MOTIVATION, ACADEMIC SUCCESS AND LEARNING ENVIRONMENTS:
COMPARING HIGH SCHOOL FACE-TO-FACE AND ONLINE COURSES

by

Barbara M. Daniels
A Dissertation
Submitted to the
Graduate Faculty
of
George Mason University
in Partial Fulfillment of
The Requirements for the Degree
of
Doctor of Philosophy
Education

Committee:

Priscilla Norton _____ Chair

Kevin Clark _____

_____ _____

_____ _____ Program Director

_____ _____ Dean, College of Education
and Human Development

Date: _November 20, 2008_ _____ Fall Semester 2008
George Mason University
Fairfax, VA

Motivation, Academic Success, and Learning Environments:
Comparing High School Face-to-Face and Online Courses.

A dissertation submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy at George Mason University

By

Barbara M. Daniels
Master of Education
George Mason University, 2002
Bachelor of Arts
George Washington University, 1982

Director: Priscilla Norton, Professor
College of Education and Human Development

Fall Semester 2008
George Mason University
Fairfax, VA

DEDICATION

To my parents, you challenged me, supported me, and dared me to succeed. Mom, thank you for all your prayers. Dad you left us too soon, I miss you.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

viii

ABSTRACT

MOTIVATION, ACADEMIC SUCCESS AND LEARNING ENVIRONMENTS:
COMPARING HIGH SCHOOL FACE-TO-FACE AND ONLINE COURSES

Barbara McGowan Daniels, PhD

George Mason University, 2008

Dissertation Director: Dr. Priscilla Norton

The purpose of the study was to investigate and compare the motivation, learning

strategy use, and achievement of classroom based and online students to describe

differences and interpret the role of motivation and learning strategy use in online

learning. Fifty one participants were included from two educational settings: thirty-one

were from a traditional, classroom based setting, twenty were from an online course. All

students were enrolled in one of three math courses: Algebra 1, Algebra 2, or Geometry.

Eight scales from the *Motivated Strategies for Learning Questionnaire* were

administered to students in both environments to assess motivation and learning strategy

use. Other data collected were achievement scores: class grade and SOL test scores.

Correlation analysis and regression analysis of sample responses confirmed the role of

motivation in academic achievement and that the sample results showed patterns similar

to that of the larger population. The investigation proceeded with a comparison of the two groups within the sample.

T- tests were conducted to compare the groups; results indicated that online students reported significantly higher self efficacy and time management skills and that these constructs contributed to a significant difference in class grade. Further, these constructs may be useful to identify students who may need support to successfully complete an online class. The results are informative for educators who teach or design online classes and those who advise students considering online learning opportunities.

1. Introduction

Educators and other advocates of K- 12 school reform seek ways to design and deliver alternative programs to address a variety of student needs. The majority of states are finding ways to utilize the spectrum of possibilities offered by the Internet and mass communication technologies (Tucker, 2007). According to a survey conducted by the National Center for Education Statistics (NCES) over half (59%) of the distance education courses offered by U.S. school districts utilize the Internet for course delivery. State legislators are including online courses in their education reform planning. For example, Michigan now requires that students experience at least one online course for high school graduation (Watson & Ryan, 2007). This legislation has been passed in order to ensure that students develop skills, such as online collaboration, needed for the current business environment.

The sentiments expressed by lawmakers underscore a belief in the responsibility of educators and schools to respond to a changing workplace. Further, the online environment is appropriate to teach skills necessary for the collaborative workplace. Virtual classrooms necessitate the use and mastery of technology to solve problems, collaborate, and produce products on a time schedule. Virtual classrooms promote

information literacy skills so that students can be active learners in a technology rich society (Partnership for 21ˢᵗ century skills, 2006).

Research has demonstrated that virtual environments are as effective as classroom based ones (Russell, 1999; Smith, et al, 2005; Waschull, 2001; Summers, Waigandt, and Whittaker, 2005) yet doubts linger. The current study compared achievement, motivation and learning strategy use among learners in two environments (classroom based and online) in order to determine if student attributes impact achievement differently for students in different learning environments. With such an understanding, educators can implement instructional practices that support essential skills and behaviors in an effort to support learners and promote achievement.

Background

As of September, 2007 forty-two states have either supplemental or full time online programs available to students. Only eight states currently have no online options, but some of them are planning to implement a program in the future (Watson & Ryan, 2007). Typically online programs fall into two categories: full time and supplemental. These distinctions are based on course offerings and accountability. Supplemental programs may have fewer course offerings; students in supplemental programs are generally enrolled in a traditional (classroom based) brick and mortar school. For example, *Virtual Virginia* is a state sponsored, supplemental program that offers Advanced Placement courses to students in Virginia (http://www.virtualvirginia.org). Full time programs (sometimes referred to as cyber schools) provide all necessary courses for graduation. Many of the full time programs are charter schools (Watson and

Ryan, 2007).

Rapid growth. Growth is reported both in the number of students enrolled and in the number of programs offering courses. Watson & Ryan (2007) report thirty-eight states have significant supplemental and full time programs. Thirty of those have state-led programs. Eighteen states have full time multi-district programs; fourteen states have both supplemental and full time multi-district programs. Online program enrollment continues; existing programs report robust growth, for example the *Florida Virtual School* has experienced 100,000 course registrations with 90,000 course completions serving more than 50,000 students in the 2006-2007 school year. In sum, more students are being served across the nation by a growing number of programs (Watson & Ryan, 2007).

Issues surrounding policymaking. The new learning environment has caused confusion for policymakers. The lack of physicality mandates new approaches to a number of topics such as attendance requirements and full time (FTE) funding formulas. These are tough issues requiring major changes in thinking. Progress has been made by legislators and state level agencies to promote and facilitate online learning. Some examples include Michigan where legislators enacted a law that requires all students to enroll in at least one online course for high school graduation (Public Acts 123 and 124 of 2006). Wyoming created a distance education task force to investigate and begin steps toward the development of a state led program (Watson and Ryan, 2007). Arkansas passed legislation to allow online courses in charter school and districts if they are "blended" courses in which students receive face-to-face instruction with part of the

course online (Arkansas HB2481).   The law also requires the state board to establish rules for approving online course providers. Still other examples include North Dakota where a law was passed to require state officials to develop an approval process for online courses (Watson and Ryan, 2007). The variety of legislative action reflects great diversity; legislators are concerned with varying degrees and types of oversight needed by an online program. There is a need to create legislation to promote consistent oversight across programs nationwide (Watson, 2007; Tucker, 2007; Gaytan, 2007).

Online programs offer learners a variety of opportunities. Online learning is recognized for its unique benefits that include personalized, flexible learning and expanded course offerings that break geographical barriers for students by reaching both rural and suburban areas (Norton, 2003; Diaz, 2002; Besich, 2005; Gray, 2005). Personalized, flexible learning opportunities that are not bound by time of day or geography are an attractive solution to meet the needs of many students. Some examples of students served by online programs include athletes who need to miss part of the school day for training or competition, students with illnesses that prevent them from attending school regularly, or students out for disciplinary reasons. All need flexible schedules and instruction that does not require reporting to a traditional building (Norton, 2005; Tucker, 2007). With online programs, students can accelerate their course completion and graduate early or pursue their interests while keeping pace with their peers.

Another compelling benefit of online courses for school districts is the ability to offer courses that previously would have been cancelled due to low enrollment or teacher

shortages. Online courses can expand the numbers of courses small districts can offer (Smith, et al. 2005; Rice, 2006; and Tucker, 2007). Virtual classes improve course offerings for underserved student populations.

Virtual Schools are recognized as a legitimate option in school choice. Under the *No Child Left Behind Act* virtual schools "can be among schools to which eligible students are offered the opportunity to transfer" (US Department of Education, 2001). Virtual schools may offer small districts a means to comply with the NCLB regulation (Rice, 2006; Tucker, 2007).

Despite the possibilities offered by online options for high school students, there are concerns raised by legislators and educators about online programs. One is that online courses vary in quality (Tucker, 2007). In a recent synthesis of online research, Smith et al. (2005) reviewed five studies that compare online and face-to-face course effectiveness. Each study was a Meta analysis of student performance and found no significant differences between the effectiveness of the learning environments. Yet questions remain. Researchers (Smith, et al., 2005; Rice, 2006: Gaytan, 2007) echo the need for more study of online design and course effectiveness. Gaytan (2007) calls for an understanding of the virtual classroom based on research rather than perception. Diaz (2000) argues that online classes need to be investigated in a purposeful manner that seeks to understand the environment and those students within it.

A final concern is that of the rate of student attrition (dropout) from virtual classes. Lorenzetti (2001) reported that the dropout rate in distance education classes was as high as 50%. Virtual high school courses have comparatively high dropout and

failure rates (Carr, 2000; Roblyer & Elbaum, 2000). High dropout rates may indicate that students are not prepared for their online experience, or that they do not understand what is necessary to succeed in an online class. Recent reports reveal that reporting practices differ among programs and that it is not always clear what the figures reference. Course completion may not include those students who received a failing grade and dropout may not include those enrolled in a program that allows an evaluation period where students can drop the course without penalty. There is a call for standardized reporting practices for virtual schools (Watson & Ryan, 2007).

Student achievement. There is a growing body of research that investigates factors that impact student achievement in online classes. Muilenberg and Berge (2005) conducted a factor analysis study of the barriers to student success. The results indicated six barriers that could impact student performance 1) insufficient time, 2) events that hinder study 3) distractions, 4) potential for dropout, 5) motivation, 6) emotional encouragement. Other studies (Waschull, 2001; Wojciechowski, 2005; Morris, Wu, and Finnegan, 2005) identify previous academic success (reflected in GPA) and perseverance as the most reliable predictors in studies conducted with college students.

On the college level and at the high school level, students who achieve in the traditional environment seem most able to achieve in the virtual classroom. Roblyer and Marshall (2003) studied high school students in virtual classrooms around the country. They posited that student success might be predicted based on four categories or constructs 1) beliefs about achievement, 2) responsibility/risk taking, 3) access to technology, and 4) self-regulation/ organization. While their study indicates predictors

6

that look beyond GPA, they identify students with strong study skills and a tendency to learn independently. The common attributes of successful online learners are previous academic success, motivation, and skills necessary for self-regulation (study skills).

Yet, these studies may not be helpful since the predictors identified may be typical of all learning success regardless of learning environment. For example, the results found by Roblyer and Marshall (2003) resemble studies conducted in classroom based environments, where researchers suggest that academically successful students will demonstrate a desire to learn and use strategies to improve their learning (Zimmerman, Bonner & Kovac, 2002; Pintrich & DeGroot, 1990). These studies point to two constructs that overlap: 1) motivation defined by goal orientation and academic self-efficacy and 2) organization and use of learning strategies. Motivation precedes and is a fundamental component of self-regulation (Zimmerman, 2001; Pintrich & DeGroot, 1990; Zimmerman et al., 2002). Roblyer and Marshall (2003) include an internal locus of control within a separate construct, in recent literature this is described as mastery goal orientation (Elliott, 2005). How these attributes differ in classroom based and online settings has not been articulated.

Roblyer (2005) underscores the need for students to take responsibility for their learning. Her description of the construct includes metacognitive activities such as monitoring performance and internal attribution as well as cognitive activities such as help seeking and taking risks to solve problems or face uncertainty in the unstructured online environment. While the risks may be different, traditional classrooms present many challenges for learners. Those who engage in the cognitive and metacognitive

strategies that monitor learning and plan for success are the students who set and achieve

higher goals (Pintrich & DeGroot, 1990; Pintrich, 2000; Schunk 1990 & 1991;

Zimmerman et al., 2002).

Statement of the Problem

As interest in online education increases, students with a variety of learning needs

and abilities may choose an online course. Valid concerns about the online environment

persist. As more students become involved in virtual environments, it is beneficial to

understand the attributes (skills and behaviors) that are used by successful online

learners. Perusal of existing literature in each environment suggest that there may be a

common set of skills and behaviors used by learners in both classroom based (Pintrich &

DeGroot, 1990; Zimmerman et al. 2002; Bandura, 1993) and online environments

(Roblyer & Marshall, 2003; Besich, 2005; Gray, 2005; del Valle, 2006). It is difficult to

discern a difference between being a successful traditional learner or successful online

learner based on the literature. Therefore, the purpose of the study was to investigate and

compare the motivation, learning strategy use, and achievement of classroom based and

online students to describe differences and interpret the role of motivation and learning

strategy use in online learning.

Research Questions

1. Is there a relationship between students' age, grade level, motivation, learning

    strategy use (as measured by the MSLQ), and academic achievement (as measured

    by class grade and SOL score)?

2. Do students' self-reported motivation, learning strategy use and age predict academic achievement as measured by class grade and SOL score?

3.   a) Are there differences in students' self reported motivation and learning strategy use between classroom based and online learning environments?

   b) Are there differences in students' achievement as measured by class grade and SOL scores between classroom based and online learning environments?

Significance

The changing nature of business, multinational interests and global markets fuel a demand for leaders able to adapt to the changing market environment (Pink, 2005). Universities have incorporated distance education classes to meet the diverse needs of a growing pool of professionals since the 1970s (Gaytan, 2007) and the practice of incorporating online class and program offerings continues today. Additionally, business-sponsored philanthropies such as the Gates Foundation fund reform efforts at the K-12 level to increase the students' abilities to address global issues such as health and living standards. On all grade levels, educators are called on to respond to the needs of a global economy.

Leaders in business and education all look to the possibilities offered in the virtual environment to address the demands of a global marketplace (Tucker, 2007). State sponsored virtual schools are offering courses to students in remote areas, private charter schools were formed in response to parent calls for alternatives to public schooling. Twenty-four state-led online education programs and twenty-six states with significant

state policies to govern online programs (Watson & Ryan, 2006) provide a glimpse of the immense growth and development occurring for students across the nation.

The online classroom presents many opportunities for creating pedagogical models that use the unique features of that environment (Norton, 2003, 2005). The notion of flexible student centered instruction is appealing to students (Prensky, 2005) and legislators are pressing for the inclusion of 21st century skills to prepare students for a global marketplace. Problem solving in a collaborative, collegial, time bound (virtual) environment challenges students to develop talents that support lifelong learning and information literacy (Pink, 2005; Partnership for 21st Century Skills, 2006).

Motivation is important, even vital to learning. Goal orientation directs behavior (Pintrich, 2000c; Shah & Kruglanski, 2000) and a positive self efficacy promotes effort and persistence (Bandura, 1997; Pintrich & DeGroot, 1990) learning approached strategically enhances understanding and comprehension (Schunk & Ertmer, 2000; Zimmerman, Bonner & Kovac, 2002). While numerous studies have been conducted investigating the constructs in classroom based environments, few have been conducted in online environments. Roblyer and Marshall (2003) designed and tested an instrument to predict academic achievement in online classrooms. Their findings point to similar attributes of successful students in classroom based environments.

Theoretical Framework

The conceptual framework for the study is based on the relationship between learner, the environment, and the resulting achievement as displayed in Figure 1. The learner is an individual with a unique set of skills and attributes; the study is based on

theories that describe the learner in terms of attributes and skills that they bring to the

learning environment. Demographics used in this study were age, grade and gender.

Other learner attributes included motivation -described as the interplay of goals (Pintrich

2000c, Boekaerts & Niemivirta, 2000; Linnenbrink, 2005) beliefs (Schunk, 1991;

Zimmerman et al., 1992; Zimmerman 2000b), and emotions that are developed within a

social context (Schunk & Zimmerman, 1997).

   One theory helpful to understanding the learning process is social cognitive

theory which offers a framework to use for understanding student success in terms of

interactions that contribute to self-efficacy, how self-efficacy affects the setting and

achievement of goals, and the selection of self-regulated learning strategies to improve

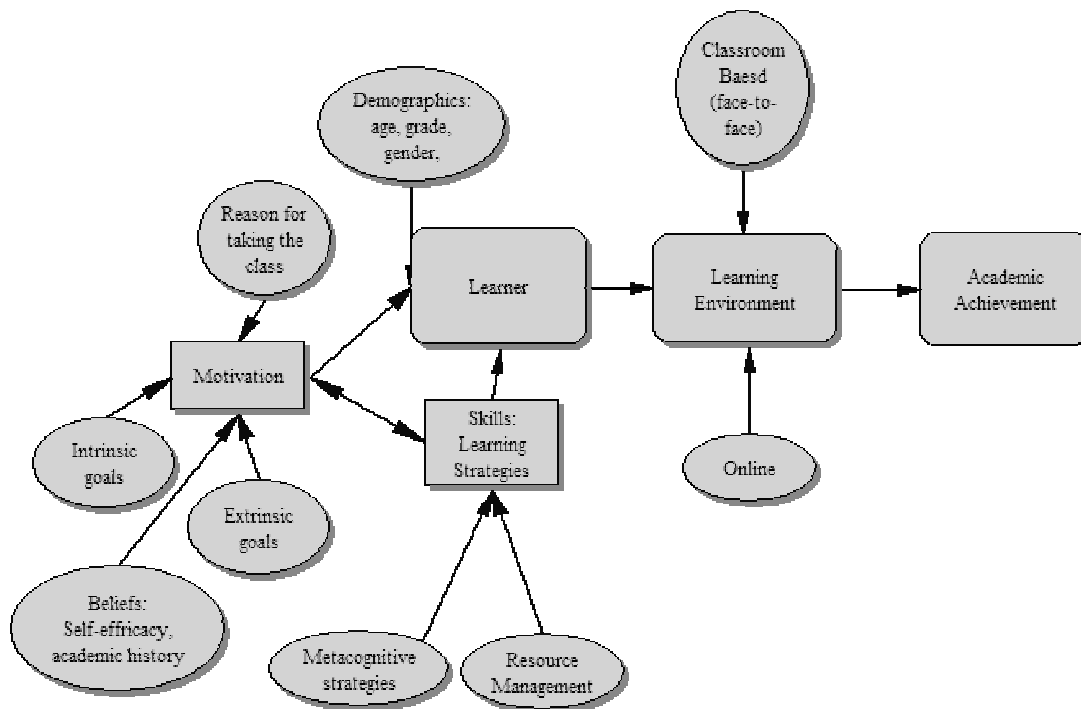academic achievement (Schunk & Zimmerman, 1997).

Figure 1. Conceptual relationship among learner attributes, environment, and achievement.

Self Determination Theory (Ryan and Deci, 2000) is used to explain the nature of intrinsic and extrinsic goal orientations. This theory distinguishes between types of motivation based on the goals associated with the behavior. The attributes of intrinsically motivating activities are those that satisfy personal desires for autonomy, they address interest and curiosity. Extrinsic rewards are those that are separate from the learner, a product of the culture or learning environment. Ryan and Deci (2000) suggest extrinsic goals vary by degree of autonomy and offer a continuum that outlines a process by which external goals are internalized. Through this process of internalization, learners adopt a goal on a more personal level and become more motivated to attain it.

Goals are an essential component of motivation. Research on achievement goals resulted in the articulation of an achievement goal construct (see Elliot, 2005). The achievement goals offer a way to consider the reasons people pursue achievement tasks as well as the standards they use to evaluate their efforts (Pintrich, 2000b). Within the achievement goal construct, goal orientations are described in terms of the learner: learning or mastering the task or performance in terms of relative ability. In educational settings, learners who are intrinsically motivated seek to experiment, manipulate and learn the material to satisfy an internal desire for the knowledge. Extrinsically motivated learners desire recognition and favorable comparison with peers. Recent research shows that learners with intrinsic or mastery goals tend to exhibit higher achievement, however extrinsic or performance goals can be adaptive as well (Elliot & McGregor, 2001; Pintrich, 2000b, Pintrich & Schunk, 1996).

Learners are impacted by many goals from internal and external sources. Multiple goal orientation is a theory that recognizes the various types of goals that are attended to by learners. Boekaerts and Niemivirta (2000) explain that as students engage in learning tasks they attend to goals arranged in a hierarchy. This theory of a multiple goal orientation emphasizes the complexity of factors that contribute to motivation (Boekaerts & Niemivirta, 2000, Pintrich, 200b).

The importance of self-efficacy in goal setting is addressed in the work of social cognitive theorists (Bandura, 1993; Schunk & Zimmerman, 1997; Zimmerman, Bandura & Pons, 1992) who suggest that as a result of the interaction between personal, behavioral and environmental factors people form self-efficacy beliefs and those self-efficacy beliefs affect goal setting. They explain, self-efficacy is a personal belief that is informed by observation (behavior), and social feedback (environment). Formed over time, self-efficacy can be increased or decreased by contextual feedback (Schunk & Zimmerman, 1997; Schunk, 1990, Schunk, 1991). While positive feelings about learning may result in achievement, negative feelings toward the task such as test anxiety are believed to have a negative impact on the use of cognitive and metacognitive strategy use. Bandura (1993) suggests that a low sense of efficacy may cause a tendency to shy away from difficult tasks, which are perceived as personal threats. As a student achieves successes or failures, self-efficacy levels affect subsequent goals (Schunk, 1990).

Social cognitive theory suggests that highly efficacious students are more likely to use self-regulation strategies for improving achievement (Zimmerman, Bandura, & Pons, 1992; Pintrich & DeGroot, 1990). Social cognitive theory is helpful as a theoretical

framework for this study because it offers explanations for the interaction of self efficacy and goals as well as indicates reasons that successful students self regulate their performance for improving their achievement. Understanding this interaction in classroom based settings can provide a basis for comparisons with students in the online setting. In a study of the effect of self-efficacy and grade goals on final grade, Zimmerman, et al. (1992) explain that social factors such as parental opinion and prior grade affected students' academic self-efficacy and grade goals. Using path analysis, they linked parental expectations and academic history to students' self-efficacy to the use of self regulated learning strategies. They conclude from their research that self-efficacy affects goal setting and the use of learning strategies for achievement. Zimmerman describes self-regulatory behaviors as processes that include behaviors that take place before (forethought phase), during (performance phase), and after (self-evaluation) a task is performed. The processes inform the setting of new goals and can influence self-efficacy and future use of self-regulatory behaviors. The successful student will be motivated and experience feelings of control of their environment thus boosting their sense of self-efficacy (Zimmerman, 2000).

Learning strategies are developed and can be brought under the control of the learner (Zimmerman, 2000; Zimmerman, et al, 2002). For the purpose of this study, learning strategies were categorized into metacognitive activities (such as elaboration, organization, and critical thinking) and resource management (such as time and study environment management and effort regulation). Motivation was highlighted as an

important precursor to learning strategy use (Pintrich & DeGroot, 1990; Van Grinsven and Tillema, 2006; Shah & Kruglanski, 2000).

Classroom based and online learning environments may differ, but they are both effective. Russell (1999) suggests that designers should take advantage of available technology and use it in a way that maximizes student achievement. Currently, instructional designs differ between environments. Aragon, Johnson, and Shaik, (2002) suggest conceptual and practical differences between the learning environments. Practical differences are observable: temporality, physicality, class organization, and resources. Conceptual differences involve theories for designing instruction and varieties of assessment.

The study included two measures of achievement, one formative and one summative. The measures provided different information on achievement; formative assessments present progress in terms of grades accumulated over time. Grades are useful feedback for students and teachers to monitor progress (Haladyna, 1999). Summative assessments provide a single measure of content mastery (Nitko, 2005). Standardized tests are intended to assess an entire curriculum or body of knowledge. Item reliability is of great importance for these measures, therefore the test scores will provide a comparable variable.

Scope of the Study

A cross-sectional survey design was used to compare students' motivation, learning strategy use, and academic achievement. Quantitative analysis was conducted

using t-tests and multivariate analysis to describe and compare student attributes and achievement across learning environments.

Two groups of students were included in the study. The first group of students was enrolled in a traditional summer school program. The traditional program met for six weeks, July 2, 2007 to August 13, 2007. Students reported to class for five hours of instruction daily. The second group of students was enrolled in *The Online Academy* (TOA) and completed classes during the summer of 2007. Online materials were available from the end of June until the course was completed. Students were allowed to set their own timetable to begin and complete classes. No face to face instruction was delivered to TOA students; instruction was incorporated into the web site and monitored by a mentor (licensed teacher). The students communicated with their mentor via the Internet and telephone. All students in the study completed the Motivated Strategies for Learning Questionnaire (MSLQ) and took a Standards of Learning (SOL) test.

Data collection in the classroom based setting was conducted by the classroom teachers who administered the survey. The district office distributed the surveys and instructions to the schools and teachers were asked to participate by administrating the survey. Students were advised that participation was voluntary. Completed surveys were returned to the school district office where the survey data was assembled with final grades and SOL scores. The data were provided to the Director of *The Online Academy* who provided them to the researcher.

Students in the online environment were asked to participate in the study during their introductory module. Students who opted to participate in the study completed the

survey online. Survey results, final class grades and SOL scores were collected by the

Director of *The Online Academy* and forwarded to the researcher.

Definitions

Achievement. The level of accomplishment or mastery of objectives related to a culturally

defined set of knowledge and skills.

Grades. Specific measures of achievement assessed by classroom teachers to certify

course completion and attainment of acceptable levels of mastery associated with skills in

the subject area (Haladyna, 1999).

Standards of Learning. Virginia curriculum standards articulated for each grade level and

subject taught in the Commonwealth.

Standards of Learning Assessment. A standardized achievement test used to assess

student knowledge of a specific curriculum articulated by the Standards of Learning.

Online Learning. An Internet based learning environment. Instruction and materials are

delivered via the Internet. Synchronous and asynchronous communication is used for

communication between student and mentor (Norton, 2003).

Goal Orientation. The origin of personal goals, intrinsic or mastery goals originate from

a personal desire to learn and orient students to a focus on mastery of the content or task.

Extrinsic or performance goals originate from external sources and orient students to a

concern for their ability and performance relative to others (Pintrich, 2000b).

Self-Efficacy. Beliefs about personal capabilities to perform tasks at a certain level of

proficiency (Bandura, 1993).

Self-Regulation. Processes and strategies used by learners to achieve higher level of performance (Zimmerman, 2000).

Outcome expectations. A belief about the ultimate ends of performance- the results of achieving a goal or standard (Bandura, 1997).

Intrinsic interest. Valuing a task for its inherent qualities (Zimmerman & Kitsantas, 2005).

Traditional classroom setting. An educational setting found in most U.S. public schools. Traditional programs take place in a designated physical space and usually include one teacher with a group of students. Instruction is designed by the teacher and generally based on textbook sources and notions of programmed instruction (Norton & Wiburg, 2005).

Environmental Restructuring. The process of selecting or creating effective physical setting in which to learn (Pintrich, 1988).

Help Seeking. Students select models, teachers, or books to assist them in learning (Pintrich, 1988).

2. Review of Literature

Virtual Schooling is transforming public education, causing educators to rethink traditional approaches to teaching and learning (Watson, 2007). The current study includes a comparison of learners in two environments, classroom based and online. This review of literature addresses and defines each study variable and related research. The chapter begins with a discussion and comparison of the learning environments, continues with a definition of academic achievement in terms of formative and summative measures, describes measures required in the Commonwealth of Virginia, and concludes with a discussion of learner attributes. Motivation is described in terms of intrinsic and extrinsic goal orientation and self-efficacy; learning strategies are categorized into metacognitive activities and resource management.

The Online Learning Environment

Online classrooms provide a unique environment that poses both opportunities and challenges. Across the nation, online courses are providing learning opportunities that benefit all stakeholders: district, practitioners, and students. The major uses for online programs currently are to supplement traditional courses, increase number of courses, or offer courses when enrollment is low. Online courses are used by districts to meet demands for courses in which there are teacher shortages. Students can select an

online class in order to fit an additional elective into their traditional schedule; or take a course online to resolve schedule conflicts. (Watson, 2007; Tucker, 2007; Rice 2006; Wojciechowski & Palmer, 2005).

An additional benefit for districts is that online courses integrated into classroom based programs are likely to positively influence the traditional program. As teachers become familiar with strategies for designing online instruction, they incorporate them into their classroom based courses. The activities can be innovative, engaging, and appeal to the modern adolescent who is well acquainted with the technology and the online environment (Tucker, 2007).

The level of personalized learning offered by online courses may be one of the most compelling benefits. Traditional geographic boundaries and buildings are traded for synchronous and asynchronous activities. "No longer is access to a quality education determined by a student's zip code," (Susan Patrick, quoted in Watson & Ryan, 2007) The opportunity to learn at any pace and any time provides a level of convenience unavailable in classroom based programs (Watson, 2007; Roblyer, 2005; Tucker 2007; Rice, 2006).

While some opponents voice concern that online students are isolated, can cheat easily, or are learning on their own in courses that are electronic versions of a correspondence course (Watson, 2007; Wojciechowski & Palmer, 2005), this is not necessarily the case. Gaytan (2007) observes that personalized learning is different from self teaching. Online courses are often more rigorous than correspondence courses and are led by experience teachers well acquainted with techniques for teaching online

(Watson and Ryan, 2007). Online teachers and mentors can be closely involved with students; the level of interaction can not only reduce the likelihood of cheating, but also address the isolation issue. Online programs can provide opportunities to establish social networks and that interaction can add to their enjoyment of online programs (Watson, 2007; Scribner, 2007; Roblyer, 2005).

Online learning provides opportunities for students that are not constrained by classroom walls yet there are challenges (Watson & Ryan, 2007, Tucker, 2007). The benefits of flexible, continuous availability that eliminates geographical constraints are balanced with the increased need for motivation and self-regulation (Roblyer, 2005). Districts can offer wider course availability to students but must be concerned with program quality, access, and cost (Tucker, 2007; Gaytan, 2007).

Equity and access are issues of concern despite increased availability of courses. Availability, speed, and quality of connection vary among schools. Providing equal access to courses is considered the most challenging issue for administrators and legislators (Tucker, 2007).

Programs can differ in quality and management differs which together result in a lack of consistency among programs (Watson & Ryan, 2007). Educational leaders attend to a spectrum of issues from funding to quality of student services. "Education policies can be outdated… they do not account for the possibility that a student in California may be learning from a teacher in Illinois who is employed by a school in Massachusetts" (Watson, 2007). National oversight is a possible solution that is suggested in the literature (Watson, 2007; Tucker, 2007).

Addressing quality concerns, Gaytan (2007) calls for careful consideration for training of faculty who design programs. He believes that content specialists need to be an integral part of the design process as they have the necessary content expertise to incorporate sufficient rigor in courses. Online courses must do more than present course content electronically; their functionality and interface must promote meaningful learning by using the technology appropriately (Tucker, 2007; Russell, 2001; Summers, Waigandt, & Whittaker, 2005).

Assessing program quality is made more difficult because of differences in reporting and evaluation practices. For example, full time programs are subjected to evaluation based on a combination of standardized test results and Annual Yearly Progress; supplemental programs are not. The absence of national standards for online programs, the variances among programs, and evaluating quality are important issues of concern (Watson & Ryan, 2007; Rice, 2006; Gaytan, 2006).

The cost of an online program can be equal to that of a traditional brick and mortar school, especially when programs are small (Anderson, Augenblick, DeCesore, & Conrad, 2006). The savings that online programs realize because of reduced physical needs (classrooms and infrastructure) are offset by the need for hardware, software, connectivity, student support, course development, licensing, and other costs. Availability of hardware, connectivity, software and support are critical issues facing online course providers at all levels (Waschull, 2001; Tucker, 2007; Watson, 2007; Robelen, 2007)

Communication in online courses may be more difficult than in classroom based environments due to the lack of visual contact. When teachers and students work together

in a virtual classroom, information can be misunderstood. Unlike a traditional environment tone is essential to virtual communication, and great care must be taken to be clear and concise (Roblyer, 2005; Wang, Newlin, & Tucker, 2001).

Immediacy issues due to geographical separation can produce obstacles for students and teachers who do not have the benefit of being in the same classroom or working at the same time. (Roblyer, 2005). When a student has a question, she must stop work, craft an email and then wait for a response. This can be very frustrating for learners. Problem solving skills are essential for online learners because they need to find a way to continue work while waiting for an instructor to answer (Roblyer & Marshall, 2003; Muilenberg & Berge, 2005).

Uncertainty or risk taking are important concerns in a loosely structured environment. Learners must interpret directions and determine how they will complete the activity. Students must be willing to try alternatives if their first attempt is unsuccessful. The lack of immediacy can also compound the student's dilemma, if a mentor is not online at the same time as the student. It can be challenging to find strategies that fit the situation and assignment. The willingness to take risks can be quite daunting for students new to the online environment. While some risk taking is a part of any learning experience, it is pronounced in an online environment (Roblyer & Marshall, 2003, Roblyer, 2005)

Active participation is vital in the online environment. Students must assume the responsibility for active engagement in and persistence with learning activities. This is challenging in an online classroom where most of the activities are carried out

independently. To be successful at these challenges, students need skills in time and resource management, articulation of goals and deliberately acting on and attaining those goals (Roblyer, 2005). While many of the same skills are necessary for academic achievement in any environment, they are essential for online learning (Aragon & Johnson, 2002; Muilenberg & Berge, 2005). Parents can help, but many students will not have a parent who has experience in online learning, therefore misconceptions abound. Especially prominent is the underestimation of the amount of time and effort online learning requires. Students need an arsenal of strategies that help them deal with unexpected setbacks and ways to stay energized and engaged (Roblyer, 2005).

Online environments pose unique challenges for students, yet empirical research from the online environment seems to indicate that a similar application of motivation and learning strategy use will result in similar achievement results. Roblyer (2005) suggests that online environments pose unique challenges for students primarily because the student is faced with accepting a large role in the learning process. Chang (1999) includes three functions of an online learner: generate an understanding of the material, collaborate as appropriate with other students and the instructors and participate actively in course activities. With an understanding that the role of the student does not imply self-teaching, the student is the primary actor in the online classroom. Students navigate through class materials and learn content through the activities. They are supported and assisted in the process, but the primary responsibility for engagement is their own.

Roblyer and Marshall (2003) developed a survey (ESPRI) to assess characteristics that predict students who will succeed in online environments. Their description of the

successful online student resembles that of traditional classrooms; they articulate five

constructs to consider 1) Access to and expertise with technology, 2) organization and

self-regulation, 3) beliefs about achievement, 4) responsibility, and 5) risk taking.

Similar to the constructs of intrinsic motivation and self- efficacy, they suggest that an

internal locus of control and positive beliefs about achievement are predictors of

success. Another indicator of self-efficacy is the construct of risk taking that points to

students who are comfortable with attempting new tasks as well as those who take

responsibility for learning. To support their individual efforts to learn, students need to

problem solve, take risks, and seek help when necessary. In light of ambiguities or

uncertainties, students need to be willing to forge ahead, risking making an error. This is

a challenge to a learner regardless of the environment, and it is made more difficult by

the independence associated with online learning. Students need to have confidence that

they can understand content and make connections on their own, without relying heavily

on teacher feedback (Roblyer, 2005).

In any academic situation students are expected to take responsibility for keeping

a schedule and completing assignments. Online learning requires innovative problem

solving and persistence. Students who need assistance structuring their time or taking

responsibility for completing assignments may have difficulty with online coursework

(Roblyer, 2005). Wang, Newlin, & Tucker (2001) analyzed discourse in online chat

rooms to determine if frequency of responses would be correlated to the final class

grade. They found a correlation between the frequency of responses and total number of

responses and assert that students who take responsibility for completing assignments

and preparing for the online discussions participate more frequently and in a meaningful way. Beyth-Marom, Saporta, and Caspi, (2005) found that students who value the contribution of their peers and the instructor levels of participation and interaction contributed to the quality of the course. Quality is enhanced by good design that encourages interaction among teachers and students. These findings agree with Roblyer and Marshall (2003) who posit that responsibility is an important attribute for successful online learning.

Roblyer and Marshall (2003) suggest one category uniquely pertaining to virtual environments: access to and comfort with technology. Access to and expertise with computers is clearly essential to successful participation in an online class. To support their learning, students need to have knowledge of and confidence in their ability to use technology required by the course. If they are not, then the technology can pose problems that stand in the way of accessing and utilizing course materials (Roblyer, 2005). DeTure (2004) found that students who sign up for online classes tend to have a higher self-efficacy for using the technology associated with an online class. Web based technology can be problematic, students need to be familiar with the technology to address and solve issues that are caused by connectivity (accessing course materials and communication) and software (completing assignments using various software tools for word processing or presentation). Having a dedicated place for study where connectivity is available is important to support online learning (Roblyer, 2005).

Waschull, (2005) compared similar sections of classroom based and online freshman psychology classes. Interested in determining who was more likely to succeed

in online classes she examined the performance and surveyed students at the conclusion of the class. The data point to motivation and self-discipline as the predictors of student success. The findings are similar to those of Roblyer and Marshall (2003) who assert that students with an internal locus of control are more likely to perform well in online classes. Research from the online environment points to characteristics for success that are very similar to those identified in research from classroom based environments.

Comparing environments. Researchers generally agree that both environments are effective, some studies found a significant difference in student attitudes toward the online and classroom based courses (Summers, et al. 2007, Aragon & Johnson, 2006, Waschull, 2001). Summers, et al. (2007) compared classroom based and online sections of a statistics class and found that students were less satisfied with their online experience. In this case, the same professor taught both classes. The materials were made available electronically to students and the lectures were put online as well. The authors concluded that one explanation for the dissatisfaction with the online class was that the technology available was not used in a beneficial manner. The course materials had been exactly replicated for the online section rather than maintaining the same content organized differently for the online environment. The technology must be used appropriately, adapted for the environment and technology with which it is delivered. Summers, et al., (2007) suggest that adapting the same content for the available technology in two environments will improve student satisfaction. Norton (2006) cautions against electronic worksheets and "disembodied teachers" and argues that the online environment is a place for innovative thinking rather than employing traditional

instructional practices. This is what Russell (2001) recommends; the environments are fundamentally different, but equally as effective for instructional delivery. Table 1 presents a summary of the practical and conceptual differences between classroom based and online learning environments.

Table 1

Practical and Conceptual Differences between Learning Environments

	Classroom based	Online
Practical Differences	- Physicality – brick and mortar building - Temporality- students attend classes on a set schedule - One teacher & many students - Print is the primary source of information - Internet use is limited by school policies and security issues.	- No physicality- no physical classroom - No temporality- students determine their schedule for study. Material and courses continuously available on the Internet - One to one or a group - Many rich resources: technology connects the class and the world.
Conceptual Differences	Traditional instructional practices: - Subjects are taught as separate disciplines - Programmed instruction - Teachers present, students listen - Teachers are the holders of knowledge- they pass it to the students - Teach and test - Assessments are designed to test knowledge of discreet facts	Constructivist problem based instruction: - Teacher is facilitator, supporter, and questioner. - Student mastery is a result of interaction with teacher and resources. - Authentic assessment- designed to demonstrate mastery

In practical terms, the classroom based environment is bound by schedules, located in a brick and mortar building; bells ring to move students through a schedule of classes. Teachers are assigned multiple students in a class grouped by grade and or ability level. Resources in a traditional school building are primarily text based; those that have access to the Internet and electronic resources may not be able to use them. District policies regarding internet use in the classrooms can limit student access for security reasons. Conversely, online classrooms break the boundaries of temporality and physicality. Flexible schedules and twenty-four hour access to materials are a hallmark of online classes. Student groupings can be one teacher to a small group of students or one teacher per student. Online classrooms tend to have a variety of resources that include text and electronic formats.

Conceptual differences between the environments can be described in terms of instructional designs and beliefs about the learner. Online classrooms provide an opportunity to design instruction in a way that challenges traditional practice (Norton, 2006). Norton and Wiburg (2003) describe the classroom based environment as one where instruction is delivered to a large group of students of the same age. The teacher is the presenter who holds the knowledge; then passes the knowledge on to their students. Teachers present the curriculum in small pieces so that students can master the discreet tasks. After instruction is completed tests are administered to measure factual knowledge. Students in a virtual classroom have a variety of materials and the flexibility to interact with mentors, and professionals in the field to develop their understanding of the content (Norton, 2005). With these tools, online classrooms can be designed on principles that

offer instruction based on contextual problem solving where content mastery occurs as a result of learning the concepts necessary to solve those problems (Brown, Collins, & Duguid, 1989). Rather than tests, performances of understanding are given for students to demonstrate their concept mastery.

Individualized instruction and content mastery can be the primary focus in a virtual classroom. Norton and Hathaway (2007) tested two approaches to online course delivery. They compared two groups of graduate students enrolled in the same online course. The assignments were the same- the instructional delivery was different, but both were based on constructivist pedagogy. One group used a learning management system for organizing class materials and group discussions. The group worked together, established work schedules, offered feedback to each other, and completed group assignments. The other delivery method was a one on one mentor/ student design. While there are no "class discussions" in this design, the mentor and student discussed the same topics via email; students completed the same assignments as those in groups. At the end of the course, the students were surveyed to determine their level of satisfaction with their experience. The researchers found no significant difference in student satisfaction between the two pedagogies used for course delivery. This study of student preferences offers examples of course designs that use technology appropriately.

Research to determine the effectiveness of online programs has found no significant difference (Smith, Clark & Blomeyer, 2005; Watson, 2007; Russell, 2001) between online and traditional programs. Watson argues that online education is effective

and warns that the extent to which it is effective depends upon "the constraints that many schools and teachers face." Smith et al (2005) concluded that online courses are as effective as classroom based ones, concluding that their findings agree with Russell (1999) and caution that more research is needed on the K-12 level.

In other research Roblyer and Marshall (2003) sought to determine who would be successful in online environments. In an effort to predict achievement in online classroom, they constructed a survey instrument (the ESPRI) designed to assess the characteristics of a student. Their research pointed to the same constructs found to be effective in the traditional learning environments and include intrinsic motivation, academic self-efficacy, organization, and self-regulation.

The literature indicates that online courses can be as effective as traditional ones, but the environment should, where possible, modify instruction to capitalize on the distance technologies available. To address challenges and maximize benefits, online classes should incorporate activities that promote student interaction, build community, allow for student choice, maintain flexibility, and offer access to their mentor and instructional materials (Gaytan, 2007).

Academic Achievement

Academic achievement is a term that is widely used within a variety of contexts. National policymakers refer to student achievement when they reference international comparisons or make bold calls for school reform; state and districts use achievement data to evaluate the effectiveness of schools. Classroom teachers use achievement data to

indicate levels of task mastery for their students. Considering the number of ways the term is used, clarification is requisite.

Academic achievement is a construct that refers to "the achievement by individuals of objectives related to various types of knowledge and skills. These objectives are socially established based on the age, prior learning and capacity of individuals with regard to education, socialization and qualification" (The Centre for Research and Development on Academic Achievement (CRIRES) 2005, November 18). Academic achievement is a measure of progress that is multifaceted. In an attempt to provide leadership, national organizations (for example, the National Council of Teachers of Mathematics and the National Council for the Social Studies) have defined content standards intended to articulate what students should know within the context of their discipline.

On a national level, an effort has been made to compare student achievement. Laws have been enacted to formalize the use of standards for comparison of student performance and to assess achievement across states (Linn & Gronlund, 1995; McMillan, 2007; Nitko, 2005). In 1983 The National Commission on Excellence in Education published *A Nation at Risk* which was a call to action for educators and legislators. It focused attention on many critical issues facing education including deficiencies in curriculum, student expectations, teacher qualifications, and time in school. Its release ushered in unprecedented large-scale accountability tests. For example, during the Clinton administration the Goals, 2000: Educate America Act was passed. It legislated national content standards and voluntary assessments consistent with the standards (Linn

& Gronlund, 1995). More recently, the No Child Left Behind Act of 2002 (NCLB) was passed in an effort to hold schools accountable for increasing the performance of students measured against state determined standards (McMillan, 2007).

The measurement of progress required by NCLB for student achievement is standardized test scores. Scores are disaggregated according to demographic criteria such as race/ethnicity, family income, disability, and language proficiency. Progress is assessed annually based on test performance in each of the subgroups (Toch, 2007; McMillan, 2007). Student performance in each of the subgroups must meet minimums required for passing scores or show continuous progress in each category to avoid being labeled as "failing." Critics of the law agree that having standards articulated and accountability for those standards is a good idea, but that the law needs to be restructured to meet its goals of improving education for all students (NEA, 2008).

To comply with current legislation, states have developed grade level standards that articulate what students should know and be able to do at each grade level. Grade level standards are a means for states to comply with the NCLB requirements; they are testable. Currently, standards and assessments are inconsistent between states (McMillan, 2007). Therefore, critics argue that the legislation has yet to accomplish its goal to assess student achievement across the nation (NEA, 2008). According to Toch (2007), NCLB has mandated more testing; "established much tighter deadlines for introducing new tests; it required that results be broken down by a range of subgroups of students in every school; and, most significant, it linked serious consequences for schools to student test

scores" (Toch, 2007). The abundance of tests being administered is a result of the NCLB mandate and the rush to demonstrate student achievement on state curriculum standards.

Measuring achievement. In the classroom, teachers assess student achievement on a daily basis. Unlike policymakers, educators understand that assessment refers to "the full range of procedures used to gain information about student learning" (Linn & Gronlund, 1995). Teachers must use assessments from a variety of student performances and at various times during the instructional process to determine student progress. Assessments are used to determine students' prior knowledge of a subject, assess understanding during instruction, and assess levels of mastery after instruction (McMillan, 2007; Lin & Gronlund, 1995). Assessments are intended to offer varied and unique perspectives on student learning so that, when combined, student achievement can be more clearly understood.

Assessment of student achievement generally falls into one of two categories, formative and summative. Formative assessments are based on data collected during instruction and include a variety of scored activities that take place over time. Examples of formative assessments include written work, discussions, collaborative activities, projects, and quizzes. Generally diagnostic in nature, formative assessments can improve student learning and motivation. The feedback provided by formative assessments can be used by both teachers and students to monitor progress toward achievement goals (McMillan, 2007, Linn & Gronlund, 1995, Nitko, 2005).

Summative assessments are more formal and usually conducted at the end of instruction. They are intended to indicate what students have learned. Used to "certify

learning," summative assessments often used normative scoring guidelines, are very general, and focus on reliability (McMillan, 2007). The achievement test is a common example of a summative assessment used to compare student achievement. Designed to measure recent learning within a subject area or curriculum, standardized achievement tests are an assessment in which the test score is intended to represent the sum of student learning for that subject area or curriculum (Macklem, 1990). Summative assessment can also be teacher designed unit tests that measure student learning for a smaller amount of material, yet for the same purpose- to obtain a score that is representative of student learning for that segment of the curriculum (Linn & Gronlund, 1995; Nitko, 2001; McMillan, 2007).

Grades are a measure of academic achievement. Classroom teachers use both formative and summative assessments when determining grades that represent student progress. Grades represent the variety of assessments conducted as a part of the instructional design; teachers assign grades for classroom performance (Nitko, 2001). Grades provide a range on which to compare student performance (Hargis, 2003), reflect a level of attainment in a course of study (Haladyna, 1999), and are necessary tools for communication to parents and students. Most important, grades in high school and college certify that you have learned enough for advancement or graduation. The earning of credits toward a diploma or degree is a critical function of grades (Haladyna, 1999).

Student achievement measures in the Commonwealth of Virginia. Virginia has embraced standards-based instruction and assessment. In the 1990's, standards were established for every grade level and subject taught in K-12. The department of education

describes the standards as "representing a broad consensus of what parents, classroom teachers, school administrators, academics, and business and community leaders believe schools should teach and students should learn" (Virginia Department of Education, 2008). Achievement tests were developed based on the standards to assess student achievement in terms of the standards, provide a means to comply with national requirements, and hold districts and school accountable for student performance. Beginning in 1996, students in Virginia public schools grades 3, 5, 7, and selected high school math, English, science, and history courses were required to take the Standards of Learning (SOL) tests. These achievement tests were designed to determine a student's level of proficiency in the subject area by testing a sample of the objectives in the curriculum. The SOL score is an indicator of student achievement that allows for comparison of students in every school district and provides a means to assess the effectiveness of schools and districts.

Scores on the SOL tests are based on the total number of correct answers; there is no penalty for incorrect answers. Raw scores are converted to scaled scores from 0- 600. Students are rated according to their score: pass advanced (500-600, pass proficient (400-499), and fail/does not meet (0-399). A rating of "pass proficient" or higher for tested students or a demonstration of adequate yearly progress is part of the evaluation process in effect for public schools in Virginia.

Verified high school course credit. In addition to assessing school performance, high school graduation requirements have been linked to SOL performance. Students receiving a diploma from a Virginia school division must attain a verified credit in a

minimum of 6 courses for a standard diploma. Advanced diplomas require verified

credits in 9 courses. A verified credit is received when a student receives a passing grade

and a passing SOL score in a course. This requirement ensures that schools use two

different measures of student achievement (grades and achievement tests) to confirm and

certify that the content has been mastered. (Superintendent's memo number 52, March 5,

2004).

Online high school programs in Virginia (such as *The Online Academy*) are

aligned to the Standards of Learning. Teachers hired as mentors for TOA are licensed to

teach in Virginia and have also studied effective practices for teaching online by taking

courses offered at George Mason University (Norton, 2005). The curriculum alignment

and hiring of highly qualified teachers by The Online Academy were steps taken to

ensure that local districts could offer credit for courses completed and certified by TOA

(personal conversation with policy board members, 2006-7).

A combination of grades (certification of classroom proficiency) and standardized

achievement scores (certified performance on curriculum standards) provide two sets of

data that reference student achievement (Haladyna, 1999; Macklem, 1990, Davey, 1992).

The descriptive statistics provided by standardized assessments (in this case, the SOL)

will portray important features of a group of scores and convey information on student

performance (McMillan, 2007). In the current study, the two measures (grades and SOL

scores) will be used to provide a measure of achievement based on student performance

with formative and summative measures.

Learner Attributes: Motivation

Motivation literally means *to move* and refers to all processes required to start, sustain, and direct activity (Zimbardo, Weber, & Johnson, 2000) such as setting goals, task engagement, and learning strategy use (Pintrich & DeGroot, 1990; Linnenbrink, 2005; Elliott& McGregor, 1998; Boekaerts & Niemivirta, 2000, Pintrich, 2000). Motivation is the result of interplay among learner goals, beliefs, and emotions, and plays an essential role in the learning process.

Intrinsic motivation. When students engage in learning to satisfy curiosity or because the topic interests them, it is thought that they are intrinsically motivated. Intrinsic motivation involves engaging in activities for their own sake rather than some external reward. Intrinsically motivated learners derive pleasure from learning which promotes a high degree of task involvement (Gottfried, Fleming, & Gottfried, 2001; Vokell, 2003). Because learners deeply engage in the task, intrinsic motivation is highly adaptive; the sole rewards are spontaneous feelings of interest and enjoyment (Deci & Moller, 2005).

Ryan and Deci's (2000) operational definition of intrinsic motivation is motivation that exists within individuals and between individuals and the tasks. Their research is based on Self-Determined Theory (SDT) which distinguishes between types of motivations based on the goals that are associated with the behavior. SDT is a construct that helps to define and differentiate intrinsic motivation from other external motivators. Humans are naturally curious organisms who engage in exploratory, playful or curiosity driven activities (White, 1959 quoted in Ryan & Deci, 2000). Their sense of autonomy and self determination is associated with intrinsic motivation (Deci & Moller,

2005). Learners who perceive that an educational objective will be truly useful to them see value in the task; the activity will satisfy their natural desire to master aspects of the world. This definition of intrinsic motivation which originates from within includes actions that are completed because they are inherently enjoyable. For example, curiosity and a desire to understand the subject (Deci & Moller, 2005) is intrinsic interest. When something is in the environment that attracts attention or curiosity learners will engage to satisfy that curiosity. Curiosity is activated when there is an optimal level of discrepancy between what is currently known and what could be learned by engaging in the activity. Cognitive curiosity is stimulated when new information does not match what is currently known but is not too far removed. Learning tasks that offer an optimal level of curiosity present information that is approachable and similar in nature to what is known (Vokell, 2003). Intrinsic motivation towards a given task differs among individuals; not all humans are motivated for any particular task.

Focusing on task properties and their potential interest may lead to improved design (Ryan and Deci, 2000). Designers have the opportunity to evaluate a task for potential intrinsic motivation. For example, motivation can be influenced by the use of mental images of situations that are not present (Vokell, 2003). Using emotional elements such as fantasy makes the activity fun or exciting. Interactive web pages are motivating because they maintain student interest (Scribner, 2007). Learners engage in roll playing using their imagination to meet challenges, satisfy curiosity, or exercise control (Vokell, 2003). Learner-centered activities are engaging and encourage active participation. Roll playing and similar interactive activities allow students to internalize behaviors and

values from their environment to feel a sense of belonging (Deci & Moller, 2005). Thus role playing is engaging (consider any video game) and fosters motivation.

Learning activities that enhance psychological processes of competence, autonomy and relatedness promote intrinsic motivation. It is important to consider the implications of intrinsic motivation in the classroom. In a longitudinal study of students in middle elementary through high school, Gottfried, et al. (2001) found that intrinsic motivation declines through late elementary and reaches its lowest levels in the eighth grade, ages 14-15. An interesting finding is the decline in intrinsic motivation seems to be subject specific. They suggest that the decline in motivation is neither a general developmental occurrence, nor is it inevitable. Their findings support the notion that learning environments can be designed that increase levels of student motivation. SDT may be helpful to interpret the motivational decline framed in terms of social and environmental factors that facilitate or undermine intrinsic motivation (Ryan & Deci, 2000).

Extrinsic motivation. A person who undertakes an activity to attain an outcome that is separate from the learner is said to be extrinsically motivated. Ryan and Deci (2000) believe that school related activities are generally extrinsically motivating; the question of concern then is how to facilitate the process of internalizing an external goal. They suggest that extrinsic motivation varies in degrees of autonomy and describe a continuum that outlines a process by which external goals are internalized. The process of internalization can result in an attachment of personal value to the external goal, internalizing it, and results in the goal becoming self determined. The learner has

identified with the value of the learning activity- it is still an extrinsic motivation, but an adaptive one.

Extrinsic rewards undermine intrinsic motivation (Deci & Moller, 2005; Deci 1971; Lepper, Green & Nesbitt, 1973 quoted in Ryan and Deci, 2000) the authors cite research that indicates threats, deadlines, and competition undermines intrinsic motivation. They conclude that the home environment can facilitate intrinsic motivation by supporting the need for autonomy and competence (Ryan & Deci, 2000). Furthermore, Zimmerman, Bandura, and Pons (1992) found that parental expectations are predictors of student achievement. Their path analysis of factors affecting achievement reveal the important role parents can play is student achievement. Research by Sheldon and Kasser (2008) confirms that college students responded to threat with a shift to extrinsic goals. The authors did not assess academic achievement in their study however it does demonstrate the tendency to shift a focus to extrinsic goals when threat is introduced.

Goal orientation Goals are an important aspect of motivation because they provide direction for actions and behaviors. Goals offer criterion on which to judge achievement (Shah & Kruglanski, 2000; Pintrich, 2000a). Recent research highlights the role of goals in motivation. Elliot, McGregor, and Gable (1999) tested the impact of goal orientation on the use of study strategies. Their study included undergraduate university level students; their findings indicate that goal orientation did tend to predict the use of strategies during test preparation, that threat and anxiety caused maladaptive performance avoidance goals to emerge. Elliott, (2005) posits that valence is an important aspect of goal orientation. The notion of approaching or avoiding goals is important because

students who approach tasks are more likely to exhibit adaptive behaviors. Task approach/avoidance is not measured by the instrument in use for this study but may need to be considered for future research.

It may be helpful to consider this definition of goals as the desired outcome and reason for undertaking a task. Goals can be associated with intrinsic and extrinsic motivation as they direct the behaviors that students choose (Shah & Kruglanski, 2000; Pintrich, 2000). Literature has many references to task, ego, mastery or performance goals (Murphy & Alexander, 2000) and it is clear that there is overlap when considering various aspects of intrinsic versus extrinsic motivation. Intrinsic motivation is based on interest in the task (Deci, 2005) and very much like mastery goal orientation which is based on a desired to learn because of interest or curiosity (Elliott, 2005).

In any learning situation, multiple goals affect learners- some originate in the environment (for example teacher or parent expectations), some are personal. A perspective on goal content is helpful to understand the nature of the multiple goals affecting students simultaneously. Wentzel (1999, 2000) describes goals in terms of those that are school related (social emotional), task related (related to mastering the task at hand) and cognitive goals (related to understanding and satisfying curiosity). Intention and effort is required to appraise the task, content, and learning environment (Boekaerts & Niemivirta, 2000). The multiple goals may represent a combination of intrinsic and extrinsic factors. In related research, Ames and Archer (1988) investigated the impact of mastery and performance goals on achievement. They report that mastery goals (based on the desire to master material and closely related to intrinsic motivation) were helpful to

43

sustain student involvement in learning and increase the likelihood that the student will pursue tasks that will develop their learning.

Linnenbrink (2005) determined that performance goals were not necessarily detrimental, that in fact they could be adaptive. Her findings indicate that students with performance goals demonstrated high levels of achievement and retained material for extended periods of time. The study indicated that classrooms can impact the types of goals that students adopt. Arguing that performance goals can be adaptive for self regulation, she finds that external forces can improve a willingness to approach learning tasks.

Pintrich and Garcia (1991) suggest that students might pursue intrinsic and extrinsic goals simultaneously. Shah and Kruglanski (2000) agree, they describe ways that students regulate their behavior addressing the multiple goals associated with the learning context. They assert that students regulate behavior on the specific set of goals associated with the task. Students interested in achievement will experience a different set of goals than for a social situation. Associations among goals affect the behaviors chosen; the behaviors are a result of the commitment to any given goal. Pintrich (quoted in Harackiewicz & Linnenbrink, 2005) suggests that mastery and performance goals are related differentially to achievement. The related behaviors and strategies are complementary and helpful for goal attainment. Multiple goals impact students in any learning environment; learning environments can facilitate student goal attainment by promoting and maintaining motivation. An understanding of intrinsic and extrinsic motivation can be informed by these interpretations of goal orientation. The terms are

similar and overlap in critical areas (Murphy & Alexander, 2000). Intrinsic motivation and mastery orientation are similar in that they based on a personal desire to learn; extrinsic motivation like performance goals refer to external forces- competition, teacher or parent evaluation, and peer comparisons. Extrinsic motivation can be adaptive to varying degrees (Ryan & Deci, 2000) just as performance goals can be adaptive for some learners (Linnenbrink, 2005).

Learner attribute: Self-efficacy

Self-efficacy refers to perceptions of self competence, a sense of autonomy and a belief in ones academic capabilities. It is a perceived ability to succeed at a specific task (Bandura, 1997) and an integral component of motivation (Schunk, 1991). Self efficacy influences a student's choice of activities, level of effort, persistence, and emotional reaction (Zimmerman, 2000b; Wadsworth, Husman, Duggan & Pennington, 2007). Kaplan and Midgley (1997) made a similar claim noting that perceived competence moderates the relationship between learning goals and behavior. Self-efficacious learners believe that they can succeed which results in greater persistence and achievement (Pintrich & DeGroot, 1990; Bandura, 1993).

Wilson and Trainin (2007) studied the impact of self efficacy on literacy development in first graders. Students were asked to assess their ability to perform tasks involving reading writing and spelling. The results indicate that there is a link between self efficacy, attribution, and achievement. They suggest that the important role of self efficacy in literacy development may indicate future intervention strategies. Self efficacious students exhibit higher levels of achievement, which agrees with the theories

posited by Bandura (1997) and Schunk (1991). In other research, Wilhite (1990) found in a study of college undergraduates in a psychology class that the best predictor of their success was their assessment of their ability to memorize material. Self-efficacy is an important aspect of motivation; it is the emotions and beliefs that impact motivation.

Research into the nature of self efficacy indicates that self efficacy beliefs differ across subject domains (Bong, 2004). In one example, Hispanic and Caucasian math students were compared. Self-efficacy was shown to predict performance and future selection of math classes (Stevens, Olivarez, Lan, & Tallent-Runnels, 2004). In another study online math students were enrolled in an online undergraduate developmental math class. The results indicate that self-efficacy promotes strategic learning and academic performance (Wadsworth, et al., 2007).

Schunk (1991) and Bandura (1993) describe the important influence of self-perception on achievement. Contextual information gathered from a variety of sources contributes to a student's assessment of personal ability and will in turn impact their persistence and achievement. The cyclical nature of this process suggests that as students gain experience in school, their self assessments will change. Younger students report high self-efficacy for learning tasks and overestimate their abilities. As children age, they are better able to assess their abilities which may explain why their reported motivation level tends to decline. This phenomenon was observed in a longitudinal study of middle elementary to early high school students (Gottfried, et al, 2001). Students in middle elementary school reported higher levels of motivation that diminished as students aged. Also the study suggests that motivation is relative to subject area, motivation in math,

science and English classes declined a great deal, social studies showed almost no decline. Kaplan and Midgely (1997) suggest that motivation seems to vary across domains and grade levels.

Feedback, goal attainment, and self-efficacy. The conviction that one can succeed is based on information from experience (Schunk, 1991; Bandura, 1997) and contextual information (Zimmerman, Bandura, and Pons, 1992; Schunk & Zimmerman, 1997). Feedback provides evidence of progress and goal attainment (Shah & Kruglanski, 2000). In a study involving middle school science students, informative feedback was shown to increase test performance for low and middle achieving students. This underscores that need to provide informative feedback to students to boost their confidence and efficacy for task performance (Van Evera, 2004). Feedback produces affect; positive affect assists students as they move toward their goals, negative affect produces doubt (Weiner, 1980). Carver and Scheier (2000) describe feedback loops that inform students as they assess their current state (the authors call it a sensed value) based on feedback from the environment, then adjust their actions (strategy use) to improve performance or understanding. After assessing learning outcomes based on feedback, learners establish new goals. The subsequent goals and actions reflect the impact of feedback (Bandura, 1993; Schunk & Zimmerman, 1997; Turner, Thorpe and Mayer, 1998). Positive perceptions of competence result in setting loftier goals, persistence at difficult tasks, and greater academic achievement (Shah, et al., 2000; Pintrich, 2000; Bandura, 1993; Schunk & Ertmer, 2000).

Self-efficacy has an impact on learning strategy use. As students work in the

context of pursuing goals, they engage in regulatory behaviors that move them toward or away from their goals. Learning strategies (activities to address learning tasks, monitor progress, and manage resources) impact achievement (Pintrich, P. referenced in Harackiewicz & Linnenbrink, 2005) and take effort. VanGrinsven and Tillena, 2006 examined self regulation among students in vocational programs. They posit that learning environments that promote student autonomy increase student self-efficacy and task engagement; the students are more willing to participate in the learning activities. Their findings indicate that motivation and learning strategy use were impacted by the environment and that motivation is the most significant factor in learning strategy use.

Learner Attribute: Learning Strategy Use

A related construct that is important to academic achievement is learning strategy use, specifically metacognitive and cognitive activities to monitor and assess progress and resource management (Harackiewicz & Linnenbrink, 2005; Zimmerman, Bonner & Kovac, 2002). Using techniques to increase cognition and metacognition while learning improve academic performance. Students who think strategically about their learning and use study techniques to improve their learning and retention experience academic success as well as set and achieve higher goals (Zimmerman, Bandura, & Martinez-Pons, 1992; Schunk & Zimmerman, 1997; Pintrich & DeGroot, 1990; Bandura, 1997).

Metacognitive processes (thinking about thinking) improve learning. Students strategically engage in the processes of learning when they select strategies for a task, monitor their progress, correct errors, and change learning behaviors and strategies as necessary to improve comprehension. Cognitive strategies focus primarily on the

thinking associated with learning and are used to help achieve a particular goal. Metacognitive strategies are a strategic approach to learning that can be applied to anticipate learning tasks, reflect on understandings or new information, and assess goal attainment (Livingston, 1997). When students learn to regulate their learning and internalize the metacognitive processes, intrinsic motivation sparks the continued activation of strategies used to engage in cognition. (Schunk & Zimmerman, 1997)

Specific metacognitive strategies for reading include techniques that promote text comprehension. Summary techniques, note taking, and the use of graphic organizers provide learners with a variety approaches to reading comprehension. Student who use these strategic behaviors develop into proficient readers (Swanson and La Paz, 1998). Further, effective students understand that an intentional approach to learning tasks is important for successful learning. They employ strategic behavior, selecting strategies to address specific goal directed tasks and monitor progress using metacognitive strategies. One study conducted by Pape and Wang (2003) to test the impact of self regulated use of learning strategies included middle school math students and investigated their use of strategic approaches to learning. Students answered survey items, participated in interviews and were observed (videotaped) during specific problem solving tasks. The authors confirm that the teaching of learning strategies is an essential aspect of developing self-regulated learners and effective problem-solvers.

A strategic approach to learning is essential to successful navigation of online courses. Roblyer, (2005) suggests that the ability to creatively address learning problems is extremely important to resolve issues that arise in online learning such as ambiguous

directions or difficult text passages. Students need an arsenal of strategies for learning

navigating text and communicating their understandings in efficient and meaningful

ways.

Resource management. Likewise, techniques that enhance resource management

and use will improve academic achievement. Students must learn to manage their time

and effort; they should structure and monitor their environment to promote learning

(Zimmerman, Bonner & Kovac, 2002; Zimmerman & Schunk, 2001; Pintrich & Garcia,

1991; Pintrich, Smith, Garcia, & McKeachie, 1991).

Effective learners use strategies to assess the requirements of the task and allocate

resources to complete it. For example, a technical article takes a greater amount of time

and effort than a magazine article. Sufficient time should be scheduled as well as a quiet

place to read. The wise use of resources and environment will assist in comprehension of

technical reading and other academic tasks. Using strategic approaches to allocate

resources to facilitate comprehension and goal attainment is the second important aspect

of learning strategy use (Zimmerman, Bonner and Kovac, 2002).

Online classes present the student with an unstructured environment that will

challenge even the most organized student. They must estimate the time needed for

assignments and continually monitor their progress toward their learning goals and

project completion. Planning time for study takes on a new dimension for the online

student who may have little experience organizing blocks of time. Procrastination can

impact achievement, Elvers, Pozella, Graetz (2003) compared dilatory behaviors of

students in face-to-face and online classes. The authors suggest that procrastination may

have a greater impact in online classes because face-to-face students are exposed to information in class. The authors conclude that exposure to information in discussion helps those who do not frequently study, they are learning from their environment. For students in an online class, procrastination is a predictor of achievement; this study suggests that the impact of dilatory behaviors for online students is greater than face-to-face students.

Beyth-Marom, Saporta, and Caspi (2005) found that students who can provide a structure in which to engage in course activities are more likely to be intrinsically motivated and not need much social support. The interaction of motivation and the tendency to self regulate while enrolled in an online class resonate with the research in traditional environments. Roblyer and Marshall (2003) underscore the importance of organizing and managing time in order to accomplish assignments.

Conclusion

Academic achievement is an important, if not the most important, goal of education. It offers insight into student success as well as program success (McMillan, 2007; Lin & Gronlund, 1995; Smith 2005). Formative assessments class grades are used to address a variety of needs. Teachers communicate progress and certify achievement (Haladyna, 1999), students and parents monitor and assess progress (Carver & Scheier, 2000; Zimmerman & Schunk; Pintrich, 2000c), administrators and lawmakers verify program quality (McMillan, 2007; Lin & Gronlund, 1995; Nitko, 2005). Summative assessments provide information to assess and compare progress among students. Virginia uses both grades and SOL tests to measure and certify student achievement.

Since academic achievement is a central educational concern, it is of interest to identify learner characteristics that promote achievement. The literature points to motivation as an attribute that contributes to academic achievement. Motivation is based on goals, beliefs and emotions that work together and affect behavior (Zimmerman& Schunk, 2001; Winnie, 2001; Pintrich, 2000c; Elliot, 2005). Students are impacted by multiple goals arranged in a hierarchy; students attend to the goals in the order of importance within that hierarchy (Linnenbrink, 2005; Boekaerts & Niemivirta, 2000; Pintrich, 2000b). Goals direct and energize behavior and are essential to motivation (Carver & Scheier, 2000; Shah & Kruglanski, 2000; Wentzel, 1999). Goals provide criterion on which to assess, monitor and guide cognition (Pintrich, 2000c).

Another important component of motivation is self-efficacy. Socially constructed this attribute is the learner's impression of competence and autonomy (Schunk; Bandura, 1997; Zimmerman, Bandura, and Pons, 1992; Schunk & Zimmerman, 1997). Self-efficacious learners set loftier goals, persist at learning tasks, and exhibit higher levels of academic achievement (Pintrich & DeGroot, 1990; Bandura, 1993).

Also important to academic achievement is learning strategy use, specifically metacognitive and cognitive activities to monitor and assess progress and resource management (Harackiewicz & Linnenbrink, 2005; Zimmerman, Bonner & Kovac, 2002). Using techniques to increase cognition and metacognition while learning improve academic performance. Students who think strategically about their learning and use study techniques to improve their learning and retention experience academic success as well as set and achieve higher goals (Zimmerman, Bandura, & Martinez-Pons, 1992;

Schunk & Zimmerman, 1997; Pintrich & DeGroot, 1991; Bandura, 1997). Likewise, techniques that enhance resource management and use will improve academic achievement. Students must learn to manage their time and effort; they should structure and monitor their environment to promote learning (Zimmerman, Bonner & Kovac, 2002; Zimmerman & Schunk, 2001; Pintrich & Garcia, 1991; Pintrich, Smith, Garcia, & McKeachie, 1991).

Students that achieve academic success are energized by their goals (Wentzel, 1999; Pintrich, 2000b; Linnenbrink, 2005) and self-efficacy (Schunk, 1991; Bandura, 1993), informed by feedback (Carver & Scheier, 2000; Thorpe & Mayer, 1998), and engage in metacognitive activities (Zimmerman & Schunk, 2001; Zimmerman, Bonner& Kovac, 2002). Motivation is an essential factor in the use of learning strategies (Van Grinsven & Tillema, 2006); both motivation and learning strategy use contribute to academic achievement.

We now have a new educational environment. While learning at a distance is not new, the virtual classroom has emerged and gained popularity and support in the last ten years. Questions concerning learning technologies, learning at a distance, and the differences among learning environments created by technologies have been researched since the 1920s. Russell (2001) searched literature from the twentieth and twenty-first centuries seeking evidence for the argument that technology improved instruction. He reviewed studies that compared various technologies (correspondence courses, television broadcasts, to virtual learning environments) and discovered that technology does not create the difference in student outcome. To explain the "no significant difference

phenomenon," Russell states that there is nothing inherent in the technology that improves learning. Rather, what makes the difference is design- the way that the technology is used. Content must be adapted to maximize the potential of the technology. Roblyer agrees, noting that course methods and student support can have an impact on achievement (personal correspondence, 2007). Recent research with designs that compare classroom based and online sections of courses generally find that achievement is similar in each environment, yet students report less satisfaction with the online course (Summers et al., 2005; Waschull, 2001, Wojciechowski & Palmer, 2005; Aragon & Johnson, 2000, DeTure, 2004). These researchers tend to support Russell's observation that the technology must be used properly. In those studies where students reported less satisfaction with the course, the research design called for exact replication of instructional methods and content- lectures, and materials were converted to electronic form for access via the Internet, electronic discussion boards, or synchronous chats scheduled, and the same instructor taught both sections. The course content and materials were the same, but because the instructor had no face to face interaction with students it eliminated an important element: the teacher's personality and personal interaction. Summers described the professor in her study as "well liked by students;" the instructor was technically able to move material to an online classroom, but the same material in electronic format were not as effective (Summers et al., 2005, Waschull, 2001, DeTure, 2004).

Given that students can select from two learning environments, it is important to determine if motivation and learning strategy use contribute similarly to academic

achievement in both environments. The Online Academy has been offering courses for three years. It is appropriate to compare the student achievement in TOA classes with that from students in a traditional classroom in a way that can inform the literature and promote an understanding with which educators can better support learning for all students in any environment.

3. Method

Participants

A total of fifty- one students were included in the study. Thirty- one were enrolled in a classroom based setting, and twenty were enrolled in *The Online Academy*. All were math students in one of three courses: Algebra 1, Algebra 2 or Geometry. The participants represent a convenience sample that was selected based on three criteria: course content, reason for taking the class, and age. What follows is a description of the steps of the process, the concerns that were addressed with each step, and the number of possible participants eliminated, see table 2.

Table 2

Steps taken for Selection of Study Participants

	Total Participants			Total Removed	
Step	Traditional	Online	Concern	Traditional	Online
1	656	71	Matching course content	288	7
2	368	64	Low numbers in English and Science Courses	158	5
3	210	59	Incomplete data sets	140	26
4	70	33	Match reason for taking class	33	3
5	37	30	Low social studies numbers	2	6
6	35	24	Differences in mean age	4	4
	31	20	FINAL STUDY SAMPLE		

Enrollment in *The Online Academy* is highest during the summer session with a majority of students enrolling from a local school district. *The Online Academy* accepts all students who wish to register. However, at the time of the study, the program was only 5 years old and not well known throughout the Commonwealth. In order to include the highest number of online participants in the study, the study was conducted during the summer of 2007.

The process for participant selection began with matching courses offered in each program. Of the 656 surveys collected by the school district, two hundred eighty eight

(288) were from students enrolled in classes not offered by *The Online Academy*. Students in all classes not offered in both environments were eliminated.

Next, the enrollment was analyzed in each subject area. Enrollment in online English and science classes was low. One Earth Science and four English students were enrolled. Thus, the study was limited to math and social studies students only, and all English and science students were taken out of the study.

Third, incomplete data sets were removed. An incomplete data set was one that was missing a substantial number of survey items or missing an SOL score. Of the possible 210 surveys from the district, seventy nine surveys were incomplete and immediately eliminated. Of the remaining one hundred thirty one, seventy had SOL scores available, all others were incomplete data sets and eliminated. In the online setting, 59 surveys were considered, thirty three SOL scores were available the others were eliminated.

Fourth, analysis of the student demographic data revealed two prominent reasons for taking the class. The first reason was related to a prior failure, and the other was to gain academic credit at an accelerated rate. The reasons for enrollment reported on student surveys are displayed in Table 3.

Table 3

Reason for Enrollment

	Traditional			Online		
Response category	*n*	*f*	*%*	*n*	*f*	*%*
	63*			36*		
a: failed class		22	31%		3	9%
b: failed SOL		4	6%		0	0%
c: improve passing grade		0	0%		4	12%
d: get ahead		37	53%		23	70%
e: flexible schedule		0	0%		5	15%

* Students were able to omit this information or offer multiple reasons

One barrier to online learning is academic failure. Muilenberg and Barge (2005), DeTure (2004), Roblyer (2005), and others have found that GPA is a significant predictor of academic achievement for online courses. Using a students' reason for enrollment as a criterion for selection is an attempt to limit the influence of previous academic failure on the study findings. The sample was, therefore, limited to those students who approached the summer course with a desire to improve their academic standing, resulting in a more homogeneous sample. It was considered beneficial for the process of comparing groups of students across environments; achievement data could inform the study in a meaningful way. Using the reason for enrollment as criteria for selection (see table 2), the groups were reduced to thirty-seven traditional and thirty online students.

The selection process resulted in a small number of social studies participants: two traditional and six online. As a result, the social studies students were eliminated, and only the math students were included for the final analysis.

In the final step, comparison of group means revealed a significant difference in age between groups. The median age of the traditional group was skewed by the presence of four eighteen years old. The median age of the online group was skewed by the presence of a twelve year old and three thirteen year olds. Eliminating these participants brought the group means to just over a year and created a more homogenous sample.

This process resulted in two groups matched on three criteria. The final group of participants selected for inclusion in the study consisted of fifty- one students; thirty- one were enrolled in the classroom based setting, twenty enrolled in the online setting. The two groups were matched on three criteria and addressed the confounding variables involved with these existing data sets: course content, reason for enrollment, and age.

Descriptive statistics of the participants. Thirty-one students from the traditional setting and twenty students from the online setting participated in the study. Traditional students were older than the online group. The traditional group had a small majority of male students while the online group had a majority of females.   Table 4 provides an overview of the demographic data provided by the study participants.

Table 4

Demographic Data

		Traditional				Online			
		M	*SD*	*f*	*%*	*M*	*SD*	*f*	*%*
Age		16.1	.89	31		14.8	1.02	20	
Grade		10.1	.77	31		9.9	.93	20	
Gender:	Boys			16	52%			8	40%
	Girls			15	48%			12	60%

Achievement data. Class grade and SOL scores were recorded and entered into SPSS - *Statistical Package for the Social Sciences, Windows version 14*. The online students achieved higher class grades and SOL scores. Table 5 describes the levels of achievement obtained by each group.

Table 5

Achievement Data

	Traditional			Online		
	N	*M*	*SD*	*N*	*M*	*SD*
Class Grade	31	86.13	12.0	20	93.9	6.4
SOL test score	31	457.3	77.5	20	479.6	67.1

Class grades for students in the online setting were higher than those in the traditional setting. In the traditional setting, twelve students (39%) received a grade of 93 to 100 compared with fourteen in the online setting (70%). Seven students (23%) from the traditional sample were low achievers; none of the online sample fell into that category. The data are presented in figure 2.

Distribution of Class Grades
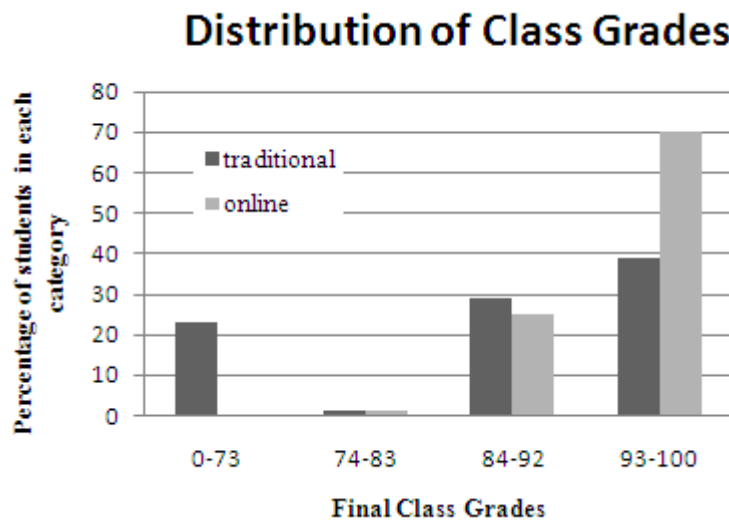
Figure 2. Grade Distribution Comparison.

SOL pass rates. In the traditional setting, four failed (13%) with a score of less than 400; twenty-one passed proficient (68%) scoring between 400 and 499; and six passed advanced (19%) with a score of 500-600. The online group scored higher on the SOL. Two failed (10%), eleven passed proficient (55%), and seven passed advanced (35%). The data are presented in figure 3.

Distribution of SOL Scores
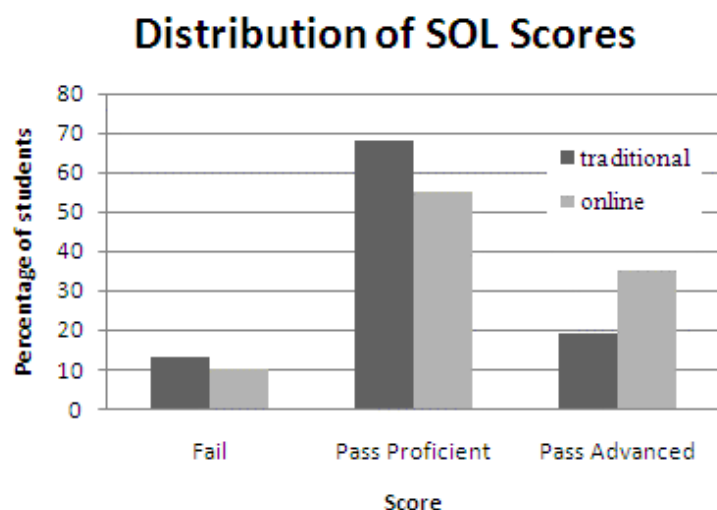
Figure 3. SOL Pass Rates by Category.

Measures

Three measures were included in the study: class grades, SOL test scores, and the Motivated Strategies for Learning Questionnaire (MSLQ) survey. Both settings reported student achievement in the form of class grades. A detailed discussion of grades and the rationale for use as a formative assessment was presented in Chapter 2. For the present study, all grades were reported as numerical averages. Class grades for students in the classroom based setting were assigned using the district policy for grading. The final average is a percentage that represents a formative assessment based on a variety of accumulated grades and quantifies the academic progress of students over time.

Students in the online setting received grades for module activities. Mentors reported percentages for each module and calculated course totals. Assignments in the online classes are categorized into background activities and performances of understanding. Grades are assigned for activities exchanged between mentor and student,

but since there is no "class" the instructional process relies on the discussions surrounding submitted work. For that reason, background activities can be submitted numerous times, and grades can improve with each submission. Mentors assess the student's acquisition of knowledge based on the work submitted and their discussions of the content (Norton, 2005).

The second measure is the Virginia Standards of Learning (SOL) test. The SOL is administered after instruction is completed and is designed to measure how well students have mastered the curriculum objectives. A detailed description of the SOL test and the rationale for using the summative measure for the study were presented in Chapter 2. SOL tests were completed by all participants included in this study.

SOL test content is explained in blueprints which include curriculum standards divided into reporting categories. The blueprint also reports the number of objectives for each category and indicates any objective not tested. The reporting categories for each test used in the current study are listed in Appendix A.

SOL test development includes field testing items to obtain data used to calculate reliability and validity. Each course has five versions of the SOL test; each version has 10 field test items. This procedure allows developers to test for item reliability, test validity, and continuously update test item banks.

Scoring. The numbers of items on individual SOL tests vary among the subject areas. To allow for general comparison of performance on the tests across subject areas scaled scores (0-600) are calculated. Three categories are used for reporting scores: a) 0-399 fail; b) 400-499 pass proficient; and c) 500-600 pass advanced.

Survey Instrument

The Motivated Strategies for Learning Questionnaire (MSLQ) is a well-known measure for the constructs addressed in the current study. It specifically addressed two of the independent variables of the study- student motivation and learning strategy use. Originally designed in 1989 by researchers from the National Center for Research to Improve Postsecondary Teaching and Learning (NCRITAL) and the University of Michigan, it has been utilized in numerous studies and languages in settings that range from middle school to postsecondary classrooms worldwide (Pintrich & DeGroot, 1990; Duncan & McKeachie, 2005). Four questions were added to the survey requesting demographic information: age, grade in school, course content, and reason for enrolling in a summer class.

The MSLQ is a self-report instrument designed to assess students' motivation (in terms of goal orientation and self efficacy) and use of learning strategies (to include metacognitive activities and resource management). It is divided into two sections, motivation and learning strategy use, with fifteen scales available. The survey authors assert that the instrument can be used in its entirety or in part. Any of the subscales can be used individually without compromising the reliability of results (Pintrich, Smith, Garcia & McKeachie, 1991; Duncan & McKeachie, 2005).

The forty-two item survey used in the current study includes eight MSLQ scales in their entirety. The scales (detailed below) were selected based on their online learning situations that correspond with Roblyer and Marshall's (2003) findings in order to provide a basis for comparison that resonates with current research. The Motivation

Scales are based on three general constructs developed by Pintrich (1988a, 1988b, 1989): intrinsic motivation, extrinsic motivation, and self efficacy. The items were designed to assess student perceptions of control over their achievement as well as their perceptions of ways that effort affects outcome.

The motivation scales selected for the current study included:

1. Value Component: *Intrinsic Goal Orientation* items refer to a student's perception of the reasons for taking the class. Some reasons that represent this construct may include personal enrichment, to challenge themselves, out of curiosity, or the desire to master a new skill.

2. Value Component: *Extrinsic Goal Orientation* items refer to a student's perception of reasons for taking the class. Some reasons that represent this construct are grades, rewards or other normative comparisons. The task is a means to achieve other desired results.

3. Expectancy Component: *Self-Efficacy for Learning and Performance* measures two expectancies: the expectancy for success and self-efficacy. Success refers to the student's confidence in their skills to perform well in class while self-efficacy is an appraisal of their ability to do well in the class.

The Learning Strategies section includes items designed to assess a student's use of cognitive and metacognitive strategies as well as resource management. The following scales were selected for the current study:

1. Cognitive and Metacognitive *Elaboration* items assess the level to which student's use strategies to integrate and connect new information to prior

knowledge. Elaboration strategies include summarizing, paraphrasing, categorizing, and note taking.

2. Cognitive and Metacognitive *Organization* items assess the use of organizing strategies used while learning. These activities are a purposeful effort to connect ideas using clustering, outlining, and determining the main idea of reading passages. Organizing requires a high level of interaction with the content resulting in better performance.

3. Cognitive and Metacognitive *Critical Thinking* assesses students' use of prior knowledge and strategies to ask questions about their learning and apply that knowledge to solve problems or make evaluations in new situations.

4. Resource Management Strategies *Time and Study Environment* scale assesses the student's use of resources and time management strategies. Time management refers to scheduling and planning study time, to include the effective use of the scheduled time. Study Environment refers to the work area referring to elements that promote concentration and effective study.

5. Resource Management Strategies: *Effort Regulation* assesses the student's strategies for dealing with distraction and boredom. Students rate the level to which they are likely to continue working despite the difficulties involved. Effort management is connected to goal orientation and regulates the continued use of other learning strategies.

*Scoring. S*urvey items appeared as a statement with an ordinal scale of 0 to 7 and descriptors ranging from "not at all like me" to "very much like me." For each item,

students assess to what degree the statement describes them. Scores were calculated based on the value of the answer in each item, summed for a scale total. Scale totals were used to calculate an average score for the section. For example, totals for scales in intrinsic motivation, extrinsic motivation, and self efficacy were used for the motivation section average.

Validity. The survey authors offered construct validity evidence in the form of confirmatory factor analysis performed on the two sections of the MSLQ. The lambda estimates presented for the sections included in the present study range from .44 to .89 (The self-efficacy loadings are the most robust ranging from .63 to .89). The authors posited, "Overall, the models show sound structures, and one can reasonably claim factor validity for the MSLQ scales" (Pintrich et al, 1990). Criterion-related (predictive) validity evidence was presented in the manual as item and scale-level correlations with final course grade.

Program Descriptions

Both groups of students were taught by teachers licensed by the Commonwealth. In addition to state certification, TOA mentors have been certified to teach online based on their successful completion of courses in *The Online Academy for Teachers* (TOAT).

Traditional setting. Summer courses were offered by a district in a Northern Virginia suburb. Classes in the traditional setting ran from July 6, 2007 to August 13, 2007 for five hours each school day. The Standards of Learning test was administered on August 9, 2007.

Students were assigned by grade and subject to a classroom in one of three district

facilities. Chapter 2 featured a discussion of the practical and conceptual differences between a traditional and online environment. In general, the following observations were presented: the physical setting of a traditional classroom includes a teacher and a group of students from same grade level. Traditional environments rely heavily on a basal text. A program is developed by the teacher to present discreet facts or "chunks" of material and then checked for understanding. Sometimes referred to as programmed instruction or the efficiency model (Norton & Wiburg, 2003), pedagogy in a traditional classroom generally emphasizes individual learning, assignment completion, and test performance. Traditional environments can be places that promote mastery of concepts and entice students to engage in learning tasks. Programmed instruction is efficient and can be effective when a number of curriculum objectives must be presented and tested in a short period of time.

Online setting. The Online Academy (TOA) is a collaborative, multi-district project serving students in Virginia. Currently offering 13 high school courses, it is designed to supplement the traditional high school program. Courses were first available to students during the 2005-2006 school year.

In an effort to design instruction that is not a replication of traditional classroom practice, courses in *The Online Academy* are designed around the Community of Practice Learning System (COPLS). Designed and copyrighted by Norton (2003), COPLS is based on a constructivist, learner-centered pedagogy that is intended to use the online technologies in an innovative, effective way. The design offers an alternative to conventional learning system notions of 'class' and face-to-face instruction. In COPLS,

mentors and students work together using a variety of instructional materials to solve

content specific and community based (situated) problems. Mastery learning is promoted

by purposeful interaction between mentors and students and culminates in a performance

of understanding. TOA courses use the COPLS model to scaffold content into activities

and modules.

COPLS incorporates five key points taken from constructivist instructional

practices. First is the posing of problems of instructional relevance to students. In *The*

Online Academy, modules are based on a central problem known as "the challenge."

Situating the learning in a realistic context brings the content alive. Knowledge is no

longer "inert" ideas that simply exist, connected to nothing. "Relevance emerges with a

good problem" (Norton & Wiburg, 2003). Brown, Collins, and Duguid (1989) cite the

importance of knowledge that is applied in context and is readily transferred and applied

in other situations.

Second, TOA course content is organized into modules built around conceptual

clusters of information (Norton, 2006). A holistic presentation of content is intended;

students use multiple skills and understandings within the context of solving a central

problem. In this way, concepts and skills can be connected and mastered. Because each

module presents a distinct concept and part of the curriculum, each module is based on a

problem to be solved. The activities designed to teach the background knowledge are

applied in the performance of understanding at the conclusion of the module.

Third, students are active participants. Working one-on-one with their mentor,

they can share their understanding and views. Mentors are content experts and have a

unique opportunity to acknowledge the student's point of view, challenge the learner, and extend their thinking. Students are encouraged to ask questions. Waschull (2001) found that students were more likely to ask questions of their professor in an online class. Informal discussions with students and online mentors indicate the same tendency (personal communication, 2003-2007). In contrast to a traditional classroom where students may hold questions in fear that they will be perceived by their peers as "dumb," online students tend to take advantage of individualized attention from the instructor and ask their question. The result is an increase in questions from students. Wang, Newlin and Tucker (2001) found that the form and frequency of student communication is related to student performance. TOA courses are designed to encourage communication between mentor and student. Through TOAT, mentors are educated in directing and facilitating communication and participation by students in synchronous and asynchronous interaction.

The fourth point is closely related to the third. Constructivist design is rooted in personalized learning which includes the notion of adapting the curriculum to the student (Norton & Wiburg, 2003). Students bring beliefs based on their experience to learning. For learning to be meaningful, students need to see a clear connection to what they value. In the context of interaction with their mentor, students understand the relevance of the curriculum to their suppositions, questions, and prior knowledge (Norton, 2006).

Finally, assessment needs to values the cognitive functioning of students (Norton & Wiburg, 2003). Traditional assessment practices are too often based on simple recall of facts. In TOA, students demonstrate their understanding in a way that is related to the

context of the module; assessments are directly related to solving the central problem or meeting the challenge of the module. In this way, TOA modules follow the principles of constructivist pedagogy and promote content mastery.

TOA courses are intentionally designed so that instruction takes place while students and mentors interact throughout the course. Students access a variety of instructional resources (including outside experts) to research information or check their understandings. They address problems that face practitioners within professional communities of practice. Mentors support the learners by answering questions, offering advice, or challenging the student's thinking (Norton, 2005). For assessment purposes, TOA courses include performances of understanding. These activities require the students to apply the acquired knowledge in a variety of ways. As presented in Figure 4, COPLS is a design for instruction based on constructivist learning principles and used as a framework for all courses offered by *The Online Academy* (Norton, 2006).

Interaction of mentor and learner in The Online Academy
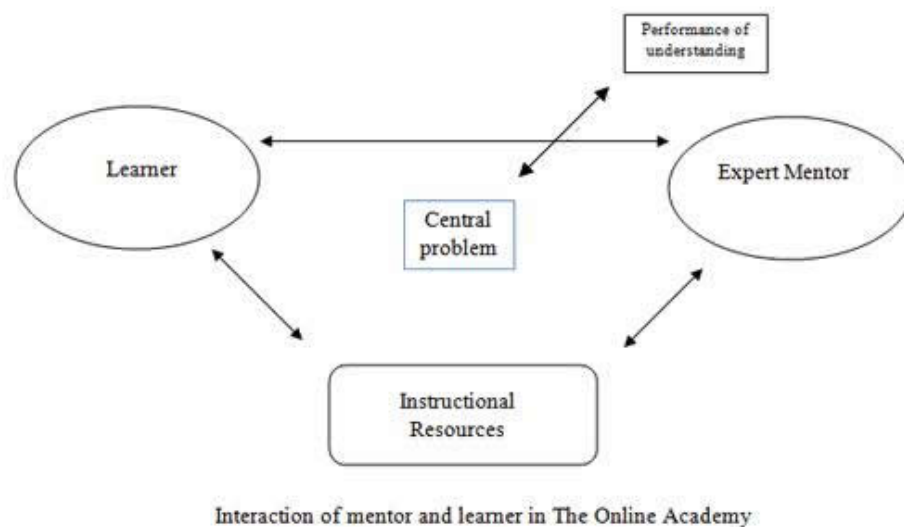
Figure 4. COPLS Design.
Diagram © Norton, 2003. Used with permission.

72

To explain the diagram, consider an example from a world history class. The topic of the module is international relations. The central problem is based on an actual situation in which an understanding of international relations is essential. Students take the role of advisers within the government agency USAID. Their task is to make recommendations to the agency for allocations of funds to third world countries. In order to solve the central problem and recommend an appropriate allocation of essential funds, students must research current information on third world nations, analyze economic data, and summarize their findings in a briefing paper. This problem-based approach challenges the students to access a variety of materials for research, gather, organize, and analyze data, then formulate and communicate a specific recommendation based on their understanding.

Mentors guide the students to access appropriate materials for research, answer questions during their analysis, acknowledge and challenge their thinking along the way, and assess the products produced by the student (Norton, 2005). The "problem," based in a real government agency and an actual function of the persons within that agency, allows the student to assume a role in a community of practice which lends credibility and meaning to the activity. In *The Online Academy,* instructional pedagogy using COPLS is intended to individualize instruction, promote content mastery, and use the capabilities of the Internet to provide an alternative to traditional classroom instruction (Norton, 2003).

Materials

Materials for courses were aligned with the Virginia Standards of Learning and included on the list of approved materials published by the Virginia Department of Education. Students in both settings were from the same school district and used the same basal texts for reference.

Traditional classroom setting. Textbooks and instructional materials were issued to students by the host school. Teachers within the traditional setting were responsible for instruction design and assessment of student progress. Teachers for the summer session were licensed by the Commonwealth of Virginia and employed by the school district.

Online setting. TOA course materials were incorporated into the web site and included detailed explanations, textbook references for all approved textbooks used in the Commonwealth, and external links to appropriate electronic materials. Most students obtained a textbook for reference from their base school. Mentor resources included suggestions for topic discussions, answer keys, grading rubrics, and suggestions for extending student thinking.

Design

The study employs a cross sectional survey research design intended to compare the attitudes and behaviors of two groups: students enrolled in traditional and online summer classes. A cross sectional survey design is used to examine current attitudes, beliefs, or practices of the sample (Creswell, 2005). Survey results provide information about student's motivation (defined in terms of goal orientation and self efficacy) and learning strategy use (defined in terms of metacognitive strategies and time and resource

management strategies) as they began their summer courses. Since there is no control group, it is non-experimental research that employs quantitative analysis and descriptive comparisons of two samples that will be used to identify trends in the data (Creswell, 2005).

This non experimental research included two independent samples of students enrolled in summer classes. The samples were compared using demographic information, MSLQ survey items and achievements data. T-tests were completed to produce a descriptive analysis of the two groups on motivation and learning strategy use (Gay & Airasian, 2000). The independent samples t-test was appropriate to compare the groups in this research because different participants were included in each group. Quantitative analysis included correlational comparisons of demographic, survey, and achievement data. This was completed in order to investigate the relationship among study variables (Gay & Airasian, 2000). Investigating the correlation among demographic data, motivation, learning strategy use, and achievement, and then comparing the results to the existing literature allowed the researcher to assess the theoretical constructs of the study and verify that the sample included in this study was similar to that reflected in the literature.

Procedures

Data collection, traditional setting. Students in the traditional setting were surveyed by the classroom teacher at the beginning of their summer course. Instructions for administration were included with the materials provided by the school district central office. The survey was untimed; students were not required to complete a survey. The

survey data from the three summer school sites was compiled in the district office with class grades. Approval to use the data was obtained from the school division (see Appendix B).

SOL achievement tests were administered to all students at summer school sites on August 9, 2007. SOL tests were untimed; students were tested in groups by subject. TOA students were included in the same SOL administration. Math SOL test materials include calculators, formula sheets, compass, protractor, scratch paper and pencil. SOL data for TOA students was provided to Dr Priscilla Norton by the school districts and made available to the researcher for the current study (see Appendix C).

Data collection, online setting. Online student surveys were included in the introductory module. Students had the option to choose to participate or skip the survey and proceed directly to the module activities. Students who chose to participate completed the survey page. Completed surveys were transmitted electronically to the Director. Achievement data for TOA students were recorded by mentors on electronic, password protected progress reports maintained on TOA servers. Reports included numerical averages for each module and class grades. The researcher requested the survey and achievement data from Dr. Priscilla Norton who gave the researcher access and permission for its use (see Appendix C).

Data entry notes. There are five survey items that are reversed; numbers 19, 27, 29, 40, and 41. Using an excel spreadsheet, the item responses were reversed and noted with a font color change. Cleaned data were pasted into SPSS.

Data Analysis

Data were entered into SPSS and analyzed descriptively using averages that provided an overview of student's achievement, motivation, and learning strategy use within each environment.

Question one asks "Is there a relationship between students' age, grade level, motivation, learning strategy use (as measured by the MSLQ), and academic achievement (as measured by class grade and SOL score)? This question is designed to investigate possible relationships among the 13 variables from the study: a) students' age, b) grade level, c) gender, d) intrinsic motivation, e) extrinsic motivation, f) self-efficacy, g) elaboration, h) organization , h) critical thinking, i) time management & study environment, j) effort management, k) class grade, and l) SOL score. According to Creswell (2005) a correlation can be used to describe the degree to which the variables are related in terms of a correlation coefficient. The Person Product Moment coefficient was calculated and described for each significant relationship discovered.

Question two asks "Do students' self-reported motivation and learning strategy use responses predict academic achievement as measured by class grade and SOL score?" To answer this question a multiple linear regression was constructed for each dependent variable: class grade and SOL score.

Multiple linear regressions are used to investigate and understand the relationships among variables and make predictions based on statistically significant models (Creswell, 2005; Field, 2005). In general, large samples are recommended to test the individual variables. For a regression to be of value, Field (2005) suggests a minimum

of 15 participants per variable. The current study included a small sample therefore three composite scores were used as opposed to the eight individual survey scales. The composite scores represent the average of the individual scales of the category. To calculate the motivation composite score, the average of intrinsic motivation, extrinsic motivation and self-efficacy scores was calculated in SPSS. In a similar manner, the metacognition composite was calculated using the elaboration, organization, and critical thinking scales. Finally the resource management composite was calculated based on the time and environment management and effort regulation scales.

Question three asks "Are there differences in students' self reported motivation, learning strategy use, and academic achievement between traditional and online learning environments?" To answer this question, two groups of students were compared on the following variables using independent samples t-tests: a) intrinsic motivation, b) extrinsic motivation, c) self-efficacy, d) metacognitive strategy use, e) resource management, f) class grade, and g) SOL score. The researcher recognizes the concern that multiple t-tests can increase the possibility of making a type one error (Hinkle, et al., 2003). The series of t-tests is preferable because of the unequal sample sizes. Homogeneity of variance based on large samples is an important assumption for conducting an Analysis of Variance (ANOVA); since that is not the case, the t-test was considered to be the most appropriate test to answer question three.

Two groups of learners were compared in this study, Thirty one students studied in the traditional setting, and twenty students completed an online class. A cross sectional survey design was developed to compare the impact of motivation and learning strategy

use on achievement in the two learning environments.

4. Results

This chapter presents the results of the statistical analysis conducted to investigate three research questions. Results from the first two tests, a correlation analysis and a regression analysis, were used to confirm that the sample was representative of the population. The findings provided evidence that increased confidence in the generalizability of study results. The final section presents results from the third test that investigated the differences between the groups. T-test analysis revealed higher class grades for the online group, and points to two major attributes of online learners that contributed to their successful course completion.

Correlation overview. The first research question of the study asked, "Is there a relationship between students' age, grade level, motivation, learning strategy use (as measured by the MSLQ), and academic achievement (as measured by class grade and SOL score)?" To investigate the question, a correlational analysis was conducted using a Pearson Product Moment correlation for thirteen variables. The first three were demographic: age, grade level, and gender. Next were eight survey scales: intrinsic motivation, extrinsic motivation, self-efficacy, elaboration, organization, critical thinking, time and study environment management, and effort regulation. The final two variables

were achievement data: class grades and SOL score. The inferential analysis will be described in terms of the strength of the relationship between variables (Field, 2005). Three descriptors appear in the following explanation. Strong correlations refer to those $\pm$ .5 and larger, medium correlations refer to those between $\pm$.3 and $\pm$.4. Table 6 displays the correlations among the variables.

Table 6

Correlations among the Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	-												
2. Grade level	.79**	-											
3. Gender	-.17	-.08	-										
4. Intrinsic Motivation	-.29*	-.21	.11	-									
5. Extrinsic Motivation	-.17	-.13	.04	.57**	-								
6. Self Efficacy	-.53**	-.32*	-.12	.62**	.25	-							
7. Elaboration	.11	.15	.07	.08	.15	.09	-						
8. Organization	.15	.22	.10	.47**	.55**	.26	.55**	-					
9. Critical Thinking	.23	.11	.02	.20	.23	.14	.64**	.44**	-				
10. Time & Study Env. Mgt	-.24	.02	-.13	.42**	.34**	.54**	.08	.33*	-.12	-			
11. Effort Regulation	-.02	-.07	-.17	.43**	.32*	.29*	-.06	.27	-.08	.39**	-		
12. Class Grade	-.42**	-.34*	-.03	.39**	.06	.46**	.01	-.00	-.17	.27	.16	-	
13. SOL Score	-.32*	.22	.10	.14	-.01	.18	.07	-.04	-.26	-.09	-.04	.50**	-

*p< .05. **p< .001.

82

Achievement variables class grade and SOL score were strongly correlated ($r=$ .50, $p<.001$). Additionally, correlations between variables within the motivation scales were strong and statistically significant. For example, intrinsic motivation and extrinsic motivation ($r=.57, p< .001$) and intrinsic motivation and self-efficacy ($r=.62, p< .001$) were strongly and statistically significant correlations. Learning strategy scales were strongly correlated. For example, elaboration and organization ($r= .55, p< .001$) and elaboration and critical thinking ($r= .64, p< .001$) were strongly and statistically significant correlations. A strong correlation was noted between extrinsic motivation and organization ($r= .55, p<.001$). A final observation is a strong negative correlation between age and self-efficacy ($r= -.53, p< .001$).

A medium yet significant correlation was observed between groups on intrinsic motivation with organization ($r= .47, p< .001$), intrinsic motivation with time and environment management ($r= .42, p< .001$), intrinsic motivation with effort regulation ($r= .43, p< .001$), extrinsic motivation with time and environment management ($r= .34$, $p< .001$), and extrinsic motivation with effort management ($r= .32, p< .05$).

A moderate correlation was observed between class grade and intrinsic motivation ($r= .39, p< .001$) and class grade with self-efficacy($r=.46, p< .001$). In addition, medium but significant negative correlations were noted between age and class grade ($r= -.42$, $p< .001$), age and SOL score ($r= -.32, p< .05$), and grade level and class grade($r= -.34$, $p< .05$).

In sum, strong correlations were noted among survey scales, particularly the motivation scales. Strong correlations were also observed between the achievement

measures class grade and SOL score. Medium yet significant correlations were observed

between survey scales and achievement, see table 6. These results confirm prior

research and support the rationale that the results generated from this sample represent

the larger population and therefore support generalization of the results.

Regression analysis. Research question two asks, "Do students' self-reported

motivation and learning strategy use predict academic achievement as measured by class

grade and SOL score?" The appropriate test to evaluate this question is a multiple linear

regression for each dependent variable. For the current study, a small sample necessitated

the use of three composite scores as opposed to the individual survey scales. Using the

composite scores, two regressions were tested - one for each dependent variable. The

results of the regression based on class grade are summarized in Table 7.

Table 7

Regression Analysis with Class Grade as the Outcome Variable

Variable	R^2	ΔR^2	F	Sig ΔF	β	t	p
Model	.22	.22	3.99	.01*			
Motivation composite					.47	2.63	.01*
Metacognition composite					-.27	-1.74	.09
Resource Mgt composite					.09	.56	.58

*p<.05

The regression analysis shows that the model is statistically significant, $F(3,45)=3.99$, $p<.05$. The most potent predictor of class grades was the motivation composite explaining 47 percent of the variance.

The second regression analysis tested the ability of the MSLQ composite scores to predict SOL scores. The analysis reveals no statistical significance for the model $R^2=.30$, $F(3,45) =1.43$, $p = .25$.

T-test analysis. Two questions were formulated to investigate the differences between groups. The first asked "Are there differences in students' self reported motivation and learning strategy use between traditional and online learning environments?" To answer the question, independent samples t-tests were conducted on each of the eight scales surveyed to determine if there were significant differences in students' reported motivation and learning strategy use.

Levine's tests were used to check for homogeneity of variances. The results showed that equal variances could be assumed on two variables: intrinsic motivation and self-efficacy. In the t-test results, two scales showed a statistically significant difference between the groups. Self-efficacy was higher in the online group ($M= 6.21$, $SD =.55$) than for the traditional group ($M= 5.32$, $SD=1.02$); $t(48) = -3.48$, $p < .001$, Reported time and study environment management was higher for the online group ($M= 4.90$, $SD=.71$) than for the traditional group ($M=4.40$, $SD=.85$); $t(46)= -2.28$, $p<.05$. Table 8 presents the descriptive statistics and t-test results.

Table 8

Independent Samples t-test on Survey Responses

Variable	Traditional		Online			
	M	*SD*	*M*	*SD*	*t*	*p*
Intrinsic Motivation	5.00	1.10	5.09	.76	-.29	.77
Extrinsic Motivation	5.90	1.01	5.87	1.00	.12	.91
Self-Efficacy	5.32	1.02	6.21	.55	-3.48	.001**
Elaboration	4.38	.91	4.39	1.06	-.12	.99
Organization	4.47	1.08	4.18	1.27	.81	.43
Critical Thinking	4.78	.78	4.44	1.00	1.29	.20
Time & Study Env Management	4.40	.85	4.90	.71	-2.28	.03*
Effort Regulation	4.26	.83	3.96	.69	1.37	.18

*p< .05, two tailed. **p<.001, two tailed.

The second research question investigating differences between groups asked "Are there differences in students' achievement as measured by class grade and SOL scores between traditional and online learning environments?" To answer this question, independent samples t-tests were conducted to investigate differences between groups on achievement variables. Levine's test for homogeneity of variance was significant for class grades but not for SOL score. Therefore, equal variances were assumed only for the variable class grades. Table 9 presents descriptive data and t-test results.

Table 9

Independent Samples t-test Results on Class Grade and SOL Score

Variable	Traditional		Online			t	p
	M	*SD*	*M*	*SD*		*t*	*p*
Class Grade	86.13	11.96	93.90	6.42		-2.66	.01*
SOL score	457.29	77.46	479.55	67.1		-1.09	.28

*p< .05, two tailed.

Class grade measures showed a statistically significant difference between traditional and online students. Online students (*M*= 93.90, *SD* =6.42) outperformed traditional students (*M*=86.13, *SD* =11.96); *t*(49) = -2.66, *p*< .05.

SOL scores were not found to be significantly different between the groups. However, online students (*M*=479.55, *SD* =67.1) scored higher than students in the traditional setting (*M*=457.29, *SD* =77.46); *t*(45)=.-1.09, *p*=.28.

Conclusion

The chapter presented the findings of three research questions. A correlational analysis of the study variables confirmed a strong correlation among some study variables particularly the metacognitive and motivation scales. A strong negative correlation was observed between age and class grades. The analysis also revealed a moderate correlation between motivation composite scores, learning strategy composite scores, and achievement as measured by class grades and SOL score. Two regression

models were developed using the composite scores of the MSLQ and the achievement variables class grade and SOL scores. Model 1 (composite scores and class grade) was statistically significant $R^2=.22$, $F(3,45) = 3.99$, $p<.05$.

The t-tests confirmed that the participants reported similar assessments of motivation and learning strategy use. Two of the variables were significantly different between the groups: self-efficacy, $t(48) = -3.48$, $p < .001$, and time and study environment management $t(46)= -2.28$, $p<.05$. Further t-tests indicated that there is a statistically significant difference in achievement scores among the groups in terms of class grade $t(49) = -2.66$, $p< .05$. The results identified two variables that contributed to the differences in class grades: self-efficacy and time and study environment management.

5. Discussion

Summary

The purpose of the study was to investigate and compare the motivation, learning strategy use, and achievement of classroom based and online students to describe differences and interpret the role of motivation and learning strategy use in online learning. Fifty one participants were included from two educational settings: thirty-one were from a traditional, classroom based setting and twenty were from an online course. All students were enrolled in one of three math courses: Algebra 1, Algebra 2, or Geometry.

Eight scales from the *Motivated Strategies for Learning Questionnaire* were administered to students in both environments to assess motivation and learning strategy use. Other data collected were achievement scores: class grade and SOL test scores. Correlation analysis and regression analysis of sample responses confirmed the role of motivation in academic achievement and that the sample results showed patterns similar to that of the larger population as reflected in the literature. The investigation proceeded with a comparison of the two groups within the sample.

A series of t- tests were conducted to compare the groups. Results indicated that online students reported significantly higher self efficacy and time management skills and that these constructs contributed to a significant difference in class grade and SOL score. Further, these constructs may be useful to identify students who may need support to successfully complete an online class. The results are informative for educators who teach or design online classes and those who advise students considering online learning opportunities.

Conclusions

A correlation analysis was conducted using student demographic data, survey scales, and achievement data to describe relationships among the study variables. The results revealed that achievement measures were related to motivation, particularly self-efficacy and intrinsic motivation. Strong correlations were observed between the survey scales, particularly the motivation scales, and between class grade and SOL score. These results reveal no differences between the study sample and the population represented in the literature (Pintrich & DeGroot, 1990, Wadsworth, et al., 2007, Stevens, et al., 2004).

To confirm the correlation analysis and investigate the sample as a group, a regression analysis was conducted using survey composite scores and achievement scores. The first regression model was significant and accounted for twenty-two percent of the variance in class grades. Motivation composite scores were the largest unique contribution to the model, underscoring the importance of motivation in the study results. The second regression using composite scores and SOL test results was not significant. However, motivation once again provided the highest unique contribution to the

explanation of the variance in SOL scores. The analysis offered evidence that motivation was an important variable to explain achievement. Even though the regression was significant, it only accounted for twenty-two percent of the variance in academic achievement.

A series of t-tests were conducted to investigate differences between groups. Motivation scales: intrinsic motivation, extrinsic motivation, and self –efficacy and Learning Strategy Scales: Organization, Elaboration, Critical Thinking, time and study environment management and effort regulation were compared as well as two achievement variables: class grade and SOL score. Students reported similar goal orientations and use of learning strategies. For example, neither intrinsic motivation nor extrinsic motivation was significantly different between the groups. Learning strategy scales were also similar. Elaboration, organization, critical thinking, and effort management were not significantly different between groups. These results indicate that the groups were similar in most ways.

Test results showed a significant difference between the groups on two scales. Self-efficacy and time and environment management were significantly higher in favor of the online group. In terms of achievement, the online students outperformed the traditional students on both measures. Class grades were significantly higher in favor of the online group. While the difference in SOL scores was not significant, the online group was higher.

Discussion

The study included a small sample of math students. To determine if the sample could represent the population and provide meaningful data, a correlation analysis was conducted to assess relationships in the data to see if those relationships were similar to those identified by the literature. The survey results from the sample showed correlations that resemble those from the literature. Within the survey scales, the motivation scales were strongly correlated. For example, strong correlations were observed between intrinsic motivation and self-efficacy. This finding is supported by research that suggests intrinsic motivation builds a sense of autonomy (Ryan & Deci, 2000) that can impact a student's self efficacy. The relationship among the motivation scales of the survey confirms the important role of self-efficacy as a component of motivation. The analysis showed patterns similar to that of the larger population (Pintrich & DeGroot, 1990, Wadsworth, et al., 2007, Stevens, et al., 2004), lending evidence to support the generalizability of the current results.

Results of the t-tests revealed that eleven of the thirteen scales showed no significant difference between groups. This is an important finding because the students who selected the online setting were not a vastly different group in terms of intrinsic or extrinsic motivation or in terms of elaboration, organization, critical thinking or effort regulation. They approached their course with similar goal orientation and similar reported use of learning strategies.

However, the class grades achieved were significantly different in favor of the online students. SOL scores while not significantly different were higher in the online group. The evidence from the study that might explain the difference in class grades for

the online students were the two scales that were significantly different in favor of the online students: self-efficacy and time and environment management skills.

Self-efficacy has an impact on students during all phases of the learning process. The study results confirm a correlation between self- efficacy and achievement. Online students reported significantly higher levels of self-efficacy and outperformed the traditional group in both academic measures. This finding indicates the importance of self efficacy in academic achievement and is confirmed by the research that suggests students who are confident in their academic ability set higher goals and persist at learning tasks (Pintrich & DeGroot, 1990; Bandura, 1993; Mills, Pajares, & Herron, 2007).

The study results suggest that self-efficacy is important for success in online classes. Academic self- efficacy was identified as an important attribute of successful online learners (Waschull, 2005; Roblyer, 2005) that can help students with interpreting assignments and expectations. Uncertainty is a barrier to online students' success (Muilenberg & Berge, 2005), self-efficacy promotes the willingness to take appropriate risks and forge ahead in learning tasks.

Time management for pacing is important in learning. Completing coursework in a timely manner is essential to achievement, but it was of critical importance in the relatively unstructured (Roblyer, 2005) environment of online learning (Besich, 2005; Elvers, et al., 2003). Students able to avoid the temptation to procrastinate due to flexible time limits and overcome other obstacles posed by asynchronous communication such as a lack of immediacy did well in their online course (Summers, et al., 2005; Elvers, et al., 2003; Wang & Newlin, 2000). The findings of this study suggest that the online students

were better able to manage their time and get the coursework completed on a schedule. Online students stronger scores related to this attribute likely contributed to their success in the online environment.

The study findings are further supported by the literature that suggests that students who are self-efficacious use strategies to manage their time and study environment to complete tasks (Pintrich & DeGroot, 1990). All of the students in this study were enrolled in a math course. Literature suggests that self-efficacy is domain specific (Bong, 2004) and can be influenced by context (Bandura, 1993; Schunk & Zimmerman, 1997). The current results can be interpreted to underscore the importance of self-efficacy and time and environment management in the successful completion of an online math course. The results are supported by the findings of Wadsworth, et al. (2007) who also determined that self-efficacy was a major contributor to the academic success of online math students.

This study underscores the importance of two variables for academic achievement. Teachers should scaffold activities to build in success, boost self-efficacy, and promote achievement as well as offer informative, timely feedback (Shah & Kruglanski, 2000), encouragement (Schunk, 1991), and the opportunity to reflect on learning to foster self-efficacy (Zimmerman, et al., 2002). Additionally, for any given task, learners need an extensive repertoire of strategies from which to select (Wadsworth, et al., 2007). To promote the use of learning strategies, educators need to provide direct instruction to intentionally increase the number of strategies available to students, particularly those strategies to manage time and study environment.

Online courses can serve students in many ways. All students who desire the opportunity should be allowed to enroll in online courses. Surveys are useful to identify the needs of the learner so that educators can provide the necessary instruction and resources to help all be successful. Educators should take advantage of the opportunity to rethink instructional design using technology effectively to build in success, develop student efficacy for learning and teach strategies for effectively using their time and environment for academic achievement.

The regression analysis was constructed using composite scores for motivation, metacognitive strategies, and resource management. Composite scores were used for the regression analysis to limit the number of variables appropriate for the sample size. The results indicated that the model using survey composite scores and class grades was significant; the construct with the highest unique contribution to the model was motivation. The results confirmed the importance of motivation in academic achievement. However, the model accounted for only twenty-two percent of the variance in class grade.

The regression model explained little of the variance in class grades and suggests the probability that other factors contributed to the success of the online students. The different approaches to instruction should be considered as a possible factor that accounted for the difference in achievement. The online design included two components that could impact student achievement and may improve the motivation of students as well. The first design component to consider is the role of the mentor in *The Online Academy*. The mentor provides content expertise and individual attention to students.

Mentors challenged the learners with probing questions to extend their thinking as they worked with the materials in TOA courses. Another benefit of the individual relationship with a mentor was quality feedback about their performance which the literature suggests is essential to inform self-efficacy (Schunk, 1991; Bandura, 1993). The online students had constant access to their mentors and progress reports that were frequently updated. Grades, available to the students through the progress reports, provided a specific type of feedback that helped student monitor progress (Haladyna, 1999) which research suggests promotes motivation (Shah & Kruglanski, 2000).

The second component that was used in the online setting was a problem based design. Situating learning in an authentic problem placed the focus for learning on collaborative interaction and solutions; the students were actively involved in the course. Students learned content as they worked toward a solution with their mentor. The content was learned because it was requisite to solve the problem. Learning in this way was contextual, situated, and meaningful. The design shifts the focus away from programmed instruction, worksheet, and lecture to interactive problem solving and application of knowledge (Norton, 2003).

Limitations

The primary limitation for this study is sample size. Using a convenience sample from one virtual high school and one district wide summer program provides some information that may be helpful for understanding this population of high school students. Also, due to the availability of complete data sets, the study was limited to math students. The value of the study is that it investigates and compares attributes from a

select sample, and it identifies areas for further investigation with larger populations. The results need to be tested again with larger samples and other content areas.

The next concern is the number of confounding variables related to the traditional setting. The sample was limited to reduce the influence of some of the variables including course content, reason for taking the class, and age. Data were collected by the school division; no classroom contact was available to the researcher. It is not possible to describe all of the variations in instruction and assessment methods used by each of the individuals. The consistency that can be assumed is the curriculum standards taught were based on the Virginia SOL and assessed by the same end of course test.

Recommendations for practice

Instructors in an online environment face challenges that arise from the need to interact differently with students. A mentor and student should forge a different kind of relationship than that found in a traditional classroom; the online relationship depends on regular and persistent reciprocity. Mentors acculturate learners so that the different expectations of the environment are understood, students must understand that their role is to be an active participant in the learning process. Characteristics of an effective mentor include one who will support and guide learners. Norton (2005) suggests the importance of listening, questioning, and enabling. These are mentor qualities on which productive relationships can be built.

This study confirms that successful online students are more self efficacious; mentors need to be equipped to support students in a way that develops self-efficacy. One technique is to provide feedback at all phases of the learning process. While setting goals

and anticipating learning tasks, mentors can offer suggestions for success and affirm plans offered by students. During the learning process, feedback should be provided to reinforce progress and suggest ways to correct errors. Mentors can interact with individuals and small groups as appropriate to ask questions, discuss results, and encourage reflection.

Results of the study emphasize the need for practitioners to teach and encourage time management skills to facilitate systematic, meaningful learning. All participants (students and instructors) should be provided with aids that include pacing estimates for assignment completion. In an individual mentoring situation, students and mentors negotiate and plan assignment due dates as part of preparation for learning. Meaningful dialog with the mentor and clear expectations and time estimates will assist students to plan for success. Designs that include a class assigned to a teacher need pacing instructional aids as well. Where classes move on a pre-determined schedule, planning appropriate amounts of study time is a key component of successful course completion. The pacing guides and discussions with a teacher can help a student plan appropriate amounts of study time and grasp the commitment required by the online course. Additionally, students should be encouraged to use pacing estimates to establish specific daily learning goals. Armed with that information, students can determine an appropriate the length of time to set aside for coursework.

Suggestions for online course developers point to designs that include purposeful scaffolding of activities that build in success and foster self-efficacy. Content should be arranged in meaningful portions and introduced in the context of representative problems

(Norton, 2003). Systematic introduction of background material in a manner that allows students to see the connection between concepts in a unit is of great importance for information transfer. It is successful understanding and application of content that promotes a sense of success and self- efficacy.

Designers should include tools to provide informative, systematic feedback. Class calendars of assignments can be a starting place for planning. Learning journals offer a place for private reflection on progress; instructors can comment and offer suggestions. Threaded discussions to foster group conversation and peer review (based on an evaluation rubric) may also serve to offer constructive feedback for participants.

The systematic scaffolding of content and informative and frequent feedback will promote self-efficacy. Pacing guides and instructional aids for planning study and assignment completion will assist students to develop the time management expertise important for timely course completion.

Recommendations for Research

The study should be repeated to include a larger sample as well as more subject areas. A cross sectional survey design was appropriate for the available data sets and provided some interesting results, yet it may be helpful to measure the levels of motivation during the course as well. Research studies (Bong, 2004; Kaplan & Midgley, 1997) indicate motivation levels change throughout the course, and differ across subject areas. Data on ways that motivation fluctuates during a course can be informative, illustrating ways that feedback and instruction impact self efficacy.

Although test results support the conclusion that motivation is important to achievement, attention should shift from a single focus on student characteristics to one that is broader. Research needs to include thoughtful consideration of learning environments and design. Online environments present the opportunity to "reconceptualize instruction" (Norton, 2006) in terms of using technology to promote content mastery. The current study did not assess the impact of design or environment on student achievement. Designs based on constructivist pedagogy such as the COPLS model (Norton, 2003) should be compared in meaningful ways with designs based on behaviorist pedagogy (Norton & Wiburg, 2003) to determine how designs impact student achievement.

Research on learning environments can also be directed toward an understanding of how design impacts motivation. Students can be surveyed at intervals during the course to attain their perceptions of various aspects included in course design. Their reactions and evaluations of the impact on motivation could be informative for all stakeholders. Programming a series of short surveys that appear as students reach certain points in the course would allow researchers to assess students at the same point in the course and allow for substantive comparisons among students and courses.

The chapter included a discussion of the implications of the current results specifically the importance of self-efficacy and time management for successful completion of online courses. Implications for practitioners and designers were presented and included suggestions for promoting self-efficacy and time management skills to support online learners. Questions remain about the online learning environment and

those who choose to participate in it. Research is needed to understand the interactions

between participants as well as ways that technology can promote effective course

delivery and take full advantage of the potential offered by online learning.

Appendix A.

Standards of Learning Test Reporting Categories

Test Name	Reporting categories	Items
Geometry	Lines and Angles	11
	Triangles and Logic	12
	Polygons and Circles	10
	Three-Dimensional Figures	06
	Coordinate Relations and Transformations	06
Algebra 1	Expressions and Operations	12
	Relations and Functions	12
	Equations and Inequalities	18
	Statistics	08
Algebra 2	Expressions and Operations	10
	Relations and Functions	16
	Equations and Inequalities	10
	Analytical Geometry	06

Appendix B

Loudoun County Public Schools
Department of Instruction
Research Office
21000 Education Court
Ashburn, Virginia 20148
Telephone: 571-252-1310
FAX: 571-252-1633

TO: Priscilla Norton

FROM: Sharon Ackerman, Assistant Superintendent for Instruction
           Stephan Knobloch, Ed.D., Research Supervisor

RE: Research Request

Date: June 15, 2007

Your request to conduct a study of successful online learners during our summer school program has been approved.

As a courtesy to Loudoun County Public Schools and the participants in your research, please provide a copy of your study and subsequent findings to the Research Office.

Contact Stephan Knobloch, Research Supervisor, if you have any questions.

Good luck with your project.

Cc: Barbara Nichols
       Dr. Mary Ann Hardebeck

Appendix C

May 15, 2008
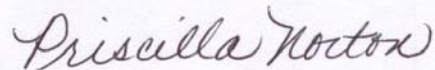
Dear HSRB Review Board:

During the Summer of 2007, we collected extensive data on our virtual high school students as part of our general assessment program. Data consisted of demographic information, responses to the Motivated Strategies Toward Learning Questionnaire, final grade, and SOL scores for all students enrolled in a virtual high school courses during the Summer of 2007.

Barbara Daniels has permission to use that data set as part of her dissertation study. We are anxious to learn of her results. We are hopeful that those results will help inform the ways in which we prepare high school students for online learning.

If I may be of further assistance, please feel free to contact me.

Sincerely,

Priscilla Norton

Priscilla Norton, Director
The Online Academy
703-993-2015
pnorton@gmu.edu

A Virtual High School Collaborative Frederick, Loudoun, Stafford County Public Schools and George Mason University

Frederick County
Public Schools
- to ensure all students
an excellent education

The Online Academy
4400 University Drive, MSN 5D6
Fairfax, VA 22030
703-993-2015

104

Appendix D

Student Survey

Thank for agreeing to participate in this survey. It should take approximately 10 minutes to answer all of the questions. Fill in the bubble for each answer as darkly as possible. Please use a pencil or pen- no markers or highlighters.

Age: ○ 13 or younger ○ 14 ○ 15 ○ 16 ○ 17 ○ 18 or older   **Gender:** ○ Male ○ Female

2006-2007 Grade Level: ○ 9 ○ 10 ○ 11 ○ 12

Summer School Course:

(Fill in the bubble for each class that you are taking.)

○ English 9
○ English 10
○ English 11
○ English 12
○ World History Part 1
○ World History Part 2
○ US and VA History
○ US Government
○ Driver's Education

○ Algebra 1, Part 1
○ Algebra 1, Part 2
○ Algebra 1
○ Algebra 2
○ Geometry
○ Earth Science
○ Biology
○ Chemistry

Reason for taking course (answer all that apply): ○ Failed a class ○ Failed an SOL ○ Desire to repeat ○ New credit

Directions: Please respond to the following items. Fill in one bubble for each question to indicate how well the statement describes you.

	Not at all true of me					Very true of me	
	1	2	3	4	5	6	7
1. In a class like this, I prefer course material that really challenges me so I can learn new things.	○	○	○	○	○	○	○
2. I believe I will receive an excellent grade in this class.	○	○	○	○	○	○	○
3. I'm certain I can understand the most difficult material presented in the readings for this course.	○	○	○	○	○	○	○
4. Getting a good grade in this class is the most satisfying thing for me right now.	○	○	○	○	○	○	○
5. The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.	○	○	○	○	○	○	○
6. I'm confident I can learn the basic concepts taught in this course.	○	○	○	○	○	○	○
7. If I can, I want to get better grades in this class than most of the other students.	○	○	○	○	○	○	○
8. I'm confident I can understand the most complex material presented by the instructor in this course.	○	○	○	○	○	○	○
9. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.	○	○	○	○	○	○	○
10. I'm confident I can do an excellent job on the assignments and tests in this course.	○	○	○	○	○	○	○
11. I expect to do well in this class.	○	○	○	○	○	○	○
12. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.	○	○	○	○	○	○	○
13. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade.	○	○	○	○	○	○	○
14. I'm certain I can master the skills being taught in this class.	○	○	○	○	○	○	○
15. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.	○	○	○	○	○	○	○

8950208608

	Not at all true of me					Very true of me	
	1	2	3	4	5	6	7
16. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.	O	O	O	O	O	O	O
17. When I study the readings for this course, I outline the material to help me organize my thoughts.	O	O	O	O	O	O	O
18. I usually study in a place where I can concentrate on my course work.	O	O	O	O	O	O	O
19. I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do.	O	O	O	O	O	O	O
20. I often find myself questioning things I hear or read in this course to decide if I find them convincing.	O	O	O	O	O	O	O
21. When I study for this course, I go through the readings and my class notes and try to find the most important ideas.	O	O	O	O	O	O	O
22. I make good use of my study time for this course.	O	O	O	O	O	O	O
23. When a theory, interpretation, or conclusion is presented in this course, I try to decide if there is good supporting evidence.	O	O	O	O	O	O	O
24. I work hard to do well in this class even if I don't like what we are doing.	O	O	O	O	O	O	O
25. I make simple charts, diagrams, or tables to help me organize course material.	O	O	O	O	O	O	O
26. I treat the course material as a starting point and try to develop my own ideas about it.	O	O	O	O	O	O	O
27. I find it hard to stick to a study schedule.	O	O	O	O	O	O	O
28. When I study for this class, I pull together information from different sources.	O	O	O	O	O	O	O
29. When course work is difficult, I either give up or only study the easy parts.	O	O	O	O	O	O	O
30. I try to relate ideas in this subject to those in other courses whenever possible.	O	O	O	O	O	O	O
31. When I study for this course, I go over my class notes and make an outline of important concepts.	O	O	O	O	O	O	O
32. When reading for this class, I try to relate the material to what I already know.	O	O	O	O	O	O	O
33. I have a regular place set aside for studying.	O	O	O	O	O	O	O
34. I try to play around with ideas of my own related to what I am learning in this course.	O	O	O	O	O	O	O
35. When I study for this course, I write brief summaries of the main ideas from the readings and my class notes.	O	O	O	O	O	O	O
36. I try to understand the material in this class by making connections between the readings and the course activities.	O	O	O	O	O	O	O
37. I make sure that I keep up with the readings and assignments for this course.	O	O	O	O	O	O	O
38. Whenever I read or hear a claim or conclusion in this course, I think about possible alternatives.	O	O	O	O	O	O	O
39. I attend this class regularly.	O	O	O	O	O	O	O
40. Even when course materials are dull and uninteresting, I manage to keep working until I finish.	O	O	O	O	O	O	O
41. I often find that I don't spend very much time on this course because of other activities.	O	O	O	O	O	O	O
42. I rarely find time to review my notes or readings before an exam.	O	O	O	O	O	O	O
43. I try to apply ideas from course readings in other class activities.	O	O	O	O	O	O	O

106

Appendix E

GEORGE MASON UNIVERSITY

Office of Research Subject Protections

Research 1 Building
4400 University Drive, MS 4C6, Fairfax, Virginia 22030
Phone: 703-993-4121; Fax: 703-993-9590

TO: Priscilla Norton, College of Education and Human Development

FROM: Sandra M. Sanford, RN, MSN, CIP
Director, Office of Research Subject Protections

PROTOCOL NO.: 5896   Research Category: Doctoral Dissertation

TITLE: Motivation, Academic Success, and Learning Environments: Comparing High School face-to-face and Online

DATE: June 19, 2008

Cc: Barbara Daniels

On 6/18/2008, the George Mason University Human Subjects Review Board (GMU HSRB) reviewed and approved the above-cited protocol following expedited review procedures.

Please note the following:

1. **Any modification to your research (including the protocol, consent, advertisements, instruments, etc.) must be submitted to the Office of Research Subject Protections for review and approval prior to implementation.**
2. Any adverse events or unanticipated problems involving risks to subjects including problems involving confidentiality of the data identifying the participants must be reported to Office of Research Subject Protections and reviewed by the HSRB.

The anniversary date of this study is 6/17/2009. **You may not collect data beyond that date without GMU HSRB approval.** A continuing review form must be completed and submitted to the Office of Research Subject Protections 30 days prior to the anniversary date or upon completion of the project. A copy of the continuing review form is attached. In addition, prior to that date, the Office of Research Subject Protections will send you a reminder regarding continuing review procedures.

If you have any questions, please do not hesitate to contact me at 703-993-4015.

REFERENCES

REFERENCES

Arkansas state code HB2481 accessed online May 9, 2008
   http://www.rsa.state.al.us/Legislation/Archives.htm#2007_Regular_Session.

Alderman, M. K. (2004). *Motivation for Achievement. Possibilities for Teaching and
   Learning* (2nd Ed.) Mahwah, NJ: LEA.

Ames, C. (1992). Classrooms: goals, structures and student motivation. *Journal of
   Educational Psychology, 84*, 261-271.

Ames, C. & Archer, J. (1988). Achievement goals in the classroom: student's learning
   strategies and motivational processes. *Journal of Educational Psychology*, *80*,
   260-267.

Anderson, A., Augenblick, J., DeCesore, D., & Conrad, J. (2006). Costs and funding of
   virtual schools: An examination of the costs to start, operate and grow virtual
   schools and a discussion of funding options for states interested in funding virtual
   school programs. Retrieved Feb 22, 2007,
   http://www.apaconsulting.net/Flash/papers/Costs&Funding.pdf.

 Aragon, S.R., Johnson, S.D., and Shaik, S. (2002). The influence of learning style
   preferences on student success in online versus face-to-face environments.
   American Journal of Distance Education, 16, 227-243.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist
   37*,122-147.

Bandura, A.(1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist*, *28*(2), 117-148.

Bandura, A. (1997). *Self-Efficacy: The Exercise of Control*. New York: Freeman.

Besich, M.A. (2005). Learning tactics of successful online learners. DAI, 66, 01A, UMI No. 3161803.

Beyth-Mayrom, R., Saporta, K., & Caspi, A. (2005). Synchronous vs. asynchronous tutorials: factors affecting students' preferences and choices. *Journal of Research on Technology in Education, 37*, 245-262.

Boekaerts, M and Niemivirta, M. (2000). Self-regulated learning: Finding a balance between learning goals and ego related goals. In Boekaerts, M., Pintrich, P.R., & Zeidner, M.H. (Eds.) *Handbook of Self-Regulation* (pp 417-451). San Diego: Academic.

Boekaerts, M., Pintrich, P.R., & Zeidner, M.H. (Eds.) (2000). *Handbook of Self-Regulation*. San Diego: Academic.

Bong, M. (2004). Academic motivation in self-efficacy, task value, achievement goal orientations and attributional beliefs. *Journal of Educational Research, 97*, 287-297.

Bong, M., & Clark, R. (1999). Comparison between self- concept and self-efficacy in academic motivation research. *Educational Psychologist*, *34*(3), 139-153.

Brookhart, S.M. & Durkin, D.T. (2003). Classroom assessment, student motivation and achievement in high school social studies classes. *Applied Measurement in Education, 16*, 27-54.

Brown, J.S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, *18*, 32-41.

Carr, S. (2000). As distance education comes of age, the challenge is keeping the students. *Chronicle of Higher Education*. Accessed February 11, 2008, http://chronicle.com

Carver, C.S., and Scheier, M.F. (2000). On the structure of behavioral self-regulation. In Boekaerts, M., Pintrich, P.R., & Zeidner, M.H. (Eds.) *Handbook of Self-Regulation* (pp 42-84). San Diego: Academic.

Chang, V. (1999). Evaluating the effectiveness of online learning using a new web based learning instrument. Accessed September 25, 2006, http://www.waier.org.au/forums/1999/chang.html

Christophel, D. M. (1990). The relationship among teacher immediacy behaviors, student motivation and learning. *Communication Education*, *39*, 323-340.

Creswell, J.W. (2005). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*. New Jersey: Pearson.

Davey, L. (1992). The case for a national testing system. *Eric Digest* ED410239 accessed February 15, 2008 www.eric.ed.gov.

DeBell, M. & Chapman, C. (2006). Computer and Internet use by students in 2003. National Center for Education Statistics. Accessed online February 22, 2007 http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2006065.

Del Valle, R. (2006). Online learning: Learner characteristics and their approaches to managing learning. DAI, 67, no. 01A, UMI No. 3204535.

Deci & Moller, (2005). Concept of competence: A starting place for understanding intrinsic motivation and self determined extrinsic motivation. In Elliot, A.J. & Dweck, C. S. (Eds.), *Handbook on Competence and Motivation* (pp. 579-594). San Diego: Academic NY: Guilford press.

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

Diaz, D.P., (2000). Carving a new path for distance ed research. *The Technology Source* Archives *The Technology Source* Archives at the University of North Carolina. Retrieved November 21, 2005, http://ts.mivu.org/default.asp?show=article&id=1034

Dixon, F., Cassady, J., Cross, T., & Williams, D. (2005). Effects of technology on critical thinking and essay writing among gifted adolescents. *Journal of Secondary Gifted Education*, 16, 180.

Duncan, T.G. & McKeachie, W.J. (2005). The making of the motivated strategies for learning questionnaire. *Educational Psychologist*, *40*, 117-128.

Dweck, C. S, & Leggett, E. L. (1988). A social–cognitive approach to motivation and personality. *Psychological Review*, *95*(2), 256–273.

Eccles, J.S. & Wigfield, A (2002). Motivational beliefs, values and goals. *Annual Review of Psychology*, *53*, 227-243.

Elliot, A.J. (2005). A conceptual history of the achievement goal construct. In Elliot, A.J. & Dweck, C. S. (Eds.). *Handbook on Competence and Motivation* (pp. 52-72). NY: Guilford press.

Elliot, A.J. & Dweck, C. S. (Eds.). (2005). *Handbook on Competence and Motivation.* NY: Guilford press.

Elliott, A.J., McGregor, H.A., Gable, S. (1999).Achievement goals, study strategies, and exam performance: A meditational analysis. *Educational Psychologist*, *91*, 549-563.

Elliot, A.J., & McGregor, E. (2001). A 2X2 achievement goal framework (personality processes and individual differences). *Journal of Personality and Social Psychology, 80*, 501-519.

Elliot, A.J., & Moller, A.C. (2003). Performance approach goals: good or bad forms of regulation? *International Journal of Educational Research*, *39*, 339-356.

Elvers, G.C. Polzella, D.J., and Graetz, K. (2003). Procrastination in online courses: performance and attitudinal differences. *Teaching of Psychology*, *30*, 150-162.

Field, A. (2005). *Discovering Statistics Using SPSS* (Introducing Statistical Methods S.) (2nd Edition). Thousand Oaks: Sage.

Gates Foundation, United States program grant making areas. Accessed April 21, 2007, http://www.gatesfoundation.org/ForGrantSeekers/UnitedStates/.

Gaytan, J. (2007). Visions shaping the future of online education: understanding its historical evolution, implications and assumptions. Accessed July 21, 2007, http://www.westga.edu/%7Edistance/ojdla/summer102/gaytan102.htm .

Gray, D. (2005). Virtual high schools: a case study to explore why students, parents, and teachers choose this type of alternative education. DAI, 66, no. 05A, UMI No. 3177355.

Grayson, I. (2005). Fast pace of business drives EMBA. Retrieved June 29, 2007 http://www.cnn.com/2005/BUSINESS/08/15/execed.defined/index.html.

Gottfried, A.E., Fleming, J.S., Gottfried, A.W. (2001). Continuity of academic intrinsic motivation from childhood through late adolescence: a longitudinal study. *Journal of Educational Psychology*, *93*, 3-13.

Haladyna, T. M. (1999). *A Complete Guide to Student Grading*. Needham Heights, MA: Allyn & Bacon.

Halter, J. (1999). Metacognition. Accessed February 12, 2008 http://coe.sdsu.edu/eet/Articles/metacognition/start.htm

Hargis, C.H. (2003). *Grades and Grading Practices. Obstacles to Improving Education*

and to Helping At-Risk Students. (2nd Ed.) Springfield, IL : Thomas.

Harris, D.H. (2007). High-flying schools, student disadvantage, and the logic of NCLB. *American Journal of Education*, *113*(3), 367-394.

Hinkle, D.E., Wiersma, W., Jurs, S.G. (2003). *Applied Statistics for the Behavioral Sciences* (5th Ed.). NY: Houghton-Mifflin.

Hughes, J.E., McLeod, S., Brown, R, Maeda, Y., and Choi, J. (2007). Academic achievement and perceptions of the learning environment in virtual and traditional secondary mathematics classrooms. *The American Journal of Distance Education*, *21*(4), 199-214.

International Observatory on Academic Achievement (CRIRES) accessed February 28, 2008.   http://www.crires-oirs.ulaval.ca/sgc/lang/en_CA/pid/5495.

Jacobson, L. (2006). Michigan poised to implement tough new graduation rules. *EdWeek*. Retrieved April 21, 2007 http://www.edweek.org/ew/articles/2006/04/12/31mich.h25.html

Jacobson, R. L. (2007). Report sees online schools as models for reform. *eSchool News Online.* Retrieved June 20, 2007 http://www.eschoolnews.com/news/PFshowstory.cfm?ArticleID=7170.

Jun, J. (2005). Understanding E-dropout. *International Journal of ELearning*, *4* (2), 229-241.

Kaplan, A., & Midgely, C. (1997). The effect of achievement goals: Does level of perceived academic competence make a difference? *Contemporary Educational Psychology*, *22*, 415-435.

Linn, R.L. & Gronlund, N.E. (1995). *Measurement and Evaluation in Teaching*, 7th edition. Englewood Cliffs, NJ: Prentice-Hall.

Linnenbrink, E.A. (2005). The Dilemma of performance approach goals: the use of multiple goal contexts to promote student's motivation and learning. *Journal of Educational Psychology*, *97*, 197-213.

Linnenbrink, E. A., & Pintrich, P. R. (2001). Multiple goals, multiple contexts: The dynamic interplay between personal goals and contextual goal stresses. In S. Volet & S. Järvelä (Eds.), *Motivation in learning contexts: Theoretical advances and methodological implications* (pp. 251-269). Amsterdam: Elsevier.

Livingston, J. (1997). Metacognition: An Overview State Univ. of New York at Buffalo. Accessed online February 12, 2008 http://www.gse.buffalo.edu/fas/shuell/cep564/Metacog.htm

Lorenzetti, J. (2002). Before they drift away: two experts pool retention insights. *Distance Education* Report, *8*, 1-2.

Macklem, G. (1990). Measuring aptitude. *Eric Digest* ED328608, accessed online February 14, 2008 http://www.eric.ed.gov/.

Marsh, G.E., & Ketterer, J. J. (2005). Situating the zone of proximal development. *Online Journal of Distance Learning Administration,* VIII, accessed September 10, 2005 http://www.westga.edu/~distance/ojdla/

Marsh, H.W. (1990). The structure of academic self-concept: the Marsh/ Shavelson model (motivational and social influences on achievement and self perception). *Journal of Educational Psychology*, *82*, 623-636.

McMillan, J. H. (2007). *Classroom assessment. Principles and practice for effective instruction*. (2nd ed.) Needham, Hts. MA: Allyn and Bacon.

Michigan state code Public Acts 123 and 124 accessed online March 9, 2008, www.michigan.gov/documents/mde/High_School_Reform_Legislation_Web_Inf ormation_193644_7.doc - 2007-04-19.

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

National Center for Education Statistics Report (2005). Retrieved April 21, 2007 http://nces.ed.gov/surveys/frss/publications/2005010/

National Commission on Excellence in Education (1983). A Nation at Risk. Accessed May 9, 2008, http://www.ed.gov/pubs/NatAtRisk/index.html.

National Education Association (2008). *The No Child Left Behind Act needs to be overhauled* accessed March 9, 2008 http://www.nea.org/esea/overhaul.html.

Nitko, A. J. (2005). *Educational Assessment of Students*. 4th Edition. Columbus, OH: Pearson. Merrill Prentice Hall.

North American Council for Online Learning (2006). *Virtual Schools and 21st century skills*. Accessed June 16, 2007 http://www.nacol.org.

Norton, P. (2003). COPLS: An alternative to traditional online course management tools. In C. Crawford et al. (Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference* 2003 (pp.465-472). Chesapeake, VA: AACE.

Norton, P. (2005). Scaffolding online learning: the ART of mentoring. In C. Crawford et al. (Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2005* (pp. 2025-2032). Chesapeake, VA: AACE.

Norton, P. (2006). The Online Academy: A unique approach to virtual high schooling. In C Crawford et al. (Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2006* (pp.2356-2363). Chesapeake, VA: AACE.

Norton, P. and Wiburg, K.M. (2003). *Teaching with Technology: Designing Opportunities to Learn.* Belmont, CA: Wadsworth/Thompson Learning.

Norton, P. and Hathaway, D. (2008). Exploring two teacher education online learning designs: A classroom of one or many? *Journal of Research on Technology in Education. 40*, 475–495.

Pape, S. J., and Wang, C. (2003) Middle school children's strategic behavior: Classification and relation to academic achievement and mathematical problem solving. *Instructional Science*, *31*, 419-449.

PEQUIS Report (2003). Retrieved *April21, 2007 http://nces.ed.gov/surveys/peqis/publications/2003017/*

Pierce, W. (2003). Metacognition: study strategies, monitoring, and motivation. Accessed online February 12, 2008 http://academic.pgcc.edu/~wpeirce/MCCCTR/metacognition.htm .

Pink, D.H. (2005). *A Whole New Mind: Moving from the Information Age to the Conceptual Age*. New York: Riverhead.

Pintrich, P. R. (2000a). An achievement goal theory perspectives on issues in motivation terminology, theory, and research. *Contemporary Educational Psychology*, *25*, 92-104.

Pintrich, P. R. (2000b). Multiple goals, multiple pathways: the role of goal orientation in learning. *Journal of Educational Psychology*, *92*, 544-555.

Pintrich, P.R. (2000c). The role of goal orientation in self-regulated learning. In Boekaerts, M., Pintrich, P.R., & Zeidner, M.H. (Eds.) *Handbook of Self-Regulation* (pp 452-502). San Diego: Academic.

Pintrich, P.R. and DeGroot, E.V. (1990). Motivational self regulated learning components of classroom academic performance. *Journal of Educational Psychology*, *82*, 33-40.

Pintrich, P & Garcia, T. (1991). Student goal orientation and self-regulation in the college classroom. In Maehr & Pintrich (Eds.) *Advances in Motivation and Achievement: Goals and Self-Regulatory Processes* (pp.371-402). Greenwich, CT: JAI.

Pintrich, P.R., Smith, D.A., Garcia, T., & McKeachie, W.J. (1991). *A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ)*. University of Michigan.

Prensky, M. (2006). *Don't Bother Me Mom, I'm Learning.* St. Paul: Paragon House.

Rice, K.L. (2006). A comprehensive look at distance education in the K-12 context. *Journal of Research on Technology in Education*, *38*, 425-448.

Richards, C.N., & Ridley, D.R. (1997). Factors affecting college student's persistence in online computer managed instruction. *College Students Journal*, *31*, 490-495.

Ridley, D. R., Bailey, B. L., Davies, E. S., Hash, S. G., & Varner, D. A. (1997). *Evaluating the impact of on-line course enrollments of FTEs at an urban university.* Paper presented at the Association for Institutional Research Annual Forum, Orlando, FL.

Roblen, E.W. (2007). A boom in online education has school leaders and policymakers struggling to stay one click ahead. *Education Week 26* (30), p 34-36.

Roblyer, M.D. (1999). Is choice important in distance learning? A study of student motives for taking internet-based courses at the high school and community college levels. *Journal of Research on Computing in Education, 32*, 1. Accessed January 06, 2007 http://www.iste.org/Content/NavigationMenu/Publications/JRTE/Issues/Volume_321/Number_1_Fall_1999/Is_Choice_Important_in_Distance_Learning_A_Study_of_Student_Motives_for_Taking_Internet-Based_Course.htm.

Roblyer, M. D. (2005). Who plays well in the virtual sandbox? Characteristics of successful online students and teachers. accessed February 27, 2007.

http://www.iste.org/Content/NavigationMenu/Membership/SIGs/SIGTel_Telelear
ning_/SIGTel_Bulletin2/Archive/2005_20067/2005_July_-_Roblyer.htm.

Roblyer, M. D. (2006). Virtually successful: Defeating the dropout problem through
online school programs. *Phi Delta Kappan, 88*, 31-36.

Roblyer, M.D.. & Marshall, J.C. (2003). Predicting success of virtual high school
students: preliminary results from an educational success prediction instrument.
Journal of Research on Technology in Education, 35 (2), 241-255.

Russell, T.L. (1999). The no significant difference phenomenon: a comparative research
annotated bibliography on technology for distance education. *Distance
Education: IDECC*. Accessed June 14, 2008
http://nosignificantdifference.wcet.info/index.asp

Setzer, J.C., & Lewis, L. (2005). Distance education courses for public elementary and
secondary school students. Retrieved February 22, 2007
http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007028

Schunk, D.H. (1991). Self-efficacy and academic motivation. *Educational Psychologist,
26*, 207-231.

Schunk, D.H. (1995). Inherent details of self-regulated learning include student
perceptions. *Educational Psychologist, 30*, 213-216.

Schunk, D.H. (2005). Self-regulated learning: the educational legacy of Paul R. Pintrich.
Educational Psychologist, 40, 85-94.

Schunk, D.H. and Ertmer, P.A. (2000). Self-Regulation and academic learning. In
Boekaerts, M., Pintrich, P.R., & Zeidner, M.H. (Eds.) *Handbook of Self-
Regulation* (pp 631-649). San Diego: Academic.

Schunk, D.H., & Zimmerman, B.J. (1997). Social origins of self-regulatory competence.
Educational Psychologist, 32, 195-208.

Scribner, D. (2007). *High School Students' Perceptions: Supporting Motivation to Engage and Persist in Learning*. Unpublished doctoral dissertation, Capella University, Minneapolis, Minnesota.

Shah, J. Y., and Kruglanski, A.W. (2000). Aspects of goal networks: Implications for self-regulation. In Boekaerts, M., Pintrich, P.R., & Zeidner, M.H. (Eds.) *Handbook of Self-Regulation* (pp 86-110). San Diego: Academic.

Sheldon, K.M. & Kasser, T. (2008) Psychological threat and extrinsic goal striving. *Motivation & Emotion*, *32*, 37-45.

Smith, E. (2005). *Analysing Underachievement in Schools*. NY: Continuum.

Smith, S. M. (1979). Remembering in and out of context. *Journal of Experimental Psychology: Human Learning, Memory, and Cognition*, *5*, 460–471.

Smith, R., Clark, T., and Blomeyer, R.L. (2005). A synthesis of new research on K-12 online learning. Retrieved April 24, 2005 http://www.ncrel.org/tech/synthesis/.

Stevens, T., Olivarez, A., Lan, W., and Tallent-Runnels, M. (2004). Role of mathematics self-efficacy and motivation in mathematics performance across ethnicity. *The Journal of Educational Research*, *97*, 208-221.

Summers, J., Waigandt, A., & Whittaker, T.A. (2005). A comparison of student achievement and satisfaction in an online versus a traditional face-to-face statistics class. *Innovative Higher Education*, *29* (3), 223- 250.

Swanson, P. a& La Paz, S. (1998). Teaching effective comprehension strategies to students with learning and reading disabilities. *Intervention in School and Clinic 33*, 209-18

The Online Academy, (2008). http://itdev.gmu.edu/vhs/information.

Toch, T. (2007). Margins of error: the education testing industry in the no child left behind era. Education Sector Reports. Accessed March 7, 2008 http://www.education.uiowa.edu/cea/documents/Margins_of_Error.pdf.

Tucker, B. (2007). Laboratories of Reform: Virtual High Schools & innovation in public http://www.educationsector.org/research/research_show.htm?doc_id=502307.

Van Evera, W. (2004) Achievement and motivation in the middle school science classroom: The effects of formative assessment feedback. Dissertation Abstracts International, 64, 10A (UMI No. 3110082).

Virginia Department of Education web site accessed March 9, 2008 http://www.doe.virginia.gov/

Vockell, E. (2003). Educational Psychology: a practical approach. Accessed February 12, 2008 http://education.calumet.purdue.edu/vockell/edpsybook/

Wadsworth, L., Husman, J., Duggan, M., and Pennington, M.N. (2007). Online mathematics achievement: Effects of learning strategies and self-efficacy. *Journal of Developmental Education. 30*, 6-14.

Wang, A., and Newlin, M. (2000), Characteristics of students who enroll and succeed in Web-based classes, *Journal of Educational Psychology*, *92*, 137-143.

Wang, A.Y., Newlin, M.H., & Tucker, T.L. (2001). A discourse analysis of online classroom chats: predictors of cyber-student performance. *Teaching of Psychology*, *28*, 222-226.

Waschull, S.B. (2001). The Online delivery of psychology courses: Attrition, performance, and evaluation. *Teaching of Psychology, 28*, 143-147.

Waschull, S.B. (2005). Predicting success in online psychology courses: self-discipline & motivation. *Teaching of Psychology*, *32*, 190-192.

Watson, J and Ryan, J. (2006). Keeping pace with K-12 online learning: a review of state level practices. Retrieved February 23, 2007

http://www.nacol.org/docs/Keeping%20Pace%20with%20K-12%20Online%20Learning%202006.pdf.

Watson, J. and Ryan, J. (2007). Keeping pace with k-12 online learning: a review of state level practices. accessed January 30, 2008 http://www.nacol.org/docs/KeepingPace07-color.pdf.

Watson, T. (2007). Exploring e-learning reforms for Michigan: the new education revolution. Accessed February 22, 2007 http://www.coe.wayne.edu/e-learningReport.pdf

Wentzel, K. R. (1999). Social-motivational processes and interpersonal relationships: Implications for understanding motivation at school. *Journal of Educational Psychology*, *91*, 76-97.

Wentzel, K R. (2000) What is it that I'm trying to achieve? Classroom goals from a content perspective. *Contemporary Educational Psychology*, *25*, 105-115.

Wilhite, S. C. (1990). Self-efficacy, locus of control, self-assessment of memory ability, and study activities as predictors of college course achievement. *Journal of Educational Psychology*, *82*, 696–700.

Wilson, K.M., Tranin, G. (2007). First-grade students' motivation and achievement for reading, writing and spelling. *Reading Psychology*, *28*, 257–282.

Winnie, P.H. (2001). Self-regulated learning viewed from models of information processing. In Zimmerman, B.J. and Schunk, D. H. (Eds.), *Self Regulated Learning and Academic Achievement* (pp. 153-190). Mahwah: Erlbaum.

Winnie, P.H. and Perry, N.E. (2000). Measuring self-regulated learning. In Boekaerts, M., Pintrich, P.R., & Zeidner, M.H. (Eds.), *Handbook of Self-Regulation* (pp 532-568). San Diego: Academic.

Wojciechowski, A., & Palmer, B. (2005). Individual student characteristics: can any be predictors of success in online classes? *Online Journal of Distance Learning*

Administration, VIII. Retrieved September 10, 2005 from
http://www.westga.edu/~distance/ojdla/

Zimmerman, B.J. (2000). Attaining self-regulation: A social cognitive perspective. In *Handbook of Self-Regulation*. Boekaerts, M., Pintrich, P.R., & Zeidner, M.H. (Eds.) pp 13-41. San Diego: Academic.

Zimmerman, B.J. (2000b). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, 25, 82-91.

Zimmerman, B.J. (2001). Theories of self-regulated learning and academic achievement: an overview and analysis. In Zimmerman, B.J. and Schunk, D. H. (Eds.), *Self Regulated Learning and Academic Achievement* (pp. 1-38). Mahwah: Erlbaum.

Zimmerman, B.J., Bandura, A., & Martinez-Pons, M. (1992). Self-motivation for academic attainment: the role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal*, 29, 663-676.

Zimmerman, B.J., Bonner, S. & Kovac, R. (1996, 2002). *Developing Self-Regulated Learners: Beyond Achievement to Self-Efficacy*. Washington, DC: American Psychological Association.

Zimmerman, B.J. & Kitsantas, A. (2005). The hidden dimension of personal competence self-regulated learning and practice. In Elliot, A.J. & Dweck, C. S. (Eds.), *Handbook on Competence and Motivation* (pp. 509-526). NY: Guilford press.

Zimmerman, B.J. and Schunk, D.H. (Eds.) (2001). *Self-Regulated Learning and Academic Achievement*. Mahwah: Erlbaum.

CURRICULUM VITAE

Barbara M. Daniels graduated from T.C. Williams High School, Alexandria, Virginia in 1977. She received her Bachelor of Arts in Education from George Washington University, Washington DC, in 1982. She was employed by Prince William County Schools, Virginia in 1991 where she taught for eleven years. She completed a Masters Degree in Curriculum and Instruction at George Mason University in 2002 and moved to Manassas City Schools where she taught for four years. She is currently employed by the Graduate School of Education at George Mason University in Fairfax, Virginia.