to time and work constraints one of the participants was only able to conduct the interview via phone and email responses.

"Interviewing," Seidman (2005) provided access to the context of people's experience and thereby provides a way for researchers to understand the meaning of that experience. A basic assumption in in-depth interviewing research is that the meaning people make of their experience affects the way they carry out that experience. Interviewing allows us to put experience in context and provides access to understanding their action.

The interviews were taped for later transcription, with an interview protocol determined ahead of time consisting of open-ended questions. Out of the research questions the following open-ended questions were used to guide each interview.

Setting questions: What grade or how old were you when you first took college

algebra? Tell me about the class makeup? What challenges did you encounter with the setting of the course? Describe the structure of the typical day in the classroom? Describe the teacher and how he/she conducted the class and interacted with the students?

Context questions with respect to the college algebra Internet course: What challenges did you encounter with the content of the course? What sorts of things did you do to help you learn the content of the course so that you could pass the exams, quizzes, do the homework, etc? Did you encounter certain topics that were easier to comprehend than others? What were some topics that were difficult to comprehend? Why do you think you struggled with certain topics? What helped to make topics easier to understand than others?

Preparedness questions: How prepared to you think you were at the beginning to take the course? How many times have you taken this course? Did this have any effect on choosing to sign up for college algebra by Internet? Have you been exposed to any of the material in the college algebra Internet course before? What effect did this have on the success or failure of the Internet course? Describe the successes you encountered with the course? What do you think this was attributed to? Describe the failures you encountered with the course, and what do you think this was attributed to? Describe how you would categorize the effort you put into the class? Was it enough? Could you have done things differently, and what would they be?

Factors and/or obstacles questions: What concerns did you have before you took the Internet course? How did your concerns change or effect your expectations for the

course? Describe your reasons for taking the Internet course. Were there factors in the school setting that contributed to your success/failure in the course? Were there factors outside of the school setting that contributed to success/failure in the course? What obstacles did you encounter during the semester you took this course? What could have made the course better for you?

Technology questions: Have you taken a distance education course before? Did you successfully complete the course? Describe some of your other distance education Internet courses and pick those in which you had success and then contrast it with those you did not have success. What concerns did you have in taking an Internet course? What concerns did you have in taking math by Internet? Are you comfortable with technology? Were there factors with the software that contributed to your success/failure in the course? Were there factors with your ISP that contributed to your success/failure in the course? Were there factors with your hardware that contributed to your success/ failure in the course? What could have made the course better concerning the software/ hardware? Were there other technology factors that could have contributed to your success/failure?

In accordance with grounded theory (Strauss & Corbin, 1990), greater emphasis will be placed on verbatim transcripts than other sources of data, which will more naturally facilitate the development of a theory. Therefore, following each interview, the researcher compiled a report and then sent it onto the participant by either e-mail or mail for his or her review and approval to corroborate the content of the report. All changes or additions recommended by the participants were made in the interview reports.

According to Lincoln and Guba (1985) this form of member checking is essential to establish the credibility of the research findings. The researcher did not find the need for follow-up interviews upon review of the interview transcripts, but she did need in some cases further verification, revisions, or elaboration and information confirmation.

Glaser (1992) advocated that after each bout of data collection the researcher notes down the key issues. This is often referred to as "note-taking." In this study, the researcher tape-recorded each interview, yet, during the interview took key-word notes and compiled it into an interview summary. The researcher found it worked better to place her thoughts and ideas on large posters so that she could continually add and adjust ideas on each of the eleven posters. Afterwards the researcher converted them to themes, double-checking all the various notes against the transcribed tape-recorded interviews.

Lastly, a follow-up letter was sent home to each of the participants thanking them for their time each participant committed to this study.

Data Analysis

Consistent with a grounded theory approach, the researcher used a constant comparative process when analyzing the data–that of comparing one segment of data with another to determine similarities and differences. Data was analyzed by following the guidelines suggested by Strauss and Corbin (1990) for open, axial, and selective coding. Coding is the process of dissembling, reordering, and reorganizing the data according to specific procedures.

Each interview was recorded, transcribed and then analyzed line by line with

descriptive code names assigned to relevant concepts, comparing them to other relevant data, and then recording them in the right hand column and then transferred to the posters. This first stage of analysis began by analyzing in depth the collection of interviews with the intent to generate the initial coding, develop categories or themes of information which Creswell (1998) calls open coding. During this open coding phase of analysis, the transcribed interviews and memos were read for the purpose of determining open, general categories that describe, conceptualize, and categorize the data. The researcher added her thoughts, feelings, insights or ideas about relationships found in the growing theory and kept this in the form of memos in a journal and then transferred to another poster of the growing categories and themes.

After transcribing and then reading each interview transcript initially for general comprehension, a more careful, second and in some cases multiple reads were conducted during which each notable incident, idea, belief, action, or some combination of these was marked. Consistent with grounded theory the open coding of raw data should yield initially category descriptors that will eventually collapse into fewer, but more prominent, encompassing themes.

Constant comparison was at the heart of this process. The researcher compared interview to interview, evolving to the emerging theory. When the theory began to emerge, the researcher compared some of the new data to the emerging theory. This process of constant comparison actually began with the first interview when the researcher asked herself and then coded the first interview with the following questions in mind. What is going on? What are the participants doing? What is the person saying?

What is the situation? How is the person managing that situation? Therefore, what categories are suggested by that sentence (Glaser, 1992)? The approach is similar to a "zigzag" process, out to the field to gather information, analyze the data, and then back to the field to gather more information, analyze the data, and so forth (Creswell, 1998).

Axial coding began during the process of reassembling data that was fractured during open coding, and its purpose was to develop sets of relationships and linkages between subcategories and categories. As with open coding, asking questions and making comparisons of the data are the basic analytical procedures used, with three steps occurring almost simultaneously. First, relating subcategories to categories by denoting the nature of the relationship between them, second, verifying the statements of relationships against the data, and lastly, investigating the differences and similarities among and within categories. Strauss and Corbin (1990) indicate that a category serves as the axis around which the data are reconsidered and reevaluated, stressing the use of some sort of model to visualize the links between the subcategories and a category.

This line-by-line coding helped define what kinds of data to pursue next. Therefore, the collection of the data took place at the same time as analysis. The idea was to see a relation between the interview transcript in question, and any theory that is derived in the material, or grounded in the text. By this time, some concepts began to predominate more than others, and interconnections between categories were identified. The transcribed data was carefully evaluated for emerging themes and individual differences.

Selective coding was the final procedure in the analysis of the data. This was the

process of selecting a core category or core categories and relating and validating them to the other categories (Creswell, 1989). After all factors were accounted for, saturation occurred, indicating that no new information was being yielded to create new categories or expanding old ones. Glaser (1992) suggested two main criteria for judging the adequacy of the emerging theory or theories: that it fits the situation; and that it works-that it helps the people in the situation to make sense of their experience and to manage the situation better.

The outcomes were validated by providing students with a copy of their verbatim transcript and interview summary and asking for feedback; utilizing a second reader familiar to the qualitative process to review and analyze the researchers thoughts, ideas and emerging theory; comparing the findings to existing research and theory; and scrutinizing inconsistent data in order to modify the conclusion. Lastly, each transcript was reviewed several more times to find supporting quotes for each phenomenon or theme, and this process also served as a way of verifying results. The core categories proposed in this study are the central phenomenon's around which all the other categories were integrated (Strauss & Corbin, 1990).

Trustworthiness

The basic question regarding trustworthiness in a grounded theory study is centered on the idea of persuading the audience that the findings of the investigation are worth paying attention to, and worth taking account of (Guba & Lincoln, 1989). Criteria for trustworthiness include credibility, transferability, dependability, and confirmability

(Lincoln & Guba, 1985).

Lincoln and Guba (1985) recommended a variety of strategies for improving the likelihood that findings will be credible. In this study, the researcher incorporated member checking by having the participants verify data via email or mail with a copy of the interview transcripts for review, clarification, and suggestions. Suggested changes were made, and transcripts re-sent for verification.

To improve transferability, or in order to enable others wanting to apply the findings of this study to their own research to make an informed decision, the study includes a rich in-depth description of the institution, setting, participants, researcher, the process and their experiences. To improve external validity, the researcher validated the process by comparing it with existing processes found in the current literature and by outside reviewers who substantiated the theory (two of the participants in the study and one outside qualitative researcher). The researcher was also an active participant in the process, keeping detailed records of what occurred, organizing data concerning the study, and constantly monitoring observations and records for evidence of personal bias or prejudice (participant observation method; Creswell, 2002).

According to Guba and Lincoln (1989), both dependability and confirmability can be determined through a dependability audit. To illustrate the researcher kept an audit trail in the form of a journal, which consists of a chronological narrative entry of the research activities, including pre-entry conceptualizations, interviews, transcription, initial coding efforts, analytic activities, and the evolution of the model. It also includes, but is not limited to, a record of the inquiry process, as well as copies of all taped

interviews, notes from the interviews, and hard copies of all transcriptions.

These records will be available upon request from the researcher yet at this time all tapes and transcriptions are currently being kept in a locked file cabinet, and will be secured there until the completion of the doctoral dissertation, with only the researcher having access to them. After which, the tapes will be destroyed. A final copy of this research will be made available to the participants' college library and the library of the candidates graduating institution.

Summary

Qualitative data was collected and analyzed on students' perceptions and perspectives of a College Algebra Internet course that they took during the spring or summer 2006 semesters at a Bachelor's degree granting college in Utah. The participants were chosen from any of the six sections offered in the spring and summer of 2006. The research design for this study was a grounded theory study with purposeful sampling applied. Interviews played a major role in the data collection and the nature of the interview took place either by telephone or in person and was later transcribed. Some email response was collected in follow-up questions. The researcher used a constant comparative process to analyze the data and the outcomes were validated by providing students with a copy of their verbatim transcript and asking for feedback. The researcher also utilized a second reader familiar to the qualitative process to review and analyze the researcher thoughts and ideas about the emerging theory.

Chapter IV will summarize the experiences of each participant. In staying true to

the spirit of this research, each synopsis was validated by the participant, in an attempt to provide an unbiased consolidation of the ideas, perspective and impressions as they were shared with the researcher.

CHAPTER IV

STUDENT STORIES

The following student stories are an attempt to capture the experiences of each participant. In staying true to the spirit of this research, each summary, which was validated by the participant, is a consolidation of the ideas, perspectives and impressions as they were shared with the researcher. In order to maintain anonymity, pseudonyms were assigned to each participant, preserving gender.

In this chapter are student stories of nine participants. Brenda, Ben, Chad, Adam and Kent all passed the College Algebra Internet course. Brenda and Ben both passed with an A-, Chad passed with a C+, whereas Adam and Kent passed with a C-. If Adam or Kent had wanted to continue into another mathematics course, neither would have been able to according to the UVSC Mathematics Department Policy, which states “a C or better is required” (UVSC, 2006d). Paul took every exam and the final, yet still failed the College Algebra Internet course. Linda and Ann attempted two exams and then discontinued in the course whereas Becky only attempted one course, all of these last four participants failed the College Algebra Internet course. Although Ann failed the College Algebra Internet course, she was able to pass college algebra at a later date.

The organization of each participant is as follows: a brief overview of the participant, their success or failure followed by their Family History, High School Mathematics Background, College Mathematics Background, The College Algebra Internet Course, Workload and Dedication, Participant Recommendations, and The Participants Future.

Participant One: Brenda

Brenda attempted and successfully passed the College Algebra Internet course in the summer of 2006. This was Brenda's first attempt at a college algebra course and her first Internet course. During the summer 2006 semester she completed and successfully passed another Internet course.

Family History

Brenda grew up in New Jersey and lived there until she was seventeen years old. During her junior year she dropped out of high school, "I moved from New Jersey my senior year…so I lived in New Jersey till I was seventeen and came here [to Utah] right before my senior year."

> [Brenda] met with a guidance counselor and they said my credits wouldn't transfer over evenly so I wasn't a senior anymore and they said I'd have to come in early and stay late…so I decided I didn't want to do it and so…I just went straight to UVSC.

Brenda's demeanor was nonchalant as she talked about dropping out of high school, so the question was raised about her family and their response. She stated casually that "it seems to be the pattern for my family, I would say…I have seven brothers and three sisters and only two brothers graduated from high school." She also indicated that she felt like this was no problem since "everyone's like, done with college, getting masters…my brother has wo masters now…I guess it's the norm for us in our family…I just got my associates last December and I just got accepted to BYU for spring."

In 2004 she got married to a "bio-statistician who's a tutor and TA at BYU" who

is also from New Jersey, "that's where I'm from and that's where my husband's from…and that's how I know him." Proudly she said:

> My husband's family is seven kids in all and they're all very on top of things, graduated very high in their class. They all went to BYU and really good places and one of his brothers has a Ph.D., one's a heart surgeon, two of them started their own company. One's like this financial coordinator for this really big company in Colorado.

When asked about the timeline and support from her husband with regards to taking the College Algebra Internet course she indicated that during the summer of 2006, "I went back to New Jersey because that's where I'm from and that's where my husband's from so we try and go back every summer and he had an internship there." She decided she still wanted to take classes while he was doing his internship, "so I did two online classes…so that was the reason for taking the Internet."

High School Mathematics Background

During the summer before her senior year, Brenda's family moved to Utah. To complete her senior year she met with a guidance counselor in Utah. She was told that her credits wouldn't transfer over evenly from the New Jersey public school system to Utah's which translated into her technically not being a senior in high school. Her guidance counselor gave her only one option and that was to come in early each day before school and then stay late after school to make up the deficient courses. The counselor told her she needed to "do all these extra art classes" which from her tone was not acceptable, "and I decided I didn't want to do it and so I…just went straight to UVSC." To enroll she completed her "GED before I took the entrance exam."

Brenda's previous math course was a Geometry-Trigonometry course, "I think it

was Geometry and trigonometry in 10th grade" but she was not quite sure what it would be called or how it articulated to the high schools in Utah.

College Mathematics Background

As a new student to UVSC Brenda was required to take an entrance exam, which resulted in a placement of Math 0950, an introductory mathematics course. She said that

> on the comp test here they'll give you a question and if you don't do well on that one they'll immediately stop asking you questions and so that's probably why I got in math 0950…'cause I knew some but didn't remember all of it because it had been a long time…a couple of years.

According to her UVSC transcript, she passed this course with a C+ and enrolled the following semester in the next subsequent course Math 0990, a pre-algebra course. She indicated that she tried to take each math course subsequently

> because I don't like math and so I purposely don't remember any of it…so that's why I try to take them each semester like in a sequence so that I wouldn't forget…I mean they seem somewhat familiar like I would remember hearing terms but I would never remember the formulas and I would never remember what I was supposed to do. You know how some people start and say "oh I remember it was never like that for me…I don't know what I am doing….

As a result, it took Brenda three attempts at this course and almost 2 years later to pass the pre-algebra course.

Immediately following the semester, she passed the Math 0990 Brenda enrolled in and barely passed the Math 1010 Intermediate Algebra. She attributed her low grade to her absences, "It was during the semester that my father-in-law died and so I missed a lot of that class and I got a C in it 'cause I missed like tests and the last half of the semester." When asked if she was worried about enrolling in college algebra she emphatically said "Yes! Because I haven't done well in math…before that class I'd gotten B's and

C's…mostly and I was really worried." Six months later she enrolled in and passed the College Algebra Internet course.

A thorough review of her transcripts indicated that the time span from the first attempt at Math 0950 through her progress to Math 1050 college algebra was exactly 4 years or 12 semesters. During this time she "lost all my scholarships and my financial aid and I had to pay for school myself and I had to take a break and I lost years." During the interview, her frustration was evident when she described the multiple failed attempts at Math 0950 and the resulting probationary academic status with UVSC. Her transcripts show the consequential gaps in her schooling from a semester to an entire year of no schooling.

After the struggles she endured she said:

> So I was really mad at myself and decided I wasn't gonna do it anymore [the attempts and failures] and just realized if I got myself into a better situation…so I cut back on work and got myself into a better situation.

At the end of her fall 2006 semester, she earned her associates degree, which took a total of six academic school years.

The College Algebra Internet Course

Towards the end of the spring 2006 semester Brenda's husband received an Internship in New Jersey close to her and her husband's extended family. She decided she still wanted to continue her schooling so she enrolled in the summer semester College Algebra Internet course, "I decided I wanted to still take classes while he was doing his internship so I did two online classes while I was there." The other course besides the College Algebra Internet was a health course, because she knew it was going to be a

> really easy class and I didn't even keep on top of that…I would wait until I had a break from math and then just do everything all at once for that class and then if I started having a lot of math again I would just not do anything 'cause it was a really easy class.

Brenda recognized that she was "not very good at math…and that it was going to be hard," so she chose to enroll in the College Algebra Interne course during the summer.

> I wasn't working and I didn't have anything else to do so I made sure I focused on that because I knew it was going to be hard and it was my last math class and I wanted to get it over with.

Wanting to contribute financially while her husband was participating in his internship, and also wanting to help out her sister, she agreed to babysit her nieces and nephews while her sister and brother-in-law worked. Her role really was in the capacity of nanny, babysitting each day, "I did that for about 5 hours in the morning." "I was sorta a nanny for a couple of weeks and I would go and do that." Once she got home, she would finish her homework. It was working well until she needed to prepare for her first exam and realized at this time that babysitting was interfering with her time to concentrate on the mathematics,

> I would try and go home and finish my homework and it was okay at first but then when I had tests or things I would tell them I couldn't babysit 'cause I had to study for tests…but then it got too hard because it was making so I didn't have time to do my homework so I stopped being a nanny.

After she quit being a nanny, Brenda fell into a routine each day. Brenda's typical week was spent working each day, including Saturdays on her mathematics. She would spend between 4-5 hours each day working through her lessons, "I would say like 4 or 5 hours everyday…probably…I mean, if you don't practice it every day and you don't like it you totally forget it." The amount of hours spent on the College Algebra

Internet seemed unusual in comparison to others so the question was asked why the enormous amount of time, in which she responded with "I had to make sure I had a lot of time because it takes me a lot of time to memorize those things and to understand it and to do all the practice work."

Another aspect of her routine was to ask questions of her husband, who

> is actually a bio-statistician…so he tutored me everyday, which is why I passed, so he helped me figure out if I ever had questions. I'd ask him and I know you can ask questions online but it was a lot easier just asking him, so he tutored me.

Brenda would wait until he arrived home and then,

> I would save up all my questions when he got home and then I would ask them all…at once and so it took us, you know, maybe 2 hours, and so if I was spending 5 hours on the homework he would spend 2 hours with me answering my questions and helping me study.

Her husband was also able to see gaps in her knowledge base and was able to help her,

> with all the things I missed out on in 1010. He caught me up on and explained it way better because we were one-on-one and he gave me a lot more time than a teacher could 'cause it was only one of me…so all the things I missed out on in 1010 he filled me in on.

Much of the College Algebra Internet course was unfamiliar to Brenda.

> I would say most of it was unfamiliar because I don't like math and so I purposely don't remember any of it, I don't want to know any of it, I just remember what I have to before the test and don't try and keep it in my memory long term.

It was a curious statement and caused confusion for the researcher, so the question was asked how Brenda was able to remember the material for the exams. She discussed a system she had created as she was working through the lessons. She compiled two notebooks.

> I had a notebook where it was a really small notebook and it was about the size of index cards and I wrote down all the formulas and all the things I needed to remember and I would review them every time before my test and probably for 2 days before my test and right before I would go in I would flip through them and try to remember all of them.

Brenda took her exams at the local library. There were many days where she would end up at the local library other than taking an exam, because

> in the house I was in we didn't get Internet everywhere [meaning some days she could hook up to the Internet in the living room or bedroom and other days she would spend the day wandering into different rooms of the house trying to connect] and so some days It wouldn't hook up to my laptop, and if that was a problem I'd just go to the library.

The College Algebra Internet course naturally has a built in flexible calendar so when asked if she was able to finish the course early she indicated that "I took everything on time…I think I ended a little early but not very…maybe a couple of days, I don't think it was really early." According to the logged in hours and homework outcomes by PLATO, Brenda turned in all of her homework on time and completed and passed the course with an A- two days prior to the end of the summer 2006 semester.

Workload and Dedication

Brenda had fairly strong views on workload and what it takes to pass the College Algebra Internet course. It came up in the interview many times in roundabout ways. At the very beginning of the interview she indicated that "I didn't have anything else to do so I made sure I focused on that because I knew it was going to be hard…" When asked how many credits she carried during the summer semester she took the College Algebra Internet course she indicated "a health class because I knew it would be really easy, so I could take it with the math." She said,

> I had to make sure I wasn't doing anything else…I was spending 5 hours on homework and he [her husband] would spend two hours with me answering my questions…and if it wasn't for him I would not have gotten a good grade in that class at all.

The view of her personal philosophy that dominated the interview focused on "work while you are going to school" in which "he [her husband] has that same philosophy" to "cut back on your work while you are going to school." During the couple of years in which she "lost all my scholarships and my financial aid" and according to her transcripts was placed on academic probation, she was "working 50 hours a week and going to school fulltime so that didn't work at all." As a result, she chose not to work

> in a place where you can't do your homework or you work in a place it's not lenient or won't let you off if you have a lot of homework building up which is what I had and it's impossible, you can't do it all.

Adopting this principle Brenda and her husband "trade on and off" working hours at their respective jobs. If in one semester her husband works 20 or more hours, then Brenda either quits her job or works less hours. Or, in the case of this interview, if they have a job "in a place where I can do my homework I'm there 15 hours…I'm doing my homework…and so it's not hard," then their policy of both working during a semester is more lenient and flexible.

Participant Recommendations

It was obvious that Brenda had some strong views on success in the College Algebra Internet course so a follow-up question was added to the interview list with respect to advice given by her to a prospective College Algebra Internet student. Her

response was:

> It would depend on the person…if you are self-motivated and can make yourself do it [the mathematics] everyday…and if you have someone [to get help from] or if you have questions you can go and ask [of someone], then I would say do it [meaning take the Internet course], but if your not in a place where you can't go to a math lab or you don't have a tutor…I would say no [meaning don't take the College Algebra Internet course].

In part of the interview the question was asked about preparedness since she indicated previously she didn't feel prepared to take the Math 1050 course. She was puzzled and said she "didn't feel prepared but my tutor really helped me because all the things I missed out on in Math 1010 he caught me up on." Once again, her most dominant suggestion centered on workload stating very strongly, "to get through [math] you've got to cut back on your hours at work."

The Participant's Future

Brenda was successful in the College Algebra Internet course. It was the last math course she needed for her associates degree. According to her transcript she graduated from UVSC in the spring of 2006. She indicated, happily in the interview that "I just got my associates and I just got accepted to BYU for the spring." During the interview she answered all of the questions passively until it was asked what her future plans were in which she became very animated in stating "they [BYU] have this great editing program and I'm going into editing and creative writing so I can work with publishing and hopefully children's publishing or adolescent."

Participant Two: Ben

According to Ben's transcripts, he attended Moorpark College in California between the years 1993 and 2004 earning 60.5 credit hours. He was also working at the time, so schooling came second in his agenda. "I've been working solidly for the last 7 years full-time and then until 2004 I got laid off and then decided I wanted to get a degree and teach." In the fiscal year from August of 2004 to August 2005, Ben earned another 54 credit hours from The New York Institute of Technology, a completely online program, in which "I had my degree in English but they told me I needed Math 1050 to be licensed to teach in the state of Utah." He began UVSC in the fall of 2005 and graduated with a Bachelors degree in English Education with a state certificate to teach Secondary Education by the end of fall 2006. It was during the spring 2006 semester that Ben took and passed the College Algebra Internet course earning A-.

Family History

Ben graduated from high school at the age of 18 in 1993 in California. He immediately enrolled in the local junior college because "it was the thing we all did." Ben stated that at the beginning of 2004,

> I got laid off from my job in California and my parents were up here [in Utah]. I've got limited funds and the apartment I was living in California was a run-down apartment and I was paying $1,300 a month…for a little 2-bedroom apartment.

Ben decided to move to Utah, move in with his parents, and continue his schooling and "pay out of state tuition but…it saves me…$15,000 a year in rent." He began his schooling at UVSC when he was 30 years old, and is the youngest of several

children. He indicated that he has brothers and sisters and that he is not married.

High School Mathematics Background

Ben graduated from high school at the age of 18 in 1993 in California. When asked if he had college algebra in high school he immediately replied "no." The only other reference to high school Ben made was a regret he expressed later in the interview.

> You know I see these people that get the opportunities to come out of high school with 2 years of college…my life would have been way different if I could have done that. I'm the kind of person that scores high on every test but didn't like school because I felt like I was not learning much in high school. So, I ended up with a 2.7 GPA in high school.

His attitude towards math in high school was summed up in this one sentence, "one of my biggest problems all through school in math was I hated showing my work. It just felt like a waste to write down all my work."

College Mathematics Background

Ben began college at a junior college in California.

> I took college algebra several times and dropped it….I'd sign up for it a couple of times…[but] the problem for me was early in the class it would be stuff that I knew and then it would be moving way too slow for me and then I'd stop going. Then I'd come back and it would be beyond me and hard for me to catch up. So I'd just drop the class, besides when I first went to the junior college I wasn't motivated and in California it was only $13 a credit unit….Also early in college I had the same kind of bad GPA [referencing his 2.7 high school GPA].

At the beginning of 2004, Ben was laid off in California. It was at this time he felt like he

> didn't really have a choice, I was on a time frame in which I needed to finish 2 years of my degree in 10 months. So, I went to Internet school. I…got my 17 units my first semester and then 20 [his second]…I had a limited amount of money 'cause I was now not working…and I wanted to maximize my time.

He completed an English degree from the New York Institute of Technology in the summer of 2005.

> I actually had my degree in English but then they told me I needed 1050 to be licensed to teach in the state of Utah, even though I was teaching English…and since my parents were up here…and I got limited funds.

He moved to Utah and began college at UVSC in the fall of 2005. As a new student to UVSC he "had to take the entry test and it said I didn't qualify for Math 1050." He actually felt like he could have passed with a little preparation:

> To tell you the truth in taking the entrance exam, I think the only reason I didn't pass higher was because being away from math probably 10 years…I didn't know what things meant. If I had known…what log(e) meant…remembering logarithms, I could have done more of the math work…or if I had remembered what symbols meant.

In 1 year (2005 to 2006), Ben completed the courses he was lacking for a Secondary Education English degree. In the fall of 2005, he completed 17 credit hours with the lowest grade of a B+ and in the spring 2006, he completed 20 credit hours with his lowest grade of an A- in the College Algebra Internet course. He indicated that,

> I planned on taking the math class either in the summer or fall and they told me that I had to have it before I student taught. So, that meant that I had to add it on…that made 20 units that semester which sounds like a lot…but if you are familiar with the education classes…they are not really hard.

He student taught and then graduated in the fall of 2006 with an overall GPA of 3.7 "You know now that I'm paying out of state tuition here…$8,000 dollars a semester…. I understand what that money means and I'm getting a 3.7 GPA."

Currently at the writing of this dissertation, Ben has continued his schooling working towards another Bachelors degree in Secondary Education History. According to his transcripts his lowest earned grade of 32 credit hours is an A-, and only once.

The College Algebra Internet Course

As Ben planned out his schedule for when he wanted to student teach he found out that in order to student teach in the fall of 2006 he would need to have completed college algebra before summer, "that means I had to add it on and I believe it made 20 units…and I was on a time frame and…wanted to maximize my time." Since I "took all Internet courses" at the New York Institute of Technology, Ben didn't feel worried about the College Algebra Internet course.

In fact, for him it was a better situation.

> It's not difficult if I can pace myself so I felt more comfortable going into the Internet course than to a regular course. I feel in a regular course the pacing of [the] other students holds me back….when you are in the Internet course I know the stuff and go take my test right there two minutes later rather than in a regular course when it's…days or weeks before when you learn the stuff and when you are taking the test.

Ben also felt more comfortable in the Internet class because he's never really had close relationships with teachers and he feels like the on-campus students need it more than he does.

> I get in arguments with math teachers a lot 'cause math people say, "oh it's logical, it's the universal language," but it's not logical a lot of the time. I also don't feel the need to be rewarded by a teacher and some people need to [have a teacher] say "yeah your doing that right." I can do something wrong and be told by the computer that I have the wrong answer and go back and do it again and figure out why I got it wrong…without it affecting me mentally a whole lot…but I think other people need instant gratification from someone who knows more than them…whereas with teachers they are just like somebody who is not more knowledgeable than me…they just had different experiences in life than me and they're not somebody that's a peg above me that I need to seek approval from.

Ben felt like there was very little material that was difficult mainly because he felt no pressure to pass with a high grade.

> Well for me part of my motivation was all I needed is a C in this class. I don't care what I get. In fact, I think I even failed the final but I already had the points I needed…so I just totally dropped off in the end. I can be good at math but I just don't like it.

Wondering if Ben sought out help in the form of tutors or study groups he immediately responded with a, "NO!" His attitude was positive and he felt like students could actually teach themselves. He likened this to how he studied by relating how he learned computer languages:

> You know I'm considered maybe the computer guru in my family, I've never taken any computer classes on any of the software I work with because computer classes just wouldn't help me. I just go through and do things and maybe read a little literature. You know people can learn themselves too…and if they could pass on that fear of math…then I think they could teach themselves this material.

He went on to say that, "I just need someone to tell me whether it's right or wrong…[other students] need somebody to tell them step by step or somebody to tell them, 'you're on the right track you doing great.'"

Ben's typical routine was to

> do all the math on the weekend…'cause I had my other education classes during the week here on campus…I did all the lessons together…I went through the online lessons, I would say maybe ½ hour to [an] hour per lesson…and then for each test there was maybe 3 or 4 lessons…and I did the lesson like I was gonna take a test…I wouldn't spread one lesson out because that would work worse for me…and then I go right in and take the test…two minutes later.

Twenty credit hours is not a typical load for students, and in most cases, a student needs special permission to take more than 18 credit hours of coursework. At this point in his life, Ben is also 30 years old and living at home. Wondering how he was able to handle this load and work the question was raised about his workload beyond school. When asked if he worked he emphatically said, "NO!" Continuing on, the question was

asked if he could have managed work with the credit hours and the College Algebra Internet,

> No…you know I specifically made the choice not to work because it would distract me. In fact, I was offered a job from Novell while I was going to school making more than I'll ever make as a teacher. But then I'd stop going to school and be content…like it would be a content life rather than a happy life and maybe I can have some happiness in teaching.

Ben also felt strongly that other students do not work, "I'm putting myself in a big hole financially by not working…but I would recommend it if you cannot work."

Workload and Dedication

As previously stated, Ben chose not to work.

> You know, I specifically made the choice not to work because it would distract me. In fact, I was offered a job from Novell while I was going to school make more than I'll ever make as a teacher. But then I'd stop going to school.

He also felt strongly that other students not work. "You know I'm putting myself in a big hole financially by not working…but I would recommend it if you cannot work." Ben was fully committed to school and in finishing as quickly as possible. It was evident in reviewing his transcript. Each semester Ben attended UVSC his course load was no less than 15 credits hours per semester.

> I was on a time frame which is why I went to Internet school. I finished 2 years of my degree in 10 months…'cause I had limited amount of money…I wasn't working…limited amount of funds and I wanted to maximize my time.

Participant Recommendations

Ben had heard rumors, "over 50% fail who take college algebra," but to him it

> didn't really matter. I mean everybody complains about math and you know people wear the 'I hate math thing' as a badge of honor. They say, 'I'm fine

> ’cause I hate math [meaning it’s okay to flaunt the fact that you do not like or are proficient in mathematics].

After discussing his attitude towards the College Algebra Internet the question was asked about advice he would give to others who were considering this course.

> There’s this math fear that everybody talks about, this attitude that everybody hates math, but it stops them from being able to be successful in something like this because they’re scared of it. The information scares them, but I think if people could get past that fear then I think they could teacher themselves this material. But if you’re the kind of person [who] needs tutoring in an Internet course then [for math] I think you would be better off just taking the standard course.

Continuing on he said, “You know if people can handle it, then Internet courses I think they’re great.” Not knowing what he meant by “handle it” further questions were asked and he indicated, “I mean if people can self-motivate themselves, teach themselves, you know then Internet classes work great.” He attributed it to someone who “has a brain like me…for the rest I would say, “no”…just because of their attitude and the way they learn.” Curious to understand his comment of “the way they learn and a brain like me” further questions were asked. Ben indicated that “the way they learn” really has to do with how a teacher rewards and confirm mathematical thinking as correct or incorrect. He said:

> Personally I don’t feel the need to be rewarded by a teacher and some people need someone to say ‘yeah you’re doing that right.’ I can do something wrong and be told by a computer you have the wrong answer and go back and do it again…without it affecting me mentally…whereas other people need that instant gratification from someone…someone who knows more than them. So, I think that’s a factor for a lot of people with approval a big thing. They also question themselves and need somebody to tell them step by step or somebody to tell them you’re on the right track…whereas I just need someone to tell whether the answer’s right or wrong.

Ben felt like confidence in mathematics, and his phrase “a brain like me” was

directly linked to individuals who were more mathematically inclined such as how he saw himself.

> I think it goes hand in hand…'cause there are some people I guess are more mathematically inclined [he pointed to himself at this time]…you know there's some people that can't do the simplest balancing of checkbooks without writing down numbers and me I have never balanced a checkbook in my life and I'm 30 years old…it's all in my head. I know within $5 what's in every one of my bank accounts…so I think it's a head for numbers.

Since he mentioned his age again, the question was asked if age was a factor in recommending the College Algebra Internet course.

> I think I would've handled it better than any of my other classes at 18…if I had the opportunity…[conceding he said] but okay since I have been working in the corporate world…and now that I'm understanding and paying out of state tuition here…I understand what that money means…whereas early in college I had the same kind of bad GPA [referring to his high school GPA of 2.7]…but now I'm getting like a 3.7 GPA.

His strongest recommendation still came in the form of working while going to school.

> You know I specifically made the choice not to work because it would distract me. In fact, I was offered a job from Novell while I was going to school make more than I'll ever make as a teacher. But then I'd stop going to school.

He also felt strongly that other students not work, "you know I'm putting myself in a big hole financially by not working…but I would recommend it if you cannot work.

The Participant's Future

In the fall of 2006, Ben graduated with his Bachelor's degree in English Education with a state certificate to teach Secondary Education. At the time of this writing in spring 2008, Ben was continuing with his education, pursuing a second Bachelors degree in History Education. He indicated he would like to not only teach

English in the public school, but History.

Participant Three: Chad

In the fall of 1998 Chad began a degree at Idaho State University "because that's what you're supposed to do after you graduate from high school" He completed his Associate's Degree in Electronics in April 2000. At the completion of the associates degree Chad began work in Salt Lake City for a company in which he was hired as a technician. As the years passed he "got pretty burned out on doing this stuff, so he enrolled at UVSC to earn his pilot's license. Realizing he "didn't want to fly for a job," he continued his schooling with the goal of earned his degree in engineering. In order to complete an engineering degree he needed college algebra. He then enrolled in and passed the College Algebra Internet course spring semester 2006.

Family History

Chad did not talk at all about his family life prior to college. He briefly discussed the time he went to college in Idaho saying, "I didn't have my head in the books, I was partying…but now it means something." He then related this to his first attempt at the College Algebra Internet saying, "I took it summer semester and I failed…I got married that summer." The only other time he mentioned his wife was when asked if he would recommend the Internet course to his wife and he emphatically said no.

> [Once] we were talking and she said a quarter and so I said 25% and she thought I was making fun of her. She didn't realize that one fourth was 25%. I had to show her…I drew ten-thousand and said 'this is the ten-thousand spot, the hundreds spot, the tens.' I had to show her 'cause she had no idea. [Chad was describing to his wife the rational number one fourth represented as a decimal .25. He then

> proceeded to represent the decimal with respect to its place value, in a sequence, naming it by its power of 10.]

High School Mathematics Background

According to his transcripts, Chad graduated from high school in the spring of 1997. He said this about his sophomore year.

> I finished geometry but nothing [meaning no math] my junior or my senior year. I took a lot of electronics classes, like conversion from hex to octal, counting in binary. Even in the calculus for electronics it was pretty much the same. There wasn't complex numbers or graphing it was only figuring out circuits and calculating circuits. It wasn't very broad, it was focused…but I was always good in math.

In the fall of 1998, he enrolled in college "in my home town," at Idaho State University, "because that's what you're supposed to do after you graduate from high school…although I didn't have my head in the books I was partying."

College Mathematics Background

In the fall of 1998, Chad enrolled at Idaho State University with the goal of an Associate's Degree in Electronics. Spring semester 2000 Chad completed this associate. While at Idaho State, "I took calculus for electronics." According to his transcript, there was no labeled description of any mathematics course. However, there were 78 credits spread over both years all labeled TECH 1900, Technology Elective. The calculus course he referenced was taught in the TECH department and was labeled the same as all the other technology courses he enrolled in. When asked what topics were covered in that course he indicated "it was basically the same topics in that class as in the college algebra class."

After he graduated from Idaho State University, Chad got a job with a company in Salt Lake City as a technician. After a few years, "I was pretty burned out on doing this stuff, so I started at UVSC at the professional pilot program." The program requires college algebra as its quantitative literacy requirement. As a new student to UVSC Chad was required to take an entrance exam to determine which mathematics course he needed to take. He was placed into Math 0990, a pre-algebra course, "'cause I didn't remember anything, it had been years ago [since his last math course]."

Chad took Math 0990 in the fall of 2004, his first semester at UVSC, followed by Math 1010, spring 2005. He enrolled in a full course load during the summer 2005 semester which included the College Algebra Internet course, but "I failed…all my courses [including two others which were non-mathematics]…I got married that summer." It was not until spring 2006 when Chad had a semester free from flying that he was able to enroll in the College Algebra Internet course. He felt like

> it was just basically a refresher…from the calc course I had before…I had forgot a lot of stuff." Chad passed the course with a C+. He said many of the other courses such as the "GE's were internet like English and others available online, but I had to come here [meaning campus] for PE.

The College Algebra Internet Course

As Chad became "burned out on doing this stuff" in the company in Salt Lake City, he started at UVSC in the professional pilot program. Yet as Chad progressed in the company in Salt Lake City, while simultaneously working on his aviation degree, he decided he wanted to go into

> engineering 'cause I found out that my credits transferred from my home state to here…didn't apply to my aviation degree, they were electronics related, so I

> pretty much had to start over. So, rather than start over I decided to go into engineering…and also I don't really want to fly…don't get me wrong…I love flying but I just don't want to fly for the job. If I fly for my job, then I fly myself down there to do the work, do engineering, and then fly myself back.

He also attributed his change in career to "I realized I had my dream job, I just needed the paperwork to back it up. I just needed my engineering degree, I already have the job."

During the course, Chad had a few problems he had to deal with. "The problem with the math problem [is] you entered in the formulas online and even though you entered it right…it wasn't in their syntax and it was wrong." Then "when I had a math question I asked one of the engineers [at his work], 'cause they were there. There was a couple that I asked…usually when I stumbled." He also felt like the

> book doesn't tell you why you do things, it just says here do it and if you don't know why you can't associate it with something…so that's why it's great to get that little hint when somebody shows you how to do it, rather than here it is figure it out." He emphasized "I have to know why…'cause I won't remember otherwise.

At first it was hard for Chad because his plan was

> I'll do it on Saturday, but then, Friday night comes and you get hung over and then by Sunday, I'd just take a nap…but I didn't want to fail…so I'd come home from work and I'd work [on math] because that's just the life right now…have to do the grind so I can play later.

In the evenings when he did not have access to his engineering friends at work, Chad used other means to get his questions answered.

> If I had a question, I'd either search on the Internet 'cause the book is actually kinda vague. It's more like, here's the steps, but it's not 'why' you take the steps, so I'd search if I ever had a question. I'd search it on the Internet and then if that didn't work or if I ever couldn't figure it out there would always be a couple of other sites I'd go to.

His normal routine was

> about 4 hours for a week. I'd usually do just my assignment on the weekend and then turn it in. I always did good on the assignments just on the test not so good…not remembering the formulas or something. I got B's on that…and if I'd spent more time I'd likely got an A.

In looking over his data from the software company Chad actually logged an average of 10 hours each week. When asked if he did anything else during that semester he said,

> No, I didn't do anything that semester, I worked and did school…I was flying down here…I already had my pilot license, and was working on my instrument…and I worked about 50 hours per week and was taking a full load.

Workload and Dedication

After Chad graduated from Idaho State University he got a job in Salt Lake City for an engineering firm and started as a tech. Over the years he worked his way up the company until he landed "his dream job…it took six years of experience and I worked my ass off. Now I just need the paperwork to back it up. I just need my engineering degree, 'cause I already have the job." Asking why he needed the engineering degree he indicated, "I don't…I just want it for me."

During the semester, he took the College Algebra Internet he had completed his pilot license and was working on his instrument. He was also working

> at least probably 50 [hours a week]…and was taking a full load…I didn't want to fail…so I didn't do anything that semester, I worked and I did school….like I'd come home from work and I'd work [on the math] 'cause that's just the life right now…have to do the grind so I can play later.

Chad felt like he was more dedicated now:

> [I]t might be my age…well when I went to college the first time, I was going to

> college because that's what you're supposed to do after you graduate from high school…but now it's like this means something…I did what I had to do.

Participant Recommendations

Chad felt like there were a few factors that would determine success in the College Algebra Internet course. First "if they don't like math, then probably not the Internet…it was easy for me…but I like math…'cause the book doesn't' tell you why." When Chad didn't know why he would either ask one of his colleagues at his work "one of the engineers," or "I'd search on the Internet…if I ever had a question." He also felt like they needed to be

> decent, I mean, if they know it [meaning the mathematics]…of course you're not going to remember everything, but that's what books are for…but if you're not confident then I'd take the class, the onsite class [meaning a campus class].

During the time of the interview Chad was enrolled in an on-campus mathematics course call Math 1060, Trigonometry. It was offered via Internet so the question was raised why he didn't take this course Internet like he did the College Algebra Internet course. He was still living in Salt Lake at the time and still working 50+ hours a week. He said:

> Well I never took trigonometry or anything like it before so this is all pretty new to me…so I'm saying that if you haven't seen the material, as far as math goes, it's new like that, it's better to take it in class than in the Internet.

Finally, when asked if age was a factor in determining success, since he had mentioned his age previously in the interview, Chad said:

> Yes, 'cause when I went to college the first time, I was going to college because that's what you're supposed to do after you graduate from high school…I didn't have my head in the books…but now it's like this means something….you have

> to have motivation to stick with it at home, ’cause that’s the hardest part…I just didn’t want to fail.

The Participant’s Future

Chad completed all the coursework he needed for an associate’s degree at UVSC in engineering. He then transferred to the University of Utah to earn his bachelor’s degree in engineering because “I already have my dream job, I just need the paperwork to back it up. I just need my engineering degree.”

Participant Four: Adam

Adam began college right after high school in the fall of 2003. He tested into Math 1010, Intermediate Algebra and enrolled and passed this course in the fall of 2003. He enrolled in college algebra in the spring of 2004 and again in the fall of 2004, failing both times. During the fall 2004 semester his mother enrolled in and passed the College Algebra Internet course. Two years later during the spring 2006 semester Adam, encouraged by his mother’s success, enrolled in and passed the College Algebra Internet course. He earned a C-, which counted, towards his quantitative literacy requirement for his degree. Had he needed another mathematics course he would have needed to retake the college algebra again. The UVSC mathematics department requires a C in order to progress into the next mathematics course.

Family History

Adam did not mention his family with the exception of his mother in which he indicated,

> During the second time I was taking college algebra, we were doing it at the same time and so me and my Mom would kinda…do homework together…she would ask me questions and I kinda helped her out with them, although she really didn't need my help.

High School Mathematics Background

Adam attended a high school three miles from UVSC. He graduated in the spring of 2003 ranking 51 out of a class of 413. His overall GPA was a 3.89 and he scored a 24 on his ACT, with an English score of 29. He had mathematics all three years of high school.

> I took college algebra called pre-calculus my junior year…it was a small class…only about 10-15 students. I actually had a teacher since I was a sophomore and I actually took all three years from her…she was a really good teacher…math isn't my strongest thing but I don't remember having a lot of problems in those classes.

Although he "loved my teacher," he did not feel like they covered all the required material.

> That's something that I don't feel that they [meaning the math curriculum at his high school] really covered very well in high school…logarithms I mean. I didn't do it at all in high school…and maybe it's just for me that graphing things from functions is hard for me to understand, so that's where it kinda got harder for me in college algebra. I also don't remember that we didn't do exponential functions either.

During his senior year of high school, Adam took discrete mathematics in "which we did binomial theorem a little bit…but I don't think it was something in the book, but my teacher decided to show it to us anyway." Once again he signed up for the course because of the teacher that was teaching the high school course. When he was taking the College Algebra Internet course,

> I would just go to visit her and I would ask her some questions…like a lot of it

> depends on your attitude….so, we became really good friends, and she was someone that would say 'it's no big deal to do this [meaning math], she had a really good attitude towards math…so I always felt like I learned a lot from her.

College Mathematics Background

Adam's began his first semester at UVSC three months after graduating from high school. He took only one course, the Math 1010 Intermediate Algebra. He passed with a B. Needing the college algebra course for his quantitative literacy requirement, and feeling confident in college he enrolled in the college algebra course the next semester, spring 2004 along with 11 other credit hours.

> But I withdrew before the deadline. I felt pretty prepared…but then it gets to a certain point when I think it's logarithms and parabolas and that kind of thing that I start having a hard time.

He attributed part of this difficulty to his high school mathematics experience,

> I don't feel that they really covered logarithms very well in high school…I didn't do it at all in high school…and maybe it's just me but graphing things from functions is hard for me to understand so that's where it kinda got harder for me.

Even the class environment was difficult for Adam.

> The class environment at least for me and my experience with the math teachers was more stressful than the online…I felt like they were very impatient with me. They don't create an atmosphere that makes you feel comfortable with asking questions…and I don't think that they know how to work [with] people who are more visually oriented. I'm more learning hands on I guess and that's hard with math but I think they don't know how to teach it so everybody can understand…really only the people who are good at math.

In the fall of 2004, Adam again enrolled in the college algebra course.

> It was in a classroom that honestly it was the hardest for me 'cause I'd heard other students say that my instructor [she] just wasn't very nice. She didn't spend time or she'd show you how to do something and then she would just move on and not really let you ask questions. She was really someone who would teach you

> something and then give you a really hard one on the test or a really elaborate one. So, I didn't really like that one.

It was during this fall semester that

> me and my Mom were doing it at the same time, except she was doing it online. So me and my Mom would kinda…well we really wouldn't do homework together but she would ask me questions and I kinda helped her out with them. But, she was a lot farther ahead than in my class.

Adam still came across curriculum that was difficult.

> We got to a point where I think we were doing the different ones where it's a 'v' [an absolute-value function], the general shape…and that's where I stopped. It hurt my chances [for success], in fact for me logarithms are something that I need a lot of practice at because for me it's hard. It's the inverse, and it's hard for me to keep those straight and how numbers on the exponents go…so I just stopped going so I got an E.

Adam took the College Algebra Internet course spring 2006,

> 'cause my Mom had done it and she heard that from someone else so I did it too….I also was pretty confident about what my Mom had gone through and [had] seen what she had done and she's someone who stresses over math too. But, I just watched her do it and she really breezed through it so yeah…I wanted to take it too.

When he came across logarithms and exponents that was previously "hard to keep those straight…I got more practice on those before I got into those more so [online] than I ever got in the classroom." In fact,

> I actually thought that online was considerably easier or less stressful for me than going to a classroom. It's interesting that I would tell people I was taking the College Algebra Internet course and their reaction is 'oh that must be so much harder' but it's not…it wasn't for me at least.

It was interesting to note his attitude towards the College Algebra Internet course, so a follow-up question related to how he viewed the college algebra course from the beginning knowing there was a lot of animosity towards this particular course on campus.

> I really didn't have a bad attitude about it…the only thing that kinda made me a little iffy was what I had heard other students say about college algebra. I'd hear people say that they'd taken it a million times, and I've heard it's the most failed course here. I don't know if that's true but I didn't really let that influence me that much 'cause I hear a lot of students say that about certain classes. Even ones that I've taken that I thought hadn't been that big a deal, so I didn't really think too much about that. It just kinda made me a little wary.

The College Algebra Internet Course

Adam took the College Algebra Internet course as a direct result of the success of his mother. He watched her "breeze through" the class and felt confident that he would have this same success. He knew his mother also had experienced anxiety with respect to mathematics in the past.

Due to his previous college algebra experiences, Adam considered the online "easier or less stressful for me than going to a classroom." When asked why, he said:

> I really liked how the quizzes were set up with online because I felt like, honestly, the other times in taking college algebra and even in high school I kinda felt like they teach you a concept and then they give you a really hard problem to try to illustrate that. I felt like I could do it with the online quizzes because it taught the concept and then it didn't show you something you've never seen before it just was one that you'd done in the homework and I like that so that's why I felt more successful.

When asked if there was something he did not like about the Internet course, he said, "The book…I did the homework problems out of the book but I learned more from the explanations online than reading it out of the book 'cause I don't like textbooks generally."

Wondering if his mother helped him out, since she had already completed the Internet course, he said:

> No…I went to my teacher, my math teacher in high school. We became really

> good friends. I would just go over to visit her and I would end up asking her some questions. She was somebody that was very like "it's no big deal to do this" and I really liked that about her and so I learned a lot from her.

Looking over his records, Adam logged over 12 hours each week and then took the exams on time.

> I don't ever think I did it late [the exams]…and I really liked the tests…they were only 10 questions, and even if the question was wrong I got some points if we showed our work. I really liked the shorter exam, I think maybe psychologically when something is shorter to me it feels like it's not as bad.

He also maintained a very strict schedule in doing his homework and exams.

> You are your own boss…but I didn't put it off, I did all the homework problems and even if I thought I didn't need to, or even if I was feeling I was doing okay or could breeze through my homework I would still do it because that's what kept it ingrained in my mind.

Towards the end of the interview he once again indicated his dislike for logarithms and indicating that he felt like they shouldn't be a part of the Internet course or the college algebra course altogether.

> I'm not a math expert so I can't really say what is necessary but maybe if whoever decides what to teach, they might rethink what exactly you must know and what could maybe be left out…you know I've heard people say 'why do I need to take math when you never use it' and that's not true because you do use it you just don't think about it. But things like the logarithms and stuff like that I didn't really think was necessary…that's my opinion.

Workload and Dedication

During the semester Adam took the College Algebra Internet course, he was also taking nine other credit hours.

> I wasn't taking full-time but I don't know if that would have made any difference because I was very pleased with the online course and it was very manageable…I mean with my normal work schedule and school schedule. I was working fulltime and had other classes but I didn't feel that it was stressful…now going to

> class I thought was. The class environment at least with me and my experience with the math teachers was more stressful than the online.

He was very dedicated to completing his work, "I did it at home." When he had questions, he said he would

> just go to visit her [his former high school math teacher] and I would just ask her some questions….I didn't put it off…I would do all the homework problems even if I thought I didn't need to because that was something that just helped more…and I didn't procrastinate 'cause I'm someone that my brain turns on when I don't have a lot of time. I'm better under pressure, so it really wouldn't matter if I wasn't working. If I had all this free time to do homework I probably wouldn't take advantage of it.

Participant Recommendations

Adam's recommendations focused on changes that could be made to the college algebra course and some for students taking the College Algebra Internet course. He felt that, "those who decide what to teach need to rethink what exactly you must know and what could be left out…the logarithms was something that I didn't really think was necessary."

With respect to the College Algebra Internet course, he indicated that success would depend on "your attitude towards math." He stressed that students should not

> put it off because…you are your own boss and so it's easier to not be as consistent with doing your homework and stuff so don't put it off. I would also tell them to make sure I would do all the homework problems even if they think they don't need to because that was something that just helped me more. Even if you're feeling like you are doing okay, even if you breeze through the homework to still do it, because that is what keeps it ingrained in your mind.

Participant's Future

According to his transcript, he has a declared major of Creative Writing in the

department of English and Literature. He continued schooling through spring 2007and enrolled in fall 2007 with 12 credit hours, but all courses indicated an official withdrawal. For a student to be granted an official withdrawal, they either drop their entire course load within 3 weeks of the semester or if they have missed that deadline, then they need to have some extenuating circumstances that are deemed appropriate to have all courses dropped. Typically, this comes in the form of an accident, illness, death in the family, or military service. Very rarely do records grant an official withdrawal.

Participant Five: Kent

Kent graduated from high school in 1978. He immediately began work in a brewery. In 1987, he enrolled in Salt Lake Community College. He took an algebra course offered in the Technology Department called TECH 1900 and completed this course with a B. Ten years later in the summer of 1997, Kent enrolled in college again at UVSC. The entrance exam results for Kent placed him in the Math 095 course, which was very similar to the topics covered in the algebra course he took at Salt Lake Community College. He completed the course and earned an A-. Seven years later, spring 2004, Kent enrolled in the next mathematics course, Math 1000, and earned a C+, which made him eligible to enroll in college algebra. In the spring 2006 semester, Kent enrolled in and passed the College Algebra Internet course with a C-. He also graduated that same semester with an Associate Degree in Science, in Criminal Justice.

Family History

Since grade school, Kent has had serious problems with math. “I had a teacher

that really didn't care…the students were correcting [the teacher's] work on the chalkboard." His high school experience wasn't any better so by the time he enrolled in college and needed to take mathematics he had created a "support network…of my personal advisors" that were made up of "my wife, my niece, my friends, and my in-laws…who said, 'just keep going, we can get you through this. We can do this together…you know you're doing fine, so keep going…it's a team effort more than anything else.'"

He relied heavily on his wife for help.

> If I ran into a problem I'd email my wife, "what's going on with this and why am I not getting this" and she'd kinda give me hints…or she'd sit with me. Several times I would have my wife sitting beside me and I would work the problem and she'd say "well you did this wrong or you did that wrong" and I would work it again and again and again until I could get it right consistently…with her. But, I tried not to use my wife too much because I started getting testy about the whole thing.

At the conclusion of the College Algebra Internet course, after Kent had taken the final, he was worried that he might not have passed.

> I climbed into bed and explained to my wife that I was really kinda sweating it and that I didn't think I would pass and how should I proceed if I didn't and should I go to another school and take it…I was planning on not passing it because I honestly didn't think I would make it. So that last night I was sitting there going over this with my wife…"I just don't know if I passed it or not…what do I do," so we kinda discussed this. With my wife's help we were able to determine exactly what my earned points were and determine that I barely scraped by to pass.

Besides his wife he would call "my niece who was 15 at the time….We were doing the same stuff, she in high school and I in college….She was tutoring me which we thought was absolutely hilarious." As he continued in his schooling with several years away from school, he would still call "my niece…she would come over and help…and

she'd kinda give me hints."

He also relied on other family members, such as

> my father-in-law who's got a doctorate in chemistry and teaches at BYU. Then there's one of his sons who's got his doctorate in chemistry and then another one's got a doctorate in mathematics and another whose masters [is] in mathematics and teaches in California.

When "I didn't think I would pass," and discussing his options with his wife, he thought "maybe my father-in-law could pull some strings and get me into BYU for that one class."

There was one family member, "my brother-in-law in particular," who helped at a crucial time in the course.

> Normally his personality and my personality are not compatible all that well. He and I butted heads over things before. So, I was at a family outing, actually his grandfather had died so we went to the funeral. A whole bunch of us were in the same hotel and he came to visit me. I was working away at my math 'cause I had brought my laptop with me…and I didn't dare slack off. He came in and he looked at some of the stuff. He was looking at the concepts that he figured should have been further in another class and said "that's really strange, you know I'm really kinda confused why this would be with an algebra class." He actually sat down and explained some things to me in a different fashion than other people. He helped me grasp a couple of concepts and he got me through that part. He kinda just said,"okay, well this is what I'm doing with my students…and so this is what I'm dealing with…with my students and this is how I tell them to do things." So he kinda walked me through a few things and I was able to get through that part. He gave me some concepts and some ideas of how to put things together and expressed it to me in a completely new light, which really helped with that particular section of the program. He also was very supportive, and he kinda brought my confidence level back up saying, "You know it's not necessarily all you…'cause like honestly your doing fine. This is even beyond what your probably ought to be expected so just get through it and you'll be fine."

High School Mathematics Background

The first real algebra course Kent had was in the seventh grade.

> It was a really basic algebra course back then. The teacher I had had a doctorate in mathematics and he refused to help any of us, he would say, "this is simple. You should figure this out on your own." The students would be going "no, you did that wrong" and we were correcting his work on the chalkboard. It was like that in every single one of his classes, everybody complained. He just didn't know what he was doing and he really didn't care. By 8th grade, I had Dr. Wood. He obviously knew what he was doing…not like the first one who didn't know what he was doing. But he just wouldn't help us because it was too simple, saying, "you should be able to get his on your own" and I was very confused about a number of different concepts and he just wouldn't help…so we were sink or swim in his classes.

In his next algebra class, in ninth grade, "I got a D in that class…and that was the end of math that I had to take in high school." His senior year of high school, "I made *Who's Who in High School*, even with a D, so you know I consider myself a reasonably bright individual. Math just never sunk in and I wasn't able to get the help I needed."

College Mathematics Background

Nine years after graduating from high school, Kent began college at Salt Lake Community College. He took a Technology Elective course, TECH 1900, a basic algebra course.

> The instructor was very good and I actually got a B in that class. It was a basic algebra class. I had trouble with concepts but he [the instructor] was very patient and explained everything thoroughly so I could understand it and he was probably the first mathematics teacher that I ever had that I could understand what was going on, so I ended up with a B for that class.

In August of 1995, Kent enrolled at UVSC and took a placement exam to determine his placement for mathematics. Although due to work, he did not actually enroll in a course until the summer of 1997. He enrolled in only one course, Math 0950, beginning algebra.

With the help of several friends, who had degrees and things, they sat me down

> and helped tutor me…plus my niece who was probably 15 at the time and was doing the same stuff…she was tutoring me, which we thought was absolutely hilarious. I pulled a pretty good grade in that one.

After a seven year break, due to work, he began college again but full-time in the summer of 2004. He enrolled in the next subsequent math course, Math 1000, Intermediate Algebra. At UVSC, the Math 1000 course is a 5-credit-hour course that combines two courses together to fast track students to college algebra. It is an intense course that expects students to keep up with the pace of two courses in a single semester.

> Because of my work schedule, I ended up taking it in distance education. My department paid for it…and at one point I was working graveyards and so getting to campus was kind of a problem. But I continued with it because I had a 12 hour work schedule. I had to be at work at 6 in the morning and come home 6 at night. It was a rotating schedule so there wasn't any set day that I was off so I couldn't schedule classes on days that I was off because there was never a day that I was off consistently.

He went on to say,

> In 1000 I struggled bad. I would be working along and come to a problem and I'd work it over and over and over again and couldn't get the answer that the book was coming up with. So I'd ask my niece and my other friends who were going to BYU and were in much higher math, and my family. So all these people who know math, the first one that would come along I'd say 'what is up with this problem' and they'd say "it's wrong, they [meaning the book authors] figured it wrong. You've got the right answer, they just figured it wrong." Then the next term I discovered that that particular program was gone…they'd gotten rid of it [meaning the developmental mathematics department that teaches the Math 1000 course].

To cope, Kent studied every day that he had work off. Then, on the other days he would get off of work around 6pm and pick up with his mathematics study until "2 or 3 in the morning." Oftentimes he would get help from his "support network," working through the problems, multiple times, until he felt he could consistently work a correct problem.

In the fall of 2005 Kent had completed all of his coursework required for an

Associate's Degree in Criminal Justice with the exception of college algebra. He then enrolled in the College Algebra Internet course the spring semester of 2006. It was the only course he was taking that semester and the last one left for graduation,

> It was the last class I had to do for my degree and I pretty much knew I needed to take the math by itself and if I didn't struggle with math so much I would have fit it into one of the other semester so I would have graduate a semester earlier.

Knowing his feelings towards mathematics, the question was asked why he did not take college algebra in an on-campus class or earlier, right after the Math 1000 when things were fresh. He indicated:

> I almost wished I had taken it right away, but some other things came up and I wasn't able to….We [meaning he and his wife] considered it [taking the on-campus class] but my work schedule wouldn't allow me to get into classes. I really needed face to face…I probably would have passed with a much better grade if I had done a class. We actually looked in the book and couldn't find any classes that I could get into because they all started right around 6 o'clock and I couldn't get there on time every time.

Kent completed the College Algebra Internet course spring semester 2006 at the end of April with a C-. A C- is the lowest grade earned that will allow a student to graduate with an associate's degree, so Kent was able to graduate in April 2006 in Criminal Justice.

The College Algebra Internet Course

Kent's degree allowed him to choose between three quantitative literacy courses. One option was Math 1030 Qualitative Reasoning, a second was Math 1040 Statistics, and the third option was Math 1050 College Algebra.

> But in talking to people who've taken those other classes they recommended, don't do it. I really didn't want to take 1050, 'cause I could take statistics which would fit the bill. But, everybody, including my brother-in-law who's got the

> doctorate in mathematics, recommended not taking statistics. He said, "if you're struggling with this, you're going to struggle even harder with that," and I said, "but this is a different genre and I should be able to get this better," and he said, "no you won't, don't even bother taking that."

When asked about the option of Math 1030 he said,

> A friend of my wife's husband had taken that one. He's a computer programmer, so math happens for him, but he didn't like it [the Math 1030 course] and he struggled so he said, "go with this one [meaning college algebra] 'cause we can get you through this one." All my advisors said go with the 1050 'cause we can help you with that."

Wondering which advisor he discussed his options with he indicated, "my personal advisors, my support network, my wife, my friends, my in-laws all said 'you know we can get you through the 1050, but I don't know that we can get you through the other ones." Because of this advice, Kent made the decision to enroll in College Algebra Internet. When asked why he did not consider an on-campus course, he indicated:

> We [meaning a joint decision between himself and his wife] considered it but my work schedule wouldn't allow me to get into classes. We actually looked in the book and couldn't find any classes that I could get into because they all started right around 6 o'clock and I couldn't get there on time every time. I knew I really kinda needed more of a structured environment because I needed more face to face stuff so I could ask questions and get answers. But again I couldn't get into one [on-campus] and it was the last class I had to do for my degree.

During the semester that Kent took the College Algebra Internet course, he had no other courses he was enrolled in.

> I was spending the majority of the time at home, working on the math [during the previous course Math 1010] and very little of it was going into the other classes. So I knew that I was going to have to take the math class [the College Algebra Internet] pretty much by itself or with something really, really easy that I could just get through because I was going to need to spend the majority of my time on that.

He felt somewhat unprepared for class

> ’cause the time had lapsed and I forgot a lot of what I was doing. The beginning of class… started out reviewing a lot of things that had gone on before, so a lot of the review I was able to catch up and do pretty well with. Especially with the help from friends tutoring me. Also my niece who was at this point in college, my wife, various family members and so forth.

Kent’s routine was as follows:

> Anytime I had a day off I frequently was over here working at the math lab. I was actually at it every day. Typically on the days that I worked I’d put in from the time I got home ‘til I went to bed. I was working on the math a couple of hours at least. See I would work 3 or 4 days a week, it was a rotating schedule, so for instance I would work a 4-day weekend and then I’d have Tuesday, Wednesday, and Thursday off. Then I’d work 3 days and then I’d have 2 days off and then I’d work 2 days and then I’d have 4 off. So all my days off I was spending doing math. I spent most of my day working on the math keeping up and trying to get the stuff into my head so I could figure it out. If I ran into a problem I’d email my wife, “what’s going on with this and why am I not getting this” and she’d kinda give me hints or I’d call my niece or I’d come over here to the math lab. I was spending all my time trying to get all the concepts pounded in my head so I could take the test and pass it. I spent every minute that I possibly could on the math class just trying to get through it and understand what I was doing. I guess whatever I needed to do to get through it, but I struggled, I really struggled.

Kent felt this way;

> There was not enough practice stuff with the book. You know I’d do the problem but I wouldn’t know if I’d done it right and finding the answers and stuff in there was kinda difficult. But as far as the software went it was pretty comprehensive and I was able to go through things a couple of times if I needed to try and get a grip on what was going on. Then again my wife would sit with me and stuff or my niece would come over and help.

Kent and the instructor also “emailed back and forth quite a bit during the course, so I got quite a bit of information that way and some feedback. About a quarter of the way through the course, Kent

> got to the point where I was beginning to get into the concepts that were fuzzy. I had seen them before but really the concepts weren’t there for me to pull from and from there it just kinda got progressively less and less familiar.

It was at this point that Kent began to lean more heavily on his “support network….my

personal advisors." Kent tried not to use his wife too much because he felt like he was "getting testy about the whole thing."

> But, really they were the only reason I got through it. The math lab was helpful but I wasn't able to get here as often as I should have or could have but the other people were there for me to fill that gap and I had more access to them than I did to the math lab. Like the times when the math lab was closed, like Sundays and things, they were there so that's what got me through it…those people.

Some of his frustrations were not necessarily math related.

> One of the frustrations that I really had was I'd have a question and I'd email the instructor and they were very quick to respond, but I still had to wait. But in that span of time my mind had gone onto other things. I'd already moved on. I mean I can't go any further with this until I get this answer, so I'd put it aside. But, I'm not gonna sit there and keep that all in my mind, I'm gonna get up and go do things, like go wash the car, do the dishes or feed the dog or whatever. My mind is not going to be on that concept at that time. So then after I got my question answered I had to re-gear myself to go "what was I doing, what was I thinking of when I asked that question." So then you've got to take the time to get back in that mode, back in that thought process to be able to absorb what your answer is and apply it to what you were doing.

For Kent it got really dicey towards the end. "Before the end, I was into concepts that I considered geometry and it really wasn't coming together for me. I was incredibly frustrated." It was at this time that Kent was able to get some help from a brother-in-law. A very interesting situation occurred. They were at a funeral and were sharing the same hotel. His brother-in-law noticed that Kent was working on his mathematics and asked if he could help. He noticed some of the topics that Kent was working on and commented that perhaps some of the topics were beyond a college algebra class. Kent recalled,

> The conversation we had along those lines kinda brought my confidence back up a bit which is something I didn't expect from his. He was pretty supportive and he actually sat down and explained some things to me in a different fashion than other people had worked with me. He helped me grasp a couple of concepts and got me through it. He just kinda said, "okay well this is what I'm doing with my students…and this is how I tell them to do these things" and so he kinda walked

> me through a few things and I was able to get through that part and eventually passed it. He brought my confidence level back up saying "you know it's not necessarily all you."

During the last couple of weeks of the semester, Kent considered other options at this point because he did not think he would pass.

> The school's newspaper said there was over 50% fail rate and so I'm like, "I don't know I guess I could go to Salt Lake Community College, or maybe my father-in-law could pull some strings and get me into BYU for that one class." I was actually thinking about that the last couple weeks of class, "what am I going to do if I don't make this' because it's a squeaker, and so we were kinda looking at options and what to do and so forth."

After he had completed the final exam, he said he

> climbed into bed and explained to my wife that I was really kinda sweating it and that I didn't think that I would pass and how should I proceed if I didn't and should I go to another school and take it. I was planning on not passing it because I honestly didn't think I would make it. I think at least half of the course I really, really struggled. None of it really made a whole lot of sense to me. So we got out a calculator and figured out exactly what percent I would have and looked at the syllabus to see the cut-offs for grades. We figured we were within a 10th of a percent in favor of passing.

Kent completed and passed the College Algebra Internet with a C-. He indicated that "if I hadn't passed it would have slowed it down [meaning completing his associates degree] by one semester…it was a roller-coaster with my confidence level…it was quite an experience."

Workload and Dedication

Based on the struggles that Kent had in his previous math course,

> I knew I was going to be in trouble, so I pretty much knew that I needed to take math by itself. In my previous math course I was spending the majority of the time at home working on the math and very little of it was going into the other classes. So I knew that I was going to have to take the math class [college

> algebra] pretty much by itself or with something really, really easy that I could just get through.

The department he was working for at the time paid for his course.

> I was working graveyards and so getting to campus was kinda a problem. I had a 12 hour work schedule, so I had to be at work at six in the morning and come home at six at night. It was a rotating schedule, so there wasn't any set day that I was off, so I couldn't schedule classes on days that I was off because there was never a day that I was off consistently.

He had very little routine based on his work schedule so on his days off he spent most of the time, day and night, working on his mathematics. Any off days Kent had consisted of the same routine; working late into the evening or oftentimes into the next morning. He would spend as much time as possible in the mathematics lab on campus but on those occasions when the lab was not open he would call upon one of his "support network" resources, first beginning with his wife and then working down the line. There were times that whomever he called or emailed first was the lucky candidate to help him at the time. It was a roller-coaster ride for Kent.

> My confidence level in math was pretty low when I went into it initially. Then things were going smoothly and my confidence level was up a little bit but as I hit concepts that weren't familiar, then I began to really struggle, then my confidence level went way through the floor…it was quite an experience." But his "support network" just kept saying to him, "just keep going, we can get you through this. We can do this together; you know you're doing fine keep going." It was a team effort more than it was anything else.

Participant Recommendations

Kent's first recommendation was based on his own experiences. Between his previous math course and the College Algebra Internet "it was a couple of years…I wished I had taken it right away, 'cause the time had lapsed and I forgot a lot….so I

struggled, I really struggled." He felt like he "probably would have passed with a much better grade if I had done a class."

When asked about the course and what changes could be made, Kent indicated that,

> I'd split the 1050 into 2 different classes so then an individual such as myself would have more time to work and rework the problems to be able to grasp the concepts. The key to the math is working it over and over and over again, to be able to know, "okay when this problem comes up, this is how I work it." So a greater amount of time for being able to get those concepts in would be incredibly helpful.

Kent also felt like an individual needed to be well rounded in mathematics.

> If they've got a firm grasp of the concept already, then the Internet is the way to go. I have advised people in this same fashion. Basically, you know if you get math, if you understand it, if it comes easily for you, then the Internet is okay for you. But, if you don't, then take a class face to face. It's gonna be much more helpful to you. You're going to be able to say "stop, I don't understand that, walk me through that." Then if you're taking good notes on what's being explained, then you'll have an easier time getting through it.

He felt that if a student was in a similar situation such as he was with family and home life,

> I'd tell them they're gonna have a rough go. I mean if they struggle with math anyway, Internet is just gonna be that much harder for them, just because of the experience that I had with time constraints and not being able to ask the questions…and get a quick response [from the instructor].

His most profound recommendation was to get together a support network of personal advisors. For him, they are the reason he got through the course.

The Participant's Future

In April of 2006, Kent graduated with his associate of science degree, in criminal justice. The College Algebra Internet course was his last course required for graduation.

During the time he was attending UVSC he had been working at the Utah Department of Corrections but with his degree he was able to transfer to the "department of my choosing, without the rotating schedule…just regular hours." He has no intention of continuing his schooling, "this was the degree I needed for my job." He is currently working in his chosen field of study for the sheriff's department in Utah County with "a salary and a position raise."

Participant Six: Ann

As a high school student Ann "loved math." Twenty-six years and six children later, Ann enrolled in courses at UVSC in hopes of earning a bachelor's degree in accounting. She began school in the fall of 2002. After three unsuccessful attempts at college algebra, one of which was the College Algebra Internet, she attempted it for a fourth time and successfully passed. In "my personal opinion, I really didn't deserve to get a C in the class 'cause I don't think I deserved a C, but because I worked really hard and I tried. He passed me with a C."

Family History

Ann was born in Georgia, "but we moved when I was 18 months old." Her parents moved to

> Anadell, Virginia, until I was 14 years old…then Rhode Island, then New Jersey….As an adult we lived in Florida with my six children. It was Citrus County, which was about 60 miles north of Tampa and it was nice. Then I moved here and most of my kids are married here, so there was a reason I came here.…I wanted them to meet and marry nice Mormon kids so we moved here [to Utah County]….and after 26 years, I came back to school.

Ann had been working part-time "for admissions and I pretty much do transcripts and applications and I like the people I work with, but it's not a full-time job." She was struggling with the prospect of working full-time.

> I'm not sure I want to work full-time, I have grandkids at home, but I'm single and my husband's back child-support will run out in two years. But you never know when he's gonna get fired 'cause he quits so many jobs or gets fired so I can't depend on how long it will last…and I really like my summers. My oldest granddaughter said to her Mom [Ann's daughter], "I wish Grammy didn't have to work so she could spend more time with us."

Of her six children, "five of them are math geniuses; my youngest daughter is a math major at SUU. She got an A in 1050 and is now a TA [teaching assistant] for trigonometry."

> [My] middle son and my youngest son are also a lot like that. My youngest son got a 5 on the Calculus AP exam and he's just brilliant. Lora just majored in accounting and she had a 3.5 GPA when she graduated and Shannon had a 3.7.

High School Mathematics Background

Ann had very little to say about her high school mathematics experiences. For her it had been such a long time that she felt like her memory wasn't very accurate except for a few details, "I know I took algebra and I got a B in algebra, I loved algebra, I hated geometry….but to be honest I don't know…it's been 26 years."

College Mathematics Background

Ann enrolled in college in the fall of 2002 and by summer 2003 she took her first math course, Math 0990 (Pre-Algebra) in which she earned a B-. According to her transcripts, she enrolled in Math 1010 (Intermediate Algebra) the next mathematics course in the sequence in the fall of 2003. Early on in the semester, she withdrew. She

re-enrolled in Math 101 in the spring of 2004 and earned a D-. To be able to take Math 1050 College Algebra she needed a C- or better, so in the summer of 2004, 1st block, she once again re-enrolled in Math 1010 and earned a B-.

Second block she enrolled in another mathematics course instead of the college algebra, a math course called Introduction to Statistics, Math 1040. She withdrew from the course after she decided she wanted a Bachelors degree and needed the College Algebra course instead, "but since I decided to play around with accounting I needed it [College Algebra] for accounting."

In the fall of 2004 she enrolled in college algebra course.

> I finally just quit going because [the teacher] wasn't teaching as far as I was concerned…I just couldn't comprehend what was being said and when I would ask questions I would just get blown off… [the teacher] made me feel stupid so I just stopped going and obviously I didn't pass.

To complete her associates' degree she decided to take the Introduction to Statistics Math 1040 course again and enrolled in it spring of 2005 in which she earned a D, yet she still needed the College Algebra course. A year later, in the spring of 2006, she enrolled in a night college algebra course.

> I took an evening class and [the teacher was] actually an extremely good teacher but he doesn't care that much really about working with the students…it's more like "I don't get paid other than to teach the class, so if you need any help you can go to the math lab or hire a tutor that kind of thing." But…there was a kid in the class who actually went to school with my youngest daughter and he was really smart and helped me through the class and I barely missed getting a C in the class…I got a C-.

Enforced for the first time in the fall of 2005, the mathematics department at UVSC changed the prerequisites for the Introduction to Calculus course, Math 1100, in which a student must pass the College Algebra course with a C or better to enroll in the

Math 1100 course. "You have to have a C to get into calc, business calculus…but since I decided to play around with accounting, I needed the business calculus for accounting." Summer 2006 semester she enrolled in the College Algebra Internet course

> because I thought, well it's really fresh on my mind so maybe I'll do okay on it…and I'm not taking anything else and I can concentrate just on this….Then after failing the first two tests, I just said, "Forget it, this isn't worth it." So I just didn't do anymore.

It was at this point that Ann thought, "I pretty much thought well maybe I just can't handle this. I came close to just saying, 'no,' but thankfully I didn't."

Ann enrolled once again in the fall of 2006 in a college algebra course.

> My personal opinion is, I really didn't deserved to get a C in the class 'cause I don't think I deserved a C, but because I worked really hard, I tried, he passed me with a C.

She indicated,

> I wish I understood it, I wish I could go back and actually feel like I learned this stuff, but I don't feel like that….I still would just give anything to understand it, I'd love to be able to take the class and get an A in it, not because it's going to help my GPA but just because I'd like to know it, I'd like to learn it, and I'd like to feel confident in it.

Her experiences with the math courses at UVSC were very frustrating. Ann felt rushed with the college algebra course and felt like there was no recourse to have this changed on campus. Her ideal college algebra course would be to spread it out over a two semesters. In her words she said:

> The biggest problem that I have with this math here on campus is I think they care more about trying to get people to pass the class in four months than they really care about students.

The College Algebra Internet Course

Summer 2006, Ann enrolled for the third time in the college algebra course. "I took the Internet class because I thought, 'Well it's really fresh on my mind, so maybe I'll do okay on it.'" Her other motivation was, she said:

> My daughter was going to be home for the summer and I figured with her home maybe I could make it through….and also it was a summer class. Before, I had always taken full-time in the summer and I just didn't want to go to school in the summer…but, with my smart daughter home and the fact that I'm not taking anything else…[then] I can concentrate just on this.

At the beginning of the semester, Ann felt very comfortable with the material. She felt that she had retained information from approximately the first two chapters. Then, partway through preparing for the second exam, she became confused and was not able to complete homework problems successfully.

> It started bombarding you with so much information that no human can actually remember that quickly, I felt confident going into the test…Oh well, so much for being confident.

It was hard for Ann to determine what her obstacles were in the College Algebra Internet. Many times she would vacillate between different reasons for her failure at the College Algebra Internet. For example,

> It just seemed like what I was learning on the Internet wasn't the same thing as what I felt was on the test, or it wasn't worded the same way…and it just seemed really different….and all the stuff that they have you work on, I don't really think necessarily prepares you for the test.

When asked how much time she spent working on the mathematics and getting help, she evaded or side-stepped the questions, oftentimes getting angry and defensive:

> I didn't really like the program…and it cost a lot more to take it online, too…the book was a killer and then you can't return it…and it really took up a lot of time…and then there's nobody to ask but the stupid computer…nobody to ask

> questions. Besides, I couldn't really take the computer with me to the math lab and ask them to explain it to me.

The question was asked a second time how much time she spent working on the mathematics, her reply was "I really don't remember, I can't say." Her reasons for taking the College Algebra Internet course was, "it was a summer class…and I just didn't want to go to school in the summer, but I thought, 'Well I'm just going to go ahead and take this in the summer just because I'm not taking anything else.'" It was puzzling since she could have taken a more structured on-campus course with more help. When asked why she didn't, she again evaded the question, "I don't know…I can't answer that…I don't remember…I can't remember these insignificant details."

At this point in the conversation, her answers became more clipped and simple, with "no" or "yes" being the only reply that she would give, so the conversation at this point was shifted to other topics. She seemed to evade the questions and answer fairly monotone, as if what was being asked was quite boring or insignificant. The impression she gave was one of indifference.

After she completed the second exam she quit working on the Internet course, "after failing the first two tests I just said forget it, this isn't working so I just didn't do anymore." Her course grade was a failing grade and she "pretty much thought well maybe I just can't handle this…I came close to just saying no…just quitting on math altogether."

Workload and Dedication

During the time she was taking the College Algebra Internet course, she was

working part-time for the admissions office. She took just the one course "because I'm not taking anything else and I can concentrate just on this." When asked if she had anything else going on at that time, her simple reply was "no" but that she "thinks it takes more time to take the Internet class than it does if you go to school."

Still not understanding her level of dedication, she was asked about previous courses:

> I go into my classes thinking, "When are you guys going to teach me something"…I don't do anything but what's required and I pass the classes and I don't really care if I get A's…Now I've learned some things, but heck, at my age I've lived most of the stuff here that I'm learning….You know there's concepts I have learned but I've already gone into the classes feeling confident enough that sometimes I just do what's required and get A's and B's in the class….Life experience has a lot to do with getting A's and B's...except for math.

Participant Recommendations

All the participants were asked what recommendations they would make for a future College Algebra Internet prospective student. Ann came up with some of the same recommendations as many of the others such as:

> I would pretty much say, How'd you do in high school?," 'cause anybody who doesn't have a knowledge already of math shouldn't take it online…if they already have a decent concept of it and understand it....or, if you can see the concept and see how you can apply it, I think that makes a difference.

One specific question asked during the interview set Ann on fire. It was the longest reply she gave during the interview. She was very animated, waving her hands, and oftentimes pounding the desk in front of her to emphasize various points. Her recommendations focused primarily on the mathematics department in general, not on the College Algebra Internet course. This is one monologue with a few um's and repeats

omitted. Her feelings were very clear and she felt very strongly about her suggestions.

> The biggest problem that I have with this math here on campus is I think they care more about trying to get people to pass the class in four months than they really care about students…I don't think they care about us....what I would do would be to offer a college 1050A and a college 1050B split it into two…and I've argued with them before on that and they just don't ever listen…but the thing is, my personal opinion doesn't matter. I don't really think it would matter to any employer how fast you learn the material, it's more important you learn the material and some people, like me, just learn slower than others. I just feel like they offer too much material for anyone to really keep up…and if you're not going onto further math, it's almost like, "why"….Obviously it doesn't work that well for a lot of students because I hear it's the number one failed class in the state, so I think that would be the first thing I would do. The second thing I would do is evaluate the teachers…just because some care and others could care less…like [one teacher] he is an exceptional teacher…and [another is] like the same way. I would have done anything if he would have taught 1050…just because he cared and I liked that fact that he'd give you homework…I think this is important too, especially for this class, is that they give you homework and then grade your homework and count that towards your grade…other's like [two other teachers] don't take the time to grade it…cause [they don't] want to. ..Another thing to bring notes would help, but they don't let you bring notes for the test…and it's just so many different concepts there's a different formula…and it's like, "I'm sorry I just don't have the memory."

The Participant's Future

At the time of the interview, Ann had already graduated with a Bachelors degree in Health Services Administration, spring semester 2006, which did not require the College Algebra course as a qualitative literacy requirement. Wanting to complete an accounting degree, she needed the College Algebra course. Her attempt in the summer of 2006, the College Algebra Internet course, failed so she enrolled in the course on-campus in the fall of 2006. This was her last semester of schooling and she has yet to complete the accounting degree.

Participant Seven: Paul

Paul enrolled in the College Algebra Internet course for the first time in the spring of 2006 in which he earned a D. Paul's declared major is business, which means he would need to successfully complete business calculus. The UVSC mathematics department policy on enrolling in a subsequent mathematics courses states that a prerequisite of a C or better is required (UVSC Course Catalog, 2008). To meet this requirement he enrolled in the College Algebra Internet course a second time in the spring of 2007 and once again did not successfully pass this course. His earned grade for the spring 2007 semester was a D+.

Family History

As a young man Paul loved mathematics, "as a kid I loved math." According to his high school transcript Paul graduated in the spring of 2001 in the upper 40% of his class. Shortly thereafter, he served a mission for his religious affiliation, which took him out of the country for 2 years. He enrolled in and was accepted at UVSC for spring semester 2004. Within 3 months, he met his future wife and by July of that same year, he was married. At the time of the interview, he had been married "a year and 8 months." It was evident that he was happy to be married but also extremely frustrated with the pressures of marriage and getting through school quickly. He said:

> I have to get through school so I can support my family. My wife [is] older than me…and she wants to start a family…She's a counselor in [a] school district…So…there's a lot of stress these past two years, getting through, trying to get it done.

Besides the pressure from his wife about finishing school, he also encountered "a

bunch of family problems….See on top of everything else, my wife's parents are getting divorced, so she's really struggling with that…and then my wife's pretty demanding… she's not going to hear this…it's marital relationships…yeah, they're huge…" In asking if he could get away from some of these family pressures he said, "They're [her parents] in Salt Lake, Murray, so…she's always needing to talk about that…and then just regular stuff…so she's really struggling."

At one point his mother tried to intervene and help out to ease some of the burden his wife was placing on him, "I was also a TA for my Mom here [at UVSC]…she's a …teacher," but the added pressure was more than he could handle and "had to give something up." As a result, he quit being a TA for his mother and went back to full-time work. Paul's Mom was hoping he would quit the full-time work and TA exclusively for her and have Paul's wife continue to work full-time, but this wasn't the intention of Paul's wife.

High School Mathematics Background

When asked about his high school experience Paul indicated "it's been a long time," and that he "did not take college algebra in high school." As the interview continued he either went blank on high school questions or indicated "it's been a long time." The transcript sent to UVSC from his high school indicated he graduated in 2001 with an overall GPA of 3.4 ranked 195 out of 486.

College Mathematics Background

When Paul began UVSC in the spring of 2004, he waived four Spanish courses

due to his previous 2 years in a Spanish-speaking country. The waiver came in the form of an exam in which he passed all four. In December of 2003, he took the COMPASS [computer-adaptive assessment program] placement exam, which each new student to the institution is required to take. His scores indicate he was placed at the beginning in Math 0950. In April of 2005, he took the mathematics placement exam again and was once again placed at the beginning in Math 0950. By August of that same year, he retook the placement exam and was able to place into the Math 1000 class, the pre-requisite to college algebra, "I took the assessment test at the beginning and the first time I didn't do as well and then I took it again and I was pushed into the 1000 level class."

Paul indicated, "I took it Internet," in which he felt like "I actually didn't do that well in 1000. It was a C+. Yeah, it was difficult for me, but I felt like I was able to get through it fairly easy." In verifying timelines, the transcript actually revealed that Paul earned a C instead of a C+. The following semester, spring 2006 Paul enrolled in the College Algebra Internet course and earned a D. "This is the only class I've ever repeated."

As a result of his work and family life, Paul took many of his courses online. "I've probably taken over 10 Internet courses, maybe more…business classes, business writing…Business law I didn't do as well in." In one semester, "I took five Internet courses, 17 credit hours." Once he began his 3000 level courses, he

> had to be on campus, so I'm there so I guess they [the on-campus business courses] become more important...just one of the management or accounting classes…not including the time in school….[He would spend] three hours to four hours probably on homework [each day versus one hour of homework on math a week].

He struggled with the reasoning behind the college algebra course saying,

> For whatever reason they let me sign up for those other courses so I'm four classes away from graduating…I'm actually in my 4000 level classes…and one of them is this, 1050 and the other one is calculus…they even let me get into statistics.

The College Algebra Internet Course

Paul actually took the College Algebra Internet course two times. At the time of the interview, he was into his second time. The questions for the interview covered only his first experience, yet at times it seemed to flow into the current semester.

Paul enrolled in the College Algebra Internet course "'cause I didn't have the time. I'm working and it's the same thing with now, I don't have any time…" He also indicated that, "the Internet is just the easiest way to do it…maybe not the easiest as far as classes…choice selection is the easiest…easiest 'cause I don't have the time." When asked if he got any additional help, he replied:

> I don't have a tutor…it probably would have helped…honestly at this point I don't know where I would get the time to do it…it's really time for me…'cause I was going to take your 7am class…but that wouldn't have worked out for sleep purposes…I wouldn't have had any sleep at all.

It was clear he was very frustrated with something. He alluded to time being the cause of his frustration, but not knowing if that was the only issue he was dealing with, the next question was raised with regards to the math Internet course. He then said that, "I have found that Internet for mathematics is a lot more difficult for me…it seems to me to be more difficult than other of my classes."

During the experience he

> did all the assignments, I did everything and I felt like I understood it, and then I

> would go into the test. I've never tested extremely well, I don't think I test poorly, like really poorly, but for whatever reason it wasn't the same connection for me…from the assignments to the test…

In evaluating his progress in the course, he completed less than 50% of each assignment with an average of 75% correct. In bringing this up with Paul he said, "Yeah…I don't test well because I don't prepare as well as I should…it's just a time thing…you know…but that's not an excuse." The real stumbling block for Paul was "just finding the time to do it…and just lack of desire to do it."

He continually beat himself up during the interview, repeating many different times "don't get me wrong it's my fault," and "it's my bed that I made…you know." It was frustrating for him not to succeed.

> I hate how people say…"You know if I had the time I would succeed in it.…I think I would"…but I hate they say that because they find a way to succeed…I don't think I can truly say that.

Curious to see if some part of the mathematics caused this time issue, the question was asked about the math specifically.

> I've seen all of them before…so…most of it, yeah…'cause most of it was in the 1000 class…There were a few things that were different.…I don't know that it is something in the math specifically, I think it's just, I don't get it done like I should…I do as much of the assignment as I can…and I really don't do that much, maybe half and then I hammer out the reviews…and then sometimes I just, I didn't study hard enough.

Later in the interview when asked how he balances his homework with his other courses he said, "I spend an hour of homework per class on a week…okay…maybe an hour total in the week…I have to say that out loud…it's horrible."

Paul did not pass his first attempt at the College Algebra Internet course. He fell behind and requested from the Department Chair an Incomplete. He did not meet the

conditions for an incomplete so his earned grade of a D was awarded. Towards the end of his second attempt at the College Algebra Internet he once again requested an incomplete and based upon his job change, he was awarded the incomplete. He completed the course five months later, failing the last two exams and the final with scores less than 50% on each. According to his transcript this was the first course that he repeated and his only course that he failed to earn a passing grade.

Workload and Dedication

During the time Paul took the College Algebra Internet course the first time he "was working at [a] school district and I was the school suspension coordinator so it was good I was able to do a lot of the homework while at school but then I was also a TA for my Mom here." Sometime during the semester as a result of pressures from his wife, he found a new job with better earning potential. "So I worked about 30 hours a week, 30-35 with TA's with my Mom and then I go to school 15-20 hours a week…I just have to…I just have to get through school." On top of that, he maintained his family and social life, saying:

> But I've just been so busy…there's just been a lot to do…and plus I'm a huge basketball fan…so…it makes sports such a big thing…and then I'm in the Young Men's presidency in my ward…so…we have campouts once a month…activities every Wednesday.

Wondering how he balanced his workload, his social and family load, and finally his schoolwork he indicated that, "the ones I'm taking here on campus, I'm there so I guess they become more important." Quizzing him on how he balances his business classes with respect to his math class,

> just one of the management or accounting classes, not including the time in school…three hours to four hours probably…homework and everything on math…I spend an hour of homework…maybe an hour…I have to say that out loud, it's horrible.

Realizing that he was currently taking the College Algebra Internet course again, the same question was posed with respect to his work, school, and social life. Under constant pressure from his wife, he said:

> I got this new job just barely, about a week ago, so two weeks ago…so now at this point in my life I'm probably busier than I ever was before…so I'm trying to finish up this one job and trying to train a new person…so I'm doing that about 20 hours a week…and then I'm also trying to get the developing company getting all their books updated and then they don't have anything ready to go to the accountant yet, so I'm trying to get that ready for the accountant and then…I'm basically their controller…So I'm trying to get all that ready to go to the accounting before April 15th…which isn't going to happen…so I'm doing that and the same thing and with my wife's parents up and down she's really struggling with that…at this point I'm really. really busy.

Participant Recommendations

Of each of the participants, the question was asked about advice given to a prospective College Algebra Internet student. Paul was one of the most vocal and detailed of all the participants. At two separate times during the interview he would interrupt and say "you know what I think a perfect class would be…" His most prevalent piece of advice was time, "it's really time for me…I would say take it but make sure you have time to do it… just finding the time to do it." He correlated time with completing the work and having a good attitude:

> I don't get it done like I should…and I really don't do that much, maybe half and then I hammer out the reviews…well if you like have a good attitude and they've taken an Internet course before I would say, "Yeah"…but those that don't like math that don't understand it…take a live class.

It was discovered during the interview that what he considered the "reviews" that "he would hammer out…and I know the reviews inside and out and then I go into the test and it's like…I'm lost…but the reviews, I'm a big review guy," were really only sample exams from previous courses but were not intended to be a review. In many cases, he was studying completely different material than was required on the exams. This led to his second most important piece of advice:

> You know what I think a perfect class would be, just while we're on the subject [which we weren't, this came out of the blue] I would think where you meet one day a week, maybe on Saturday. Then during the week we work from home. Just having you there…even if it's just for an hour on Saturday…would be the push I would need.

What Paul did not realize is that there is an alternate College Algebra Internet course offered on campus that is exactly what he described. It is called the College Algebra Hybrid Internet course. It was designed to encourage the students once a week to stay on track, answer their questions, and help them review for exams. He was unaware of this possibility.

The Participant's Future

At the time of the interview Paul was "four classes away from graduating…so I'm actually in my 4000 level classes…and one of them is this, 1050 and the other one is calculus." In a quick review of his transcript, spring 2008, he had completed two of the four courses by December 2007 and still had not taken the college algebra course. To graduate with his Bachelor's degree in accounting he needed Math 1050, college algebra (which he failed twice and was "the only class I had to repeat") and the next successive course Math 1100, Introduction to Calculus. He has not been back to school since the

interview was conducted.

Participant Eight: Linda

In the fall of 1977, Linda enrolled at Snow College in central Utah. She spent two years there and earned 15 credit hours with most of her credits coming from physical education, music, and English. In 1985, Linda met and married her first husband. During the time they were married, she had five children and was living in California. Over the course of about five years, fall 1991 to April 1996, Linda attended North Country Community College in California. During this time she took Math 1030, a quantitative reasoning course, which was comprised of a little bit of algebra, geometry, and statistics.

In 1998, after 13 years of marriage, Linda's husband passed away and she was left to raise and financially support her children. For a space of about 5 years, Linda continued to work to

> support us [her family]…and it was very frustrating too because I know that some people that I was working with had less experience that I did. In fact, I ran across that several times. They had the degree, less experience but they were being paid good. So I thought, okay fine, I'm gonna equalize this issue and that's why I went back to school.

As a result, Linda enrolled at UVSC spring 2003 semester and began her degree in accounting. It was not until summer semester 2006, after three failed attempts at college algebra, when Linda decided to try the College Algebra Internet course. Eight weeks into the semester, Linda became ill and consequently failed the course.

Family History

Linda enrolled in college "right out of high school. It was a chance to be away from home for the first time and I loved the social aspects. I didn't do as well in the academics, and that was because hey, I was having more fun and more social life." She quit school after the spring semester 1996.

> I had been out of school about 2 to 3 years when I went on a mission. [She is referencing a mission for her church that lasted 18 months in a foreign land]. I had to study a language, and it was doing that that actually taught me how to study. I had to learn this language in two months and during that two months it was very concentrated learning. We had an hour a day where we sat and just memorized some of the words and phrases. I realized I've never done this before. I've never sat down and said, "Okay, this is how this sentence structure goes." I didn't go home at the end of the day; I was staying right there in the dorms on the BYU campus. So the people around me were also doing the same thing and we didn't really spend much time with anybody else. There wasn't social time, it was basically study time. I found that applying that same idea to the courses that I took later on gave me a big plus in the ability to concentrate even though there were other distractions.

In 1985, Linda met and married her first husband. Over the course of about 5 years, fall 1991 to April 1996, Linda attended North Country Community College in California. According to her transcripts, she took a variety of courses, predominately centered on business and graduate with an associate's degree in accounting. In 1998, after 13 years of marriage, Linda's husband passed away and she was left to raise and financially support her five children. She said "if I had known then that my husband was going to die after 13 years of marriage and leave me with five kids, I would have applied myself better."

> I [Linda] went to work as an account temp. They would put me in a job where I had no problems doing the work. I was actually sometimes literally toddling my thumbs wishing for more work and yet the pay was such that I could not support

> my family with it. I was still asking for assistance from other places; from the church or at work. I realized a degree correlates to enough money to support them [her kids]. The other issue I had was I couldn't get medical that I could afford. It was just out of sight. Everywhere I looked, everyplace I applied, came back to, "without a bachelors degree we don't want you." I've got an associates degree but it's not enough…I have five children and like I said after my husband died, I could not find enough work to support me, to support us…it was very frustrating.

In the spring of 2003, Linda enrolled at UVSC to complete her bachelor's degree in accounting. According to her transcript, she plodded along each semester taking courses towards her degree. Yet, as her children became older, she realized "I needed to be home when my kids were home." She had a lot of issues with her children during this time.

> I had one of my daughters who was molested during that time. That was very distracting trying to work with police on that. I had two of my kids who were sent to court for truancy. I was in court four times with the kids…I found that was very distracting. Then part of the problem that I had was…I was having some other [female] problems and losing a lot of blood and so it was a combination of one thing after another after another.

During the summer 2006 semester, Linda became ill with a disease known as Celiac Sprue Disease.

> Eating was making me sick. I would get headaches. I would get sick to my stomach. I would sit there at the computer for half an hour and just be…I can't do this, so I'd go lay down. They finally discovered I have a wheat allergy.

High School Mathematics Background

In seventh grade, Linda took an accelerated pre-algebra course.

> I was in pre-algebra or something and it was actually an honors math class that did a lot of algebra. Then in eighth grade I took geometry. That's where I hit my brick wall. In fact, that was the biggest reason I took an alg-geometry course when I was a junior [in high school]. I had to have a math class, it was required. I had to have at least one more math class so I did that one with the idea since I

> had algebra, and I sorta had geometry, I could probably do okay with is one [the combined algebra-geometry course]. I think I got a B- out of that class. But again that one consolidated a lot of it, so it didn't give me enough of a background.

College Mathematics Background

Linda began college work at Snow College in central Utah. She attended from fall 1977 until April 1979. She took one mathematics course, Math 140 Survey Mathematics in which she failed.

Twelve years later, in the fall of 1991, Linda began at North Country Community College in California. She took an Introduction to Math Concepts, Math 120 which translated to UVSC transcripts as Math 1030 Quantitative Reasoning. She passed this course with a B. She completed her associate's degree in the spring of 1999 from North Country Community College.

In December of 2002, Linda was accepted to UVSC and took the entrance exam to determine placement in mathematics. She was placed in Math 0950, a Foundations of Algebra course. She began that course in the spring of 2003 and passed it with a B+.

As a result of her high grade in the Math 0950, she was allowed to enroll in a fast-paced mixed course of Intermediate Algebra and Beginning Algebra, Math 1000. She passed that course with a C-.

Linda enrolled in college algebra in the spring of 2004. Her first attempt resulted in an official withdrawal.

> I withdrew after 3 weeks because of some problems I was having with my kids….I know that part of the challenges that I had in the classroom were related to issues that were going on at home with my kids [in reference to her daughter who was molested and her other children who were arrested for truancy].

Her second attempt was in the fall of 2004 in which part way through the semester, she had her status changed to an audit.

> just before the end of the term because it was obvious I was not going to get a passing grade. The problem I had was when I'd go into class I'd sit there and go, "What are we talking about.… This just doesn't make any sense to me."

When the question arose why she thought it was difficult she described what her teacher was like.

> I had this one instructor who would make up his own problems and sometimes they worked well and sometimes it was like, "What was that?" Then he'd say, "Okay, so we have to go through this other thing to get this one figured out, that one wasn't a good problem." It was like, "Thanks a lot," so then we'd start over with a new one, which is fine if that helps you understand it. But if you're struggling to figure out what's going on, like me, that's really confusing.

There are many resources on campus to help students in this same situation, so the question was asked if she utilized any of those resources.

> I tried using the video tapes that they had in the library. While those were helpful I would run into the same thing. I tried to run it back and I'd follow through but then I'd turn around and go to do it, and I'd missed some little step. They'd also say, "Go to the math lab," and I would try to do that, but I didn't dare stay there more than an hour or so before I had to head home. I needed to be home when my kids were home.

Her third attempt occurred in the spring of 2005 with the resulting grade of a D, "I thought I was going to get passed through the class. I ended up with a D which wouldn't pass me." She said:

> It seemed like it didn't really matter how many times I had somebody help me with it, I still couldn't transfer that to the testing. I would do stupid little things like put a negative where there shouldn't be one or take it away where I shouldn't, or square it when I shouldn't have. Just little things like that and I realized overall that was probably my biggest challenge with the whole course. I wasn't really paying attention to the little mistakes.

She felt like her biggest problem was her tests.

> I would freeze up on a test. I got to a point where I was doing that with all my tests and it was very frustrating. I used to do solid B or B+ on a test and that's what I expected, but I started pulling C's out of my tests and it was really aggravating to me, really it just ticks me off.

Her final and fourth attempt occurred in the summer of 2006, which was the College Algebra Internet course.

> I took it online with the idea that I could spend more time just studying and working with it….I was tired of going into class. I was just tired of it because math classes are everyday of the week and the time issue was a big one because I took it in the summer when my kids would be home. I figured, "Okay, I can do this at home." But, the biggest problem I had with the online course was that I got sick.

Eight weeks into the semester Linda got to the point where

> I wasn't physically able to sit at the computer. I would sit there for half an hour and just be… "I can't do this," so I'd go lay down. [Her family physician] finally discovered I have a wheat allergy…they finally figured out that I had Celiac disease.

With her illness occurring so late in the semester, she was not able to change her status to either an audit or withdrawal. She was unable to continue in the coursework, so consequently, she failed the course.

The College Algebra Internet Course

Linda enrolled in the College Algebra Internet course summer 2006. "I was familiar with it because I'd taken it enough. Definitely having experienced a lot of this before in the other three classes was a big plus, too." She loved flexibility of the Internet course for a variety of reasons. One of her favorite aspects was "I could actually spend more time with the problems….I could go at the pace where I could understand it and I could actually replay some of what I needed to hear." She loved the fact that she could

> slow down…and do it at my own pace or actually stop and re-do some problems. I could go in and find little steps more easily that I had missed…it just seemed more efficient to go back and say, "Oh, I missed this one step."

Linda felt more confident with the Internet course.

> I found that when I would do a lesson I could turn right around and immediately do all the homework. I felt like I understood it and I felt much more confident going to take the tests, although I'd still get nervous and still not do as well on the tests as I wanted to do. I felt like I should, but I still had more confidence doing it, whereas when I'd go into class, I'd sit there and wonder what we were talking about.

There were occasions where she was struggling.

> I would just literally say I can't do this right now and I would stand up and turn away and say, "Okay I'm gonna walk away." I could then come back in an hour and I could actually get past that barrier that I had hit. I could work out my frustration, get up take a drink of water, or walk outside around the block and then come back and sit down. In fact, when I'd walk away I wouldn't turn the computer off, I would just leave it so that it was still there to come back to. And, when I would turn it off it was because I knew I was at a stopping point, or I was at a point where things still made sense to me….It was really a huge plus for me to be able to take a break and come right back and not be frustrated.

When asked if there was material that was difficult for her this time around she indicated:

> I didn't and that was the thing that was frustrating to me, not being able to finish [as a result of her illness]. I felt like I was actually progressing and that I was going to do well, or at least getting a passing grade that I needed. I could actually do it by myself. There was only a couple of times when I'd sit there trying to figure something out and my kids, the two younger kids still in high school, would walk in and say, Oh we did that today" and they'd help me with it.

Her only true challenge to the course was

> that I had to go into campus to take the tests, but at the same time I understand why that's necessary. Sometimes I would get right to the deadline and say, "Oh I have to get that done," and the reality was I'd already gone beyond that section. So I'd have to back track to review again to go in to take the tests and that was a little bit frustrating. But I'd want to go ahead and go forward and then I'd have to review again, so that was one of my challenges. Really it was a personal challenge to not go on when I finished the section, rather than going forward 'cause I was right there with it.

She also had some incidents when "I would freeze up on a test. I used to do a solid B or B+ on a test. It was what I expected and then I started pulling C's out of my tests and it was really aggravating to me." The flexibility of the Internet course also allowed her to

> be home when my kids were home. Last summer I was in court four times with the kids, so my family life was overwhelming. I scheduled the online class deliberately so I could be available to go to court.

She coped with having her kids afoot and working online by making a pact with them.

> I finally got to a point where I said, "If I'm at the computer, do not talk to me until you come up and see what I'm doing. If I'm writing something you can talk to me, but if I have a math problem up that's talking to me, you get out of my face," and that worked…they were pretty good about it.

The distractions she referred to occurred the weeks prior to and during the College Algebra Internet. Even though they were time consuming, she felt that

> I couldn't address them if I was at school whereas when I took the class at home I was able to be there and balance my school and family life. I could concentrate for an hour because I know where they are [meaning her kids] and I know what's happening right now. The distractions were minimized because I was in a place where I could more readily address those distractions if I needed to.

She even felt that if she took the Internet course again and still had some of those same distractions, "I think I would be much more than okay. I may still have the inability to created by those issues, but I believe that it would be minimized."

Eight weeks into the semester, Linda became ill. After having been tested for a variety of diseases, she was diagnosed with Celiac disease. It left her weak and viscously ill. Due to her illness, Linda discontinued the coursework. It was past many deadlines that allowed tuition reimbursement and audits. Unfortunately, her final course grade was an E, which is considered a failing grade. Although, when asked if she would take it again, she quickly answered, "Yeah, I would." She had success in the course and "found

that when I'm doing something and it clicks with me it's exciting and fun and I wanted to do more." She felt like "if I had finished the semester, I would have passed."

Workload and Dedication

At the beginning of 1982, Linda fulfilled a mission for her church and learned how to study and stay focused. She discovered that applying the same idea to the courses that she took later on in college gave her a big plus in her ability to concentrate. She realized that the only way to get through college course-work was to spend the time to fully study.

Her attitude in beginning the College Algebra Internet course was "I'm going to beat this, I'm going to do it and I'm gonna do it well." She felt like, "If motivation counts, I wanted to get in there and take it online…I wanted to do it." Linda actually enjoyed the course because "it clicked with me and it was exciting and fun and I wanted to do more." Linda spent quite a bit of time with the material.

> I liked it 'cause I could actually spend more time with the problems…go at my own pace…and I could actually replay some of what I needed to hear. I could actually run it back again and reply it…finding the little steps more easily. I also felt more confident. I found that when I would do a lesson I could turn right around and immediately do all of the homework and I felt like I understood it. I just felt more confident going into the tests.

Linda said that all she thought about was the math. At one point during the semester her "daughter was trying to figure something out with her class and she was so frustrated and so aggravated and I looked at it and I said, "Well try this," and it worked. She was able to get her whole assignment finished, with my help."

Linda felt like she was completely dedicated until "I wasn't physically able to sit

at the computer." At the summary of the interview, she indicated that "if I could just redo the whole thing I would do it online."

Participant Recommendations

Linda was asked the same question as each of the other participants. If you were to give advice to prospective Internet students, what would it be?

> I would ask them several things. First, "What kind of background do you have?" I think that while I feel that slowing the course down was a big help to me, I think that definitely having experienced a lot of this before in that classroom as a big plus, too. I would ask, "What kind of math had you had before?…How do you deal with math generally?… 'cause you need the solid build thing [referring to gaining a foundation in mathematics rather than repeating the college algebra course. Or dropping back to the previous course to fully understand concepts before attempting the college algebra again], rather than take 1050 over and over and over and over…"

Or, "What have you done in math so far, and do you like math, do you enjoy it when it works?"

Other advice she gave was:

> It also all comes down to what's your ability. Some people really excel at math, and some people excel with science. I think those who do better with those areas do better with the 1050 class. Like, what are you studying and if they have any of those fields that are strengthened with that or that strengthen the math course I would say, Sure go ahead and take it online."

She also indicated that motivation counts.

> If you're gonna get in there and take it online, you gotta want to do it. If your just doing it because it will just be easier that way and it's hard to find a class that fits your schedule, you're not gonna do well. I really don't think you would, because you're doing it just because, "Oh, I'll just get around it," whereas you're saying, "I just want to take it so I can get it done." But, if you say, "So I can work with it," then you're more likely to succeed.

The Participant's Future

As a result of her illness, Linda was unable to take any courses the following two semesters. She enrolled in the fall 2007 semester trying to continue in her schooling. "I'm about two semesters away from my bachelor's degree," although she still has two mathematics courses left. One is the college algebra course and the second is another mathematics course called Introduction to Calculus, a calculus course from a business perspective.

> I actually love English and history but the market for them wasn't as high as the market for business. Every time I've gone out and worked it's in business, I ended up in accounting so this was a no brainer to go out where I'm actually working.

Her biggest frustration she was dealing with

> since I have taken the class [college algebra] more than twice I have to have it signed off [to take it a fifth time]. The man I talked with said, "You should go back and take 1010 again," but I don't have the time to take 1010 again. But the reality is, am I gonna be successful with 1050 if I don't take 1010 again? When I started my degree, 1050 was the highest required math course, but now they've changed it and I don't grandfather because I wasn't matriculated. So I'm frustrated with it. I just want to say, "This isn't fair," but in the meantime I'm stuck between a rock and a hard place. I'm one of those that kinda fell through the cracks because whatever issues were happening, I have to deal with it.

Spring 2008, Linda did not sign up for courses and has yet to take the college algebra course.

Participant Nine: Becky

In grade school, Becky was placed in resource. When her resource teacher changed jobs to an alternative secondary school, Becky followed her to the new school because,

> we never did anything in class…we sat there and we watched movies, chatted, ate, and we didn't do any work….You know how most of the time in English you read a certain amount of books? We never read a dang book in that class. That's the reason I followed her to high school. When I went to that school, she [the resource teacher] did the same exact thing, easy ride.

Becky graduated from high school in 1997.

She "tried beauty school and I dropped out…then went to nail school and got my degree and everything." The nail school Becky attended was a six-week course in which she learned how to apply and upkeep acrylic nails. After completing the six-week course Becky was awarded a nail degree which means she had been trained to work with acrylic nails. After a few years and a variety of dead ends, Becky began college in the summer of 2001.

> When I first started college, I started just because I'm a wimp. I was bored, just a whim. I thought I'll just take a class or two…and then I took some more classes and then I took some more classes. I wasn't even really looking to get a college degree, hell, nobody else in my family had done it and so I was like, "Why do it, who gives a crap?" Then I realized in this day and age even a high school diploma doesn't mean crap. If you want to succeed you have to have some sort of college education. So okay fine, I'll take my generals 'cause up until that point I was just taking art classes and stuff. I've taken a lot of, you know, the arts, but it's hard to make that into a living. So, I'm like, "What are my other interests." So I started taking classes out of each and every little thing. I took psychology and it was like, "Hey, this is kinda cool." But my first thought was, "Can I go into that and would it be the least amount of math that I would have to take?" After taking all of the required prerequisites, she was able to enroll in Math 1010.

After two failures, Becky enrolled in Math 1010, for the third time. She felt confident in her mathematical abilities and enrolled immediately in the Math 1050 College Algebra Internet course "because I was ready and I knew I was gonna ace it [the Math 1010 course]." Prior to the end of fall 2006 semester, Becky began work on the College Algebra Internet course early with the permission of the instructor. She was already

enrolled in the spring 2006 course and she "had the time." As the semester began in the spring of 2006, she "was doing beautifully on all of it," and was ready for the first exam. She took the first exam and failed it miserably. A few days later she was notified that she did not pass the Math 1010 course and was removed from the College Algebra Internet course. To this date, Becky has three courses left to graduate with her associate's degree, but will not come back "on that damn campus, they can just kiss my butt."

Family History

Becky's father worked for BYU, "he was a plumber…and he was an accountant so he actually had the two pieces [meaning he was multitalented, he could work in plumbing or accounting]." Since he worked at BYU, "he could use their pottery for free so he could go in there and do pottery." After high school, Becky's father passed away.

From the time Becky started elementary school, she was in resource. "I had [this teacher] and I loved her to death. Throughout the school [meaning elementary and secondary education] they kept me in resource. They told me I had ADD." ADD is an acronym that stands for attention deficit disorder. It is a condition affecting children and adults that is characterized by problems with attention, impulsivity, and over activity.

Then "as a child I was raped and I had to do it [meaning she had to get an abortion]." This reference came up in a conversation in which Becky was discussing her anger at a group of students and her teacher for the class . They were discussing the ethics of abortion during an "ethics and values" class at UVSC. The discussion was centered on "the baby" and not about the "poor woman." She had been crying quite a bit and continued crying during this conversation. She was also expressive with her arms.

She would fling them out and then pull them tight to her chest, hang her head and then continue crying. She said her biggest frustration was aimed specifically towards the teacher of the class.

> I was persecuted and you're still persecuting me even though you have no idea that I have done it and you're not being objective. You stupid woman [in reference to her teacher of the ethics and values class], it was like, you have no idea the situation they were under." There were three other women sitting in there and all of us…every single one of us were stark white after this and all of us were just crying and crying and everybody ignores what happens to the woman. It's all about the baby. It's always about that and it's like, "What's wrong with you people. You don't even see the big picture of this." Yeah, people need to be objective and needs to be able to see both sides of the story. If they're not, then get the heck out of teaching.

Becky indicated that she has had two siblings attend college. Her sister "came to UVSC but she dropped out because she wanted to have children…she was actually on the student committee [an elected UVSC student campus activities committee]. So now my brother is going to school and he's going to be a nurse, but he's struggling.'"

In 2004 Becky met her husband.

> I actually met him in a bar in Salt Lake City. We had to have a lot of wine before we had met. After we had met, we got into a huge fight 'cause he was telling me how it was and I didn't want to listen to him, so I hung up on him. I was like, "I am never talking to him again." Then all of a sudden he called me up and he apologized and I went, "Oh, now I have to be nice to him." So we've been together for like 3 years….We got married in January of 2007.

Becky described him as a

> renaissance man…he is much older than me. He likes to do everything. He was going to Idaho State and he was doing a triple major at the same time. He's very driven…he was doing photography, anthropology, and some other major. Then he got into a car accident and he had to take care of his kids. So, he couldn't go back to school. He's gonna try and straighten it out and everything so he can come back to school 'cause he hasn't paid on any of his student loans, so he's working towards that again.

During the final time Becky took Math 1010 and was overlapping this material with college algebra, Becky was still dating her husband. Becky says he was

> totally supportive….He would listen to my issues with it and he would try and help me as best as he could. He was learning it right along with me and he was very encouraging. He still is. He's like my backer you know, "Come on, you can do it."

Had Becky been able to complete her associate's degree she

> would have been the first one in my whole family to have a college degree…no siblings…none. I'm this close and I don't want to do it. I have no motivation whatsoever to do it…even though my husband's going, "You're going back…it doesn't matter. You're going back [she is sobbing at this time]."

High School Mathematics Background

In elementary school, Becky was placed in resource. As she progressed to junior high she was place in a pre-algebra course.

> I had this teacher…I loved her to death. She was my resource teacher for math and English. In junior high I was in pre-algebra and she took me out of it and put me back into hers. We never did anything in that class, nothing.

Becky described the class as an "easy ride" and that the only reason why she even graduated was because she "completed 32 packets in 2 weeks." Becky completed high school in May of 1997. She ranked 63 out of 71 students. Throughout her entire schooling experience, elementary and secondary,

> they kept me in resource. They told me I had ADD. Then when I went to try and get on disability [at UVSC] they gave me that test and said, "Oh, you're not ADD, you don't quality." So I took the test over again by a different person and they said I don't have ADD, and yet I was led to believe my whole entire life that I had this ADD. "You're stupid" and I don't have it.

During her high school experience, she had one teacher

> that on any test she would actually sit us down and we'd do yoga, totally

> relax…get your mind set…and it didn't matter how long it took. Then right afterwards we took the test and every single person, we would ace it.

College Mathematics Background

Becky began college in the summer of 2001. According to her transcripts the first course she took was a college textbook reading course designed to improve reading and comprehension.

> I took English first because math is my hardest subject, so I decided to leave the math which was not really a good idea. I should have switched it and did it [the math] first. So, when I took a placement test, I was not surprised that I was way down there and I had to take Math 0800 but that wasn't a bad thing for me I think, to backtrack, because I never got above basic math in anything.

In the spring of 2002, Becky enrolled in her first mathematics course. It was the lowest mathematics course offered on campus, Math 0800, which covers topics introduced in elementary school. She was psyched about taking the course even though she was tracked into the lowest mathematics course offered.

> I wanted to do it even though I knew it was a complete waste of time because it wasn't gonna count towards anything. But I thought, "Well I'm gonna start at the beginning and I'm gonna start fresh and learn this all over again and it's gonna be just great going back so that when I actually got to 1050, I'll be totally prepared for it."

Yet, at the same time Becky was very nervous.

> I was scared to death with my first day of class. When I walked in I went, "Oh my gosh, what the heck am I doing? Am I retarded?… Oh my gosh…I just made a huge mistake." I paid all this money out of my pocket to go and tell this person, Okay, I'm here…and it isn't gonna be like high school." I was so overwhelmed because I had not been on campus before at all. I showed up to a math class and sat through this whole entire math class and then I found out that I was sitting in the wrong classroom. I was like scared to death, but I was like this meek little mouse. And then it was like, "Okay, I've already done the stupid thing, so let's go, let's do it." For me, it was college that changed me, that first class, that first teacher that changed me and went, "Okay, here's my future."

The Math 0800 was a good experience for Becky because

> the teacher at the time was just totally awesome. He made it simple, he made it fun. I actually came out of that with an A, so I was really impressed with myself at that point. In fact everyone passed it…and there was this one guy in that class that didn't even know how to balance his checking account but by the end of that class he knew. I think the teacher was an architect. He was real, he knew because he had gone through all this math and everything else. He came down to our level, I mean, I was kinda happy in that class 'cause I knew I wasn't the dumbest student because of that one guy that couldn't even do his own checking account. I went, "Man, this is cool, this is a class where you can ask the stupidest question and nobody's gonna be the wiser."

The following semester summer of 2002, Becky enrolled in the next subsequent course, Math 0950.

> It wasn't as much fun as that original teacher and I struggled through it. I think I got a C. I think it was due to the teacher because the teacher didn't explain things fully. It was more like, Here is your homework; this is how you do it, bye-bye." Whereas, before if you didn't understand something with the other teacher, my first teacher, he explained things to you in a logical sense. He wasn't even a math teacher, so maybe that's the reason why. He brought it down to our level. I find that a lot of math teachers are up here [she gestures with her hands above her head] and were [the students] down here and they don't want to stoop and so they try to bring us up to their level and it doesn't help us. That teacher just assumed that we were all stupid.

Again, the following semester fall 2002, Becky enrolled in the next subsequent course, Math 0950 and passed with another C.

> I realized it's like totally different than high school…and I was even going into the algebras and all this and I was going, "So when are there letters in math…and why the hell do I have to do this and learn geometry and shapes and all this and who gives a crap?"…and I was so pissed that I had to learn all this stuff that was never gonna apply to me.

The Math 0990 course required her to do homework and

> I thought, "Oh damn, high school was an easy ride"…that was a stupid mistake and I thought first off, "What am I gonna do?.... This is totally different, it's not an easy ride. You have to do homework man," but I stood up to it and earned a C.

A year passed before Becky enrolled in the next subsequent mathematics course, Math 1010.

> So I finally got up to the 1010, so I had 1010 to go and then the next one. I was good to go. So I had it from an Asian man and right off the bat he challenged you not to quit the class because of his accent. So, of course, me being who I am I, take the challenge on even though I had no idea what this man was saying. He would make jokes and everybody would look at each other and go, "What?" I found out later on as it was getting down to the wire that several students had gone above him to the math department and said, "this is not working." Well, I tried to do that and it didn't happen and I failed the class.

This was the first course she failed in college. "That was the first time. I was very disappointed 'cause I had done the homework and I had done beautifully on the homework but as soon as those tests came, boom, it just wasn't happening so I got frustrated."

As a result of her frustration, she waited another year to re-enroll in Math 1010. It was not until fall 2004 when she reenrolled in the Math 1010 again.

> I took time off and just decided to let it ride. So, I took it again, but this time I took it from a woman. She was more into her sports than she was into teaching the class. I think she was a soccer coach. She was like, "Here's how you do it. Here's your homework, bye-bye." She'd write it on the board, what you were supposed to do with these problems, give you your homework, and you were out of there. I was struggling with that class. I went home so frustrated I was ready to quit school…all of it, all together. I got no encouragement. I tried to talk to her after class but there was so many kids trying to talk to her after class that it was just like…she…"I gotta go, I got to be a coach now"…so I failed it.

She indicated that during that class

> I did all of the homework and the tests. But on her tests some of the questions were not even like what we were practicing so I got really frustrated and I was ready to quit. Then all of a sudden I found out that you could take it online.

In reviewing her transcripts during the semester of fall 2004, Becky had three other courses. All of the courses were 1010 courses, math, biology, anthropology, and

humanities and are general education courses for an associate's degree. She earned D's in two and E's in the other two. Subsequently she was placed on academic warning.

Becky waited yet again another year to enroll in college and to enroll in the Math 1010. This time she took it online. By this time the Math 1010 teachers had decided to band together and write a common Math 1010 final. The department agreed that no matter what grade the student had going into the final, if they did not pass the final with 70% or higher, then they would not earn a passing grade for the course, even if their grade going into the final was an A.

She said:

> I was doing excellent, beautifully on all of it. It [meaning the program] would show you how to do it and I could do it at my own pace. Since it was on the computer I could do it at my own pace and they would show you over and over again until you go it. I liked it, actually I loved it and I did okay on the tests and everything. Then came the final. I had a C in the class and I missed the 70% by two points. I was peeved and I was so angry with it. I had to go to the testing center and I HATE [by this time Becky is shouting and gesturing and has stood up in the interview] that damn testing center. Whoever thought up that idea should be shot! Oh yeah, sit a whole bunch of people into a tiny little room that are already nervous as all get out and the pressure's on.

When asked how she prepared she indicated that

> I studied and studied. I went back through everything and I still failed it. If you didn't ace that final or at least get a C average or better on that final you were pretty much screwed and I was…that was the last time…I haven't taken it since and I'm dreading taking it again. I just kinda went three strikes and you're out.

Becky felt so confident right up to the final in Math 1010 that "I had already signed up for 1050…and so over Christmas I worked…'cause I thought yeah I was ready because I thought I was gonna ace it this time and after that I just said, 'Screw it.'"

During the Christmas break, Becky prepared for the first exam. As spring 2006

semester began she emailed the instructor and asked if she could take the first exam. Each of the exams was offered in the testing center on campus unless a student was further than an hour and could find a suitable proctor. Since she was within a few miles of campus the exam was proctored by the testing center.

> I was ready…and I said, "Yeah, let's do this." I felt comfortable with it and liked the Internet because no other teacher sat down with you and repeated it in different circumstances with different things so I like the Internet. I enjoyed it. But then as soon as I took that first test and there was no alternative that I could take other than that testing center…and I had studied for three days straight…I failed that one, so I said, "Screw it."

The question was asked why she felt like she failed the first exam in the Math 1050 College Algebra Internet course and she said,

> I had passed the homework with flying colors. I went in there [the testing center] and I was going, "Okay, this is weird." The questions had switched words to the point where you're like going, "What? Which way do they want you to do it, do they want it this way or that way"…since there's all sorts of different ways. So…when I went in there…I walked out and I cried all the way to my car 'cause I knew that I hadn't passed it…I kinda went, "Well I'm done."

Becky dropped the College Algebra Internet course after taking the first exam. A few days later Becky was able to access her grades and found that she had not actually passed the Math 1010 course. She missed the 70% mark by two points.

At this point Becky had her husband call the Math 1010 teacher to try and change her grade the two points she needed to pass the course.

> My husband called…to see if we could do it over again somewhere else and she said, "you're screwed"…she said, "no, if you would have called maybe a month ago we could have done something." [meaning make other arrangements to take the final in another location besides the testing center] and I said, "WE DID." [by this time Becky is yelling again, crying and is gesturing with her hands, both filled with Kleenex]…. "You said it was impossible for him to stand by and watch me and make sure that I wasn't cheating or anything."

Becky's husband continued the phone conversation with the Math 1010 teacher:

> I was so upset that I was like, I am not going to be here because I would have been behind him screaming "this sucks." So, I just left the room completely because I just knew that I wasn't gonna be able to handle it. He talked to her and he basically told her off and, "NOPE, it's a no go. She's gonna have to do it again."… and I went, "This is three fricking times, why am I paying this teacher all this money that I've worked so hard to earn and get nothing out of it?"

As a result of the conversation and since she missed the 70% mark by only two points, she was given an alternative to passing the Math 1010 course and resigning up for the College Algebra Internet course. The alternative was a retake of the COMPASS exam, a placement exam offered on campus. She took the placement exam on January 17, 2006 and did not meet the appropriate cut scores.

> Going to take the placement test again to see if I could test out of Math 1010…I couldn't do it, so it was like I got to that pinnacle and I was almost there and, boom, it was just snatched back. So it was just like, "Why? Why put myself through it again. I don't see how I'm gonna get out of college."

The College Algebra Internet Course

Becky enrolled in the College Algebra Internet course in December of 2005. She asked special permission from the instructor to begin the course three weeks early before the semester began. "I was prepared, oh yeah; I had already bought my books and everything. I had gotten everything that I needed for that class…I was ready to rock and roll."

Becky worked hard over the Christmas break, "'cause I thought, yeah I was ready because I thought I was gonna ace it this time." During the Christmas break, Becky prepared for the first exam.

She loved the online course because "it was so great just sitting down in my

pajamas and not to have to fix my hair and get dressed and come up to school and find a parking spot and all that crap. I can just sit down and totally get enthralled with it."

Becky set time aside to work.

> I was very disciplined in doing it 'cause I was working graveyards at the time so I'd go to work at night and in my spare time at work I would just do it online. I was working at a drug rehab and I checked on the ladies once an hour. After that I had free-time. I had all that time…during that 8-hour shift.

Becky felt like she spent "oh probably a good 2 to 3 hours if not more…at least three times a week….I was very disciplined because I had done it once before [in reference to the Math 1010 Internet course]."

Her biggest cheerleader was her husband,.

> He was like totally supportive. He rooted me on and he quizzed me and everything. He would listen to my issues with it and he would try and help me as best he could. He was learning it right along with me and he was very encouraging. He would try and do it with me even though he had no idea what he was doing but he still tried to do it with me. He was like my backer, you know, "Come on you can do it." It was really great to have him sticking behind me, like he did it made me more enthusiastic for it. It's why I married him…I had to keep him.

Becky loved the Internet material

> …'cause on the particular board you could watch how they do that and then you could have three different ways that you could watch how it was done, the screen and then the write-out. I loved it because then I would do all three and I could do it on my own. I was doing so well I was so happy with myself and so proud.

As spring 2006 semester began, she emailed the instructor and asked if she could take the first exam. Each of the exams was offered in the testing center on campus unless a student was further than an hour and could find a suitable proctor. Since she was within a few miles of campus the exam was offered by the testing center. Becky felt ready for the first exam, and actually enjoyed working and preparing from home on the

mathematics. Realizing she needed to go take the exam in the testing center, she studied "3 days straight." Unfortunately as she left the testing center she realized that "I failed that one [the very first exam], so I said screw it."

Several times during the conversation she felt like there were many things unfair about the course. One repeated issue was the first exam. She felt like that first exam should have been the easiest so if she could not pass that one, she would not be able to pass any of the exams.

> That fricking test…it totally screwed me up…I was blown away, totally blown away. It was the test because a lot of this stuff that I had been going over wasn't in there…and so it threw you off exactly how they wanted you to do it. So I'd do it the way that I thought it was and I checked my questions and my answers twice and everything and I still failed it.

The question was asked why she felt like she failed the first exam in the Math 1050 College Algebra Internet course and she boiled it down to one thing, the testing center.

Another issue that surfaced was a policy of the mathematics department that students would not be allowed to utilize calculators on exams.

> They would let you do a calculator in class but not on the exam and me, I'm so horrible with times tables and I still don't know them so for me to figure out a times table, especially if it's really high up, it will take me awhile to figure it out 'cause I have to do it my way. So I would sit there and try and do it by hand and sometimes it's not always the best way to do it. So that was my other problem with it 'cause some people like me can't do that kind of math in their head. It wasn't like I was asking for one of those really smart calculators; I just wanted a simple basic calculator, that's all I wanted.

One of her reasons for taking the College Algebra Internet course was because of teachers she had encountered before.

> They can't come down to your level, 'cause there is no way in hell that a student

> is gonna go up to your level, there's no way…they don't even have the education or even the brain power to get up there and that plays a huge role. Sometimes I wish I could just sit down with some of these teachers and go, "You know what this is, what you need to do, people, if you want these students to succeed and be all they can be? This is what you need to do. Stop being so stupid and stop being so prideful. Leave your pride at home when you enter this school, leave it alone. Come down to their levels, speak to them. They are people. They are not just mindless robots that are going to, 'Oh yes, I will write that down, yes sir.'" I had one teacher that I just was blown away because he was so hoity toity and he stuck up his nose and he just thought that he was the brass ring and that everybody else was dumber than a box of rocks. I just wanted to slap him upside the head and say, "You know, get out of this profession NOW!"

With the variety of resources on campus to help, the question was asked if she had utilized any, such as the math lab.

> I hate the math lab too [in reference to her hate of the testing center], how it's set up…'cause it's no use. You can sit at a table with that little flag up forever and still nobody's there to come over and help you. And then, then only help you with one thing so it's like, "Oh yeah, that was real worth it." I sat in the math lab for three hours one day and one person helped me with my problem…that was a waste of my time. Okay so this student already thinks I'm not making it…low morale…and they go into that lab. They sit there, and another student tutors, like this person might be in an advanced class so they know what they're doing and everything, but even they have pride and even they look down upon us….We don't want to deal with that, we don't want to have to look someone in the eye and have them judge us.

Becky dropped the College Algebra Internet course after taking the first exam. She had enrolled in two other courses that same semester. She earned a D+ in one of the courses and a C in the other. She then dropped out of college altogether, three courses shy of her associate's degree. She felt that

> there are probably 50% if not more of the students that just dropped out of school permanently because it was like we'll never get it done so why try…why pay for it…because money is a precious commodity these days and for school, how expensive it is and the prices keep on going up. Some of those students aren't gonna come back because of it [meaning the Math 1050 course] and they really seriously need to look at it and look at the glitches in it and they need to find a lot of different ways to actually improve their curriculum.

Workload and Dedication

As previously stated, Becky enrolled in the College Algebra Internet course in December of 2005. She began the course 3 weeks early, feeling prepared and excited to begin in the new material. Becky worked hard over the Christmas break, "'cause I thought yeah I was ready because I thought I was gonna ace it this time." During the Christmas break Becky prepared for the first exam. Becky set time aside from work and the holidays to strive to get ahead in the course.

Becky felt like she spent "oh probably a good 2-3 hours if not more…at least 3 times a week…. I was very disciplined because I had done it once before [in reference to the Math 1010 Internet course]." Becky took the first exam early on in the spring 2006 semester. After failing the first exam, she dropped the course.

Participant Recommendations

Becky had a wide variety of recommendations for future College Algebra Internet students. To begin with, she felt like a student needed to be "structured…they can't be scatter-brained or not disciplined…it might not be a good thing for them." She also felt like the student needed to be "jazzed about it. In order for them to really go, "Okay cool, this is gonna be great, they need to be prepared for it."

One of her strongest recommendations focused upon the particular teacher of the mathematics course.

> I think that in order to go into a math class, that teacher has to come down to your level. If they do not come down to your level, there is no way in hell that that student is gonna go up to your level. There's no way…they don't even have the education or the brain power to get up there and that plays a huge role. My biggest problem with some of these teachers is because of their education and

> everything. They're so high that they don't want to come back down. They see it as a weakness or a failure kinda thing. It's like, "Do you understand that this is what you're supposed to be doing?" If they don't want to teach and come back down to our level then why do it? 'Cause they can come back down and just be amazing….They can get into your head and they can help you in a way that nobody else can."

Yet because of her strong feelings towards teachers on the campus, this was her reasoning for taking the College Algebra Internet course; the separation of teacher and student. However, her feelings about teachers still determined her success in courses on campus. If she liked a particular teacher, she would work harder for that teacher and was successful, although this was a contradiction with the mathematics.

> I liked the Internet 'cause I didn't have the whole teacher factor in it at all…I totally dismissed it. If you looked at my grades, you can tell what teachers I went really well with and what teachers I hated. It is totally a reflection in my grades. You really should be able to interview teachers before you take their class. It would help a lot for certain students to be able to do that…to see this…it just depends on the teacher. Teacher's, I'm not sure that they understand what a huge amazing role that they have….It's a huge task to take on. If a teacher is good and they know their stuff, they can come down to that students' level…anything can occur…the sky is the limit....Sometimes I wish I could just sit down with some of these teachers and go, "You know what you need to do if you want these students to succeed and be all they can be?.…You need to come down to their level, stop being so stupid, and stop being so prideful. Leave your pride at home when you enter this school. Leave it alone, speak to them, they are people, they are not just little mindless robots that are going 'oh yes, I will write that down, yes sir.'

Another very interesting suggestion was to remove the math courses altogether.

> I told my counselor I'm not taking that, can you get rid of that out of my generals? One of the classes I hated the teacher, she was a snotty little bitch and I went through it and barely passed that class and I was like, "That was the stupidest class on the face of this earth"…and I was like, "Who gives a crap, you know?" So, I'm looking through this generals and I'm like, "This is stupid, this is truly stupid. If you already know your major, why do you have to take all that crap?" All I thought was, it's a money ploy to get a whole bunch of money to pay all these people, which is fine I understand that people have to make a living and stuff, but unless you are going into something that pertains to math, why the heck waste your time and your money? I can understand throwing in psychology

> because that will help them further understand the brain. You have to take sociology, and I can understand that one…because it's gonna help them understand personal relationships, but this math crap…is just stupid. I also once took a communications class…I loved that class. I learned that, man, actively listening is hard. Once you actually master that skill your relationships totally change. That class was just awakening to the point where I was just, "Wow, that was a totally new world I had no idea about." It's those kind of classes that are important…other kind of crap that you have to take in generals are stupid as hell [she gestures to the math texts sitting in the office]. I just want to go up to the people that structured [meaning the guiding board that determines what each student needs to take for general education coursework] and go, "What were you thinking?"

Becky felt like her only purpose in coming to the interview was to

> stand up [which she physically did] and share this with anybody and say, "Yes, this is what happened to me." So the school should find a lot of different ways to actually improve their curriculum, also help people to get tutors. They should have extra classes or an extra tutor or something to go alongside that class. Yeah, and not have the requirements be so high to get into that class. Have a lot of free tutors 'cause we already are paying a butt load of money for these classes. Or, have someone come to them, 'cause who has that precious time to sit in a fricking math lab. Some sort of outlet they could go to, whether it was online or on the phone, or someone coming to him or her to actually ask questions that you have without that someone looking down upon you or anything. Something should be provided, some type of service to go along with this…'cause that's what helps me. Also some type of online thing where it shows them how to do the problem and it tells them how to do a problem and everything. Even that could help more than that stupid math lab. And, if it was free by all means that would be the best. Yeah, exactly, something like that. I'm sure that if there was some type of problem where they could put in the question and they could do it for you, something like that, something with the technology that we have there's gotta be something. Then you're gonna need enthusiastic people that do not look down upon people; enthusiastic people that actually give encouragement. Teach it simply.

Becky also felt that the testing center should be abolished.

> The testing center is just the stupidest idea. The teacher can do it online…but get rid of that stupid thing…I hate that testing center with a passion. The students walking up and down making sure you do this….If they had it in the library with everyone around and take it there. Just don't stick them in a tiny little room with no windows, no air conditioning, with a whole bunch of people packed in it where your roasting to death and your nervous as hell. I think that every student has test

> anxiety…so there's gotta be another way. They've gotta make a curriculum of some kind that give you tips, how to take tests, how to relax with tests, and take them correctly. A lot of teachers don't think of that so when they put that test together they don't understand it…they're thinking about what they have to do, their guidelines on this test, yet they're not really thinking about the outside influence on the test. But there are tons of ideas, very good ideas that people could take and can do these; simple ideas that would make all the difference in the world.

Becky felt that big changes needed to be made to the Math 1050 course but that, "one student is not gonna be taken seriously…but if it's a whole mass of students going in, something might be done."

The Participant's Future

For Becky, the failure of the Math 1010 and the first exam in the Math 1050 was the culminating experience.

> So…I had to drop it, so I was like, "Fine, I'm done," and I haven't been back to school [at this point she is bawling]. It was such a horrible experience. It didn't matter who you talked to either, you can go talk to teachers, nothing happens. I would try to contact someone in the math department to talk to them about this, nothing was going on…so I said, "Screw it."

As of spring 2008, Becky is currently, "three classes away from my degree…it's Math 1010, Math 1050, and anthropology…and then I'll have my degree, my associate's…and it's those classes that are holding me back." At the time of the interview the question was asked if she would consider courses during the summer 2006 semester and she indicated that, "Oh, if I can get my grants, get everything in order. I'm already starting the process and we'll see how it goes." On the other hand, she is

> still scared to death…it's just…because it's humiliating, it's embarrassing. I'm on suspension and now I have to go grovel to another person to get me off of that suspension…since I've now taken it more than two times. I have to go, "Yes, I'm the dork that failed this again." But I'm not sure I can leave my emotions at the

> door and be objective when I go and talk to them. That's an issue 'cause some people don't know how to handle emotion and if you get emotional they shut down and they don't listen to you. Then it becomes obsolete…and then nothing's gonna be done.

Failing for Becky was not an option and this is what has caused her to not come back on campus, "'Cause I'm not failing this again…it's not an option. I've already been on suspension and if I fail another class and my GPA goes down again…I don't see how I'm gonna get out of college." The one thing that continues to hold Becky back is the mathematics, "then I started thinking, you know, if it's this damn hard to get 1010, do I really want to get 1050…do I really want to do that?" Her recourse went as far as changing schools,

> after that last time…I was going, "Am I gonna go back to UVSC? Is it worth it for me to come back and fail again? I thought about going to U of U [University of Utah]. I thought about just going to Steven's Henagar's [College], even though sometimes their credits are not transferable to a credible college. But, I was still going, "What am I gonna do?"…so my options are kinda limited. I am this close to getting that fricking degree…in my hands, the first one in my whole family to have a college degree. No siblings, none…I'm this close and I don't want to do it. I have no motivation whatsoever to do it [she is crying and very animated, gesturing with her hands].

Her husband tried on various occasions to encourage Becky to continue in her schooling,

> It doesn't matter, you're going back. He's going, "You're going back," and okay fine, and I have dragged my feet in getting my Pell grant and everything. I've dragged and dragged my feet 'cause I just don't want to do it. I just don't. I'm just kinda dreading going back…really I'm dreading it. But, I've got to do it…there's no other choice.

It was such a devastating experience for Becky that she had not stepped foot on campus since spring 2006. When the call was placed to ask her if she would participate in the interview she requested that the interview be conducted in her home. At the last

minute, she changed her mind and indicated she would meet on campus. The directions were given that the building to meet in was next to the newest addition on campus that was under construction. She was puzzled, not realizing there was a new building under construction.

> I was bound and determined to not come on campus. I was peeved and I swore that I was never gonna come back here and I haven't until today. I was shocked when I came onto campus and saw that new building. Now I know what she was talking about on the phone. That's the reason I suggested you coming to me because I was like, "I'm not going back on that damn campus, they can just kiss my butt." I have made it into a war against me and this school. I still got this war going on…I've got to get over it. My husband, he's like, "Just do it…just let it go, it's not gonna help you in the end. Just go for this degree and once you got that degree you can shove it in everybody's faces that you're that first person in your family that has a college education."

Yet, as of spring 2008, Becky has yet to follow through in continuing with her schooling.

Summary

The student stories in this chapter provide an opportunity to capture a glimpse or a picture of each participant, supplementing and placing in context from where the Core Category and subcategories are derived. Chapter V will describe each of the five categories or themes and the core category discovered in the data analysis.

CHAPTER V

CORE CATEGORY AND SUBCATEGORIES

The student stories in the previous chapter provided an opportunity to capture a glimpse or a picture of each participant, supplementing and placing in context where the core category and subcategories or themes are derived. Chapter V will describe each of the five categories or themes and the core category discovered in the data analysis.

A careful analysis of the participant interviews in this study revealed that students taking College Algebra Internet were able to successfully pass the course if they sustained self-responsibility, prioritized their current situations, and consistently stayed focused and motivated. Motivation occurred with respect to outside influences or by an innate drive to conclude the course.

It is safe to say that the analysis also revealed that students were also influenced by four other distinct subcategories. The constructions of the major theme or core category and the subcategories were pieced together based on the participant interviews, participant transcripts, researcher memos, journal entries. The quotes were chosen and pieced together to try to faithfully capture the broader views of the entire set of participants.

The themes or categories will be followed by a narrative that will identify the connections between the ideas presented. The categories or themes are as follows: mathematical self-esteem–(self-confidence & attitude); mathematical preparation and ability–(mathematical foundation developed during elementary, secondary, and post-

secondary schooling); structural support network; mathematical environment–(course atmosphere/comfort ability); and finally the major theme or core category, self-responsibility–(prioritization/motivation-dedication).

Mathematical Self-Esteem–(Self-Confidence and Attitude)

The self-confidence and attitude needed to pass the College Algebra Internet course was a factor in determining success. The participants who were not confident in their mathematical ability questioned their skills, which affected their attitude towards the course, typically in a negative fashion. Those participants who were confident and almost egotistical in their mathematical skills, didn't hesitate to enroll in the course and maintained an optimistic view of their success even when they failed an exam or in the case of Ben, the final

Innate Mathematical Attitude/Confidence

Very few participants were able to begin the course with a solid mathematical self-esteem. It was rare to hear comments such as Ben saying "I can be good at math…it's not difficult," or Chad who said "it was pretty easy." Hesitantly some participants even admitted that at one point in their lives they felt confident in mathematics and even enjoyed it, such as Paul who indicated that "as a kid I loved math."

Adam, Chad, Ben, Paul, and Linda all began with a good attitude towards the College Algebra Internet course. Chad's confidence derived from his previous mathematical work, "I always did good in math." When Chad "hit a brick wall" he would "search on the Internet and browse through a couple of sites." In contrast, Ann

and Becky would not seek help because oftentimes they felt stupid asking for help with exception of a family member. Even though at times Chad would "not remember formulas or something for the tests," he did not really allow this to affect his attitude. He would continually plow through the material knowing that "you're not going to remember everything, but then that's what the books are for."

Adam began the course not necessarily confident in the mathematics but confident in his ability to pass the College Algebra Internet course. He had previously failed the college algebra course two other times. What Adam had was called College Algebra Internet self-esteem due to an experience of his mother's when she took the College Algebra Internet course. He was confident based upon his Mom's experience with the course. He even went so far as to endorse the course to anyone that asked for his advice. Adam felt like he "came in with a really great attitude," and attributed his success to Mom.

Although Paul and Linda did not successfully pass the course, they both felt like they would have passed the course had it not been for non-controllable (at least as they perceived it) circumstances. Paul said "probably just finding the time to do it," and Linda who was unable to complete the course because "I got sick.... I couldn't even sit at the computer for a half hour."

Progression in Mathematical Attitude/Confidence

Very few participants felt confident in their mathematical self-esteem to begin with, but were able to gain more confidence as time progressed. Brenda, Kent, and Linda indicated that this was due to either other individuals helping them or their satisfaction

with the Internet setting. Brenda began the course "worried about the material…because I haven't done well in math" Yet with time she began to have success and attributed her new-found confidence and positive attitude to her tutor ,which in her case was her husband, who spent the time working with her on a consistent basis.

Kent's typical attitude towards mathematics has been "I'm a math moron and math I don't get." He began the course smoothly and confidently, but hit a few mathematical bumps, which sunk his confidence level. Luckily, he had family support that was able to build his mathematical self-esteem in order to enable him once again in the course. This occurred on various occasions and by a variety of family members, even from those whom he did not maintain a good relationship with.

Linda felt her confidence grow as she progressed though each lesson and attributed this to the ability of the program utilized in the Internet course. It had a mechanism that allowed her to slow down the lesson and individually pace her learning. As a result, when she was working online, she felt more confident in her abilities. She found that as she completed lessons, she felt that her abilities to comprehend the concepts were growing and felt secure that she could pass the exams.

Lowest Mathematical Attitude/Confidence

Ann and Becky were the two participants who began the College Algebra Internet course with the lowest mathematical self-esteem. It was evident in their attitude during the interview. Ann approached the interview with a grudge against the mathematics department with a sense that the department did not place value in their charges. She began the course with the attitude that, "maybe I just can't handle this," and if she was

not going any further in mathematics, then why learn the material

Becky's low self-confidence began long before she took the College Algebra Internet course. Her first experience with mathematics was traumatic. She began her first course "scared to death," worrying she had made a mistake in coming to college. Nervous on the first day of her first college mathematics course, she attended the wrong class and felt that people were judging her for making this mistake. Becky's attitude mirrored Ann's when she expressed her feelings about the College Algebra Internet course. Both participants questioned the necessity of the course in their general education requirements, and were frustrated by the waste of time and money.

Rumors and Mathematical Attitude/ Confidence

Both participants attributed some of their attitude to the rumors abounding on campus about the state of the college algebra course, not necessarily the College Algebra Internet course. Yet the rumors had some affect on the outcome for some in the College Algebra Internet course. Ann felt that she tried to accomplish as much as she could but indicated that "it obviously didn't work that well for me and a lot of students because I hear it's the number one failed class in the state."

Each of the other participants also mentioned they had heard rumors, Ben saying, "I had heard that it was bad, but it didn't really affect me." He realized early on that everywhere people complain about mathematics. As he worked his way through a variety of English, history, art and other coursework, he noticed students and other faculty members would complain about math. Ben noted that many would "wear the 'I

hate math thing' as a badge of honor'" or as a cover-up for their ineptitude towards mathematics.

Adam felt almost the same way, "I'd heard people say that they'd take it [the college algebra course] a million times and that it's the most failed course here." Yet Adam did not give credit to the rumors when he signed up for the College Algebra Internet course. He felt that the rumors did not apply to him. He had listened to students complain about some of English courses that he had taken in the same fashion as their complaints with respect to the math courses. Yet, he did not think the English courses that students complaining about were that hard, so he began the math course with a positive attitude.

Kent worried that it would take three to four semesters to complete the college algebra course because of "hearing the stuff on campus wherever I went." When Kent feared that he would not pass the College Algebra Internet course he considered other schools after reading in the school newspaper the high failure rate at UVSC in college algebra. He assumed it was the fault of the mathematics department and inquired into other schools and their articulation agreements with UVSC.

Advice on Mathematical Attitude/ Confidence

At the closing of each interview each participant addressed advice given to prospective Internet students and in almost all cases the advice focused on attitude and mathematical confidence. Ann summed this up in a very simple statement, which was agreed upon by almost every participant. She said, "Well, when you feel confident about

what you're doing and what you're learning [in math] obviously you're going to do better."

Paul and Chad's advice were very similar in that Paul felt like "if you have a good attitude…then I would say, yeah take it online." But, Paul felt strongly that if a student didn't understand the math, or didn't have a good attitude towards passing then an on-campus course would better suit that student. Chad concurred with Paul in that student's attitude and confidence are key for success in the course.

Linda's advice came from her own personal experience stating that "one of the factors that I found was important to me was when it worked it was exciting." Yet, when it did not work or "when it was frustrating and I wanted to scream" Linda had the self-confidence to walk away from the material when it became overwhelming, and then come back after a cooling period. She felt that students who were not confident in their abilities to begin with would walk away and not come back.

Becky thought that prospective students should have the same excitement that Linda was describing, "they should get jazzed about it…and to go okay cool this is gonna be great." Ironically, she was the one participant that was the harshest critique about the course. Her attitude soured to a point where she felt the mathematics course was unnecessary for graduation or for general education requirements. She verbally attacked the college, the mathematics department, and many mathematics faculties on campus. She felt that the course was used as a money ploy to bilk students out of hundreds of thousands of dollars and to justify inflation of professor's salary.

Ben felt like there was a way around the "attitude" in mathematics. He

recognized that students have a mathematical fear, which correlates into a hate of mathematics. But, he indicated that this fear will eventually stop a student from being able to be successful in mathematics. He felt strongly that students could get help in overcoming this fear and eventually get past that fear. If this could happen, Ben felt that they could teach themselves the material.

Mathematical Preparation and Ability–(Mathematical Foundation Developed During Elementary, Secondary, and Post-Secondary Schooling)

The next factor that determined success in the College Algebra Internet course was the participant's level of mathematical preparation. This preparation could be gained or lost at any level, primary, secondary or post-secondary schooling. The participants who did not have a solid mathematical foundation either did not pass the course or were only able to pass by laying that foundation along the way. The advice given by all of the participants was without a structural mathematical foundation, the College Algebra Internet course would be close to impossible to pass. They advised those who did not have a strong foundation to take the on-campus course, else recognize that failure was a predicted outcome.

Mathematical Preparation in Primary and Secondary Grades

All of the participants mentioned the link between preparation in mathematics and their ability to pass the College Algebra Internet course. Some participants indicated a negative affect while others felt like they could have passed with a better grade had they

had a stronger foundation in mathematics. Then there were the few, who passed the course and felt their ability to pass was attributed in part to a solid high school and college mathematical foundation. However, the outcome, each of the participants in giving advice to prospective College Algebra Internet students strongly recommended that a solid mathematical preparation was key in affecting their ability to pass the course.

Linda, Becky, Kent, and Brenda each attributed their difficulties with the College Algebra Internet course as a product of their deficiency in mathematical preparation. Each of these participants tracked their lack of foundation and preparation to elementary or secondary school experiences or both.

Kent and Becky's struggles began in elementary school and then carried through to their secondary schooling experiences. Becky never got above general math in high school or in any school. Becky was placed in resource (a special education classroom within the public school building, designed to separate students with disabilities from mainstream students in order to give them the extra help they might need individually) in elementary school, and was told she had ADD. She stayed in resource, and she felt she was led to believe that she was stupid. Becky continued in resource throughout her secondary school experiences and felt that they "never did anything in that class, nothing."

For Linda her mathematical culminating experience was almost the same year as Becky. She took her first algebra class "when I was in the seventh grade, it was a pre-algebra or something." Then in the eighth grade she took geometry and that's where "I hit my brick wall."

As each of these participants continued onto high school, the mathematical problems either amplified, or as many of the participants chose, they discontinued in mathematics altogether due to previous problems. For several participants they took whatever was required to graduate from high school, which did little for their preparation for college. Linda and Kent, for example, took either a combined algebra-geometry course, or in the case of Brenda, just "dropped out of high school" to avoid the mathematics altogether.

Becky, enjoying the non-work philosophy that her junior high school resource teacher employed, she "followed her to high school" because she knew "she would help me through it." Becky indicated that once again it was an easy ride graduating from high school. In fact, had it not been for her resource teacher she would never have graduated in the first place, because of her "school sluffs" she had accrued. As a result, when she began college mathematics she realized that there was a discrepancy between high school and college mathematics and recognized her lack of preparation.

Becky attempted to get help through the disability department on UVSC's campus due to her previously diagnosed ADD in elementary and secondary schooling but when she was tested her diagnosis came back negative for ADD, which meant she did not qualify for any extra resources or help in her mathematics courses. Her concluding thought was "damn, that was a stupid mistake…college is not an easy ride, you have to do homework man."

Mathematical Preparation in Post-Secondary Schooling

Linda, Becky, Kent, Ann, and Brenda each started college mathematics from either a basic numbers course or very close to it. Brenda and Ann began in Math 0990, Kent in a basic algebra class, and Becky in Math 0800. However, none of the other participants, after taking the mathematics entrance exam, still did not place into the Math 1050 automatically, each of them were placed in the prerequisite Math 1010 course or the combination Math 1000 course.

Even as the participants progressed from prerequisites courses into the College Algebra Internet course, they still worried about their lack of mathematical preparation. As Brenda so eloquently put this, "Yeah, I was worried about the material…'cause I still didn't feel prepared."

Although Chad passed the course and attributed this to his mathematical foundation, he recommended that his wife not take the College Algebra Internet course because of her elementary and secondary mathematical preparation. He relayed the experience of percentages he had with her that convinced him that mathematical preparation and foundation was key to passing the College Algebra Internet course.

For some participants, Becky in particular, they had pre-conceived notions of their ability in mathematics combined with their lack of preparation that was the catalyst for failure. Becky felt like she "wasn't the dumbest student" when it came to mathematics but still felt like she was "stupid" with regards to math. She often felt like she was having a "brain block" with the material and wondered if it was her or the curriculum in general. Others had similar feelings with regards to their mathematical

ability and condensed it down to their own mathematical preparation whether it was in high school, college or a combination of both. Kent in making an offhand comment said "if I didn't struggle with math so much, you know through high school and then into college, I would have graduated earlier." Brenda mirrored Kent's same feelings, the worry and lack of confidence in their preparation.

Ability to Pass Determined by Length of Time in Between Post-Secondary Prerequisites Courses

Many of the participants who struggled, or did not pass the College Algebra Internet course viewed the time span between mathematical preparation and/or repeated college algebra courses as their inability to pass the course. For Linda it had been "about 20 years," Ann "it's been 26 years…and then I've had to take Math 1050 four times here on campus." Paul indicated, "it's been a long time between Math 1010 and Math 1050." Lastly, for Kent it had been "10-20 years between the two classes, Math 1010 and Math 1050." In reviewing their transcripts, the participants who had lengths of time between the prerequisite for Math 1050 and then enrolling in Math 1050 showed a decline in grades, this also occurred between failed attempts. Many, in hindsight, wished they had taken the mathematics courses in subsequent semesters, recognizing this as a benefit for success.

In addition to their preparation prior to the College Algebra Internet course several of the participants felt that their preparation during the course hindered their ability to pass. Kent and Ann felt very strongly about the amount of material that the course entailed. Kent felt like "the pace was very brisk for what I was capable of doing

based on my mathematical abilities." Ann agreed, "I just feel they offer too much material for anyone to really keep up."

Mathematical Ability Determined by Outside Resources

Many of the participants agreed that they could have done better or actually passed the course had they been allowed resources in preparing for and taking the exams. They felt that their ability to pass was hindered by the UVSC mathematics department policy of no outside resources on any of the exams. Some of the comments made were similar to what Ann voiced when she said, "bringing notes would have helped," and Becky's comment of needing a calculator on the exams because of her lack of knowledge of basic primary arithmetic.

Some participants even went as far as to say that they could prepare for the exams by working through the assignments but that their ability to pass was defeated by their inability to take tests. They indicated that there was very little connection between the material covered in the lessons and homework. Becky felt that she could do beautifully on the homework but the exams did not reflect what she had learned or studied. This disconnection caused a breakdown in her ability to think clearly during an exam.

Mathematical Preparation and Success

Unanimously all five participants that passed the College Algebra Internet course, vigorously defended the idea that their previous mathematical preparation whether it was high school or college was the medium by which they were able to pass the course. Ben, for example, felt like he was "more mathematically inclined" and indicated that his only

problems with mathematics occurred when he had to demonstrate his mathematical procedure.

Chad's previous preparation was in electronics courses at Idaho State in which he was exposed to Calculus. It was basically the same topics as in the college algebra course on UVSC campus. His previous preparation in mathematics courses and his pursuit of an engineering degree guaranteed that he would "pass the course…'cause I always did good in math…so it was basically a refresher."

Adam's preparation came in the form of a combination of high school and college preparation. He felt confident in his ability to pass the College Algebra Internet course. He had had pre-calculus course his junior year and continued in another mathematics course his senior year. Since his sophomore year, he took a math class all 3 years in high school. He was also fortunate enough to have a teacher "that I just loved so I took all three years from her." Then as Adam began the College Algebra Internet course he "felt pretty prepared." He had actually taken college algebra two times previous and was unsuccessful in those two attempts. During his second attempt, he even worked with his mother in her college algebra class supporting each other in their homework. By the time he had enrolled in the College Algebra Internet course, he "felt pretty prepared."

Linda was another of the participants who had attempted college algebra on numerous occasions and although she did not successfully pass the College Algebra Internet course, she did feel like "the other ones prepared me in part." When it came time to enroll, she was not worried because she had previous exposure to enough of the material to be familiar with the mathematics. She was prevented from succeeding only

due to an illness. Linda stated that there was a definite link between preparation and the ability to pass the course. She had firsthand knowledge based upon her own experiences and also that of her daughter.

Advice on Mathematical Preparation and Ability

At the closing of each interview, each participant addressed advice given to prospective College Algebra Internet students and in every case, each participant said something almost verbatim to the following quote. "I would ask, what's your background…what have you done in math so far" (Participant 8, Linda), or "how'd you do in high school mathematics" (Participant 6, Ann). Ben's version of the advice given to prospective College Algebra Internet students was "I would recommend it to her or him, if they have a brain like me." Kent used the term "well rounded," interpreted as a firm grasp of the mathematical concepts to begin with. He felt that for success to occur in the College Algebra Internet course, that the topics should only be a refresher, not a new experience.

Most of the advice given was based upon personal experiences. Even though Chad was one of the more prepared and confident students in his ability, he felt that "unless they were decent, I mean, if you know it, then I'd take the class online." At the time of the interview Chad was currently taking trigonometry and the question was asked why he didn't take this online, although it was available and he indicated that "but I haven't seen the material…it's new to me…it's better that I take it in class than on the Internet."

Several of the participants took the advising idea one step further saying that "anybody who doesn't have a knowledge already of math shouldn't take it online…they have to have a decent concept of it and understand it before they can go into it" (Participant 6, Ann). Linda summed this idea up nicely saying, "what kind of background do you have…what have you done in math before…and if you have a great background I would say sure go ahead and take it online…otherwise don't bother, you'll just fail."

Structural Support Network

Kent coined the phrase, "support network," which was determined as the next factor in determining success in the College Algebra Internet course. The participants who were supported by family, friends or outside influences, in the aspects of financial, mathematical and encouragement support, had a better chance at passing the course. The factor that determined the most success was in mathematical support. Without a mathematical "support network" of some sort in place or at least readily accessible, the participants had very little chance of surviving the course with a passing grade.

Financial Support from Family

Several of the participants expressed their concern about working during the time they were taking the College Algebra Internet course. Some were fortunate enough to have some financial support from family that allowed them to give the course their undivided attention. Unfortunately, there were others who preferred not to work but were unable to take this option due to outside influences. Paul, who was pressured to stay

employed, felt that in order to complete the course successfully he would need to cut back on the hours he was working yet "I wasn't given this option…it just wasn't something I could do."

The lucky ones, such as Brenda and Ben who both "made the choice not to work" were able to be financially supported by family. Ben lived in his parent's home and although he was "putting myself in a big hole financially" was grateful for the opportunity to concentrate on his schooling. Brenda did not attempt the college algebra course until she was "more financially stable…and was able to focus on school and stopped working." When she first began the College Algebra Internet course she wanted to financially help out her husband. She took a nanny job with some relatives but within a few weeks it became evident that she would not be successful unless she quit working. Her husband encouraged and supported this decision to quit and she was able to successfully complete the course.

Encouragement and Support from Family

Ben, Chad, Kent, Becky, Adam, Paul, and Linda each detailed during the interview the encouragement and support they received from family that kept them centered during the College Algebra Internet course. However, in the case of Linda, the family support she received was in contradiction to those same family members who negatively impacted her success. In addition to Linda, Paul experienced a similar situation with the battle of support being waged between his wife and his mother. On the one hand, his mother was trying to support his best efforts, and on the other hand his wife impeding his success in the course.

Ben inadvertently mentioned his support and encouragement by his family. He talked about the support from his sister whom he felt a kinship with and the support from his retired parents in allowing him, at the age of thirty, to move to their new home in Utah from California without any charges of rent, utilities, food, or any other living expenses. Adam, subtly, in the same fashion as Ben made reference to his mother whom by example encouraged him to enroll in the College Algebra Internet course. He was "pretty confident about what my Mom had gone though" so he took that as a sign of support to enroll.

The summer before enrolling in the College Algebra Internet course, Chad got married. Before that marriage, his grades were "okay…but not great…in fact I failed those summer classes." He stated that prior to marriage "I didn't have my head in the books." Since his marriage, his perspective on schooling changed dramatically. Unconsciously, Chad was supported by his marriage and wife. He recognized that school "means something" and that if he "does the grind now, I can play later."

Becky received constant cheerleading and support from her husband. He took his role of cheerleader and counselor very seriously. He would listen to her complaints and "try and help as best as he could." He expressed enthusiasm for her mathematical work almost daily. He manifested this in a variety of ways, such as doing the mathematical work with Becky even though "he had no idea what he was doing," helping her study and quizzing her on the concepts. He would use phrases such as "come on you can do it" and "once you get that degree…shove it in everybody's faces that you're the first person…with a college education in your family." When she became discouraged, Becky

used the term “backer” to express the support she felt from him when he defended her skills to the mathematics department chair after she realized she failed the College Algebra Internet course.

Kent coined the phrase “support network” in reference to his wife, his niece, his brother-in-law, and various other family members. He stated unequivocally that he would never have passed without those resources. His wife was his main supporter and he’d conference with her first. She supported him by helping foster the mathematical concepts and reinforcing his self-esteem by saying things like “we can get you through this,” and “we can do this together…your doing fine…keep going.” The support he received from this key group of people was one of a “team effort more than anything else.”

On many occasions, one or several of these resources were ready and willing to help Kent. The time or setting had no bearing on the gift of help, guidance and support he received. On one particular occasion, one resource, whom he had previously had a combative relationship with, turned out to be a means by which he was able to regain confidence in his ability and push past a very difficult concept. He indicated that without that individual’s insight and support he would have chosen a different path in the College Algebra Internet course. At this time in the semester, he had contemplated other options besides UVSC. Kent’s “support network” became “the only reason that I got through it.”

As stated previously, Linda and Paul’s experiences with support were at odds with each other. For example, Linda expressed support from her children. They jointly

agreed that while Mom was “sitting at the computer” they were “not to talk with her, especially if there was a math problem on the screen.” She indicated that her children respected this agreement and that she had been able to work for an hour uninterrupted. Yet, in another part of the interview, she stated that while at times she was able to study, her children became a distraction that impeded her progress. The “distractions” she described were the daughter who was molested and the boys who were truant, which resulted in truancy court.

Paul’s support came from his Mother who realized the pressure that his wife was placing on Paul. She offered him a reasonable job with high pay and very few hours. However, Paul’s wife wanted to “start a family” and “quit her own job.” She made demands on Paul’s time and earning ability. To please her he changed jobs, working more hours, and spent the few hours of time he needed to devote to studying listening to her complaints and anguish about her parent’s divorce. He carried a full load of classes and worked 35-50 hours a week. He felt like he could have used “more support…maybe a little more pushing to get it done” and stated that “if I had the time I would succeed.”

Mathematical Support/Bridging the Gaps

Ann, Brenda, Chad, Adam, and Becky each enrolled in the College Algebra Internet course anticipating guaranteed mathematical help from family or friends. They each had someone or knew specifically of someone that they could rely upon when mathematical help was needed, especially when then needed help bridging gaps in their mathematical knowledge. For Ann, she enrolled in the summer College Algebra Internet course knowing her daughter was going to be home for the summer. Her daughter was a

mathematics tutor at another institution of higher education that she attended during the fall and spring semesters.

Chad, who was training to become an engineer, had inquired of several colleagues within his department about the possibility of answering questions in the course, should they arise. When his engineer colleagues were not available, he relied upon his own investigative skills to "search on the Internet," for sites that could answer his mathematical questions. He indicated that he had questions within the college algebra material, but at other times he needed questions answered that bridged some of his mathematical gaps.

Adam found two resources that were able to give him mathematical help during the course. As stated in the previous chapter, Adam originally enrolled in the College Algebra Internet course as a result of the success his mother had experienced in the same Internet course a year earlier. Consequently, Adam was able to ask his mother questions as difficult material was presented. His second and most important resource occurred by accident. One afternoon Adam decided to visit his high school mathematics teacher and while with her asked some mathematical questions pertaining to the material he was studying and then of some of the material she had presented while he was in high school. Afterwards his high school teacher agreed to continue this arrangement as long as Adam was able to come after her work hours. Adam indicated that he felt like "I learned a lot just from her."

Although Becky's husband had not taken a mathematics course for many years, he turned out to be her most supportive mathematical avenue. He would "quiz me" and

oftentimes sit with her and work on the mathematics together. She said, “he was learning it right along with me.” Because of his patience with her when she did not understand something the two of them would “work on it together until I understood it.” When asked if his role was more of encouragement she indicated that even though “he had no idea what he was doing, he was still able to get me through it” meaning the mathematics.

Becky relied on her husband because of her frustrating experiences with the mathematics lab on campus. She felt that many times when she needed help, she would waste hours in the lab waiting to get “just one question answered.” She believed strongly that the mathematics lab was a “waste of time,” and that those who tutored in the lab had too much “pride and looked down upon those of us in Math 1050.”

Brenda enrolled in the College Algebra Internet course for one reason only, her husband. She and her husband had temporarily moved to New Jersey when she had enrolled in the course. She originally worried that she would not be successful since she was so far away from her previous student tutor and the UVSC mathematics lab. At the encouragement of her husband who “is a bio-statistician,” she plowed through the material. She would work each day and save up questions for her husband to help with in the evenings. Several hours were spent each evening with current material and oftentimes with “things I had missed out in Math 1010.” She felt like he was able to not only teach her the college algebra material but also to bridge the gap that she felt was missing in her mathematical background. “He filled me in on all of the things I missed out on in 1010…then answered my questions and helped me study.”

Advice Given with Respect to a Structural Support Network

From Brenda's perspective, she would not have passed the College Algebra Internet course without her support system, mathematical or financial. Therefore, when asked what advice she would give to a prospective College Algebra Internet student she resolutely answered "only if you have someone that you can go to and get your questions answered especially if you can't go to the math lab or you don't have a tutor."

She strongly recommended that the student quit work while taking this mathematics course. But, if that's not possible then cutting back on work hours is the only other alternative. It was the same advice Ben recommended. He felt that to achieve success in this mathematics course, working would only suppress that goal. He also stated that if the prospective student needed the encouraging words of a teacher and was not able to substitute that form of encouragement with friends or family, than perhaps the on-campus course would better suit the individual.

Becky was able to find a happy medium with work and her campus studies and thought that others could financially support themselves while taking the mathematics course. However, she adamantly implied that teachers encouraging words and actions solely determined the success of a College Algebra Internet student. Such as words in emails, telephone calls, online chat and any other form of communications between teacher and student. She felt that teachers needed to communicate on the level of the student, with the realization that teachers and students have vastly different mathematical backgrounds. She used terms such as "come down to our level" and "don't treat us as a weakness and not help us" and "not to see those of us who can't do math as stupid…and

don't judge us [all in reference to students who struggle with mathematics]." She felt that with the encouraging words of a teacher "the sky is the limit…and that just a tiny bit of encouragement can go a huge way…those are the prized teachers."

Becky also recommended that prospective students read the vitae's of each College Algebra Internet teacher, and interview other College Algebra Internet students from past semesters to determine the best fit between teacher and student. She acknowledged the support given by her husband but did not give this as much credence as the power of support and encouragement given by teachers. Her words were, "a teacher can help you in a way that nobody else can...that's the reason why people [meaning prospective students] should be so picky."

Mathematical Environment–(Course Atmosphere/Comfort Ability)

The next factor that instigated enrollment in the College Algebra Internet course, and then became a positive factor in success, was the setting, or natural environment of the Internet course. Over half of the participants enrolled in the course due to prior issues with the mathematical environment in on-campus courses. Once they enrolled, they found the environment of the Internet course supportive of mathematical progress. Many of the participants in reference to the environment of the College Algebra Internet course, used terms such as "comfortable" and "less stressful" versus the on-campus course. As a result, this comfort ability allowed some participants to overcome mathematical anxiety and successfully progress in the course.

Mathematical Environment–Flexibility and Pacing

The advantages of the Internet course with its flexible pacing schedule versus a rigid traditional college algebra course, was expressed by many of the participants. Ben felt more comfortable in the Internet course after experiencing traditional on-campus mathematics courses. He felt that during a traditional course the pacing of the other students held him back. In an on-campus course, material for an exam could take weeks to disseminate, and then by the time the exam date arrived Ben would have forgotten much of the material. It was frustrating for him to have to backtrack and try to assimilate many concepts again. With the Internet course, he was able to "learn the stuff and be comfortable with it." His preferred method was to dedicate a weekend to focus on one chapter. Then on the following Monday, he would "go take my test right there 2 minutes later after reviewing rather than…days or weeks."

In fact, when he attempted a traditional on-campus college algebra course the pace at the beginning was too slow. He would discontinue attending class. By the time he chose to attend again the material would be beyond his knowledge, and he was unable to catch up. As a result, he would be forced to drop the course. He indicated that this occurred multiple times, until he realized the advantages to the Internet course.

The flexible pacing that Ben enjoyed were some of the same reasons Linda felt successful in the Internet learning environment. Her feeling was that she could actually spend more time with the problems. She was able to slow the pace down and took advantage of the rewind capability on the Internet program. Linda spent more time studying the information and working through problems online. Her positive remarks

were, “I could actually run it back again and replay it.” For her, that helped tremendously.

In prior attempts at college algebra, she would attend on-campus lectures. On days in which she understood the material in class she felt confident to go home and begin homework, but there was always some piece of the concept she didn’t grasp. Unfortunately for her, she was unable to remember what her on-campus instructor talked about. In contrast, as Linda would come across material she could not quite grasp, she had the advantage of being able to walk away from the material, take a breather and then come back to it at a later time. For Linda, taking a break allowed her to clear her mind and be able to come back to the material fresh. In her words she said, “I wouldn’t even turn off the computer…I would just leave it where it was and then when I came back it would make sense…the break helped me clear my head.”

Adam actually felt that the “online was considerably easier or less stressful…than going to a classroom.” He found that after two attempts in a traditional on-campus classroom, the Internet provided him a way to learn the material with respect to his learning style. Adam felt that he was more of a pictorial learning. He liked the variety the College Algebra Internet program provided, such as the various ways the program presented explanations to concepts versus reading a traditional textbook.

Another selling point for Adam was the Internet quizzes that the program provided. In his previous traditional courses, Adam indicated that the quizzes did not match the material presented. Whereas the online quizzes covered the recently taught concept, not “something you’ve never seen before or that you didn’t do in your

homework."

The appeal for Becky paralleled the same thoughts as Ben, Linda, and Adam. She loved the idea of being able to "do it at my own pace." She found that being able to slow the program down and replay concepts facilitated her ability to remember material. Her particular interest in the Internet program was the capacity to see three different versions of the same material presented. She could watch a teacher teaching in one view screen, see it written in the teacher's handwriting in another view screen and then lastly in typeface script.

Becky and others were actually physically comfortable in the Internet class. No other participant expressed this advantage as clearly as Becky. She said she loved the fact that she could work on her mathematics in her pajamas, not worrying about her appearance, or finding a parking spot on campus. As a result, she was able to better focus on the mathematics and get "completely enthralled with it."

Mathematical Environment – The Teacher Factor

Six of the nine participants enrolled in the College Algebra Internet course as a direct result of a prior experience or multiple experiences with teachers. This occurred as early as grade school and as late as college. Ben recognized this issue not only in him, but realized this was an issue with many other students on campus. He stated that while he did not need a teacher to guide his mathematical studies he recognized that there were many students who were unable to take the math Internet course without a teacher to direct their work. The point that Ben was making was that in an on-campus setting

students receive instant feedback to questions posed and a confirmation of right or wrong solutions, by someone in authority. In contrast, in an Internet setting there is feedback to questions posed but not by a physical teacher in the same room and for some students this presents a problem.

Kent's experiences with teachers began early on. When he was in grade school he was exposed to several mathematics teachers whom he felt "really didn't care" and "refused to help any of us." It was not until 20 years later that Kent experienced a teacher "that explained everything thoroughly." By this time, Kent felt like he was a lost cause mathematically. He expressed concern about choosing a "good" college algebra teacher that the option of the Internet course became "a decent alternative."

Adam, Linda, Ann, and Becky each experienced mathematics teachers, college algebra or others, that had such an impact on their view of mathematics teachers that the Internet was not only an option but, the only option that they would consider. Adam stated that "the teachers that I had before…were very impatient…one just wasn't very nice." He felt that they did not create an atmosphere that made him comfortable to ask questions. It became such a stressor to him that he postponed college algebra for several semesters.

Ann also postponed taking the college algebra course for some of the same reasons as Adam but for her, the postponement period turned into years. Prior to taking the College Algebra Internet course she experienced college algebra on-campus in which "I just couldn't comprehend what was being said and when I would ask questions I would just get blown off." She said, "I was made to feel stupid." Another experience she had

was with a teacher that did not take the time to help the class, which eventually translated into a negative atmosphere within the class setting.

Linda and Becky voiced the same concerns with teachers in almost identical experiences. Linda had problems with an on-campus teacher who taught a level higher than the students, making it difficult and in some cases impossible to follow along. She was unable to get her questions answered and when wanting to discuss these issues with the teacher was not given that opportunity because the teacher was "too busy." As a struggling mathematics student she found this not only disheartening but realized the value of the Internet course.

Becky's negative experiences went far beyond one mathematics teacher to almost all of her mathematics teachers. Her experiences with "crappy" mathematics teachers actually began in grade school and carried all through her junior high and high school experiences. College then became somewhat of a rude awakening in terms of teacher expectations. Compounding this problem Becky experienced mathematics teachers who had difficulty with the English language, some who were "prideful," one who was a "snotty little bitch," and another who "was so hoity toity and…stuck up his nose…he just thought that he was the brass ring and that everybody else was dumber than a box of rocks."

Consequently, she "loved" the Internet course and told all her friends about this alternative. She said that nowhere else will you experience a situation where a teacher will sit down with you and repeat the same concept to you in three different venues patiently. This was the benefit to the Internet setting and her sole reason for

recommending the course to others.

Mathematical Environment–Program Problems

Although all the participants enjoyed the software package for the College Algebra Internet course, several experienced some program problems that made them uncomfortable at times. Ben felt that the "lessons were cheesy" but did not think the Internet course could get away with not having some aspect that was entertaining and as Ben put it, "cheesy."

Brenda enrolled in the course because of her move to New Jersey across the country from UVSC. She did not anticipate problems with access to the course and homework, so she was disappointed when "things didn't work as well as I would have hoped." Along the same lines, Kent had anticipated a more thorough program but was somewhat disappointed when he could not access more "homework problems" to work through and felt that it was difficult to "find the solutions."

Linda, Chad, and Adam each experienced problems with the mathematical syntax of the program. Many of the problems required some steps that they each worked out with paper and pencil. The difficulty came when they attempted to put their solutions into the programs mathematical syntax. Their solutions were at odds with the programs syntax, and the program marked their solutions as wrong. Chad's mathematical foundation was strong enough to withstand this kind of negative feedback. He did not question his mathematical knowledge whereas Linda began to wonder if she really knew what she was doing. Even at the interview she indicated that perhaps she did not know

what she was doing or that maybe "something was wrong with my keyboard." To overcome this problem, Adam actually shut his computer down to see if this would change anything and as a result when he began the material again he had to "start over…and then I just skipped over those areas…and I think I missed something."

Mathematical Environment – The Exams and Setting

Many expressed a "disconnect" with the material in the Internet course and the paper and pencil exams. Some expressed minor issues such as "not remembering all the formulas during the test" yet Chad felt like this was an expected minor inconvenience. Others though had more serious issues with the state of the exams to a point where it determined the atmosphere of the Internet course.

Ann and Becky felt that the material presented in the program was not the same thing that was being tested over. Phrases and words were changed just enough that the exam questions became ambiguous. Ann took two exams before she realized that no matter how prepared she felt, this disconnect was only increasing by each exam. For Becky it only took one exam to realize that how the exam questions were worded varied enough from the Internet program that she would not pass the course.

For Becky, her anxiety over the exam really began with the realization that the exam would be offered in the testing center on campus. This created severe anxiety for her that her "normal text anxiety was just made worse" knowing that the testing center was her only alternative. The environment of the setting of the test caused such anxiety in Becky that she realized she would never be able to perform in this setting and so she

dropped the course.

Chad, Brenda, and Adam experienced a great deal different setting in taking the Internet exams. Each of these participants took the exams proctored outside the testing center. They each felt comfortable with the material and felt very little, if any, anxiety about taking the exams. Adam liked the "shorter exams" of ten questions and indicated that "psychologically when the exams are shorter I just do better." Brenda's exams were proctored by the local librarian in the town she was living in, in New Jersey. She would review the material ahead of time while sitting in the library waiting for the librarian to have some free time to proctor her exam. Incidentally, a suggestion Becky offered to help relieve testing center anxiety would be to "offer the exams in the library instead of that damn testing center."

Mathematical Environment–Recommendations

Many suggestions were made to improve the atmosphere and comfort ability of the College Algebra Internet course. Besides Becky's suggestion above about offering exams in the library, other suggestions were made. Ann and Becky both felt that outside resources would ease the atmosphere of the mathematics course making it a more comfortable situation. Ann felt that bringing notes for the exams would relieve some of her anxiety over remembering formulas, whereas Becky felt that a calculator of some sort "just a simple basic calculator" would help ease some of her testing anxiety.

Although many enjoyed the flexible pacing schedule of the Internet course, Kent and Ann felt the "pace was too brisk." Kent felt that he did not have time to work and rework through problems because of the enormous amount of material to be covered.

Consequently, he felt that he could have done better had he had more time to work and digest the mathematical content covered in the course. Ann expressed the same concern. She felt comfortable with the material towards the beginning of the semester but as she progressed further she felt that the course sped up to where "it starts to bombard you with so much information that no human can actually remember." Ben suggested that individuals like Kent and Ann who were not "mathematically inclined" or had a "head for numbers" would not find the Internet environment conducive to their situation.

When specifically asked what improvements each participant would make to the College Algebra Internet course to improve the atmosphere, Kent and Ann suggested the same proposal. Ann said "the first thing I would do would be to offer a Math 1050A and then a Math 1050B…split it into two classes," and Kent said "I'd split 1050 into two different classes." Each felt that the amount of material that needed to be covered and worked through was overwhelming. Both suggested that to be comfortable with the material they needed time to work and rework through the concepts, but factoring in the amount of material that needed to be covered this feat was near impossible. Ann eventually dropped, overwhelmed with the task, and Kent took the course solely on its own knowing full well what was expected.

Kent summed up each of the participants final thoughts on comfort ability in the College Algebra Internet course. He said, "there are those who need a more structured environment…those who need more face-to-face stuff." Kent and many others felt that a prospective Internet student would not thrive in the Internet environment if they fit in this category of student. Kent admitted, "I could have gotten a better grade" had he been able

to enroll in an on-campus course. He survived in the Internet course due to other factors but "I would have failed had I not had other resources…'cause I really needed face-to-face."

Self-Responsibility–(Prioritization/Motivation-Dedication)

Self-responsibility was the core category or major theme, in which all factors were dependent upon. Even when many of the participants did not have a solid level of mathematical preparation, or a positive attitude towards mathematics, or any of the other factors, the one factor that determined their success was the issues of prioritizing their time to develop their mathematical skills. By setting aside time, and staying completely devoted to the course from the very beginning established above all else, the one factor that determined success in the College Algebra Internet course. Kent is the perfect example of a student with a low self-esteem in mathematics, a weak mathematical background, and displeasure with previous mathematical environments. Yet, Kent was able to successfully complete the course by devoting every day, whatever time he could squeeze in, to studying the mathematics utilizing every resource he could unearth.

Motivational Drive/Dedication

When the participants were interviewed, it was noted that nearly all felt some driving force that maintained motivation. Predominately rationales were focused on improving oneself. For one particular participant, his driving force was from his spouse, which resulted in a collapse in his resolve. Paul felt the pressure from his wife to pass his courses, gain his degree, thereby alleviating the burden his wife felt from working. He

indicated that he was already working in a “great job…in fact, really my dream job,” yet her desire was for him to finish. It was at best a strained relationship with the pressures he felt from her.

On the other hand, Chad summed up the dedication each of the other participants felt about completing the College Algebra Internet course. He spoke of his desire to complete the course and said, “it’s just for me…I just didn’t want to fail.”

When Chad began college for the first time he attended school “because that’s what you’re supposed to do after you graduate from high school.” He loved to party and did not feel like he had his “head in the books.” After getting a job in an engineering firm as a tech, and then spending the next seven years “working my ass of,” he was able to advance in the company until he “landed my ideal job.” Enjoying the work, he realized he wanted to complete his degree for himself, which led him to the College Algebra Internet course. His perspective on school changed dramatically, he said, “Now, it means something…and for me I have to do the grind so I can play later.”

Ben, Linda, Kent, and Becky each reiterated a similar rationale. Kent needed to complete the course to advance in the Sheriff’s office where he was currently employed. He felt the need to gain the degree for him to feel worthy of the position he was entrusted to. Likewise, Ben had worked in some very high paying positions but was not fulfilled or “just wasn’t happy.” He felt that he could be happy teaching and set a goal to student teach in the fall of 2007. In order to complete his goal he was told he needed to “take the college algebra before I could student teach.” It meant that he would be enrolled in 20 credit hours during the semester he had the College Algebra Internet course, but he felt

that he was “on a time frame and really wanted to finish so that I could student teach.”

Linda’s experiences mirrored Chad’s in that she attended college after high school since it was the expected thing to do in her family. She also wanted to “be away from home for the first time…and loved the social aspects” and independence. Her social life took center stage, which resulted in many failed courses. She quit school and eventually married. Thirteen years later, she became a widow and was forced to get a job to support her family.

The only work she could find was as an accountant in temporary positions, which did not quite meet the needs of her large family. She had at many times, since her husband’s death, needed external financial assistance. One day at work she stumbled across a pay invoice in which she noticed the dramatic difference in pay between her “temp pay” and her colleague’s pay. Her frustration surfaced when she realized that she was capable of her colleague’s job yet did not have the degree to support her justification of a higher pay. “So I thought okay fine, I’m going to equalize this issue and that’s why I was in school.” She felt that her driving motivation stemmed from her desire to earn her bachelor’s degree to “support my family.”

Following the death of her father, Becky was given several pieces of her father’s pottery work. Inspired, she began pottery courses and found that she had “a talent that came out of me…so I thought of different ways to make it a career.” To fulfill her dreams she recognized the need for a degree in business. Once she began college, she became aware of two important reasons why she wanted to complete her degree. First, she “realized that in this day and age even a high school diploma doesn’t mean crap,” and

second, that she would be the "first one in my whole family to have a college degree." The second reason was her driving motivational factor in achieving her goal. She wanted this for herself and to make her family proud.

Brenda's dedication resulted from a hard lesson she had previously learned. At the time of the interview she had been attending college off and on for six years. She began college on a scholarship and assumed she could work a fifty-hour week and still attend school. After losing her scholarship and financial aid her only recourse was to earn her own college money. Once she "got myself into a better situation" and became more "financially stable" she continued her schooling. She said, "I was really mad at myself and decided I wasn't gonna do that anymore." Since the College Algebra Internet course was her last math class, she "made sure I focused just on that…I wasn't going to fail."

Dedication and Devoted Time to Study

Regardless of the level of preparation, all the students that passed the College Algebra Internet course had devoted an enormous amount of time and were faithfully dedicated to the course. Each of the participants commented on the time it took to complete the course versus a traditional college algebra course. It should also be noted that in the case of Paul and Ann, they were not or did not bother to devote time, and recognized this as the catalyst for failure. Although Becky and Linda did not succeed in passing, Linda became ill but firmly believed she would have passed had her illness not prevented her from completing the course. Whereas in Becky's case, she was unable to complete the course due to her failure in the prerequisite course, she would have been

manually dropped from the course had she not dropped the course herself.

Of all the participants, Ben, Chad, and Adam were perhaps the most mathematically prepared participants. However, they each recognized that the course would take time and devotion, but were content that they could dictate when and where that time was allotted. Adam focused mainly on the homework, even when he thought he was comfortable with the material. In his program records, Adam devoted an average of 8-10 hours a week on his mathematics study online. This is typical of any college algebra student, with the average class meeting time of 4 hours per week with 4-8 hours of assigned homework on top of class meeting times. He felt impressed to continue working homework problems regardless of his ability to "breeze through them."

Ben also felt comfortable with the material yet still maintained an average of 8-10 hours of homework each week. His work online was usually documented on the weekends and was in large chunks of streaming sessions. Typically, he logged in chunks on Sunday's with some on Saturday evenings and Monday mornings. He recognized the fact that this class was not applicable for everyone. "I don't think for everybody it's an easy way to learn the stuff," meaning, he did not feel that those who could not dedicate the time to study would be able to handle this course.

In reviewing Chad's records from the online program, he was unique in that his documented logged work was only 4-5 hours per week. During the interview he disclosed how he studied and prepared for the exams. He felt comfortable with most of the material yet at times needed extra help with certain topics. Chad then turned to his colleagues at work who were engineers, and requested help. When his colleagues were

unavailable, Chad would search Internet sites looking for information on concepts that he was struggling with. He indicated that he would only log onto the program 4 hours a week but spent as much time, or more, with colleagues help or searching for solutions online.

Brenda, Linda, and Kent each detailed out their devotion to the College Algebra Internet course. Brenda realized early on that in order to devote time she needed she would not be able to work. In fact, she quit being a nanny for her relatives when she was unable to devote the time she needed to her lessons. She also recognized she could only take an "another easy" class during that semester. "I made sure I focused just on that because I knew it was going to be hard and I needed the time." Each day she devoted "4 hours or more" to her studies and then when her husband arrived home from work another "2-3 hours" with him getting her questions answered. Brenda did not feel prepared for the course but was able to bridge her mathematical gaps with her husband's help. Had she not had his tutoring help she did not feel that she would have passed the course. She said "I made sure I had a lot of time" to devote to making note cards, reviewing formulas, and at least two days prior to each exam, working and re-working each of the problems.

Although many students are not happy about devoting time to mathematics Linda and Becky were thrilled with the features of the program to slow down, rewind, and replay. In reviewing the logged hours both participants accumulated during the time they were enrolled, each averaged approximately 10-12 hours weekly. Linda had previously taken college algebra three other times, whereas Becky was on her first attempt, yet never

felt nearly as comfortable and dedicated to any other course other than the College Algebra Internet course. “My feeling was that I could actually spend more time with the problems” was Linda’s response which mirrored Becky’s almost verbatim. From their point of view, the time dedicated to their studies was an additional benefit, not a deficit. It was the first time either of them recalled really understanding mathematics and was confident they would pass the course. Linda’s test scores were strong prior to her illness, which indicated her level of understanding was solid. Although Linda experienced distractions at home, she was able to work around those details to utilize more time with the mathematics. Linda’s only distraction that caused her to fail the course was an illness that nearly took her life.

On the other end of the spectrum were Ann and Paul. Each knew they needed to spend the time but were either unwilling or “lacked the desire or even had time” as Paul stated. Ann quickly became disillusioned with the course and spent as a little time as possible hoping that her previous attempts would bridge her mathematical gaps. After failing two exams, she gave up. During the interview she acknowledged that had she spent more time, or was more devoted, she may have been able to pass. However, her dislike for mathematics and the math department was the driving force that hindered her progress and her decision to not spend any more time than was necessary.

Paul began the course “not having enough time to work on the math or study.” He indicated that he did just barely enough to get by. He would work on the assignment “maybe half” as time allotted but when asked how much that entailed, he admitted to perhaps an hour per week. He was embarrassed by this admission and quickly indicated

that his time was very constricted. He stated that "Internet for mathematics is a lot more difficult for me...than other classes." He recognized that his time correlated to his ability to understand the material, and pointed out that he did not study hard enough and didn't prepare as well as he should. He said that when he has prepared he has tested well and possibly could have passed had he "had more time, but I don't."

Of all the participants, Kent spent the most amount of time with the mathematics. He logged more hours per week than any of the other students. He was also one of the least mathematically prepared students, so it stands to reason that he would need the extra time. He recognized this and compensated with his devotion to the course. He took the course solely on its own, utilized every resource available, and devoted every day to working the mathematics. He indicated that had he had any extra hours in the day he would have utilized it dedicating more time to his studies. Many days he would work until six in the evening and then work on his studies until 2 or 3 in the morning. This pattern continued day after day. At one point, he needed to be out of town so he made sure the hotel he booked had Internet access so that he could make use of the available time while he was away from home. He recognized his mathematical weaknesses and over-compensated with time and help from his network of tutors. Even then, he struggled throughout the entire course and was only able to pass the class by "barely one-tenth of a percent."

Participant's Family-Prioritization/
Motivating Factor

Kent and Brenda credited their family as their motivator and support in

succeeding in the course. They both had a "support network" in place that was available to help mathematically and to diligently motivate them during the course. Kent had a large motivating group that was continually available and willing to lend support or to help him in his studies, "if I needed help, I'd drag in one of my resources." He realized that if one was not available at the time he needed the help, there was always someone else he could reach out and call or email. Even those whom he did not have a previous sound relationship with were willing to motivate Kent through his mathematical trials. He credited his success to this group of family members who were vigilant in their quest to get him passed. Their mantra was always in the form of "we" not "you," meaning we as a group will help you succeed. Above all, his wife was credited as being the most supportive and his "biggest motivator" with words such as "just keep going…we can get you through this…we can do this together."

Brenda's motivational family member was her husband who devoted tirelessly his evenings and weekends to help his wife with her mathematics. During the interview there was no mention of ill feelings due to the time he spent with her. His devotion to his wife was constant and unwavering. He was just as dedicated to her success as she was in finishing the course. She indicated, "Had it not been for him, I would not have passed the course." His role of tutor and cheerleader took center stage in her ability to understand and pass the mathematics course.

Becky also derived motivation from her husband. Although he did not have the mathematical background to help her in her studies, he continued to support her throughout her studies over the Christmas break. He made sure Becky kept the College

Algebra Internet course as a priority during the time she was enrolled. He would listen to her issues and try to help as best he could. Oftentimes he was more enthusiastic about her succeeding than she felt. Her pet name for him was her "backer."

Ann and Linda acknowledged that although they felt that they could place the College Algebra Internet course as priority one, it was evident that the interference from family was a problem in completing the course. Linda's family interference was a daily occurrence, instigated from her children. She had to deal with daily interruptions while she was working, and weekly interruptions that took her outside the home. She had two children that needed her time in truancy court and a daughter that needed psychological counseling after a rape. Each of these incidents took hours away from the course. She felt that she could have overcome these daily interruptions if she took the class again, yet, it is questionable if she would take it anytime soon, or at least until her children are more independent.

Ann's experience was very similar to Linda's, yet more subtle. She enrolled in the College Algebra Internet course and nothing else with the idea that she could devote all her time to the course. She had hopes that her daughter, who had returned home from college and was a math tutor, would find the time to help her. This assumption, unfortunately, did not come to fruition. She also felt subtle pressure from her grandchildren wanting their grandmother to attend their swimming lessons, come over and play, and be a full-time grandmother. Pressure to spend time with her daughter and granddaughters was more internal, but was just enough pressure that she neglected her studies and spent time with them instead.

Although Chad did not have to deal with a spouse or children during the time he was enrolled in the College Algebra Internet course, he admitted that had he been engaged, he might not have passed the course. He acknowledged this as a result of the outcome of his summer courses during his engagement in which he failed all four of the courses he was enrolled in. He also speculated that after the marriage to his wife, he might not have had her support, knowing the demands she placed on his time.

Paul did not have to speculate about the priority his wife placed on his time, he felt that this was the mechanism for his failure in the course. He continually emphasized the need to complete school and ease her burden of working. She pressured him to get a better job and support her, in hopes that she could quit her job and begin their family. Paul's mother tried to ease his burden by offering him a TA position with her, but unfortunately this did not pay enough money to satisfy his wife. She pressured him daily and it only escalated when her parents began having relationship problems. He indicated that his wife's "pretty demanding," which caused "marital problems" between them…and on top of that she wants to talk about that [the impending divorce of her parents] all the time." His coursework took last priority due to his wife, which translated to "no desire" to put the time in.

Participant's Work – Prioritization of Time

Some participants felt that it was absolutely necessary to quit work while taking the College Algebra Internet course, while others were able to balance a job under certain conditions. Some had no option but to work and it became a matter of priorities of time that determined success in the course.

Ben, Brenda, and Linda were the participants that adamantly refused to be involved with paid employment during the time they took the College Algebra Internet course. Their priority was to successfully pass and acknowledged that any interference of work would hinder their progress or result in a failed grade. Brenda said, “I had to quit being a nanny…I just didn’t want to fail.” Ben realized this would result in some enormous financial debt when he was done with school, but it was more important to pass than to fail and retake the course, which would cost him more money.

Ann and Becky needed to work, but did so only part-time. They both indicated that any more work would be detrimental on what little time they had to devote to the course. Ann said even then, “it really took a lot of my time and I didn’t like that.” Becky changed jobs working graveyard shifts at a drug rehab clinic in order to dedicate uninterrupted periods of time when the “ladies were sleeping.”

Kent, Adam, Chad, and Paul each worked full time during the College Algebra Internet course. Although this was difficult to manage time, Kent, Adam, and Chad discovered ways to balance work with study time. Paul, on the other hand, was unable to find a happy medium, which resulted in failure twice in the course. Chad worked a 50-hour workweek, and was flying at the time. He made the decision to not do anything else to interfere with his schooling. He said “I did what I had to do…I just worked and did school,” prioritizing those two and nothing else. Adam knowing he needed to work full-time to support himself chose to take the College Algebra Internet course with only one other class. Although he indicated that his priority was to the math course.

Kent did not feel that he could take another course during the College Algebra

Internet course. He did not feel that he could balance full-time work and another course with the math course, although he needed, and wanted to work full-time. He had already earned his "dream job," but wanted to complete the Associate's degree to advance in position and pay. Kent prioritized his time spent after work dedicating this to his mathematics study. Paul was unable to balance work and school. He worked full-time and took a full load of classes. The time he had, he devoted to his on-campus courses setting aside his mathematics course, which twice resulted in a failing grade. He admitted, "this is my fault" yet was unwilling to rectify the situation, saying "I just don't have the desire to do it." He continually emphasized that he "just didn't have the time."

Outside Activities – Prioritization of Time

A few participants mentioned other activities and how it impacted their time with respect to the College Algebra Internet course. Chad's comment summed up the feelings of most of the participants who recognized the need to place the mathematics first. He said, "I just need to grind now so that I can play later." Brenda also indicated that while they were in New Jersey, surrounded by both sides of the family, she loved to "see some plays and go to the amusement parks," she would not join her in these activities unless she felt that she was caught up in her schoolwork.

One participant was unable to find this balance with activities and schoolwork. Paul found that his activities interfered with his schooling but he continued to "watch sports…'cause I'm a huge basketball fan," and "spend time 'cause I'm in the young men's presidency in my ward so were are busy every Wednesday night…and we go on campouts every month." He realized he was busy but was unable to rectify this situation.

What Does It All Mean?

The primary purpose of this study was to determine what factors contribute to the success or failure of a student enrolled in a College Algebra Internet course. Each of the participants had met the appropriate prerequisites for enrollment in the course, which included successful completion of the previous mathematics course, intermediate algebra, or, a placement score, or lastly, equivalents SAT or ACT scores. Although this was designed to help establish mathematical preparation, it holds little value in determining success for the course. Through the interviews of the participants, they told a different story of how to succeed in the College Algebra Internet course. Incorporating together with the categories or themes is also the recent literature that exists today. Together, the recent literature and the themes in the data, determine what ought to occur when offering a College Algebra Internet course, with the exception of the major theme found in the data, which adds to the literature on success in a College Algebra Internet course.

Course Design/Environment

The participants taking the College Algebra Internet course are different than their counter-parts several years ago. The students are different in that more traditional students are taking an Internet course, and the technology is different. Instructors should be creating or adopting the best that technology has to offer, customized for the subject matter and personal teaching style (Robinson & Doverspike, 2006). With the availability of a variety of programs and technology to choose from, the data in the study indicated that the online environment should be fun, engaging, empowering and enhancing to

algebraic thinking. The data also indicated that with the access to technology there should be very little problems with algebraic syntax that prevents otherwise successful students from being successful all due to syntax when entering solutions. Kryczka and Ebersole (Dahl, 2004) term this new vision of distance education as a Third Generation Distance Education, encompassing aspects such as short online lectures that do not repeat textbook reading, contain flexible scheduling, and highly interactivity involving students on average of every 7 to 10 minutes.

The data designates that courseware should be easily navigate-able, user friendly, with the functions, syntax, and transitions between the lessons as smooth as possible, a finding supported previously by Dietz-Uhler, Fisher, and Han (2008) and Perez and Foshay (2002). Many of the participants stated that the technology should also contain meaningful examples that help the participants to make important connections with the course content and have many opportunities for content understanding. A mistake that could potentially be made in addressing this issue is for an instructor to directly convert a traditional course to an Internet course with little or no interactivity. In fact, the U.S. Department of Education (2006) has labeled this as a “red flag” indicating a weak or ineffective low quality course. Choi and Johnson (2005) found that there was a significant difference in learner’s retention of material when an Internet course design was technology driven versus a text-based instruction.

Another important aspect of course design discovered in the data is that of correlating online assignments with course objectives and exams, a finding also supported by (Perez & Foshay, 2002). A factor the participants found important was that

terminology between the course instruction and the exam questions should remain clear and consistent. For example, if the Internet instruction acknowledges a theorem title such as, Upper and Lower Bounds Theorem, then forming an exam question utilizing the term, Bounds on the Zeros Theorem, might be inappropriate.

A recommendation made by most of the Internet participants was to allow flexibility to students with respect to examination sites, a new finding not previously seen in recent literature. In the online environment, many students are not onsite so they utilize a proctor for their exams, yet on-site students are required to test in the college's testing center. Participants who began the course with high anxiety towards mathematics were finding it difficult to test in the college's testing center. Allowing those students to utilize the same proctoring situation as off-campus or out of state students are allowed would potentially help alleviate concerns that caused lower testing scores or help create a calming test experience.

Eric Duval (2008) said, "In the same way that all snowflakes in a snowstorm are unique" so should the courseware that is utilized to accommodate the diverse style of learners. Thus, students can be active learners with the appropriate course design, selection, or creation as discovered in the data.

Teacher Behavior

According to Young (2006), participants want not only a high-quality course but an instructor who was engaged along with the students, one who motivates students to do their best, communicates effectively, and shows concern for the students learning. The participants felt that effective communication was one of the most important elements in

a successful Internet course, especially given the physical distance and reduced communication cues that are natural in a face-to-face setting. They said that instructors have the responsibility to respond in a timely and professional manner, providing corrective feedback and encouragement, motivating students to stay on task and achieve the learning goals. The data shows that communication should be consistent, thoughtful, and personal.

In a traditional classroom, students can easily ask the instructor to clarify fuzzy concepts, yet in an online environment answers can be delayed as a result of normal circumstances. This caused frustration and reduced motivation to learn as stated by the participants. The data shows that the instructor, needs to be fully absorbed in communication including email, phone calls, and chats, and must work hard to meet the varied demands of the students. The teacher, the human interaction, must remain visible and actively involved in the learning even to a greater degree than in a traditional classroom.

In the face-to-face traditional course students see the teacher either in class or in office hours, yet, in the online environment the participants expected immediate feedback because they have the perception that the instructor is readily available regardless of the day and time. The data reveals that the instructor may then be perceived as inaccessible when they do not respond in a timely fashion desired by the student. These perceptions lead to students feeling isolated and becoming more anxious with the course. A resolution as recommended by the participants, is to post virtual office hours for students to be able to contact the instructor by email or telephone.

Outcomes in the data revealed that teacher responsiveness (answering emails and providing feedback), message tone or style affected the participants perception of their ability to be successful in the Internet course. The instructors tone creates a greater connection between student and teacher, a finding supported by Dennen, Darabi, and Smith (2007) and Russo and Campbell (2004). Feedback to students should be in a manner that is constructive, non-threatening, and timely, a critical benchmark for success in an Internet-based course as confirmed by the Institute for Higher Education (2000).

Time Commitment and Motivation

Above all else, students need to be warned as to the extent of time commitment and motivation that occurs in the College Algebra Internet course. This is especially relevant when time has elapsed between the prerequisite course and the College Internet course. The research data revealed that managing time and motivation are the important attributes for successful Internet-based learning. Although this is true for a traditional course, they appear to be even more essential for success in the College Algebra Internet course than in the face-to-face classroom, a finding also confirmed by Howland and Moore (2002).

Students need to be advised that the College Algebra Internet course is designed for a student who is proactive and an independent learner, an individual who is more responsible for finding their own answers to questions or who has a support group to rely on rather than relying on the instructor to teach them. Therefore, students who rely heavily on an instructor to guide their learning would benefit from a traditional course or get help in learning how to become more self-reliant (Kennedy, 2000).

College Algebra Internet students must be self-motivated and self-disciplined. The freedom and flexibility of the online environment require personal responsibility, tremendous commitment, and discipline to keep up with the course. They must be advised to be willing to commit extensive time daily, or at least weekly, to the course, for example 5-7 days a week, including holidays. They must also be advised that it is not easier than the traditional educational process and the quality no less than the traditional program.

Most students enroll in the Internet course because of the anywhere, anytime concept of online courses, yet this flexibility in the online environment really means where you choose to interact with the course, not how much time you spend on the course. With the online courses, students often think they will find the time when, realistically they must be told to schedule the course into their lives like a routine. Hence, instructors should provide guidelines for the number of times a week and potentially how much time they need to interact with the course material. In a study conducted by Swan and colleagues (2001), the researchers found that students with higher reported levels of learning also reported higher levels of activity.

Prospective College Algebra Internet students should be advised with regards to scheduling time for the course, especially while continuing to work and fulfill family obligations. This difficulty relates to students' initial misperceptions of time commitments for the Internet course. Many perceive the Internet course as not as time consuming as face-to-face courses, when, in fact, online courses require more time. For example, it is now the responsibility of the student to read information that typically is

explained orally in a face-to-face setting. Bishop (2002) found that it took one and half times more work and time commitment than her face-to-face courses and had not been advised of this issue, so did not block that extra time. Kryczka and Ebersole (as cited in Dahl, 2004) found that the least popular aspect of the Internet courses was their intensity and amount of time needed to devote to the course. In a study conducted by Moore, Bartkovich, Fetzner, and Ison (2003), they found that the time commitment of school contributed to the dropout and failure rate.

The most recent literature concurs what the participants expressed in this study that the critical factors for student success in the College Algebra Internet course are personal traits such as self-discipline, life-style factors such as adequate free time to commit to the course, and motivation to perform well in the course (Hodges, 2005; Richardson & Newby, 2006; Waschull, 2005). Although it may seem that these factors could contribute to success in any setting, whether it be traditional or Internet, it has been found in this study and in others that this relationship is stronger in the Internet setting (Sankaran & Bui, 2007).

As a final thought, it may seem wise to advise prospective College Algebra Internet students to consider which course would best suit their abilities. Consider the words of Wadsworth, Duggan, and Pennington (2007):

> Universities might consider screening who is and is not allowed to take an online course. The current research suggests that students with specific skills are more likely to succeed in the online classroom than students who lack those skills. Therefore, inventories to measure specific study skills could be part of a placement system. This may suggest…some sort of…screening for students wanting to enroll in online courses in order to offer students the most optimal learning environment for their own skill set. (p. 13)

Summary

Chapter V described each of the five categories or themes and the core category discovered in the data analysis. After a careful analysis of the participant interviews in this study it was revealed that students taking College Algebra Internet were able to successfully pass the course if they sustained self-responsibility, prioritized their current situations and consistently stayed focused and motivated. Motivation occurred with respect to outside influences or by an innate drive to conclude the course. Chapter VI will summarize each of the previous five chapters, followed by a brief discussion from the researcher's perspective, concluding with future recommendations for research.

CHAPTER VI

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

Introduction

Chapter VI concludes with a summary of each chapter. Following the chapter summaries will be a discussion of preconceived notions and assumptions the researcher made prior to the study, and surprises that occurred during the collection of the data. The concluding remarks will be recommendations for future research.

Summary

Chapter I reviewed the growth of distance education courses offered across the nation and worldwide. In response, corporations and education publishing companies designed textbooks and software packages to accommodate this growth. As a result, the number of distance education course offerings and enrollments increased dramatically. However, the problem plaguing distance education has been the high turnover in enrollment with dropout ending in failure of the course with distance education learners to be higher than that of on-campus learners. At the same time, the mathematical community held firm to the belief that college algebra would remain the general education requirement and, in some cases, an unconditional admission to undergraduate programs. Although, nationwide, almost half of the students who enroll in college algebra courses fail or fail to complete the course. Because of the explosive growth of the Internet, college algebra as a required course was one of the first math courses to be

considered for this transition. Combining the high dropout rate of distance education courses with the high failure rate of college algebra courses has had a deadly effect on the pass rate of the math courses across the nation, especially the College Algebra Internet courses.

Presently, there is no research-based guidance for students or institutions as to which format of course offering could provide College Algebra Internet students with the best opportunities for success. Therefore, a gap exists in the research as to what factors contribute to the success or failure of a student enrolled in a college algebra course by distance education Internet. The research questions outlined in chapter one were: What theory explains the phenomenon of success or failure of College Algebra Internet students? What are the primary factors that helped in progressing in the course? What are the primary factors that hindered progress or were barriers that impeded progress or even stopped progress in the course? What caused these factors? How did these factors hinder progress and completion, or eventual success in the course? What strategies were used to overcome these factors? What were the consequences of the strategies used?

Chapter I concluded with the significance of the study in which the discovery of a theory of success for prospective College Algebra Internet students could allow guidance counselors, distance education, and mathematic departments a method to advise students to enroll in the type of instruction best suited for each individual, assess student needs, and predict the at-risk population in the distance learning environment. By identifying a theory about methods that students have found successful, educators can begin to use these methods in other online mathematics courses as ways to improve the success rates

in a college algebra distance education Internet courses.

Chapter II discussed the literature review which was laid out in a four-fold fashion; to understand the origins, and various evolving definitions of distance education, to discuss distance education with respect to the features, flexibility, and growth, to analyze the features and explanations for dropout and resulting failure rates in distance education, and to review the national goals and expectations, and success and failure rates of college algebra students in higher education with a focus on college algebra implemented through distance education Internet.

There was a good deal of research dealing with distance education, with a wide variety of definitions. Most of what is happening in the name of distance education is simply traditional pedagogy and traditional structures of higher education with the addition of new technology. Varieties of terms appear in the literature, such as e-learning, flexible learning, open learning, and so on. All this is part of distance education, and none of it alone is distance education. Therefore, it was important to review literature to understand what is meant by "distance education." For the reason that technology is evolving, the definitions of what distance education is, continues to change.

There was an impressive amount of writing that concluded that distance education is viable and effective. Most of the studies concluded that regardless of the technology used, distance education courses compare favorably with classroom-based instruction and enjoy high student satisfaction. Regardless, distance education has one primary obstacle, the exceptionally high dropout and resulting failure rates of students.

Currently on college and university campuses across the nation, college algebra has become a general education requirement for most baccalaureate degree programs. While more students are being required to enroll in college algebra, dropout and failure rates exceeding 50% are not uncommon on college campuses. Combining dropout rates in distance education courses with dropout and failure rates in college algebra courses, colleges and universities are facing a challenge of epidemic proportions. The literature is the key to understanding the dropout and failure rates of college algebra.

Despite the enormous amounts of literature involving research about the dropout rate and success and failure rates of college algebra students in traditional courses in higher education, or in comparison courses with distance education students, or in developmental mathematics courses in community colleges, there is still very little information available in the educational literature about the dropout, success and failure rates of distance education courses, specifically in teaching the Internet college algebra courses. Therefore, chapter two hopefully provided some insight into what research has contributed to the area of dropout and success and failure rates in college algebra distance education courses in higher education. In fact, a review of the literature did not produce any comparable studies and found no published quantitative or qualitative studies on the dropout, failure, and success rates of college algebra distance education specifically Internet only students.

Chapter III discussed the methodology of this grounded theory study. In summary, qualitative data was collected and analyzed on students' perceptions and perspectives of a College Algebra Internet course that they took during the spring or

summer 2006 semesters at a Bachelor's degree granting college in Utah. The participants were chosen from any of the six sections offered in the spring and summer of 2006. The research design for this study was a grounded theory study with purposeful sampling applied. Interviews played a major role in the data collection and the nature of the interview took place either by telephone or in person and was later transcribed. Some email response was collected in follow-up questions. The researcher then used a constant comparative process to analyze the data and the outcomes were validated by providing students with a copy of their verbatim transcript and asking for feedback. The researcher also utilized a second reader familiar to the qualitative process to review and analyze the researcher thoughts and ideas about the emerging theory.

Chapter IV outlined the student stories in an attempt to capture the stories of each participant. In staying true to the spirit of the research, each summary, which was validated by the participant, was a consolidation of the ideas, perspectives and impressions as they were shared with the researcher. In order to maintain anonymity, pseudonyms were assigned to each participant, preserving gender.

The chapter contained the student stories of nine participants. Brenda, Ben, Chad, Adam, and Kent all passed the College Algebra Internet course. Brenda and Ben both passed with an A-, Chad passed with a C+, whereas Adam and Kent passed with a C-. If Adam or Kent had wanted to continue into another mathematics course, neither would have been able to according to the UVSC Mathematics Department Policy, which stated, "a C or better is required" (UVSC, 2006). Paul took every exam and the final, yet still failed the College Algebra Internet course. Linda and Ann attempted two exams and then

discontinued in the course whereas Becky only attempted one course, all of these last four participants failed the College Algebra Internet course. Although Ann failed the College Algebra Internet course she was able to pass college algebra at a later date.

The information provided by each participant was organized as follows: a brief overview of the participant, their success or failure followed by their Family History, High School Mathematics Background, College Mathematics Background, The College Algebra Internet Course, Workload and Dedication, Participant Recommendations, and The Participants Future.

Chapter V described each of the five categories or themes and the core category discovered in the data analysis. After a careful analysis of the participant interviews in the study it was revealed that students taking College Algebra Internet were able to successfully pass the course if they sustained self-responsibility, prioritized their current situations and consistently stayed focused and motivated. Motivation occurred with respect to outside influences or by an innate drive to conclude the course.

It was safe to say that the analysis also revealed that students were also influenced by four other distinct subcategories. The constructions of the major theme or core category and the subcategories were pieced together based on the participant interviews, participant transcripts, researcher memos, journal entries. The categories or themes are as follows: mathematical self-esteem–(self-confidence and attitude); mathematical preparation and ability–(mathematical foundation developed during elementary, secondary, and post-secondary schooling); structural support network; mathematical environment–(course atmosphere/comfort ability); and final the major theme or core

category, self-responsibility–(prioritization/motivation-dedication).

Chapter V concluded with what all the data really means, containing an incorporation of the categories or themes and the recent literature. It states that together, the recent literature and the themes in the data, determine what ought to occur when offering a College Algebra Internet course, with the exception of the major theme found in the data, which adds to the literature on success in a College Algebra Internet course.

Discussion

I began this study with preconceived notions of how students could be successful in the College Algebra Internet course. Prior to, during, and after the interviews there were several unexpected surprises that occurred or were brought forward. The first assumption I made was that there would be a plethora of research pertaining to college algebra and distance education or Internet. The second surprise that caught me off guard was that just over 50% of the participants enrolled in the College Algebra Internet as a result of bad experiences with previous mathematics teachers. The third unexpected incident occurred as I interviewed the participants. They were very animated and passionate with respect to their frustrations with the College Algebra Internet course. The fourth assumption that I made was that preparation was the key factor that determined success, which leads to the final surprise of all, the fifth surprise, that motivation and time were the key factors that lead to success in the College Algebra Internet course.

There was one other surprise that I did not even want to consider because it

reflected on me as a teacher of an Internet course. It was clear to me that I needed to make improvements to the course. As perfect as I thought it was, the participants undoubtedly stated that changes could and should be made that would factor in their success in the course.

Literature–College Algebra Internet Course

UVSC hired a new president in the year 2000. As he began his administration, he received a variety of complaints that focused on the college algebra course. On campus, the college algebra course had become a bad word and complaints spread. At the State of College address given in the spring of 2002, the president addressed his concerns with the mathematics department and promised to make some changes. He formed a task force and had it look at each facet of the college algebra course in order to improve pass rate statistics. It became a focus of his administration and was addressed at a variety of meetings he attended within the college and then within the state.

During this turmoil on campus, I began my research into pass rates and success in college algebra courses. I assumed there would be numerous articles addressing this issue of success and since there was such a huge, widespread move to go to distance education I made the assumption that there would be plenty of articles with that focus. I was terribly disappointed. Even at the conclusion of this study as I reviewed current literature there still did not seem to be many articles focused on college algebra via Internet. The bulk of research has focused on success in distance education, e-learning, Internet, web-based and other aspects of distance education, some even in developmental

math but only less than a handful that include some aspect of college algebra by Internet. This came as quite a surprise to me.

The Impact of Teachers

One of the first questions asked during the interviews was why the participant chose to enroll in the College Algebra Internet course. I had talked with many students in the past, many of whom had failed, and each seemed to indicate that the College Algebra Internet course was the hardest course they had taken in their college career. Therefore, I wondered why anyone would enroll.

Of the nine participants, five indicated that they had enrolled because they could not handle an on-campus mathematics course. I was taken aback. I felt like I was a pretty good on-campus college algebra teacher, had won a variety of teaching awards in the past, and so assumed that all of the faculty in our department and others were good at what we do. What I did not realize is that these participants had experienced some truly horrific experiences with regards to on-campus college algebra teachers. What was not surprising was that some of their experiences had extended all the way back to their elementary years. It was a direct result of negative experiences with traditional delivery that convinced these five participants that the only option they had left was the College Algebra Internet course.

According to the literature, students enrolled in an Internet course for its features and flexibility. The flexibility of the course, the anytime, anyplace stigma, the mothers who had children at home, the working professionals, and other reasons seemed plausible, but it never occurred to me that there was an additional reason why a student

would enroll. It became obvious that mathematics was again a completely different course to many students. The reason they enrolled was not as a result of the reasons cited in the literature, for over half of the participants it was a direct result of experiences with teachers either in elementary, middle, high school, or college.

Passion of the Participants

Anticipating the negative stigma that is attached to mathematics, I anticipated students to be passionate about their reasons for failure. What I did not expect was the explosive reaction of Becky and Ann, and the complete dejection of Paul.

By the time I had interviewed Paul, he had failed the College Algebra Internet course once and was in the middle of failing it a second time. It was close to the end of the semester and Paul had given up on completing the course the second time. He was depressed and had no hope left of passing the course. He kept looking down at his feet and very rarely would look me in the eye. I felt such overwhelming sadness for him; I overrode my department chair and offered him an extension on the course. His demeanor did not seem to change, and I felt desperate to help him in some way. It was at this point that the only option he felt that would help him was if I just passed him with a C- so that he could progress onto the next mathematics course. I was surprised at his attitude and his boldness in asking for something I considered unethical. I expressed this to him and he said that he felt like it was worth a try.

Becky and Ann were on the other end of the spectrum. They did not express depression but anger. After Ann became warmed to the conversation and felt comfortable in the interview, she expressed her feelings about the mathematics

department quite clearly. She was quite animated and used many colorful words in talking about the hatred she had for the faculty, the system, and especially the college algebra course. I interjected often to try to bring her back around to the topic of conversation.

From the very first question I asked Becky, she expressed her feelings about the mathematics department, the faculty, and her hatred towards the college algebra course. She told me right off that she had not stepped foot on the campus since the very day she realized she had not passed the first college algebra exam. I felt that during the first 15 minutes I was trying desperately to get her calmed down and focused on the questions I was trying to ask. I knew if I could get her focused and talking I could get some rich data from her, but the problem was with each question she became more upset. The interview was conducted on a Saturday afternoon so there was very little activity within my building. As she became more upset, verbally her language got worse. She would stand up, cry, fling her arms around, and stomp around my office. She would be considered by the world's standards as an obese girl and on top of that she is very tall. She towered over me by at least 9 inches and was probably twice my weight. There came a point during the interview that I became worried for my safety. I excused myself for a minute and indicated that I needed to get another box of Kleenex for her. My intent was to open my door so I would feel a little safer. One of my colleagues was down the hall and as I slipped out, I quietly walked into his office and asked him if he would stay until this interview was over. He agreed and I walked back in and completed the interview.

Ann and Becky's emotional outbursts changed how I view students not only

taking the College Algebra Internet course but all of my courses. I believe their anger really stems from their own inability and fear of mathematics, combined with an ineffective teacher. It is surprising to me the impact a teacher has on the behavior and success a student experiences in their courses. I would never have guessed that the teacher's attitude, communication, and presence in the online classroom or in front of a live classroom could have such impact on a student's performance. I had assumed, based upon data given to me by my department chair, that the teacher influenced only 25% of a student's performance. Yet, it is evident to me now the impact of that 25%. I have chosen one aspect that I consider important to change and that is in the communication I have with them. I have realized that everything can be viewed from a positive lens, so that is the perception that I hope to convey in my communication with my students. I hope that this small change that I can make could impact their desire to spend more time with the mathematics and be some sort of motivator to complete the course.

Level of Preparation

After the interviewing began, a trend started forming that took me by surprise. The discovery was that preparation, to a point, really was not a factor in determining success. I had assumed that those students who were successful in the College Algebra Internet course had a strong mathematical background. My assumption was that they needed to have seen and studied in detail ALL the topics in college algebra to be able to pass the College Algebra Internet course. I assumed that if there was a topic such as binomial theorem taught in the College Algebra Internet course, then a student should have a solid foundation in binomial theorem to understand it via Internet.

It came as quite a surprise to me that this really was not the case. Many of the participants had not had experience with the topics of college algebra, yet they were able to move through the material and understand the concept enough to pass the exams and the course. Some even enjoyed learning the topics for the first time on their own or with help, in their own comfortable setting. They indicated that the pacing they were able to set for themselves and the help they were able to get was what ultimately made the difference in passing the course.

One aspect of preparation was evident; a delay between the prerequisite mathematics course(s) was critical. If this delay was 1 year or longer the time factor became more vital to the participants success. The participants who delayed taking the college algebra course after they had completed the prerequisite course were those participants who also had to spend more time in bridging their mathematical gaps, and refreshing their mathematical foundation besides learning the new material. If they could not accomplish all of these tasks simultaneously they tended to either not do as well or just gave up on the course.

The Biggest Surprise

The biggest surprise then was the realization that preparation was not the key to success as I had originally supposed. They key to success was the level of commitment and devotion of time. Research literature indicated that time and motivation was one of the factors to success in distance education courses, but this can be said in any traditional course. Yet, as revealed by the participants, time and motivation took a front seat to success unlike any of the other factors.

The students that enroll in the College Algebra Internet course or any college algebra course on our campus have to have met certain prerequisites. We have several in place, such as ACT cut-score, SAT cut-score, a certain cut-score on an entrance exam, or a having previously passed the prerequisite course with a C or better. Therefore, I knew each of the participants had previously met these prerequisites. The problem is that each participant comes with their own mathematical gaps in their knowledge. For example, in a history class, when a student has a gap in their knowledge they can easily repair or bridge that gap by looking up the requisite information. Yet, in mathematics, it is harder for students to diagnose their own mathematical gaps. Therefore, my assumption was they were not able to bridge or fill in their own gaps without direct teacher's guidance in the form of face-to-face interaction.

This is where my assumption was false. These participants had gaps in their mathematical knowledge, yet devoting time and being committed to the course they were able to seek out help, and bridge their gaps. They were able to overcome mathematical obstacles, by spending enormous amounts of time with the material, yet they were able to do this on their own or with the support of others, and actually in most of the cases it was with the support of others. It was a wonderful experience to listen to their stories and realize that students could indeed pass the College Algebra Internet course if they could designate time and stay completely focused and devoted to the course.

Course Changes

I realized that that changes that needed to be made were not necessarily all with respect to the students. Some changes I needed to personally make. These ideas and

suggestions I learned from the participants, and the outcomes of the dissertation. I have since implemented these changes into the spring, summer and fall 2008 Internet courses. First, it was evident that I needed to adopt a MAC compatible program and one that was more dynamic, interactive, and had more real world applications. After an extensive search I found one and began it in the fall of 2007 as a pilot and have since loved it so much that I have continued with the same program.

The second change that I made was a re-wording of the syllabus to take on a more positive tone. I did not consider my attitude poor, but it was obvious after the interviews were completed that some of my phrasing on the syllabus was negative. I wanted to make the students aware that the content of the course was beyond my degrees of freedom. For example, I did not determine what was to be included in terms of content, such as logarithms or Induction, or the calculator policy. The content and policies were determined by the mathematics department and the mathematics department chairs across the state of Utah, and were beyond my control, so I wanted to make sure this was understood and worded carefully in the syllabus.

Another aspect of re-wording was with regards to email communication which had been considered derogatory. In fact, the impact of email communication was the one change I considered to be the most critical. Again, I did not consider my tone negative, but it was not that overly positive either and I realized I needed to be their cheerleader in each email communication to try to continually encourage the students to be successful.

Another change I made was an added link that gave tips on how to be successful in the course, such as weekly communication and how to find a tutor. I needed to track

the students work and encourage them when they began to fall behind, before they got too far behind. I also needed to give them some examples of who would be considered a good, cheap tutor, such as a high school senior in calculus, a family member, or a friend who could help at a moment's notice.

I felt these changes needed to be implemented immediately, especially after I began tracking the participants. In the fall of 2007, I found out that Becky, Paul, and Linda have yet to return to campus, including all other Utah campuses, to complete their degrees. Even though Ann completed her degree eventually, her bitterness towards the mathematics department remains the same. Lastly, although Adam did successfully complete the College Algebra Internet course, he has yet to complete his degree on campus.

Recommendations for Further Research

This study focused on developing a theory of success or failure of a group of College Algebra Internet students at one Utah college in order to discover the factors that contribute to the success or failure of college algebra for students taking college algebra by distance education Internet. After a careful analysis of the participant interviews in the study it was revealed that students taking College Algebra Internet were able to successfully pass the course if they sustained self-responsibility, prioritized their current situations, and consistently stayed focused and motivated. Motivation occurred with respect to outside influences or by an innate drive to conclude the course.

This study is intended to be a springboard for further research. Based on the

results of this study, there are several areas that could be explored and additional questions that could be asked.

This research highlighted the problems facing educators who offer a College Algebra Internet course. Therefore, it seems essential to advise prospective College Algebra Internet students to enroll only if certain criteria can be met, such as time and motivation.

In the review of literature, it was suggested that there was a positive relationship between grade point average and successfully completion of distance education courses. Future research might look at the factor of GPA with regards to the College Algebra Internet course. Would there be a connection between past GPA performance in the prerequisite course to college algebra and the performance in the College Algebra Internet course?

Looking to the future of the College Algebra Internet course it seems critical to determine how to help students succeed in the course. It is damaging to students to enroll in and proceed throughout the course with the resulting failure of the course. When advisors and educators consider the means by which they can reduce or eliminate the failure rate, any course of action is better than no course of action. Considering the importance of this matter, this subject should be considered imperative for future research.

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APPENDICES

Appendix A

Initial Letter and Consent Form

Consent to Participate in a Doctoral Research Study
Utah Valley State College
Mathematics Department

Factors Relating to the Success or Failure of College Algebra Internet Students in a Qualitative Grounded Theory Study

Investigator

Christine Walker, Principal Investigator
Utah Valley State College
(801) 863-8634
walkerch@uvsc.edu

What is the reason for this study?

The reason for this study is to discover the factors that contribute to the success or failure of college algebra for students taking college algebra by distance education internet. Your information will be used to generate a theory of success or failure of the group of college algebra Internet students at Utah Valley State College.

Before you agree to participate in this study, I want you to know the reason for the study. I would also like you to know exactly what to expect if you decide to participate. Being a part of this study is entirely your choice. You are free to stop at any time. There are no penalties. Feel free to ask questions about anything you do not understand.

Christine Walker at Utah Valley State College in the mathematics department will conduct this research study. About 25-30 students in the Internet college algebra courses from Spring 2006 and Summer 2006 will be asked to participate.

What will happen?

First, I will give you a brief explanation of the reason for this study to read. I will also be available to talk with you about this. You will need to sign the consent form to give me your permission to be involved in the study. Once you agree I will contact you for an interview. I will ask you to share your experience as a student in the college algebra Internet course either by phone or in person. This discussion will be audio taped. After I have transcribed the interview I will send you a report of the discussion for you to evaluate and either confirm or correct the general findings. There is a possibility of a follow-up interview.

Will this cost me anything?

There will be no cost to you. I will try to make this as easy as possible for both of us to get together for the interview. If this becomes burdensome then you have the right to withdraw at any time.

What will I gain?

You will not benefit directly from this study. But your feedback will help improve the college algebra Internet course for Utah Valley State College and potentially for college algebra Internet courses across the nation.

Is this study confidential?

The records of this study are confidential consistent with federal and state regulations. Each volunteer will be given a number. I will write about what I discover but your name will not be used. Your information will stay confidential. The taped interviews will be transcribed and your name will not be used. All notes, audiotapes, and records will be kept in a locked file cabinet and will be destroyed at the conclusion of the study. *You have the right to stop answering questions or leave the discussion without any penalty.* You may share any concerns that you have with Christine Walker at (801) 863-8634 or walkerch@uvsc.edu.

Can I quit at anytime?

Being a part of this study is entirely your choice. If you take part, you may choose to stop at any time. There are no penalties for quitting. Quitting will not affect your status or experience at Utah Valley State College. This study will not affect any involvement in any of your current or future mathematics courses at Utah Valley State College.

Who do I call if I have questions?

Please call Christine Walker at (801) 863-8634 or walkerch@uvsc.edu if you have any questions about this study. If you have any questions about your rights or giving your permission, you may call the IRB, Institutional Review Board for the protection of human participants at Utah Valley State at (801) 863-8156.

Consent to Participate in Doctoral Studies
Research Project

In signing this consent form, I agree to volunteer in the Doctoral Studies Research Project being conducted by Christine Walker. I understand that excerpts from the tape-recorded interview(s) will be studied and may be quoted in a doctoral dissertation and in future papers, journal articles and books that will be written by the researcher.

I grant authorization for the use of the above information with the full understanding that my anonymity and confidentiality will be preserved at all times. I understand that my name or other identifying information will never be disclosed or referenced in any way in any written or verbal context. I understand the transcripts, both paper and electronic versions will be secured in the privacy of the researcher's home office and that any audio tapes of my conversations with the researcher will be erased at the conclusion of the study.

I understand that my participation is entirely voluntary and that I may withdraw my permission to participate in this study without explanation. I have received (or I will receive) a copy of this form for my records. Please return this page in the enclosed envelope to Christine Walker. The address is 800 West University Parkway, Orem, Utah, 84058.

_____
Print Name of Participant

_____ _____
Signature of Participant Date

_____ _____
Signature and Title of Researcher Date

_____ _____
Signature and Title of Dissertation Chair Date

Appendix B

Student Interview Information Form and Questions

Student_____

Interview Date_____

Phone_____

Email_____

Success Rate_____

Section/Semester_____

Interview Questions

I. Setting Questions

What grade or how old were you when you first took college algebra?

Tell me about the class makeup?

What challenges did you encounter with the setting of the course?

Describe the structure of the typical day in the classroom?

Describe the teacher and how he/she conducted the class and interacted with the students?

II. Preparedness Questions

How prepared to you think you were at the beginning to take the course?

How many times have you taken this course?

Did this have any effect on choosing to sign up for college algebra by Internet?

Have you been exposed to any of the material in the college algebra Internet course before?

What effect did this have on the success or failure of the Internet course?

Describe the successes you encountered with the course?

What do you think this was attributed to?

Describe the failures you encountered with the course, and what do you think this was attributed to?

Describe how you would categorize the effort you put into the class?

Was it enough?

Could you have done things differently, and what would they be?

III. Factors and/or Obstacles Questions

Describe your reasons for taking the Internet course.

What concerns did you have before you took the Internet course?

How did your concerns change or effect your expectations for the course?

Were there factors in the school setting that contributed to your success/failure in the course?

Were there factors outside of the school setting that contributed to success/failure in the course?

What obstacles did you encounter during the semester you took this course?

What could have made the course better for you?

IV. Technology Questions

Have you taken a distance education course before?

Describe some of your other distance education Internet courses and pick those in which you had success and then contrast it with those you didn't have success.

What concerns did you have in taking math by Internet?

Are you comfortable with technology?

Were there factors with the software that contributed to your success/failure in the course?

Were there factors with your ISP that contributed to your success/failure in the course?

Were there factors with your hardware that contributed to your success/failure in the course?

What could have made the course better concerning the software/hardware?

Were there other technology factors that could have contributed to your success/failure?

V. Context Questions

What challenges did you encounter with the content of the course?

What sorts of things did you do to help you learn the content of the course so that you could pass the exams, quizzes, do the homework, etc?

Did you encounter certain topics that were easier to comprehend than others?

What were some topics that were difficult to comprehend?

Why do you think you struggled with certain topics?

What helped to make topics easier to understand than others?

VITA

CHRISTINE WALKER
Associate Professor
Mathematics
Work Phone: (801)863-8634
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Education

2008	**EdD in Curriculum & Instruction,** Utah State University, May 2008 (projected). Dissertation Title: Factors relating to the success or failure of college algebra Internet students: A grounded theory study. Advisor: Janice L. Hall.
1991	**M.A. in Mathematics**, Brigham Young University, Provo, Utah
1989	**B.A. in Mathematics/Education, Minor in History, Computer Science**, Brigham Young University, Utah
1986	**A.S. in Mathematics**, Ricks College , Rexburg, Idaho

Employment

1992- Present	**Associate Professor of Mathematics** Utah Valley State College, Orem, Utah Valley State College
1991-1992	**Mathematics Instructor** Westminster College , Salt Lake City, Utah
1989-1992	**Mathematics Instructor/Department Chair** Wasatch School District , Wasatch Middle School , Heber City, Utah

Licensure

1989-Present	**Utah State Office of Education** Level 2 license, Mathematics Endorsement 4**

Committee Assignments and Service

President, Utah Council of Teachers of Mathematics, 2008
President, Utah Association of Mathematics Teacher Educators, 2008 - Present
Volunteer Co-Chair, Local Arrangements Committee, National

Council of Teacher of Mathematics, 2007-Present
President-Elect, Utah Council of Teachers of Mathematics, Fall 2007 – Present
President-Elect, Utah Association of Mathematics Teacher Educators, 2007-2008
College Algebra Textbook Review Committee, 2008 – Present
Member, Utah's Mathematics Core Curriculum, Spring 2006
Member, Executive Committee, Mathematics Task Force, Fall 2005-Present
Co-Chair, Pedagogy Committee, Mathematics Task Force, Fall 2005-Present
Chair, Retention, Tenure, and Promotion Committee, Mathematics Department, Fall 2005-Present
Member, SSH RTP Committee, Fall 2005-Present
Post Secondary Board Member, Utah Council of Teachers of Mathematics, Fall 2005-Fall 2007
Lead Teacher, Distance Education Online Math Courses, 2001-Present
Mathematics Textbook Review Committee, 1992-2000
Computer Technology Committee, 1993-1994
Math Lab Committee, 1993-1996
Math Adjunct Advisor, 1996-2000
Adjunct Faculty Screening Committee, 1997-2000
Textbook Reviewer, 1996-2000
School of Science and Health National Dean Search, 1994-1996
School of Humanities and Science Curriculum Committee, 1993-1995
Teacher of the Year Committee, 1998
Curriculum Development, Accreditation and Articulation Committee, 1992-1993
Senate Committee Experience: Tenure, Merit Point, Curriculum and Benefit Committees

Activities and Awards

Innovative Programming Award Credit Program for Online Course Production of College Algebra, 2003
Certificate of Appreciation for Outstanding Service to UVSC Students, 1997
Outstanding Service to Students with Disabilities, 1996
Office of The Year, Math Lab, 1996
Alumni Outstanding Teacher of the Year from School of Science and Health, 1996-1997
Outstanding Service to Students Presented from ASUVSC, 1992

Conferences, Presentations, and Published Articles

"Current Updates to AMTE that affect UAMTE", Presentation at the UAMTE Conference, UVSC, February 2008.

"Resources the Utilize Technology in the Elementary and Secondary Classrooms", Utah Council of Teachers of Mathematics, February 2007.

"Assessing the Product", Utah Council of Teachers of Mathematics, April 2006.

"Book Review: *The Math Gene*", Utah Council of Teachers of Mathematics, January 2006.

"Establishing a Masters Degree for Middle Level Mathematics Teachers", Mathematics colloquium, UVSC Mathematics Department, September 2006.

"A session for pre-service teachers: From degree completion to that first year of teaching", Presentation at the Utah Council of Teachers of Mathematics, Salt Lake City, Utah, October 2006.

"Lessons Learned: Preparing Future Mathematics Educators", Presentation at the NCTM Western Regional Conference, Denver, Colorado, November, 2005.

"What is She Going to Do Next? How To Keep Them Coming Back For More…", Presentation at the American Mathematical Association of Two-Year Colleges, Portland, Oregon, November, 2005.

Professional Organizations

Mathematical Association of America (MAA)
Utah Council of Teachers of Mathematics (UCTM)
National Council of Teachers of Mathematics (NCTM)
Utah Association of Mathematics Teacher Educators (UAMTE)
American Association of Mathematics Teacher Educators (AMTE)
National Council of Supervisors of Mathematics (NCSM)