AN EXAMINATION OF MOTIVATIONAL STRATEGIES AND ACADEMIC ACHIEVEMENT IN AN ONLINE HIGH SCHOOL LEARNING ENVIRONMENT

by

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DEDICATION

To Don, Rick, and Jim; your support and guidance past and present has directed my future.

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There are many people who made this four and a half year journey with me, and now at the end of it, I share this accomplishment with them.

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And, finally, for my husband, Jim, who made at least as many sacrifices as I did (but without the benefit of choice in the matter) I present this work in your honor.

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ABSTRACT

AN EXAMINATION OF MOTIVATIONAL STRATEGIES AND ACADEMIC ACHIEVEMENT IN AN ONLINE HIGH SCHOOL LEARNING ENVIRONMENT

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The objective of this study was to examine the relationship between a student's motivational strategies and academic achievement. It was framed by the following research questions:

1. Is there a relationship between students' demographic characteristics (age, gender, subject area, previous grade in the subject, and reason for taking the online course) and academic achievement (as measured by final course grade and score on Standards of Learning exam)?
2. Do students' initial self-reported goal orientation, self-efficacy for learning, learning strategies, and attribution survey responses predict academic achievement (as measured by final course grade and score on Standards of Learning exam)?
3. Is there a significant difference between student's self-reported pre-course measures of goal orientation, self-efficacy for learning, learning strategies,

and attribution and student's self-reported post-course measures (as reported upon completion of their online course)?

4. Is there a significant difference between student's self-reported pre-course measures of goal orientation, self-efficacy for learning, learning strategies, and attribution and student's self-reported post-course measures and are these differences associated with the student's level of academic achievement?

Participants were high school students participating in online courses provided by *The Online Academy* during a summer time frame. The Motivated Strategies for Learning Questionnaire (MSLQ) was the primary instrument used in this study. Academic achievement was measured by final course grade and the score on the Virginia Standards of Learning (SOL) exam.

This study utilized a pre-test/post-test format. Multivariable regression analyses were conducted to answer the first two research questions. A series of paired *t*-tests were conducted to answer the last two questions.

Analysis shows that age, grade in school, and previous grade in subject area were useful predictors of final course grade and SOL exam score. Intrinsic goal orientation and self-efficacy for learning were useful predictors of final course grade. Internal attribution, critical thinking, self-efficacy for learning and performance, extrinsic goal orientation, time and study environment and elaboration were useful predictors of SOL score. The only motivational strategy measure that changed significantly was effort regulation. The levels of change in measures were consistent among high and mid level achieving students.

1. Introduction

As online learning becomes a popular choice for high school students, it is important to examine the development and history of this learning option to aide in understanding its enormous impact. Many online programs were developed to provide students educational opportunities that were otherwise not possible due to time, space, distance or resource limitations. These programs were simply one answer to a problem. However, the benefits of online learning are not just in the area of logistics. Students who participate in online programs not only have the opportunity to earn credit but in the process, they can develop the skills necessary for their success as life-long learners prepared to face the challenges of an increasingly global economy (Virtual schooling comes of age, 2006). This realization has prompted the state of Michigan to modify graduation requirements to include an online learning experience component (Sotak, 2006). It is not unreasonable to expect other states to follow this lead.

Despite the benefits, there are plenty of skeptics. At the time of the approval of the graduation requirement modification, 56% of Americans did not think that high school graduates should be required to take an online course (Education Week, 2002). In the same publication, the National Education Association and the National School Boards Association expressed particular unease with the possibility that online education would filter down to the lower grades.

Given the extent to which online learning has grown, the skeptics seem to have lost. One report compares the nature and type of growth seen with K-12 online learning with biological evolution. Stating that evolution is not the "slow and gradual process of change" but rather happening in "short, volatile bursts" (Watson, Ryan, et al., 2006, p.39); this description fits online learning or perhaps anything related to the Internet. Actual growth rates of existing high school online programs have been reported as high as 50% during the year 2006 (Watson, et. al.), which could certainly be considered a burst. As with any evolutionary change, the question looms: what will education look like after the evolution?

Instead of passively watching as more online learning opportunities develop and wondering if and how they will work, educators have a responsibility to examine online learning critically. In addition to requiring high school students to participate in online courses, it would be of great benefit to students to have a sense of the skills they need to achieve in their course before they actually begin them. Are there specific learning strategies that lead to academic achievement online? What kind of goals do students who choose to take an online high school course pursue? What attributions do students who succeed in an online course exhibit? Providing answers to these questions can allow educators to help students prepare to take online courses and complete them successfully. If explosive evolutionary growth in online learning is truly here, then every educator has a responsibility to help their students adapt to it.

Unfortunately, students who participate in online learning programs frequently just stop working on them. They are referred to as "stop-outs", the online synonym for

"drop-out". These terms are different not just in name, but also measure. Although the stop-out rates are difficult to obtain, anecdotal evidence suggests that completion rates for online courses are lower than that of face-to-face counterparts (Carr, 2000). Perhaps the policy makers who were skeptical in 2002 were not wrong in their thoughts. However, the question still nags. How will the educational needs of these students be met? The answer may not be in using the ways of the past.

Background

Perhaps a first place to begin to look is to the student participants. Who exactly are these students who will potentially participate in high school online programs? They are the digital natives; students who are no longer little versions of us (Prensky, 2005). Prensky cites of the arrival and rapid dissemination of digital technology as the cause of such widespread change that there is absolutely no going back. This statement supports the explosive evolutionary description, but what contributed to this? One suggestion is video games. The generation of children who grew up with video games has very different ways of viewing the world (Beck & Wade, 2004). Beck and Wade specifically focus on the business habits of what they call the “gamer generation”, stating that the “gamers” have very specific ways of thinking about work, risk, success and what they expect of themselves. From this idea, it is reasonable to surmise that students’ electronic play experiences do not just shape their future business habits, but also the way they view and experience learning. Prensky concurs, stating that today's students "think and process information fundamentally differently from their predecessors" (2001, p. 1) and that their

"brains may already be different" (p. 3). Here exists another seed of evidence of the evolution.

Don Tapscott's Growing up Digital (1998), discusses the 'net generation as those who have been surrounded by digital media their entire life. He continues by asserting that from what we know about the children born after 1985, it is clear that the generation gap could not be bigger than that between the "baby-boomers" and the "digital" or "net" generations. Whether labeled as digital natives, n-geners or gamers, these are the students that arrive at the door of our schools including virtual ones.

Thinking from a pedagogical perspective, Brooks and Brooks (1999) posit that students benefit from the knowledge that they construct as they experience the world. Their constructivist paradigm states that "we make sense of our world by synthesizing new experiences" (Brooks & Brooks, 1999, p. 4) and so schools should "better reflect the complexities and possibilities of the world" (p. 6). It makes sense that online courses delivered within the almost limitless bounds of the Internet should be a model of this paradigm. However, we don't see this model used very much in online learning. Perhaps the reason for the high stop out rate is due to the development of poor quality programs that assume an online learning environment should mimic that of a face to face classroom. Many online courses have been designed with activity worksheets taken directly from traditional classrooms. The only difference is that worksheets are delivered via an online course management system instead of handed out. For example, an Algebra 1 lesson from one virtual school presents students with 2 "lesson pages" to read, 1 "practice" page that provides students with self-checks , and then 1 "exercise" page that

students complete and send to their online teacher. This structure does not lend itself to a back and forth dialog between the student and the teacher. Many educational policy makers worry about what is lost when students do not meet face to face with their classmates and teachers and this is a reasonable concern. In the cases where the design depends solely on electronic worksheets, we can deduce what is lost. While it does not matter how the student interacts with the worksheet, it does matter that the transfer of learning usually depends on the interaction between the worksheet, the teacher, and the other members of the class. In essence, what is lost when the interaction stops is the learning. It is not reasonable to assume that what works well in a classroom will also work well in an online learning environment, but many virtual schools (perhaps in an effort to jump on the virtual high school bandwagon) were well-established without a clear understanding of how they should operate. In many cases, policies are adopted after virtual schools are up and running using outmoded and ineffective approaches (Greenway & Vanourek, 2006).

Accepting the constructivist paradigm as a model for the development of learning opportunities, the next step is to examine how to use this design in the development of online high school courses. One such answer is to use the Community of Practice Learning System (COPLS), (Norton, 2002) as a design model. In this model, students learn within a context of an authentic problem and with the support of an expert mentor. In order to do this, both students' (learners') and teachers' (mentors') roles must evolve. The learner interacts with the instructional resources to develop a solution. The mentor is not responsible for managing or monitoring the learner, but instead asks prompting,

extending and application questions and provides other interactions to support learning. Students "prepare products that illustrate solutions to a range of problems related to situations encountered within a community of practice." (p. 6). This study is framed by the intent to understand how students experience this type of learning.

In *The Online Academy*, course modules have been designed using constructivist principles and with a framework to support the development of self-regulation. In general, students have very little opportunity to learn on their own or develop self-regulation skills even though current research shows that using self-regulation skills leads to success in school (Zimmerman, 2002). Zimmerman's claim could be a potential reason for the high stop out rates seen in online courses. A self-regulated learner monitors their behavior in terms of their goals and uses self-reflection to assess the effectiveness of their behaviors. Students who employ self-regulation skills achieve in school and *The Online Academy* is designed to foster the development of this skill. One of the goals of this study is to see how students experience this component of their online courses and how it is related to their academic achievement.

Online education that has evolved as a result of the COPLS design, with a focus on self-regulation, and the awareness of the differences of our students today is *The Online Academy* in a nutshell. Therefore, students who participate in the courses offered in *The Online Academy* have a unique opportunity. Do the students who achieve in this environment have unique characteristics? The following characteristics will be examined in this study:

Self-regulation

There are three components of self-regulated learning that that are especially relevant to classroom performance; student's metacognitive strategies, their management and control of effort on their academic tasks and the actual cognitive strategies that students use to learn and understand material (Pintrich & DeGroot, 1990; Zimmerman, et al., 1996). The benefits of implementing self-regulatory processes are two-fold; students maximize their learning opportunities and improve their perceptions of their control over their learning (self-efficacy). Students who use a self-regulatory model do so with intent to motivate and guide themselves in their learning process. The overarching goal is for students to have control over their processes instead of being a victim of their processes.

Academic self-efficacy

Bandura's concept of self-efficacy (1982) concerns the students' beliefs about their ability to complete a particular task. It is not concerned with the linkage between the process and the outcome. Student's beliefs are classified within a particular domain; students will have different beliefs about their ability within different subject areas. A student's self-efficacy will impact the goals they decide to pursue; a student with a low sense of efficacy will shy away from difficult tasks whereas students will a strong sense of efficacy will view tasks as a challenge to be mastered as opposed to a threat to be avoided. Students' perceived self-efficacy also determines their level of motivation (Bandura, 1993). Previous research (Bandura, 1986; Bong, 2004; Niemczyk, & Savenye, 2001; Shell, Covin, & Bruning, 1995; Zimmerman, Bandura, & Martinez-Pons, 1992)

shows that student perceptions of self-efficacy have been proven an effective predictor of academic outcomes.

Goal placement

There is substantial research on the effect of goal placement and academic achievement. Goals are described as being either mastery (based on intrinsic motivations) or performance (based on external motivations). Students with mastery learning goals tend to value the learning process rather than simply see the learning experience as a means to an end. Those whose goals are focused externally, such as on grades are less likely to employ effective learning strategies. Research on this topic includes face to face classrooms (Dweck, 1986; Niemczyk, 2001; Pintrich, 1995) as well as in athletic tasks (Zimmerman & Kitsantas, 1997), but there is no research on how the placement of goals affects the performance of students taking an online course at the high school level.

Motivation

Motivational theories have a relationship between personal goals and personal agency beliefs. Ford (1992) summarizes the many theories that exist to include psychoanalytic theories which are based on humans' instinctual drives, causal attribution theories which are based a person's desire for understanding, and social cognitive theories which presume that expected outcomes motivate behavior. Context strongly influences a student's motivation; while some students' motivational beliefs transfer across multiple domains more than others, (Bong, 2004) academic motivation constructs contain strong domain-specific components.

Additionally, the components of the motivational theoretical framework are related to particular tasks. The components are the student's belief about their ability to accomplish a task, the value or importance that a student assigns to the task, and the emotional reactions that a student has to the task. There is a positive relationship between motivational and self-regulated learning components and student academic performance (Pintrich & DeGroot, 1990).

Attribution

Attribution theory pertains to how a person perceives the causes of their successes and failures. Early theories include Rotter's Locus of Control (1966) which states that a person's perceived causes of success and failure could be measured along a spectrum of internal (such as ability and effort) to external causes (such as luck and task difficulty). Later research includes the components of stability (Weiner, 1985), and controllability (Rosenbaum, 1972). There is a positive association between attributions of achievement to effort and actual achievement. There is a negative association between attributions of achievement to luck or other external factors and actual achievement.

How and where students place credit for academic achievement (and conversely, blame for academic failures) influences a student's level of motivation. If a student felt the cause of a particular outcome was related to internal factors such as ability or effort, then the learner would be motivated to attempt to try to influence the outcome. If instead, the learner assessed that the causes of a particular outcome were attributed to external factors (such as luck, task difficulty, or outside intervention by others) then the student

would be more likely to assume that there was nothing to be done to effect the outcome and would therefore be not motivated to make any attempt (Svinicki, 2004).

Students who participate in an online learning program such as *The Online Academy* have a unique learning opportunity. Previous studies (Bandura, & Martinez-Pons, 1992; Bong, 2004; Pintrich, & DeGroot, 1990; Sins, et al., 2007; Zimmerman, Niemczyk, & Savenye, 2001) have examined the effects of student's goal orientation, self-regulatory efficacy, attributions and study habits on academic achievement, but there is little research on how these characteristics affect student's online experience. Research predicting online achievement has been conducted at college level but usually within the context of an online course delivered via a course management system (Jamison, 2003). Research on academic achievement in online high school settings has been conducted in virtual high schools using content management systems software to deliver courses (Smith, Clark, & Blomeyer, 2005) or online programs with specific weekly assignment or scheduled asynchronous structures (Roblyer, & Marshall, 2002).

Problem Statement

Given increasing use and even requirements for high school online learning opportunities, educators need to be better able to understand the factors that contribute toward a successful online learning experience. Of particular interest is the relationship between a student's goal orientations, self-efficacy for learning, learning strategies, and attributions and their academic achievement. Additionally, what is the relationship between students' various demographic characteristics and their academic achievement in an online high school course? Therefore, the problem of this study is to examine the

relationship between these student characteristics and academic achievement for high school students completing a summer school course in *The Online Academy*.

Research Questions

The following questions frame the research:

1. Is there a relationship between students' demographic characteristics (age, gender, grade in school, subject area, previous grade in the subject, and reason for taking the online course) and academic achievement (as measured by final course grade and score on Standards of Learning exam)?

The researcher asserts that there will be no relationship between the various demographic variables and academic achievement.

2. Do students' initial self-reported goal orientation, self-efficacy for learning, learning strategies, and attribution survey responses predict academic achievement (as measured by final course grade and score on Standards of Learning exam)?

The researcher asserts that these variables (measured before the student begins their online course) will be useful predictors of student achievement.

3. Is there a significant difference between student's self-reported pre-course measures of goal orientation, self-efficacy for learning, learning strategies, and attribution and student's self-reported post-course measures (as reported upon completion of their online course)?

The researcher asserts that there will be a significant difference between the pre and post-course measures of goal orientation, self-efficacy for learning, learning strategies, and attribution.

4. Is there a significant difference between student's self-reported pre-course measures of goal orientation, self-efficacy for learning, learning strategies, and attribution and student's self-reported post-course measures (as reported upon completion of their online course) and are these differences associated with the student's level of academic achievement?

The researcher asserts that there is a significant difference between student's pre-course and post-course measures of goal orientation, self-efficacy for learning, learning strategies, and attribution and these differences are associated with the student's level of academic achievement.

Theoretical Framework

The main focus of the study is to examine students' motivational strategies, online learning, and academic achievement. The causal factors considered in this study based on previous research include motivation, academic self-efficacy, self-regulation, goal orientation, and attribution. This study relies on previous causal models of motivation (Zimmerman, et al., 1992), academic self-efficacy (Bandura, 1993), self-regulation (Pintrich & DeGroot, 1990; Zimmerman, et al., 1996) goal orientation (Dweck & Elliott, 1983), and attribution (Weiner, 1985) on academic achievement to frame this study. Also, based on previous research that illustrates the relationship between student perceptions and satisfaction based on course structure, this study asserts that a student's online course

experience is shaped by the design, structure, and tools of the online course (Smith, et al., 2005).

These two components and their impact on academic achievement are the basis for the following conceptual framework (Figure 1) developed by the researcher to frame the study.

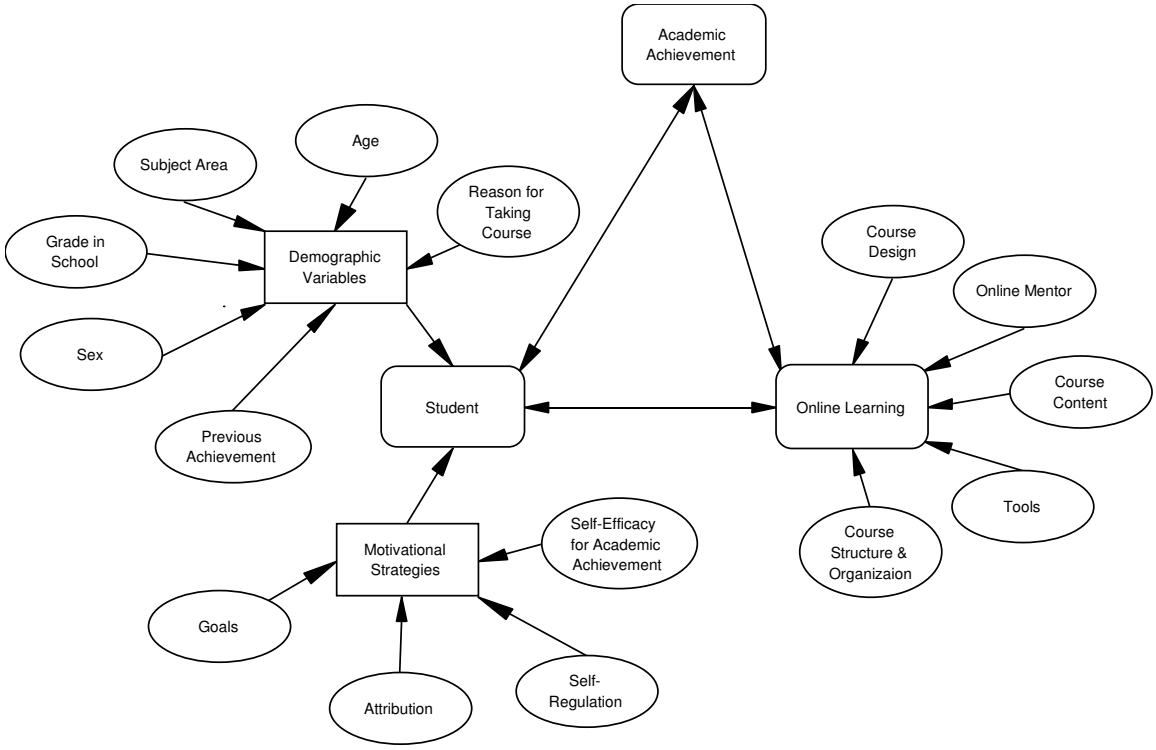

Figure 1. Conceptual framework of relationship between students' characteristics, online learning and academic achievement.

Significance

There is no reason to think that there will be decline in the development of online courses. As more and more high school students are expected or even required to

participate in online programs, it is vital for educators to have a sense of the skills necessary for students to achieve. The completion rates of online courses currently available are not encouraging. High school students need new options for online learning as well as an understanding of the skills they will need to possess to be successful. *The Online Academy* provides such an option for students by its design for ultimate flexibility, personal mentor support and innovative course content. The information obtained in this research study should be used as a motivation for reform of online high school programs to do more than simply be available for students. Appropriate online opportunities need to be made available, and educators and course designers need to understand how students can be assisted in their achievement in these new environments.

Scope of Study

Quantitative analysis techniques were employed to answer the research questions. Because the goal of this study was to obtain specific descriptive information about the characteristics of online learners enrolled in *The Online Academy,* a survey instrument was used. Because one research question addressed the relationship between students initial self-reported goal orientation, self-efficacy for learning, learning strategies and attribution on academic achievement, the survey was administered at the beginning of the student's online course. Other research questions examined the difference between the self-reported scores at the beginning and upon completion of the course. Therefore, the survey instrument was also administered upon completion of the student's online course.

The survey instruments used in this study were selected sub-scales of the Motivated Strategies for Learning Questionnaire (MSLQ) and the causal attribution

instrument developed by Shell, et al. (1995). The surveys were administered online at the beginning and end of the students' online course. Surveys were identified by the student's username so that pre and post-course data could be matched.

Once all data was collected, regression analysis was conducted to determine the relationship between the student's course, self-reported previous grade in the subject, age, grade in school, and sex and academic achievement. Additional regression analysis was conducted to determine the relationship between students' initial goal orientation, self-efficacy for learning, learning strategies, and attribution survey responses and academic achievement. Differences in scores for all 10 motivational strategy measures collected via pre and post-course surveys were examined using paired *t*-tests.

Definitions

Academic achievement

This study examined achievement via two assessment variables; the student's final grade in their online course and their score on their end of course Standards of Learning (SOL) test. The final course grade was calculated based on the work done in all of the modules over the course of the summer. Therefore, this grade represents achievement in a variety of activities in a variety of topics measured over time. This variable was used as a measure of academic achievement because it represents more than just the level of mastery of skills. The other achievement variable used in this study was the SOL exam score. This standardized test score represented the student's mastery of the specific skills in the subject area at one point in time. Although concern is raised with using this variable because there is not always a strong relationship between these

measures and a students' progress in the curriculum (Shapiro, 2004) this standardized measure can be used to compare strengths and weaknesses in a student's academic profile.

Mentor

Mentors in *The Online Academy* are teachers highly qualified in their course content area and certified by the state of Virginia. They have completed on online mentor education program, *The Online Academy for Teachers*, which consists of five courses focusing on how online learning works, developing relationships online, and promoting self-regulation, self-efficacy and transfer.

Motivational strategies

The collection of variables used in this study to measure the learning characteristics of the students. Specifically, the following variables: attribution, goal orientation, learning strategies, and self-efficacy for learning were used in this study. These variables will be explained separately below.

Attribution. This refers to the reference to which success (or failure) is credited. The reference includes an external vs. internal locus, stable vs. unstable causes, and controllable vs. controllable causes (Weiner, 1985).

Goal orientation. This construct refers to the placement of the academic goal; either focused on achieving a learning goal (mastery) or the outcome, such as a grade (Linnenbrink & Pintrich, 2001). Goals set by a student are influenced by motivation and are managed by self-regulatory and self-efficacy processes.

Learning strategies. The specific strategies measured in this study using the MSLQ include *elaboration* (the strategies that students use to store information into long-term memory), *organization* (the strategies that students use to construct connections among the information to be learned), *critical thinking* (the degree to which students report applying previous knowledge to a new situation), *time and study environment management* (the strategies used to schedule, plan and use time effectively) and *effort regulation* (the ability to control effort and attention in the face of distractions).

Self-efficacy for learning. The student's beliefs about their ability to do a particular task; it does not concern the linkage between their doing the task and the outcome of the task (Bandura, 1982). Self-efficacy beliefs affect student goal systems. In addition, the student's perceived self-efficacy to regulate their own learning determines their level of motivation (Bandura, 1993).

Online learning

The type of educational experiences that take place outside of the bounds of brick and motor school building can be classified under the general term online learning. Activities for student participants can include receiving course content material electronically, participating in online discussion boards in a moderated or un-moderated manner and electronic submission of student work.

Self-regulation

The learning processes employed by a student based on their metacognition, strategic planning and evaluation thereof used to accomplish a specific educational goal.

It is a cyclic process that provides a student the opportunity to improve their learning and their perceptions of their control over the learning process (Zimmerman, 2002).

The Online Academy

A virtual high school project developed in partnership with George Mason University, Loudoun, Stafford, and Frederick county public schools. *The Online Academy* provides courses for high school students delivered completely electronically. Each course is divided into approximately 12 to 15 self-contained learning modules. Students may take an entire course or any part of it to meet their individual learning needs. Each module is framed by an authentic problem called a challenge that is to be completed throughout and by the end of the module. Throughout any module, students read the online content material and complete background building activities with the support of their online mentor. Mentors do more than simply assess the student's work. They provide feedback and engage the student in conversations about the course content to help the student build the skills they will need to complete the challenge. Students work through the modules at a pace that suits their learning. They do not continue through the module until the content is mastered.

Virginia Standards of Learning (SOL)

These include specific course objectives on which accredited high school courses are based. Upon completion of such a course, a student is required to pass an end of course test (SOL test) to verify credit in that particular subject area. Passing the SOL test in specific required courses is a component of the state's graduation requirements.

2. Review of Literature

The growth in online learning is proceeding at an explosive rate. At the secondary level, 72% of schools with distance education programs planned to expand them during the year 2006 ("72% of districts will expand distance ed," 2005). Further quantifying the growth rate is difficult since consistent measures, terminology and methods of reporting do not exist at the national level (Smith, et al., 2005). Terms such as distance education, e-learning, and virtual high schools are seen in the literature and none of these learning designs follow traditional school structures. Therefore, traditional school evaluation criteria do not fit when studying online learning environments. Furthermore, while there are common characteristics between these virtual structures, they are different and should not be studied using the same criteria (Smith, et al., 2005). Because of the explosive growth of online learning at the K-12 level, there is a "pressing need for efforts to organize and systematize research on the effectiveness of K-12 online learning" (Smith, et al., 2005). This study examined a specific virtual high school structure, *The Online Academy*, and the relationship between various demographic factors, motivational strategies, and academic achievement of its students.

Predicting academic achievement allows educators to support and prepare learners before they begin their course. Using a predictive instrument to identify characteristics that indicate a lower probability of success can allow educators to

intervene to optimize a student's potential for academic achievement. With the growth of online environments, and the possible uncertainty of who can and will be successful, developing such a predictive model is vital for the academic well-being of current and future online students.

The predictive variables used in this study include the demographic factors of age, grade in school, gender, subject area, previous grade in the subject, and reason for taking the online course. Other predictive variables used to develop a model for academic achievement are classified as motivational strategies. They include the student's goal orientation, self-efficacy for learning, learning strategies and attribution. These variables are measured using eight of the subscales of the Motivated Strategies for Learning Questionnaire (MSLQ).

Online Learning

Online and distance education structures. Terminology about online learning can frequently be confusing. Courses that are classified as "online" may have face to face components. Some online courses may require student collaboration in both synchronous and asynchronous manners. Still others may provide the online student with little to no interaction with other students and perhaps little interaction with an instructor or teacher. The difference in the vast number of terms used to describe the type of learning that is not traditional face to face is sometimes subtle. Therefore, it is difficult to understand what exactly is meant by "online learning".

There is a tendency to clump anything related to the use of computers with education together without regard to the manner in which it is used. The Synthesis of

New Research in K-12 Online Learning document (2005) attempts to distinguish these terms in the following manner. Distance learning is defined by programs having separation between the student and teacher in the form of either time or space. Distance education can be delivered with or without the use of electronic devices. This broad umbrella of distance education includes telecourse study, audio and video conferencing, correspondence or study by mail or a mixture of any of the above. In addition, each of these modes of delivery has a wide range of student interactivity.

The types of learning opportunities that rely on electronic delivery methods are classified as e-learning structures. They can be online environments, face-to-face, or both. The generally understood definition of online learning implies a distance and e-learning component and additionally a high degree of interactivity (or at least the potential for it) in three areas: learner-teacher, learner-content, and learner-learner. Virtual schools fall into the online learning category as self-contained institutions (Smith, et al., 2005).

The ability to distinguish between the differing types of online learning structures is valuable because results of studies examining student satisfaction (and other factors) vary depending on the course structure. For example, in a course where online instructors encouraged students to solve problems via student-student interactions online, students perceived the instructor to be less involved and less supportive. Students then report less satisfaction with their work when they felt that teachers were not interested in their individual progress (Smith, et al., 2005).

The online environment examined in this study, *The Online Academy,* can be classified as a virtual high school. It has been designed to have a high degree of learner-content and learner-teacher interactivity. This study seeks to explore the relationship between demographic factors and motivational strategies and academic achievement of students who participate in this specific program.

The online learning phenomenon. Online learning has grown at an explosive rate for a variety of reasons. Economic benefit is a likely reason for this growth as logical constraints of time and space are all but eliminated along with the bricks and mortar. Access to a variety of courses has been equated with academic opportunity for students, and early growth in online learning opportunities was seen at the post-secondary level. However, what was once considered an optional opportunity for adult students has shifted to a mandate for adolescents as states such as Michigan require an online component as part of graduation requirements (Sotak, 2006).

With any mandate, the concern for consistent quality is naturally present along with concerns about the potential positive and negative impacts. While most educators may not at any point in their careers be in a position to control the quality of an online learning program, they must at least have an understanding of what makes an effective program and what does not. It is, therefore, vital for educators to understand not only the potential strengths and weaknesses of online courses for high school students but also how to help students be successful in this environment.

Finally, online learning is "increasingly a tool of educational reform" (Smith, et al., 2005, p. 3). Questions for the future beg educators to examine if K-12 online learning

will provide quality experiences for learners or instead be a waste of scarce educational resources. Will online learning in K-12 environments prove to be effective and useful or will it go the way of the "open concept" classroom structures of the 1970's? With online enrollment rates reflecting a doubling in three years (Jacobson, 2007), the answer to this question cannot come soon enough.

Besides online learning, many schools have highly developed distance education programs. In order to lessen the constraints of time and space, school districts have taken advantage of the opportunity of the Internet to host video conferencing opportunities. A 2005 report states that "students in more than one-third of U.S. school districts take courses over the Internet through video conferences" and, of the districts that currently had distance-education courses, 72% of them planned to expand their programs ("72% of districts will expand distance ed," 2005). These distance education programs provide many flexible options for their participants in terms of availability. Of districts with distance-education courses, 92% had students accessing from school and 60% from home.

Opportunities for students who reside outside of school districts have also been made available. One fifth of the districts who deliver courses do so to students who are not enrolled in the district such as home-school students and those who attend private schools. Using the Internet to deliver distance education courses naturally eliminates the problems associated with limited space and long distances. However, many distance course delivery methods require simultaneous participation, and this structure does nothing to eliminate the constraints of time. Online learning opportunities that allow

students to participate in the same course at different times are the natural extension of distance education structures.

Concerns about quality stalled some of the initial online learning growth, but in 1995, the U.S. Department of Education presented a national vision that would "strive to provide every student access to e-learning" (Smith, et al., 2005, p. 53). The initial growth of online learning was "top-down" in manner, starting at the post-secondary level. It is still more widespread in post-secondary education but post-secondary institutions are "major providers of K-12 online learning" (Smith, et al., 2005, p. 7). It is believed that 1 percent of K-12 students have taken an online course; most of these students take their online courses while they are also attending public high school full time (Smith, et al., 2005). Enrollments by subject show higher levels of enrollment in the core subject areas. But, in rural areas, subjects such as foreign language have higher enrollments than schools in larger cities.

Regardless of location, online learning opportunities are popular choices for a variety of reasons. These include eliminating the usual time and distance constraints but additionally reducing student schedule conflicts. Also, many enrollments provide students with the opportunity to earn high school and college credit simultaneously; in 2005, 43,000 distance education enrollments were in Advanced Placement (AP) or other college credit courses (Smith, et al., 2005). Finally, online courses are a solution (especially in rural areas) for hard-to-staff or higher level courses.

With this list of potential benefits, it is no wonder that current online education is often considered to be efficient in terms of cost and time by "providing anytime/anyplace

opportunities" (Smith, et al., 2005, p.53). However, even more dramatic claims have been made. It has been stated that online learning increases productivity, and a synthesis of research has confirmed the belief that the context of education has changed. The change seems to be encouraging; students who participate in online high school programs demonstrate academic performance that is at least as good as performance in face to face courses (Smith, et al., 2005). Perhaps the reason for this success is the structure of the learning environment itself. Online learning environments provide personalization and individualization with the "potential to facilitate assessment of individual learning needs and ongoing feedback for improved outcomes" (Smith, et al., 2005, p. 63). This suggests that the online learning phenomenon has the potential to improve quality as well as efficiency and equity within the American educational system.

This assumption must include a consideration of how well students actually perform in their online courses. The results of current research show that online learners perform as well as (Smith, et al., 2005) or slightly outperform their face-to-face counterparts (meta-analysis of distance education and online learning studies, 2001-04). But, little research exists to answer the question "is K-12 online learning effective in terms of academic achievement?" Generally, the conclusions state that there is no significant difference in the effects of online and face-to-face learning, so the general conclusion is that online learning is at least as effective as conventional education. This study seeks to examine a specific online program, *The Online Academy*, not in comparison to a face to face counterpart but instead to understand in-depth the experiences of the learners who participate.

Studies of this type are especially important for schools as they struggle with the implementation of online learning programs. Convincing skeptics is difficult because online learning challenges traditional educational constructs and requires a new way of thinking (Smith, et al., 2005). Concerns about cost of course development and concerns about the quality of the courses are difficult challenges although reasonable concerns. While it is believed that assessing the quality of online courses can be easier than that of face-to-face courses because of the ability to track measures (Smith, et al., 2005), it would be difficult to reach a point where this would be possible because of the enormous costs of development and staffing.

Online courses are developed differently. Online course development requires instructors to produce an entire course at once as opposed to section by section as students progress through the course, and many teachers are not used to this. As a result, the demands on virtual school teachers are heavy (Smith, et al., 2005). Once developed, additional difficulties associated with online learning include keeping online courses current, communicating with parents and students, and keeping up with constantly changing technologies (Smith, et al., 2005). Therefore, for a school to be able to successfully deliver online courses, new models of sustainability need to be developed.

Students as well must make adjustments to participate in online learning opportunities. Online learning is highly dependent on students' ability to read and communicate using skills and strategies that go beyond what is required to read and communicate with traditional print technologies (Smith, et al., 2005). Based on statistics of student completion, it appears that students are not used to online learning. Although

there is no national effort to collect information about virtual schools in a regular and systematic fashion (Smith, et al., 2005), there is at least anecdotal evidence that rates of online course completion are generally lower than face-to-face (Carr, 2000). Reported online course completion rates range from 50% to 99% (Watson, 2007, p. 39). Dropout rates are reported as high as 60% to 70% (Roblyer, 2006). Obtaining these measures is difficult because there is not a consistent method to classify "dropouts" or "non-completers." Also, it is unknown if completion rates included students who dropped the course during the "drop period" or if the calculated completion rate included only students who passed the course. So, because of these uncertainties, reported measures can be conflicting (as those reported above). Even if there was more certainty of measures, the numbers do not explain the dropout rate, although some teachers feel less of a personal connection with their students and this can have negative consequences for the learning process.

This study examines the behaviors and academic achievement of students enrolled in one specifically designed program providing online high school courses; *The Online Academy.* Therefore, the focus of the study is directed to a particular type of online learning environment without comparison to other learning environments, virtual or face-to-face. This process is justified as stated by Revenaugh (2006); "face-to-face and online courses are comprised of differing components and thus comparing the two on certain levels is similar to comparing apples and oranges."

Academic achievement

Definition and measurement. Academic achievement is defined by Zimmerman (1990) as the "acquisition of academic knowledge." In order to examine this construct, two assessment measures were used as variables to quantify this construct. Specifically, academic achievement was measured using both summative and formative methods. The terms formative and summative are not intended to simply classify assessments, but instead they are terms used to identify the function of the assessment (William & Black, 1996). A formative assessment's objective is to provide feedback for students at multiple points during a course so that there is opportunity for improvement. Summative assessment's goals are to judge the extent of a student's learning or to evaluate the effectiveness of a curriculum. They are typically administered once, usually at the end of a unit or a course. With these definitions, it is, therefore, possible for a summative instrument to be used for formative purposes. But, summative assessments are expected to meet other criteria including reliability factors, which challenge the notion that a summative measure can be obtained by simply summing up a string of formative measures (Harlen & James, 1997). Formative assessment has the overall objective of providing feedback to enable the student to improve and so it is designed to identify the quality of a student's response (Sadler, 1989). Because of the differing characteristics of these two kinds of measures and the potential usefulness of each, both a summative and a formative measure were used as variables for academic achievement in this study.

In this study, the student's final grade is an accumulation of formative assessments completed by the student over the entire course period. It is a measure that

represented the students' performance on course assigned tasks completed directly after the introduction of new concepts. These course assigned tasks included those that required mastery of facts and information as well as those that required the application of new knowledge. Each task was sent to the student's mentor upon completion for feedback and evaluation based on established rubrics. However, because some of the activities required a mentor's subjective assessment, there was the possibility of variability in the scores and this variability is not measureable within the bounds of this study. This is a limitation that exists in the use of this variable, but it was included anyway because of its usefulness in providing a measure of student's progress throughout the entire course.

Additionally, a summative measure was used as an outcome variable. In this study, the state mandated end of course exam aligned with the Virginia Standards of Learning (SOL) objectives was used as the summative measure. This standardized test is administered three times a year and consists of base test items called cores developed in three sets. Each core is rotated through each administration of the test and three new cores are developed each year (Fitzpatrick & Triscari 2005). As with any standardized criterion-referenced test, the SOL compares student "performance against an absolute standard" (in this case the SOL objectives) "that reflects acquisition of a skill" (Shipiro, 2004, p. 13). Scoring for this test is determined by a normative comparison in order to determine cut scores for passing at the "proficient" and "highly proficient" levels.

Standardized tests have limitations and causes for concern as well. Standardized test measures do not always show "strong relationships to student progress in a

curriculum" (Shipiro, 2004, p. 15) due to the possible lack of overlap between the developed test items and the curriculum delivered. However, the use of a standardized test measure resolves the issue of inconsistency of assessment and so it was also included as an outcome variable in this study.

Demographic factors and academic achievement. Bandura (1986) suggests the cyclical relationship between perceived ability and academic achievement. Higher achievement boosts a student's perceived ability which results in greater confidence, which in turn, supports the student's motivation in striving for and maintaining high achievement. However, in this study, this relationship has been further examined for interactive effects from various demographic variables, such as gender, age, and subject area.

Research by Martin (2004) of high school students across subject areas showed that girls have statistically significantly higher levels of motivation on a number of dimensions. These include adopting a mastery focus, planning schoolwork, managing study effectively, and persisting in the face of challenge. However, "the fundamental motivation structure is similar across boys and girls even if they differ in degree on some facets of this structure" (Martin, 2004, p. 142). This suggests that gender differences, however subtle, do exist, and while the effects might not be measureable, they should not be discounted.

Other gender studies across subject areas include Chaplin (2000) who demonstrated that males were more confident in their problem-solving skills than females and yet, males were more likely to believe that their success in life depends on luck. This

study also found that males tend to believe that it is necessary to be smart in order to do well more than females. Females tend to give up more easily than males indicating that females believe that ability is important and they lack this ability to be successful. This study hints at the differences to be found across subject domains and shows results in conflict with Martin's (2004) study. Chaplin concluded that more females enjoyed reading and writing than males and this difference was significant. Since the delivery of online courses rely on reading and writing almost exclusively, reading and writing enjoyment could potentially influence a student's experience in an online course. Therefore, while gender may not be a distinguishing predictive demographic characteristic per se, it is recognized as a potential mediating variable at least.

Studies that examined subject areas specifically include Oberman's (2002) study of academic help-seeking in a high school computer science classroom. This study showed no differences in help-seeking behaviors related to gender or ethnicity. This study also showed that while girls had equal skill levels in computer science, they reported lower levels of self-concept, and self-efficacy for self-regulation than the boys.

Debacker and Nelson (2000) examined subjects within science (specifically physical sciences vs. biological sciences) in an effort to further delineate the differences in motivation across and within subject areas. They report that "higher ability students, physical science students, and male students had higher scores on perceived ability than did lower ability students, students in biological science, and female students, respectively" (p. 251). This demonstrates the effect of subject area and the level within the subject on perceived ability. In this study, the effect of gender was consistent across

the subject and ability levels. Female students had lower levels of perceived ability regardless of subject or level of subject. Similar results have been shown in math. Research shows the disparity of the performances in math based on gender is declining (Hyde, Fennema, & Lamon, 1990), but there are still gender gaps in math achievement reported by National Assessment for Educational Progress (NAEP). Specifically, in 2004, "male students scored higher than female students only at ages 13 and 17; at age 9, the apparent difference was not statistically significant" (National Center for Education Statistics, 2005, p. 1). The National Science Foundation report on science and engineering indicators (1996) shows that females' achievement is similar to that of males in all but the most advanced levels of mathematics (p. 1-6).

Malpass, O'Neil, and Hocevar (1999) found no significant gender effects on performance in math even though boys showed significantly higher scores for self-efficacy. This result differs from previous research, especially Fennema and Carpenter (1998), which showed gender differences in learning math and utilization of problem-solving strategies that can be identified as early as grade three. In online environments, Smith, et al. (2005) report more females enroll in online high school courses than males. However, there is no available data on relative success rates based on gender.

The impact of age on self-regulation and self-efficacy has been briefly examined in previous research. Several studies (Pintrich & DeGroot, 1990; Zimmerman & Kitsantas, 1997) specifically collected data on participant's ages but did not report the impact (if any of this variable). One study that did report the impact of age (Caraway, Tucker, Reinke, & Hall, 2003) indicated that age, gender, and race showed no effect on

self-efficacy or goal orientation. A summary of the research reports that younger children have inaccurate perceptions of causality, over-estimate outcomes and their self-efficacy, and have overly high levels of self-competence (Pintrinch, Mark & Boyle, 1993). As children get older, the accuracy of their self-efficacy increased, and their beliefs are more highly related to achievement and, therefore, attribution perceptions become more accurate (Shell, et al., 1995). Pintrich (2003) suggests that the relationship between motivation and cognition should be further examined in longitudinal studies conducted over the course of one's lifetime. He especially questions how the relationship between motivation and self-regulation changes as an individual gains experience and expertise.

Previous experience within a subject area is another demographic variable of interest in this study. Students were asked to consider the last course they took within the same subject area as the online course in which they had enrolled and report the grade they received in this previous course. The decision to include previous grade as a variable was based on previous studies that show that retention in online courses at the university level is correlated with prior academic experiences (Smith, et al., 2005). Specifically, a student's GPA was the best predictor. Also, because self-efficacy (Bandura, 1982), goal-setting (Bong, 2004; Kember, 1997) and motivation (Bong, 2004) have strong domain-specific components, subject area was included as a variable in this study.

Self-regulated learning components

Pintrich and DeGroot (1990) assert that students have control over their learning and posit that there are three components of self-regulated learning especially relevant to classroom performance: student's metacognitive strategies, their management and control

of effort on their academic tasks, and the actual cognitive strategies that students use to learn and understand material. Zimmerman, et al., (1996) concur and define academic self-regulation as a cyclic process referring to the "self-generated thoughts, feelings and actions intended to attain specific educational goals" (p. 2). If students implement self-regulatory processes, not only is the opportunity for learning maximized, but their perception of their control over their learning (self-efficacy) is as well. Students who use a self-regulatory model do so with intent to motivate and guide themselves in their learning process. The overarching goal is for students to have control over their processes instead of being a victim of them. Examples of strategies employed by self-regulated learners include learning how to overcome obstacles such as a distracting environment and discovering the learning processes that work best for them. Zimmerman (1996) states that self-regulatory learning strategies can be taught to students from elementary to college levels. The cyclic process is described by four interrelated phases: self-evaluation and monitoring, goal setting and strategic planning, strategy-implementation and monitoring, and strategic-outcome monitoring. These phases are described below.

The *self-evaluation and monitoring* phase begins when a student encounters an unfamiliar topic. At this point, a student must assess their current level of understanding. Often students have very little sense of the effectiveness of which approaches are best in order to master the new topic or concept. Therefore, it is necessary for the student to keep and maintain performance records to develop their self-evaluation competency. In the *goal setting and strategic planning* phase, students set goals based on their analysis of the given task. In this stage, it is necessary for the student to have assistance to be able to set

reasonable goals. The *implementation and monitoring* phase is where students begin to implement their plan and receive feedback to determine their effectiveness. Finally, implementations may be modified as feedback relating to effectiveness is received; this is the process associated with the final phase, the *strategic-outcome monitoring* phase.

This study examines students enrolled in a course in *The Online Academy*. This particular program encourages students to use self-regulatory processes, as described by Zimmerman, by the nature of the course design. At the beginning of each module in all courses, students are presented with an authentic problem to complete by the end of the module. Students set anticipated target completion dates for each activity in the module. Throughout the module, students receive feedback from their mentor and make adjustments to their schedule as necessary to complete their work. Mentors dialog with their student throughout the module and especially at the end of the module to provide students with feedback about their self-regulatory habits so that adjustments can be made, if necessary, as they proceed through the course.

Research in the area of learning characteristics state that the ideal characteristic for learning online is the ability to self-regulate one's learning (Hargis, 2000). The process of self-regulation is tied closely to not only a student's self-efficacy, but also motivation and goal setting theories. Each of these additional components is examined separately but with the influences of the other components as well.

Self-efficacy

Self-efficacy concerns the students' beliefs about their ability to just do the task, not the linkage between their doing it and the outcome. There are many links between

self-efficacy and other variables in this study, especially the goals that students set for themselves and their motivation to attain these goals. Additionally, because students' beliefs regarding their performance capabilities are classified to a particular domain (Bandura, 1982), this study examines the course in which the student is enrolled as a potential explanatory variable.

Bandura (1993) explains the relationship between these student learning characteristics based on the notion that a student's perceived self-efficacy to regulate their own learning determines their level of motivation. For example, students with a low sense of efficacy in a given domain will shy away from difficult tasks; have low aspiration and a weak commitment to goals they choose to pursue. These students will dwell on their personal deficiencies when faced with a task that is difficult. In contrast, a student's strong sense of efficacy enhances their personal accomplishment. They view difficult tasks as a challenge to be mastered as opposed to a threat to be avoided. They maintain a task-diagnostic focus (Bandura, 1993). An additional study by Zimmerman, Bandura, and Martinez-Pons (1992) shows similar findings to include the aspect of self-regulation as well: "Students' beliefs in their efficacy for self-regulated learning affected their perceived self-efficacy for academic achievement which in turn influenced the academic goals they set for themselves and their final academic achievement" (p. 663).

This study includes the variable of self-efficacy for learning as a potential predictive variable because of its usefulness in predicting academic outcomes (Bong, 2004; Bandura, 1993). Measures of self-efficacy for learning and performance will be collected before a student begins their online course to determine if the measure predicts

academic achievement. Additionally, measures will be collected at the end of the student's course to examine any changes in self-efficacy from the beginning to end of the course.

Goal orientation

The research describing goal placement shows consistent assertions, although the language used to describe differs somewhat. Generally, the two primary goal orientations are defined based on an individual's focus. The first focus is one that is directed toward an individual's learning and improvement, the second focus is directed with the intent to demonstrate ability especially in relation or compared to others. These two focuses are identified with the terms *mastery* and *performance* (Ames, 1992b; Harackiewicz, et al., 1997), *learning* and *performance* (Dweck & Leggett, 1988), *task* and *performance* (Kaplan & Midgley, 1997; Middleton & Midgley, 1997), *process* and *outcome* (Zimmerman and Kitsantas, 1997) or *task-involved* and *ego-involved* (Nicholls, et al., 1989).

Although research shows that there is a difference in the terms that are used, it is generally suggested that the two different goal orientations lie on opposite ends of the spectrum. In this study, the terms *performance goals* and *mastery goals* will be used. Besides the general belief that performance and mastery goals are opposite, there is research that shows the benefits of student's abilities to adopt mastery goals. Mastery goal orientations lead to more self-regulation and cognitive strategy use and therefore better achievement (Ames, 1992; Pintrich, 2000b). This research has also shown the

problems in the areas of cognition and achievement for students who adopt performance goals.

Descriptions of goal orientations are further specified by the dimensions of *approach* vs. *avoid*. These dimensions are used in addition to the terms mastery and performance. Like students with mastery orientation, students with approach orientation show generally positive relations to motivation, cognition and behavior (Linnenbrink & Pintrich, 2001). A student with a performance-approach goal orientation will wish to outperform others to show his/her competence or superiority as opposed to a performance-avoid goal orientation in which students wish to avoid failure and looking incompetent. Similarly, students with mastery goal orientations are further delineated using the approach and avoidance dimensions. Students with mastery-approach goal orientation focus on mastering a task to develop a deep understanding. Students with mastery-avoidance goal orientation focus on avoiding misunderstanding or being wrong.

As mentioned previously, a student establishes academic goals based on other variables, including the student's motivation, academic self-efficacy and self-regulation which impact academic achievement. Goal placement is described as being either focused on a process (such as learning) or an outcome (such as a score compared to others). Students select their goal orientation as part of their self-regulation practice. Additionally, students' perceived self-efficacy will influence the goal level that they set for themselves (Zimmerman, et al., 1992). The placement of goals is not always consistent; students will adopt different approaches in different courses, based on the influence of the learning environment (Bong, 2004; Kember, 1997). There is a benefit to placing goals

appropriately. Research by Zimmerman & Kitsantas (1997) showed that students who set initial process oriented goals and then shifted to outcome goals would surpass learners who simply set process oriented goals who in turn, surpassed learners who set only outcome oriented goals when faced with learning a complex task in academic or athletic environments.

The theory of goal orientation suggests that goals are "cognitive representations" that can "guide and direct academic behavior" (Linnenbrink, & Pintrich, 2001, p. 251). The goals set by a student are also influenced by their motivation and are managed by the student's self-efficacy and self-regulatory processes, illustrating the interactions between these factors. Further, individual characteristics and contextual characteristics influence goal orientation. In academic settings, these influences can be the course in which the student is enrolled or the value that a student assigns to a particular task.

As mentioned before, students establish their goal orientation based on contextual factors. The classroom structure is one such context. The environment of a classroom impacts how students perceive their goal structures which in turn influence the adoption of mastery or performance goals. Students with more autonomy in their classrooms tend to develop mastery goals as opposed to students in a more teacher-controlled classroom who develop performance goals. Linnenbrink and Pintrinch (2001) describe this notion as strength of the achievement goal theory because it recognizes the potential influence of somewhat controllable external factors on student's goal development. In particular, Linnenbrink and Pintrinch mention the effects of objective and subjective classroom demands and how they impact the type of academic actions a student will take. They

suggest that students' perceptions are influenced by their existing goal structure, and students rely on their perceptions to further set their goal structure. If the structure of an online environment allows students to feel more autonomous, perhaps online learning opportunities can encourage the development of mastery goals. This study will examine the goal orientation of the students enrolled in *The Online Academy* before they begin their online course and after they complete it to examine if any adaptations are made.

Motivation

Motivating learners is seen as an important focus for teachers in an online environment compared to face to face due to the higher attrition rates for online courses (Smith, et al., 2005). Ford's (1992) summary of motivational theories shows the relationship between many theories of motivation and their relationships to personal goals and personal agency beliefs. Theories of motivation have evolved from psychoanalytic theories (which relate goals and instinctual drives) to need theories (which presume that humans have goals based on multiple and hierarchical needs which govern thoughts and actions) to causal attribution theory (which relates personal goals to a person's general desire for understanding). The self-efficacy/social cognitive theory of motivation presumes that goals and expected outcomes guide and motivate a person's behavior and this theory provides a framework for this study. While students' goal orientation influences their motivation, motivation and goal theories differ. Goal orientation theories suggest that goals are cognitive structures, and motivation theory proposes that personal needs are the source for an individual's behavior. Like goal-

orientation and self-efficacy, student's motivation is strongly influenced by the instructional context and domain.

The theoretical framework for conceptualizing student motivation consists of expectancy, value, and affective components of self-regulated learning. The expectancy component includes a student's beliefs about their ability to perform a task and is conceptualized in many ways including self-efficacy and attribution placement. The value component includes student's goals and beliefs about the importance of the task. The affective component includes student's emotional reactions to the task including test anxiety. Previous research shows that there is a positive relationship between the expectancy and value components of motivation and the three components of self-regulation: metacognitive strategies, their management and control of effort on their academic tasks and the actual cognitive strategies that students use to learn and understand material (Pintrich & DeGroot, 1990). In turn, the motivational and self-regulated learning components are positively related to student performance on academic tasks (Pintrich & DeGroot, 1990).

Previous studies that have attempted to determine if there is a relationship between learner characteristics and student achievement in online environments have been focused primarily at the post-secondary level. Examples include Jamison (2003) who showed that student completion of an asynchronous web-based distance education course can be predicted by a set of motivation-related variables. However, academic motivation constructs (like many others) contain strong domain-specific components. Students form motivational beliefs that are subject-matter specific although some student

beliefs transfer across multiple domains more than others (Bong, 2004). In this study, the researcher collected information about the student's course in order to include this as a variable in the study. Additionally, measures of motivation are collected at the beginning and upon completion of the online course to examine any differences during the students' participation in their online course based on Liu's study (2003) indicating that technology facilitated project-based learning has the potential to enhance students' motivation. Results from a study (Stefanou & Salisbury-Glennon, 2002) conducted at the undergraduate level show significant changes in motivation and cognitive strategy use by the end of participation in a learning community. Specific results indicated increased intrinsic and extrinsic motivation, more internal control of learning and self-efficacy. The instrument used in Stefanou and Salisbury-Glennon's study, the Motivated Strategies for Learning Questionnaire (MSLQ) was also used in this study.

Attribution Theory

Attribution theory has a history that begins with the idea of Rotter's (1966) Locus of Control which states that a person's perceived causes of success and failure could be measured along a spectrum of internal causes (such as ability and effort) vs. external causes (such as luck and task difficulty). In 1971, Weiner, et al. proposed that in addition to internal and external causes, one needed to also consider the *stability* of each. Although it was difficult to apply this notion into practice, the theory stated that instead of simply external, a cause of success (or failure) could be classified as *external unstable* or *external constant* and similarly *internal unstable* and *internal constant*. The concept of luck would be classified as *external* as before and additionally identified as *unstable*.

Task difficulty would be considered *external stable.* The attribute of effort would be classified as *internal* and *unstable*, but because a person had the ability to control the expenditure of some internal unstable variables, Rosenbaum (1972) added the aspect of *controllability*. Additional dimensions of *intentionality* (which co-varies with control, but can also be separate) and *globality* (which asserts that causes are situation-specific) have also been considered as additional dimensions, but Weiner (1985) stresses that the three principals of locus, stability and controllability are the three common properties that describe perceived causes of success and failure. By the time students reach junior high school, they have generally stabilized their perceptions of causality and outcome expectancy (Shell, et al., 1995). There is little change in their perceptions throughout high school.

Attributions of achievement to effort, ability and other internal factors are positively related to actual achievement in children while attributions to luck and other external factors are negatively related to actual achievement (Georgiou, 1999). Therefore, this study collects measures of student's attribution at the beginning of their course to examine its relationship with academic achievement in the online course. Additionally, end of course measures were collected to determine if there was a significant change in students' attribution during their participation in their online course.

Conclusion

Because of the explosive rate of online growth, Smith, et al. (2005) calls for efforts to organize and systematize research to explore the effectiveness of K-12 online learning. Meeting this need is difficult for many reasons. First, online programs cannot be

effectively evaluated by using traditional school criteria since traditional evaluation criteria do not fit well with online learning environments. It is also necessary to distinguish program structures within the online learning context because general distance education evaluation criteria do not fit all online learning environments. Secondly, consistent measures and methods of measuring do not exist for online programs. As a result, there have been few empirical studies to determine the effectiveness of online educational programs in elementary and secondary settings and those studies of distance education programs or virtual programs that have specified structures cannot be translated to all online programs. In the Synthesis of New Research on K-12 Online Learning, Smith, et al. declare that "more rigorous, experimental research needs to be undertaken examining online interaction, with much clearer definitions of cause and effect, before clear and useful findings are possible" (p. 67).

This study was framed by the theory that motivation and self-regulation depend on self-efficacy beliefs and personal goals (Zimmerman, et al., 1992). The design of the study was also influenced by Bandura's social cognitive view of motivation that states that "motivation and learning strategies are not traits of the learner, but instead motivation is dynamic, contextually bound and can be learned and brought under the control of the student" (Duncan & McKeachie, 2005, p. 17). The Motivated Strategies for Learning Questionnaire (MSLQ) was developed using the social-cognitive view of motivation. Therefore, it was an appropriate instrument for this study.

This study was conducted entirely within the domain of *The Online Academy*; a virtual high school program developed using the tenets of ultimate flexibility, problem-

centered learning approaches, and the support of an online mentor. Previous research has shown that active learning and social construction of knowledge have the potential to improve academic performance in online and face to face learning environments, and problem-based models had a positive effect on achievement and attitudes of online learners (Smith, et al., 2005). The structure and design of *The Online Academy's* is unique; it is not guided by any pre-set or specific time tables. Students can work at a pace that meets their learning needs and this creates a specific online context. This study examined the relationship between this learning environment and students' motivational strategy measures.

Previous predictive studies of virtual high schools have been limited to predicting achievement in terms of success (as defined by passing or failing). For example, Roblyer's (2002) study of virtual high school students predicted with nearly 100% accuracy whether a student would pass or fail their online course. The study relied on measures of student's self-reported achievement and self-esteem beliefs, responsibility and risk taking behaviors, technology access/skills, and organization and self-regulation levels to make these predictions of success. Roblyer's study was designed to examine success only as "pass" or "fail" and did not discriminate between levels of academic achievement. Additionally, the study was conducted in an online environment that utilized a scheduled asynchronous mode with a specific weekly structure- a different structural context from *The Online Academy*.

In this study, the researcher assumed that student's demographic characteristics shape the student in some manner. The researcher also assumed that the motivational

characteristics that students hold during any academic experience have an impact on the student's academic achievement. This study brought the examination of the relationships between these various student characteristics and academic achievement into the domain of a unique online learning environment, *The Online Academy.* By examining these student characteristics within this specific environment, this study had two goals. The first was to determine if academic achievement levels could be reasonably predicted. The second was to determine if students exhibited significant differences in their motivational measures after completing their experience in this unique online learning environment.

3. Methodology

Research Questions

The following questions frame the research:

1. Is there a relationship between students' demographic characteristics (age, gender, grade in school, subject area, previous grade in the subject, and reason for taking the online course) and academic achievement (as measured by final course grade and score on Standards of Learning exam)?

   H_0: There is no statistically significant linear relationship between any of the demographic variables collected in this study and academic achievement.

   H_A: At least one demographic variable collected in this study will provide a statistically significant linear model for academic achievement.

2. Do students' initial self-reported goal orientation, self-efficacy for learning, learning strategies, and attribution survey responses predict academic achievement (as measured by final course grade and score on Standards of Learning exam)?

   H_0: There is no statistically significant linear relationship between any of the self-reported pre-course motivational attribution measures and academic achievement.

H_A: At least one of the self-reported pre-course motivational strategy measures will provide a statistically significant linear model for academic achievement.

3. Is there a significant difference between students' self-reported pre-course measures of goal orientation, self-efficacy for learning, learning strategies, and attribution and student's self-reported post-course measures (as reported upon completion of their online course)?

   H_0: There is no statistically significant difference in pre and post-course self-reported measures of motivational strategies.

   H_A: There is a statistically significant difference in at least one of the pre and post-course self-reported measures of motivational strategies.

4. Is there a significant difference between student's self-reported pre-course measures of goal orientation, self-efficacy for learning, learning strategies, and attribution and student's self-reported post-course measures (as reported upon completion of their online course) and are these differences associated with the student's level of academic achievement?

   H_0: There is no statistically significant difference in pre and post-course self-reported measures of motivational strategies based on academic achievement.

   H_A: There is a statistically significant difference in at least one of the pre and post-course self-reported measures of motivational strategies based on academic achievement.

Research Design

As defined by Creswell (2005), this was a cohort study; the specific common characteristic that identified the target sub-population of interest was participation in *The Online Academy*. One of the goals of this study was to obtain descriptive information about the characteristics of the online learners taking courses in *The Online Academy* so that academic achievement might be reasonably predicted. Additionally, this study was developed to determine if any of the online learners' various motivational strategy measures changed significantly during their online course. Therefore, a survey design was appropriate because the sample was selected from individuals of a known population, and relatively small amount of data in a standardized form was desired (Robson, 1993). One of the questions framing the research was to examine the changes in students' learning behaviors after their participation in their online course. Therefore, a pre-test post-test one-group design was appropriate to determine if there was a significant change in the measures of goal orientation, self-efficacy for learning, learning strategies, and attribution. The nature of this design does not allow the researcher to determine causality because of the lack of a control group, but this was not an intended goal of the study. This design does, however, allow the researcher to examine the relationship between the demographic variables, pre-course and the post-course measures, and academic achievement by the use of the pre and post-test format.

Subject selection

All students who enrolled in an online course offered by *The Online Academy* during the summer of 2007 were considered for participation in this study. Human

Subjects Review Board approval was obtained before the start of the summer session. Once a student was enrolled, letters were sent via email to each student and student's parents explaining the study and requesting participation (Appendix B, C). Students and parents were able to give their consent electronically by sending a message to the researcher indicating either "I consent" or "I do not consent" within the message.

Subjects

The students in this study attended high school in suburban mid-Atlantic schools during the regular school year. They were participants in *The Online Academy* during the traditional summer school time frame although the start and completion dates were flexible. Each student completed one course in one of the four core subject areas: math, science, social studies and English. This course demographic data is summarized in the Table 1.

In order to determine students' previous performance in the particular subject area, students were asked to report the grade they had earned in a previous course in the same subject area. Nine students left this question blank or responded with "N/A." The summary of this previous grade data is summarized in Table 1.

Students were also asked to provide their reason for taking this online course in the online survey (Appendix C). The responses to this question centered around three themes. The first was to get ahead and provide the opportunity to take advanced courses later during high school or to perhaps graduate early. The second theme was centered on repeating a course because they failed it previously or they passed but wanted to improve their grade. The final theme was not academic in nature, but instead was centered on the

idea of scheduling and flexibility; specifically, students expressed comments that they had conflicts with the face to face summer school schedule. Two responses could not be classified into these themes. These responses were "I haven't taken it yet" and "My current math class bored me." Since they could not be classified, they were omitted. The summary of the responses for taking this online course is provided in Table 1.

Upon completion of the online course, students were asked to complete the post-course survey. This survey was identical to the pre-course survey and was again administered online. A copy of the online survey is included in Appendix C. Several students obtained extensions to complete their courses during the following school year and so no academic achievement data was collected on these subjects. There was a 57% response rate on the post-course survey (N = 28). Similar to the pre-course survey, four students either answered "N/A" to the previous grade in the subject area question or left it blank. These responses were omitted. Also, the answer "Bored in math class" was again given as a response to the question asking about the reason for taking the online course, so it was not classified.

Table 1

Demographic Data of Participants

	Pre-course survey	Post-course survey
Gender	Counts (N = 54)	Counts (N = 28)
Male	25	13
Female	29	15

Age	Counts (N = 54)	Counts (N = 28)
12-13	5	5
14-15	24	12
16-17	24	11
18	1	0
Course	**Counts (N = 54)**	**Counts (N = 28)**
Algebra 1	7	4
Algebra 2	7	4
English 10	1	0
English 11	2	1
Geometry	23	15
Physics	4	1
US History	2	2
World History 1	4	1
World History 2	4	0
Previous grade in subject	**Counts (N = 54)**	**Counts (N = 24)**
A	26	17
B	12	2
C	3	2
D	4	2
F	0	1
Not reported	9	4

Reason for taking online course	Counts (N = 52)	Counts (N = 27)
To get ahead	29	20
Make-up credit or improve previous grade	12	5
Schedule/flexibility	11	2

The subjects in this study were selected because of their participation in *The Online Academy.* The summer school time frame allowed for a fairly large sample size with participants starting and completing at approximately the same time. One of the challenges of a study of virtual schooling is that subjects of studies can almost never be random because students self-select to participate (Smith, et al., 1995). However, according to Robson (1993), subjects in a research study can be selected purposively based on "researcher's judgment as to typicality or interest" (p. 141). Because the study's population of interest is online learners participating in *The Online Academy* courses during a summer session, each subject of the study meets this requirement for selection. This study does not use random sampling and, therefore, results obtained in this study will be generalizable only to students taking online courses in *The Online Academy*, which is the researcher's area of interest.

Instruments

Academic Achievement. For the purposes of this study, the researcher defines academic achievement in two ways: the students' final grade in their course and the score on the Standards of Learning (SOL) test. The final course grade is a numeric value within

the range 0 to 100. Numeric grades from 93-100 were classified by the participating school district as an "A", 85-92 as a "B", 77-84 as a "C", 70-76 as a "D" and grades below 70 were classified as an "F". The SOL test score was also a numeric value ranging from 0 to 600. Scores ranging from 500-600 were classified by the state of Virginia as "highly proficient", scores of 400-499 are classified as "proficient" and scores below 400 are classified as "not proficient". Final grades in the course were obtained by reports from each of the students' mentors. Grades on the SOL test were obtained from the students' school district. The researcher used both measures for academic achievement as dependent variables so that both a standardized, summative measure (SOL scores) and a formative cumulative measure (course grade) could be examined.

Summative assessments (typically administered at the end of a course) are used to measure a student's learning at a point in time and provide assurance for school organizations that students are receiving at least the standard curriculum by meeting the pre-defined goals and expectations (Danielson, 2006). The SOL test score is used for *No Child Left Behind Act of 2002* (NCLB) reporting purposes for the state of Virginia. Also, passing the SOL test in each required subject area allows a student to verify their credits required for graduation.

The formative measure (the end of course grade) was used as a measure of achievement because of its more longitudinal or cumulative structure. Formative assessment is used to provide timely feedback and evidence of student learning throughout a course as opposed to only one point of the course. The end of course grade for courses in *The Online Academy* is calculated by the mentor based on the student's

performance throughout the entire course in a variety of areas; the module challenges (which are assessed using a rubric), and individual activities which are graded based on established point structures. The rubrics and point structures were presented to the students at the beginning of each module

Demographic data. All students were asked to complete a demographic questionnaire that preceded the MSLQ and attribution questions (Appendix C). Students were asked their age, gender, grade in school (as of Fall 2007), and why they were taking this online course. Because the researcher anticipated that the reasons for taking an online course over the summer would vary greatly, this question was purposely written in an open-ended format.

Motivated Strategies for Learning Questionnaire (MSLQ). Besides completing the demographic questionnaire, students completed a total of 48 questions taken from the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia & McKeachie, 1991, 1993) to measure four of the independent variables in the study. The MSLQ was developed using a social-cognitive view of motivation and learning strategies. It is framed by the principles that motivation is dynamic and students can learn and control their learning strategies (Duncan & McKeachie, 2005).

The entire MSLQ is comprised of two sections for a total of 81 Likert-scale questions. The two sections (motivation and learning strategies) are further divided into subscales. The motivation section is comprised of six subscales and learning strategies is comprised of nine subscales. The researcher selected a total of eight subscales (for a total of 48 questions) for their relevance to the study: intrinsic goal orientation, extrinsic goal

orientation, self-efficacy for learning, and performance from the motivation section and elaboration, organization, critical thinking, time and study environment management and effort regulation from the learning strategies section. These subscales are explained below.

The following three subscales were taken from the motivation section of the MSLQ. The values from each of these sections were used separately to measure three of the independent variables of the study.

1. Intrinsic goal orientation (four questions): Students were asked to respond to questions such as "In a class like this, I prefer course material that really challenges me so I can learn new things" with response options of 1 (not at all true of me) to 7 (very true of me). All four questions from this subscale were used in this study to measure the extent to which a student perceives that participation in a task is for reasons such as challenge, curiosity, and mastery.
2. Extrinsic goal orientation (four questions): Students were asked to respond to questions such as "Getting a good grade in this class is the most satisfying thing for me right now" using the same Likert-scale responses of 1 to 7. All four of the questions from this subscale were used in this study to measure the extent to which a student perceives that their participation in the task is for reasons such as grades, competition or evaluation by others.
3. Self-efficacy for learning and performance (eight questions): Students were asked to respond to questions such as "I believe I will receive an excellent grade in this class" using the same 7-point Likert scale. All eight questions

from this subscale were used in this study to measure expectancy for success (performance expectations related to task performance) and self-efficacy (self-appraisal of one's ability to master a task).

The learning strategies component of the study (the fourth independent variable in this study) was measured by combining the five scores from the elaboration, organization, critical thinking, time and study environment management, and effort regulation subscales.

1. Elaboration (six questions): Students were asked questions such as "I try to relate ideas in this subject to those in other courses whenever possible" using the same 7-point Likert scale to measure how well strategies such as paraphrasing, summarizing, and creating analogies were used. All six questions from this subscale were used. However, four questions were modified slightly due to the online course structure. The question, "When I study for this class, I pull together information from different sources, such as lectures, readings, and discussions" was changed to simply, "When I study for this class, I pull together information from different sources." The question, "When I study for this course, I write brief summaries of the main ideas from the readings and the concepts from the lectures" was changed to "When I study for this course, I write brief summaries of the main ideas from the readings and my class notes." The question, "I try to understand the material in this class by making connections between the readings and the concepts from the lectures" was changed to "I try to understand the material in this

class by making connections between the readings and the concepts from the course activities." The question "I try to apply ideas from course readings in other class activities such as lecture and discussion" was changed to "I try to apply ideas from course readings to other class activities." In each of these cases, the modifications were justified. Lectures are not part of the online course structure, and student's communication with their mentor consisted mostly of email exchanges. Therefore, the term "discussions" is inappropriate.

2. Organization (four questions): Students were asked questions such as "When I study the readings for this course, I outline the material to help me organize my thoughts" using the same 7-point Likert scale to measure how well strategies such as clustering, outlining, and selecting the main idea from reading passages were used. All four questions from this subscale were used in this study.
3. Critical thinking (five questions): Students were asked questions such as "I often find myself questioning things I hear or read in this course to decide if I find them convincing" using the same 7-point Likert scale to measure the degree to which students report applying previous knowledge to solve new problems. All five questions from this subscale were used in this study.
4. Time and study environment (eight questions): Students were asked questions such as "I usually study in a place where I can concentrate on my course work" using the same 7-point Likert scale to measure the scheduling, planning, and managing of study time as well as the setting in when the

student does work. Seven of the questions were used in this study. The question "I attend this class regularly" was omitted since students in *The Online Academy* work online at their own pace following a schedule that they establish so there is no notion of "attending class." The question "I rarely find time to review my notes or readings before an exam" was modified to "I rarely find time to review my notes or readings" since most of *The Online Academy's* formal assessment mechanisms were in the form of authentic problems. Exams in the traditional sense were not widely used.

5. Effort regulation (four questions): Students were asked questions such as "I work hard to do well in this class even if I don't like what we are doing" using the same 7-point Likert scale to measure self-management and commitment to completing study goals. All four questions from this subscale were used in this study.

Research during the years 2000-2004 using the MSLQ survey has addressed the relationship between academic self-efficacy and motivation on academic achievement in a variety of settings including computer-based instruction and constructivist versus objectivist Internet-based instruction (Duncan & McKeachie, 2005). The MSLQ is part of the public domain and it has been delivered in an online format at the University of Arizona (http://www.ulc.arizona.edu/mslq.php). The survey has been most frequently used to evaluate the effects of various aspects of courses on students' motivation including educational technology (Liu, 2003) using a pre and post-test format. The authors of the instrument report that the MSLQ shows "reasonable predictive validity to

the actual course performance of students" with robust scale reliabilities "and confirmatory factor analyses demonstrating good factor structure" (Pintrich, et. al., 1993). Because of its functionality, reliability, and flexibility to enable its delivery via the Internet, it was selected as the primary instrument for this study to obtain measures for four of the independent variables; intrinsic goal orientation, extrinsic goal orientation, self-efficacy for learning and performance and learning.

Attribution variable instrument. A six question causal attribution instrument developed by Shell, et al. (1995) was used to measure students' beliefs about the causality of their success using the variables internal attribution and external attribution. Students were asked to rate the importance of six different causes along a 5-point Likert scale from 1 (not important) to 5 (very important). The questions were prefaced with the phrase "to be successful in this course, how important are the following?" The students were then asked to rate each of the following causes individually: effort, luck, task difficulty, ability, obtaining help, and enjoyment of the course.

The causes effort, ability, and enjoyment are classified as internal attributions, and student responses were combined to calculate the internal attribution variable. The causes luck, task difficulty, and obtaining help are classified as external attributions, and student responses to the questions about these variables were combined to calculate the external attribution variable. The original instrument developed by Shell, et al. was used to assess students' perception about the importance of various causes on the reading and writing process. For this study, the researcher modified the prefacing question from "How important are each of the following to be a good reader/writer?" to "To do well in this

subject, how important are each of the following?" These questions were presented online immediately after the MSLQ sub-scale questions.

Effort was made to address all questions to students within the context of the subject area of the course in which they were enrolled. Specifically, the phrase "as you answer the following questions, consider the last math (or science, English, history) course you took". This measure was taken based on results of previous studies that indicate that relationships between the various learning characteristics and academic achievement are isolated based on the nature of the setting or type of subject (e.g. Goal Setting, Latham & Locke, 1990; Motivation, Liu, 2003; Attribution, Bong, 2004).

Treatment

This study examined students participating in *The Online Academy's* courses taken during the summer school time frame. *The Online Academy* is an online virtual high school project developed in partnership between George Mason University and three school districts in close proximity to the university. *The Online Academy* offers a complete core of academic courses in math, science, social studies and English. Students can enroll in a particular course at any time during the regular school year term or during the summer to either recapture lost credit or advance to a higher level. Once a student completes the requirements for their course, a certificate of completion is sent to the student's home school so that the student's local school district can award credit. To this end, *The Online Academy* has met the state requirements to be classified as an approved correspondence school, enabling students from around the state to take courses online and earn or recapture the credits they need.

Although *The Online Academy* meets the Virginia state approved correspondence school guidelines, its design is not like that of a typical correspondence school or other virtual high schools. Instead, *The Online Academy* courses are designed around three principles: ultimate flexibility, a problem-based content design, and online mentor support. These principles form what *The Online Academy* refers to as "a classroom of one." Each course of the online academy is divided into 12 to 15 conceptual modules designed around the Virginia state standards of learning (SOL) requirements. Students are presented with an authentic problem at the beginning of each module that requires an understanding of specific content objectives for successful completion. Throughout the module, students complete background building activities to master the content objects and send their work to their online mentor. Mentors respond with feedback on the work submitted and ask follow-up questions to engage the student in conversations about the content.

Mentors who teach in *The Online Academy* are Virginia state licensed classroom teachers who have completed *The Online Academy for Teachers*. This program consists of five courses focusing on how online learning works, developing relationships online, and promotion of self-regulation, self-efficacy and transfer. Teachers taking this course engage in a process of learning that mirrors *The Online Academy's* format and communicate with their mentors predominantly via email, although an online chat room is available for synchronous communication opportunities.

Prior to beginning their actual content course, students enrolled in *The Online Academy* courses completed an introductory module that is not related to the subject

matter material but instead is designed to give students a brief overview of the processes used by *The Online Academy*. The goal of the introductory module is to introduce students to the structure and processes of the course as well as the technology used and the role of their mentor.

The introductory module also introduces students to the technology that they will be required to use to complete their course, specifically, their email account, the course checklist and the DigiChat software, which is a synchronous chat room available only to *The Online Academy* students. Students are assigned an email account through George Mason University that is web-based. Students can access their email via any web browser and in the introductory module, students were taught how to attach files to messages sent to their mentor. The final objective of the introductory module is to introduce students to their online mentor and the concept of working with an online mentor. Students have the opportunity in the introductory module to tell their mentor about themselves and learn how to develop a schedule for completing their work. Each module has an interactive checklist with a list of the activities and a place for the student to provide a target completion date for each. Once the student sets the target completion dates, they share these dates with their mentor who may offer suggestions for modifications. Once the dates are established and agreed upon, the checklist serves as a pacing guide for the student and the mentor and a learning contract for the student to follow in order to meet their goals. It is a way to help learners manage their workload, their time, and their progress through the course. The checklist represents one strategy used in *The Online Academy* to help learners with self-regulation (Norton, 2005).

Once students completed the introductory module, they began their course. Each course developed for *The Online Academy* follows the same design format, so the structures and processes used for each course are the same. All of the courses are divided into 12-15 self-contained conceptual modules, and each module follows the same format. At the beginning of every module, the student is presented with the challenge (authentic problem) that they will need to solve by the end of the module. "The challenge presents a representative problem- one that learners might actually encounter- that sets the stage for learning", (Norton, 2005, p.13). For example, in one module of the Algebra 2 course, students assume the role of an intern working for a planned development community. Part of the challenge of this module required students to present a report on the exponential growth of a species of rabbits that infiltrated the community and predict the population after a certain number of years. As they proceed through the lessons/activities, the student is frequently emailed by their employer and assigned design challenges for new community concerns, such as the impact of new developments on the ozone layer.

Immediately after being presented with the challenge, students are presented with three follow-up sections; meeting the challenge, background building and knowing you have succeeded. The "meeting the challenge" section explains the concepts or objectives that students will need to understand in order to complete the challenge. The "background building" section presents to the students in an overview manner the activities that they will complete throughout the module in order to master the concepts and objectives. In the "knowing you have succeeded" section, students are given a rubric or other

assessment mechanisms to understand how their responses to the challenge will be assessed so they will know what they need to do to complete it successfully.

Conversations about schedule and pace are one of the things that mentors and students discuss during their email conversations, but most importantly, students and mentors discuss the academic content. This is done as the student completes the course activities and sends them to the mentor for feedback. "The lesson/activity pages often present learners with tasks that prompt and support them in summarizing, synthesizing, applying, and/or reflecting on information from the readings" (Norton, 2005, p.13). The mentor uses the activities and the student's responses as an opportunity to engage the student in conversation about the content to extend the student's understanding. The back and forth asynchronous conversations are a unique concept, and the introductory module gives students some experience with them (as well as the technology and structure used) before they begin the online course in their content area.

Students have the opportunity to correct the mistakes that they make before they move on to new material. If a student needs assistance at any time, they can email their mentor with questions and wait for a reply. Although there is some delay using this procedure, each student is able to get an answer to any question that they might have. Another option for students to receive support is through online chat (DigiChat) session opportunities. Students can meet with their mentor at a pre-determined time to discuss the material or assignments

The design of *The Online Academy* allows students to progress through the course at a pace negotiated with parents, learners, and/or school divisions. Students can work on

their coursework at any time and from any place as long as they have an Internet connection. Once the student completes their course, their grade is reported to the student's base school. Credit for the course is awarded by the student's school district.

Procedures

Data Collection. As part of the registration process, students were asked "why are you taking this course?" The answers to this question revealed if a student was taking the course for the first time to advance or repeating a course previously taken at their base school to recapture lost credit or improve a previous grade. It also allowed the researcher to understand the student's reason for selecting the online option instead of the traditional face to face summer school format. Many students had conflicts with the traditional summer school schedule and took advantage of the flexibility of the online format. The response from this question allowed the researcher to categorize students as those who were taking the course to "get ahead", "make-up credit or improve previous grade" or "take advantage of scheduling flexibility." The remainder of the demographic data (e.g. age, gender, grade in school, and course subject) was collected via the online survey instrument.

In order to obtain consent for participation, the following procedures were followed after Human Subjects Review Board approval was obtained. Parents of potential student participants were emailed to obtain parent permission first. A copy of this email is contained in Appendix B. Parents could give consent for their child to participate by replying to the message and stating "I consent." Students were sent a separate email (Appendix B) requesting their participation in the study after parental consent was

obtained. Students were able to give their consent by replying to the email message and stating "I consent."

Once students were enrolled in *The Online Academy*, they were given access to the online materials via a username and password. Before students began their actual coursework, an introductory module that presents an overview of *The Online Academy's* processes was assigned, and since all students were required to complete this module, it enabled the researcher to deliver the online survey as part of this module to all students in a consistent manner. The first activity of the introductory module explained the nature of the survey and presented students with directions on how to complete the survey. Responses to the survey were sent to the researcher in an electronic format so that they could be saved for later analysis. No further action was taken until the student reached the end of their course.

Students were identified by their username so that pre and post-data could be compared and analyzed. Post-data were collected with the assistance of the student's online mentor. When students completed the last module of their course, the researcher was notified by the student's mentor. An email (Appendix D) was then sent to the student directing the student to the webpage containing the online post-survey. This survey asked the same questions in the same order as the pre-survey, and responses were again sent electronically to the researcher so that data could be collected and analyzed.

Using an electronic format to deliver a survey has potential limitations (Creswell, 2005). These limitations include difficulties obtaining email contact information, technology limitations, and lack of a population list. In this study, these limitations are

easily resolved. First, the target population consists of students enrolled in *The Online Academy,* so the researcher had access to all members of the target population. Second, as part of their registration and application process, students were assigned an email account to use to complete their course work so there was no difficulty obtaining reliable contact information. Email contact information for the students' parents was obtained via the course registration form. Finally, as part of the application process, all students were informed of the need to have a reliable Internet connection so there was no concern that members of the population would be missed due to technology constraints.

Data Analysis. All instrument data from the administered surveys was entered into SPSS for analysis. To address question number 1, "Is there a relationship between students' demographic characteristics (age, gender, grade in school, subject area, previous grade in the subject, and reason for taking the online course) and academic achievement (as measured by final course grade and score on Standards of Learning exam)" multivariable regression analyses were conducted. The first analysis utilized final course grade as dependent variable, the second utilized score on Standards of Learning exam.

To address question number 2, "Do students initial self-reported goal orientation, self-efficacy for learning, learning strategies, and attribution survey responses predict academic achievement (as measured by final course grade and score on Standards of Learning exam)?", multi-variable regression analyses were conducted with pre-course survey responses for the variables intrinsic goal orientation, extrinsic goal orientation, self-efficacy for learning and performance, learning strategies, internal attribution and

external attribution as independent variables and final course grade and score on SOL exam as dependent variables.

The use of multivariable regression analysis is appropriate to explore the combined relationships between two or more independent variables on a single dependent variable (Cresswell, 2005). This procedure allowed the researcher to examine the relationships between the demographic variables and their combined effect on student achievement (to address question 1). This procedure also allowed the researcher to explain the complex relationships between the pre-course measures and their combined effect on student achievement (as addressed in question 2). Since two dependent variables were used in the study (final course grade and SOL exam score), two sets of multivariable regression analyses were conducted for these research questions.

To address question number 3, "Is there a significant difference between student's self-reported pre and post-course measures of goal orientation, self-efficacy for learning, learning strategies, and attribution (as reported at the beginning and upon completion of their online course)?", a series of paired *t*-tests were conducted comparing the pre and post-course measures for each of the above mentioned variables.

To address question number 4, "Is there a significant difference between student's self-reported pre and post-course measures of goal orientation, self-efficacy for learning, learning strategies, and attribution as reported at the beginning and upon completion of their online course) and are these differences associated with the student's level of academic achievement (as measured by final course grade and SOL exam score?", it was necessary to classify academic achievement nominally. For the first series of tests (using

final course grade as the factor), a grade of "A" was classified as "high achieving", a grade of "B" or "C" was classified as "mid-level achieving", and a grade of "D" or "F" was classified as "low achieving." For the second series of tests (using SOL score as the factor), students achieving a score of "advanced proficiency" were classified as "high achieving", scores of "proficient" were classified as "mid-level achieving", and scores of "not proficient" were classified as "low achieving." Once academic achievement was classified and student data was grouped by academic achievement, paired *t*-tests were again conducted to examine differences in pre and post-course measures for students within these achievement groups.

The *t*-test is commonly used to compare the means of two groups and is robust to account for smaller sample sizes (Peck, Olsen, Devore, 2005). Because the pre and post-course data collected for questions 3 and 4 do not come from independent samples (each student provided two scores), a series of paired tests is appropriate (Robson, 1993).

By collecting pre and post-course data, the researcher could observe the effects of participation in *The Online Academy* on student learning characteristics. Studies conducted during 2005 (Dickson, Leu, Ferdig, Hughes, Kleiman, Cavanaugh, Zucker) offer evidence of increased academic performance of students participating in online schools, suggesting that students adapt their learning behaviors as a result of their participation in an online environment. This research determined how students in *The Online Academy* make (or fail to make) adaptations. Also, characteristics necessary for academic achievement in *The Online Academy* were identified.

The intended outcome of this research study was two-fold. By having knowledge of meaningful and useful predictors for online academic achievement, students can be provided with opportunities to develop necessary skills early in their online course to maximize their opportunities for success, so developing a predictive model was the first primary goal. The researcher asserted that students would make adaptations in their academic habits during the online course experience and wished to examine the validity of this claim as the secondary goal of the study. It is noted that because this study did not employ experimental procedures, it does not allow the researcher to imply any causation between any of the variables, only an association.

4. Results

The following questions framed the research:

1. Is there a relationship between students' demographic characteristics (age, gender, grade in school, subject area, previous grade in the subject, and reason for taking the online course) and academic achievement (as measured by final course grade and score on Standards of Learning exam)?
2. Do students' initial self-reported goal orientation, self-efficacy for learning, learning strategies, and attribution survey responses predict academic achievement (as measured by final course grade and score on Standards of Learning exam)?
3. Is there a significant difference between student's self-reported pre-course measures of goal orientation, self-efficacy for learning, learning strategies, and attribution and student's self-reported post-course measures (as reported upon completion of their online course)?
4. Is there a significant difference between student's self-reported pre-course measures of goal orientation, self-efficacy for learning, learning strategies, and attribution and student's self-reported post-course measures (as reported upon completion of their online course) and are these differences associated with the student's level of academic achievement?

Data Collection

The demographic information required to complete question 1 was collected as part of the pre and post-course surveys. Pre-course motivational strategy measures used to answer questions 2, 3, and 4 were collected at the beginning of the online course from students for which consent was obtained. Post-course motivational strategy measures used to answer questions 3 and 4 were obtained upon completion of the student's online course. Final course grades were obtained from the student's mentor for all students who completed their online course within the timeframe of the study. Scores on the Standards of Learning (SOL) exam were obtained from the student's school district for all students that took the test at the end of the timeframe of this study (August, 2007). Not all data that was requested was obtained from all participants so they were subsequently excluded from the analysis. The explanation of these exclusions is described below.

Demographic data questions were part of both the pre-course and post-course surveys and were collected from all participants that provided consent. The number of students who completed the pre course survey was 54; the number of responses for the post course survey was 28. There were 7 students who completed the post course survey only and so the total number of students for which demographic information was obtained was 61. Of these 61 students, 9 either dropped the course or negotiated extensions to complete the course after the timeframe of this study, so no final grade information was collected from these students. These students were excluded from the analysis. This exclusion resulted in $N = 52$ for statistical analysis of demographic variables and final course grade as the academic achievement measure.

The state of Virginia does not administer an SOL test in physics, so no SOL test score was available for any of the students enrolled in this course. Two students attended private school during the regular school year and SOL tests are required only for students enrolled in public school, so no SOL data was collected for these students. Several students were not available to take the SOL on the scheduled test date because of scheduling conflicts, so no SOL score information was collected for these students. All of these students, along with the students who dropped or failed to complete their course within the study's timeframe (and therefore did not take the SOL) were excluded from the analysis. These exclusions resulted in $N = 40$ for analysis of demographic information and SOL score as the academic achievement measure.

The motivational strategy pre-course measures were obtained from all students for which consent was obtained. Of the 54 students who completed the pre-course survey, 9 either dropped the course or failed to complete within the timeframe of this study, so no final course grade information was available for these students. Therefore, these students were excluded from analysis. These exclusions resulted in $N = 45$ for statistical analysis of pre-course measures and final course grade. Because there was no SOL score for twenty students for the various reasons explain above, these students were excluded from analysis. These exclusions resulted in $N = 34$ for statistical analysis of pre-course measures and SOL score.

Of all students who completed the pre or post-course surveys, 21 students completed both. This resulted in $N = 21$ for analysis of paired data to answer question 3. To answer question 4, it was necessary to classify students by academic achievement

(using final course grade and SOL score). Final course grade information was available for all 21 students. SOL test score information was available for 18 students. This resulted in $N = 21$ for analysis of difference between pre and post-course measures delineated by final course grade and $N = 18$ for analysis of pre and post course measures delineated by SOL score. To classify student academic achievement by final course grade, students were classified as "high achieving" if their final grade was an "A" (90-100). Students with a final grade of a "B" or a "C" (75-89) were classified as "middle achieving." Students with a final grade of a "D" or an "F" (<75) were classified as "low achieving." Only one student was classified as low achieving, so this category was eliminated from analysis because of issues with small sample size. The distribution of academic achievement by final grade is summarized in Table 2.

Table 2

Distribution of Academic Achievement (by Final Course Grade)

Achievement level	Counts ($N = 21$)
High	16
Middle	4
Low[a]	1

Note. [a]Sample size is too small for two-sample paired *t*-test; therefore, this category was omitted from analysis.

The possible scores on the SOL exam range from 0 to 600. To classify student academic achievement by SOL score, students were classified as "high achieving" if their score was 500-600. Students with score of 400-499 were classified as "middle achieving." Students with a score of 300-399 were classified as "low achieving." No students scored lower than 300, but only one student was classified as low achieving and because of this small sample size, this category had to be omitted from the analysis. The distribution of academic achievement by SOL score is summarized in Table 3.

Table 3

Distribution of Academic Achievement (by SOL score)

Achievement level	Counts (N = 18)
High	7
Middle	10
Low[a]	1

Note. [a]Sample size is too small for two-sample paired *t*-test; therefore, this category was omitted from analysis.

Statistical Findings

Analysis of demographic variables and academic achievement. Multivariable regression analysis of linear predictive models show that previous grade in subject area, age, and grade in school account for a statistically significant amount of variance in final numeric grade, $R^2 = .212$, $F(3, 40) = 3.593$, $p = .022$. However, the change in R^2 from

restricted to full model (adding variables reason for taking the course, subject area in which the student enrolled, and sex) is not statistically significant, R^2 change = .012, $F(3, 37) = .194$, $p = .900$. The summary of the regression analysis is presented in Table 4.

Table 4

Summary of Hierarchical Regression Analysis for Demographic Variables Predicting Academic Achievement as Measured by Final Course Grade (N = 52)

Variable	B	SE B	β
Step 1			
Previous grade in subject area	1.636	2.009	.131
Grade in school	-.160	4.005	-.015
Age	-3.640	3.881	-.369
Step 2			
Previous grade in subject area	1.635	2.198	.131
Grade in school	.411	4.380	.039
Age	-4.575	4.230	-.463
Reason for taking online course	.867	1.807	.078
Sex	-1.453	4.556	-.053
Course subject area	.867	1.807	.078

Note. $R^2 = .212$ for Model 1 ($p = .022$); $\Delta R^2 = .012$ for Model 2 ($p = .900$).

Multivariable regression analysis of linear predictive models show that subject area, sex, and age account for a statistically significant amount of variance in SOL score,

R^2 = .309, F(3, 36) = 5.373, p = .004. However, the change in R^2 from restricted to full model (adding variables previous grade in subject area, reason for taking course, and grade in school) is not statistically significant, R^2 change = .015, F(3, 33) = .237, p = .870. The summary of the regression analysis is presented in Table 5.

Table 5

Summary of Hierarchical Regression Analysis for Demographic Variables Predicting Academic Achievement as Measured by SOL Exam score (N = 40)

Variable	B	SE B	β
Step 1			
Course subject area	16.557	7.751	.316*
Sex	-38.409	18.037	-.301*
Age	-24.741	7.070	-.525**
Step 2			
Course subject area	15.815	8.457	.302
Sex	-38.944	21.486	-.305
Age	-21.702	17.836	-.460
Reason for taking online course	3.548	13.561	.044
Previous grade in subject area	8.323	11.203	.126
Grade in School	-1.094	20.238	-.021

Note. R^2 = .309 for Model 1 (p = .004); ΔR^2 = .237 for Model 2 (p = .870).

*p < .05. **p < .01.

Analysis of pre-course motivational strategy measures and academic achievement. Multivariable regression analysis of linear predictive models show that two predictors, intrinsic goal orientation, and self-efficacy for learning and performance account for a statistically significant amount of variance in final course grade, $R^2 = .140$, $F(2, 42) = 3.416$, $p = .042$. However, the change in R^2 from restricted to full model (adding variables extrinsic goal orientation, organization, time and study environment management, effort regulation, critical thinking, elaboration, internal attribution, and external attribution) is not statistically significant, R^2 change = .108, $F(8, 34) = .612$, $p = .761$. The summary of the regression analysis is presented in Table 6.

Table 6

Summary of Hierarchical Regression Analysis for Motivational Strategy Variables Predicting Academic Achievement as Measured by Final Course Grade (N = 45)

Variable	B	SE B	β
Step 1			
Self-efficacy for learning & performance	2.635	2.158	.194
Intrinsic goal orientation	3.300	2.123	.247
Step 2			
Self-efficacy for learning & performance	1.962	2.641	.144
Intrinsic goal orientation	3.018	2.855	.226
Extrinsic goal orientation	-3.757	2.828	-.255
Organization	4.621	2.859	.482
Task & study environment management	-5.190	4.158	-.355
Effort regulation	.949	2.757	.083
Critical Thinking	-.972	2.631	-.082
Elaboration	-1.097	3.330	-.089
Internal Attribution	3.149	3.916	.147
External Attribution	-3.000	3.887	-.140

Note. $R^2 = .140$ ($p = .042$) for Model 1; $\Delta R^2 = .108$ for Model 2 ($p = .761$).

Multivariable regression analysis of linear predictive models show that internal attribution, critical thinking, self-efficacy for learning and performance, extrinsic goal

orientation, time and study environment management, and elaboration account for a statistically significant amount of variance in SOL score, $R^2 = .667$, $F(6, 27) = 9.023$, $p = .000$. However, the change in R^2 from restricted to full model (adding variables external attribution, intrinsic goal orientation, effort regulation, and organization) is not statistically significant, R^2 change = .091, $F(4, 23) = 2.165$, $p = .105$. The summary of the regression analysis is presented in Table 7.

Table 7

Summary of Hierarchical Regression Analysis for Motivational Strategy Variables Predicting Academic Achievement as Measured by Final SOL score (N = 34)

Variable	B	SE B	β
Step 1			
Internal Attribution	35.478	12.630	.367**
Critical Thinking	-27.262	8.197	-.484**
Self-efficacy for learning & performance	37.859	9.720	.469**
Extrinsic goal orientation	-34.185	8.113	-.512**
Time & study environment management	-31.903	9.182	-.490**
Elaboration	37.021	8.874	.641**

Step 2			
Internal Attribution	39.129	12.875	.405**
Critical Thinking	-29.966	8.293	-.532**
Self-efficacy for learning & performance	39.592	11.245	.490**
Extrinsic goal orientation	-36.403	9.132	-.545**
Time & study environment management	-38.884	13.081	-.597**
Elaboration	40.890	10.775	.708**
External Attribution	-27.273	14.081	-.274
Intrinsic goal orientation	17.073	10.966	.230
Effort regulation	-14.103	10.051	-.277
Organization	7.182	9.759	.153

Note. $R^2 = .667$ ($p = .000$) for Model 1; $\Delta R^2 = .091$ for Model 2 ($p = .105$).

**$p < .01$.

Analysis of differences in pre and post-course motivational strategy measures. Descriptive statistics were calculated for all motivational strategies measured at the beginning and end of the student's online course. Specifically, means and standard deviations for intrinsic goal orientation, self-efficacy for learning and performance, extrinsic goal orientation, organization, task and study environment management, effort regulation, critical thinking, elaboration, internal attribution, and external attribution were calculated. These values are summarized in Table 8 and illustrated in Figure 2.

Table 8

Summary of Motivational Strategy Survey Measures (N = 21)

	Pre-course		Post-course	
	M	*SD*	*M*	*SD*
Intrinsic goal orientation	5.401	.796	5.381	.854
Extrinsic goal orientation	5.814	.782	5.567	1.330
Self-efficacy for learning & performance	5.725	1.164	5.768	.167
Organization	4.464	1.388	4.250	1.346
Task & study environment management	4.708	.920	4.585	.667
Effort regulation	5.583	1.149	5.000	1.009
Critical Thinking	4.800	1.190	4.657	1.241
Elaboration	4.877	.904	4.587	1.073
Internal Attribution	4.254	.595	4.127	.477
External Attribution	2.873	.679	2.889	.710

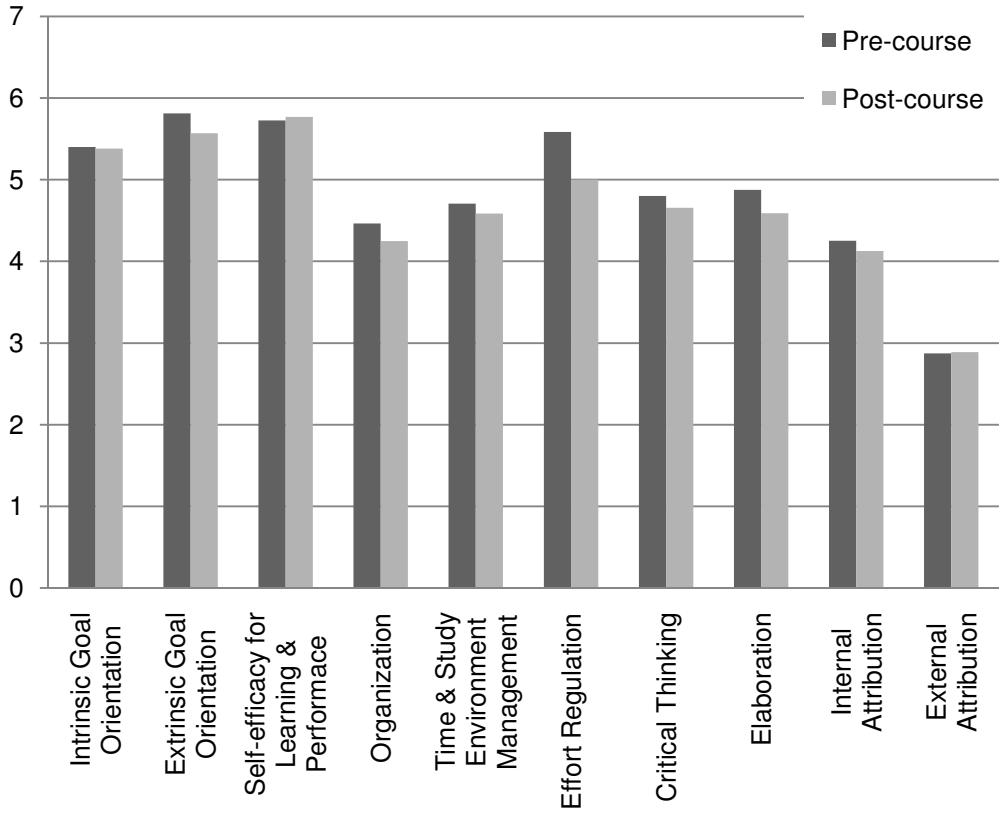

Figure 2. Mean scores of motivational strategies ($N = 21$).

Paired *t*-tests were conducted to answer question 3 to determine if there was a statistically significant difference in any of the motivational strategy measures of the students. Only one attribute, effort regulation, had a statistically significant difference in pre and post-course measures, $t(20) = -3.122$, $p = .005$. Results of this analysis are summarized in Table 9.

Table 9

Differences between Pre and Post-Course Measures

	M	*SD*	*t*	*p*
Intrinsic goal orientation	-.020	.467	-.195	.848
Extrinsic goal orientation	-.246	1.156	-.976	.341
Self-efficacy for learning & performance	.043	.924	.215	.832
Organization	-.214	1.471	-.667	.512
Task & study environment management	-.123	.945	-.594	.559
Effort regulation	-.583	.856	-3.122**	.005
Critical Thinking	-.143	1.474	-.444	.662
Elaboration	-.290	1.233	-1.077	.294
Internal Attribution	-.127	.477	-1.220	.237
External Attribution	.016	.637	.114	.910

Note. ** $p < .01$, two-tailed.

Analysis of pre and post-course motivational strategy measures by academic achievement level. Differences between pre and post-course motivational strategy measures were further examined based on the student's academic achievement level (as determined by final course grade and SOL exam score) to answer question 4. Paired *t*-tests were conducted to determine if there was a statistically significant difference in any of the motivational strategy measures of the high and mid achieving students based on both final course grade and SOL score. Only one attribute, effort regulation, had a

statistically significant difference in pre and post-course measures for high achieving (by final course grade) students, $t(15) = -2.764$, $p = .014$ and mid achieving (by SOL exam score) students, $t(9) = -2.766$, $p = .022$. There were no statistically significant differences in attributes of high achieving (by SOL exam score) students. There were no statistically significant differences in attributes of mid achieving (by final course grade) students. Results of these analyses are summarized in Tables 10, 11, 12 and 13.

Table 10

Differences between Pre and Post-Course Measures of High Achieving Students (determined by final course grade)

	M	*SD*	*t*	*p*
Intrinsic goal orientation	-.021	.386	-.216	.832
Extrinsic goal orientation	-.078	1.011	-.309	.762
Self-efficacy for learning & performance	.002	.741	.012	.991
Organization	-.469	1.423	-1.318	.207
Task & study environment management	-.045	.954	-.187	.854
Effort regulation	-.563	.814	-2.764*	.014
Critical Thinking	-.213	1.436	-.592	.563
Elaboration	-.401	1.154	-1.391	.185
Internal Attribution	-.146	.501	-1.163	.263
External Attribution	.063	.635	-.394	.699

Note. * $p < .05$, two-tailed.

Table 11

Differences between Pre and Post-Course Measures of High Achieving Students (determined by SOL exam score)

	M	*SD*	*t*	*p*
Intrinsic goal orientation	-.083	.456	-.483	.646
Extrinsic goal orientation	-.143	1.289	-.293	.779
Self-efficacy for learning & performance	-.089	.562	-.420	.689
Organization	-.357	1.492	-.633	.550
Task & study environment management	.204	.600	.900	.403
Effort regulation	-.179	.688	-.687	.518
Critical Thinking	.057	1.413	.107	.918
Elaboration	-.024	.784	-.080	.939
Internal Attribution	-.286	.448	-1.686	.143
External Attribution	-.143	.604	-.626	.555

Table 12

Differences between Pre and Post-Course Measures of Mid Achieving Students (determined by final course grade)

	M	*SD*	*t*	*p*
Intrinsic goal orientation	-.188	.718	-.522	.638
Extrinsic goal orientation	-.917	1.744	-1.051	.370
Self-efficacy for learning & performance	.031	1.666	.038	.972
Organization	.250	1.429	.350	.750
Task & study environment management	-.321	1.115	-.577	.605
Effort regulation	-.875	1.109	-1.578	.213
Critical Thinking	-.350	1.684	-.416	.706
Elaboration	-.167	1.683	-.198	.856
Internal Attribution	-.167	.430	-.775	.495
External Attribution	.250	.739	-.676	.547

Table 13

Differences between Pre and Post-Course Measures of Mid Achieving Students (determined by SOL exam score)

	M	*SD*	*t*	*p*
Intrinsic goal orientation	-.175	.409	-1.353	.209
Extrinsic goal orientation	-.292	1.229	-.751	.472
Self-efficacy for learning & performance	-.237	.936	-.802	.443
Organization	-.150	1.313	-.361	.726
Task & study environment management	-.157	1.215	-.409	.692
Effort regulation	-.825	.943	-2.766*	.022
Critical Thinking	-.240	1.569	-.484	.640
Elaboration	-.508	1.554	-1.035	.328
Internal Attribution	-.100	.498	-.635	.541
External Attribution	.033	.597	.176	.864

Note. * $p < .05$, two-tailed.

Conclusions

Demographic predictors of academic achievement varied depending on the measure used for academic achievement. Age, grade in school, and previous grade in the subject area were useful predictors of final course grade. Age, course subject area, and sex were useful predictors of SOL score. The researcher expected that none of the demographic variables would be useful predictors of academic achievement, but instead

all but one of the variables (reason for taking the online course) were found to be useful in predicting at least one of the measures of academic achievement.

Predicting academic achievement by pre-course motivational strategy measures also differed depending on which academic achievement measure was used. The model to predict SOL score was stronger (R^2 = .140) than the model for final course grade (R^2 = .667), but both were statistically significant (p = .042 for final course grade model and p = .000 for SOL score model). Of all the specific attributes, only one (self-efficacy for learning and performance) was found to account for a significant amount of variance in both final course grade and SOL score. The model for final course grade was composed of two of the 10 variables (intrinsic goal orientation and self-efficacy for learning and performance). The model for SOL score was composed of six (internal attribution, critical thinking, self-efficacy for learning and performance, extrinsic goal orientation, time and study environment, and elaboration). The researcher expected that there would be a relationship between the motivational strategies and academic achievement, but the difference in models for final course grade and SOL score is interesting.

The researcher expected that all students would demonstrate some change in motivational strategy measures during the course of their online study and that the changes would be positive showing improved behaviors. Only one measure, effort regulation, changed significantly and its value was lower at the end of the online course. Additionally, eight of the ten measures showed a decrease in mean score indicating a negative change in behavior. This result was surprising, so further examination was

conducted to determine if students of differing achievement levels made significant changes in any motivational strategies.

Very few students performed poorly in terms of final course grade and SOL score, therefore, analysis of low achieving students was not possible because of the small sample size. Analysis of high achieving students (as measured by final course grade only) showed a significant decrease in effort regulation, $t(15) = -2.764$, $p = .014$. Analysis of mid achieving students (as measured by SOL score only) also showed a significant decrease in effort regulation, $t(9) = -2.766$, $p = .022$.

The fact that two useful predictive models based on pre-course measures were discovered is encouraging and will be useful for future students enrolling in *The Online Academy*. However, consideration must be made for the fact that all motivational strategy measures are self-reported. It is not unreasonable to expect student's perceptions to differ at the end of their course based on many extraneous factors, including the different pacing schedules employed by the students. As a result of this variation, some questions of validity arise with this pre/post-survey structure, but the results suggest that an examination of other factors besides those belonging to the student is necessary. Specifically, the researcher suggests examining the impact of the design of the course and the role of the mentor on the student's use of motivational strategies.

5. Summary

This study examined the relationship between demographic variables (age, gender, grade in school, subject area, previous grade in the subject) and self-reported motivational strategy measures (goal orientation, self-efficacy for learning, learning strategies, and attribution) on academic achievement. Subjects were high school students participating in online courses provided by *The Online Academy* during a summer time frame. This study did not find any relationships between demographic variables, motivational strategy variables, and academic achievement that were not predicted by the literature. Results of the analysis of differences in pre and post-course measures are not consistent within the social cognitive framework of motivation which suggests that motivation is dynamic and that within specific learning contexts, learning strategies can be brought under the control of the learner. It is surmised that the short timeframe of this study, the timing of the survey administration, and perhaps other design factors of the online learning environment account for this discrepancy.

Conclusions from Statistical Analysis

1. Analysis of demographic variables on academic achievement showed that previous grade in subject area, age and grade in school were useful predictors of final course grade. Subject area, sex, and age were useful predictors of SOL exam score.

2. Analysis of motivational strategies generated two useful models for predicting academic achievement. Intrinsic goal orientation and self-efficacy for learning were useful predictors of final course grade. Internal attribution, critical thinking, self-efficacy for learning and performance, extrinsic goal orientation, time and study environment and elaboration were useful predictors of SOL score.
3. A final aspect of this study examined the differences between the self-reported attribution measures measured at the beginning of the student's course and upon completion of it. Analysis indicated that of the 10 measures examined only 1 measure (effort regulation) was significantly different at the end of the course. Differences in pre and post-course measures were further examined based on student's achievement levels to determine if differences were consistent across achievement groups. Analysis indicated that for students who were classified as high achieving (based on final course grade) there was a significant difference in pre and post-course measures of effort regulation. This difference was not observed for students classified as high achieving based on SOL exam score. Students who were classified as mid achieving (based on final course grade) showed no differences in pre and post-course measures. Finally, students who were classified as mid achieving (based on SOL exam score) showed a significant difference in pre and post-course measures of effort regulation.

Discussion

This study used two variables to measure academic achievement: final course grade and SOL exam score. The final course grade was used because it represented many aspects of the student's learning process. Final course grades were calculated based on scores students earned on several types of activities. These included short assignments completed immediately after exposure to new material to demonstrate understanding, larger projects that required the student to use many skills to solve an authentic problem, and occasionally, traditional assessment measures such as module tests. Because of the design of the courses provided by *The Online Academy*, students engaged in conversations about the material with their online mentor. Students frequently had the opportunity to revise their work after their mentor identified areas where there was a lack of understanding. Students who demonstrated greater effort and were willing to complete revisions would naturally earn higher grades than those who wished to simply get the work done as quickly as possible.

Each of the courses offered by *The Online Academy* is comprised of 12 to 15 self-contained modules. The final course grade was calculated based on the work done in all of the modules over the course of the summer. Therefore, this grade represents achievement in a variety of activities in a variety of topics measured over time. Students in each course completed the same activities, so the workload in a course was consistent for all students enrolled in a particular course. Not all students worked with the same mentor, however. It is possible that there was some variability in the assessment of the activities completed, and this variability was not measureable within the bounds of this

study. However, this variable was used as a measure of academic achievement because it represents more than just the level of mastery of skills.

The other achievement variable used in this study was the SOL exam score. This standardized test score represented the student's mastery of the specific skills in the subject area at one point in time. Because its administration and scoring was standardized, there was not the concern of variability that exists with final course grade. However, as with any standardized test, there was potential for bias based on the design of the test itself. There are a "limited number of items assessing any particular subskill" (Shapiro, 2004, p.16) and as such, there is not always a strong relationship between these measures and a students' progress in the curriculum (Shapiro, 2004). However, because the SOL exam in a particular subject asked the same questions of all students and were evaluated in exactly the same way, it can be used to compare strengths and weaknesses in a student's academic profile.

Given that the student's final course grade was an academic measure calculated by many components, the fact that the model generated by the data from this study included only 2 of the 10 variables was unexpected. Conversely, the model generated by this study to predict SOL exam score was comprised of variables that would be reasonably associated with final grade (especially critical thinking, time and study environment management and elaboration). The researcher is not willing to assert that this model brings any new insight to online learning, but these findings do suggest that examination of other components of the online learning experience are necessary.

The "relatively unstructured nature" (Roblyer, 2002-2003) of online learning poses unique challenges for its students. "The burden of self-organization and responsibility for completing tasks in online courses seems to fall primarily to students" (Roblyer, 2002-2003, p.253). Other learning characteristics specifically mentioned in the research as necessary for success include "the ability to learn independently, effective written communication skills, self-motivation and discipline" (Smith, 2005, p.56). So, is it simply a case of a lack of skills that prevents students from succeeding in an online environment? We have to consider just how much the skills mentioned by the literature as being necessary for success in an online learning environment really differ from skills necessary in a face to face environment. Recalling that the online drop-out/stop-out rates are reported as high as 60%-70% (Roblyer, 2006), is it possible to suggest that all of those students who do not experience success do not have these skills? Could there be something more?

Demographic variables and academic achievement. Results obtained from this study are consistent with the literature with the possible exception of age. The researcher conducted statistical analyses using both measures of academic achievement. The first analysis of the relationship between demographic variables and academic achievement indicated that previous grade in the subject area, age, and grade in school were useful predictors of final course grade. Subject area, sex, and age were useful predictors of SOL exam score. These two models had only one variable in common (age), and both models indicated that younger students had higher achievement levels. Although not comprehensive, there is a suggestion in the literature that the accuracy of learner's ratings

of self-efficacy increase with age, and their beliefs are more highly related to achievement. Similarly, attribution perceptions become more accurate as students get older (Shell, et al., 1995). Results from this study suggest that younger students had higher achievement levels. This result might be explained by the large number of participants (23 out of 54) who enrolled in Geometry because they had been accepted into their school district's science academy. These students had just completed the eighth grade and were, therefore, some of the youngest participants in the study. Additionally, they were all academically advanced enough to meet the requirements for the science academy program. It is not unreasonable to assume that these factors impacted the model to indicate higher achievement levels for younger students.

Results of this study indicated that a relationship exists between subject area, previous grade in subject area, and academic achievement. This is consistent with the literature. Specifically, the model obtained in this study showed that there was a positive relationship between a student's previous grade in the particular subject area and the grade they earned in their current online course. This result is consistent with previous research findings related to domain specific achievement (Linnenbrink, and Pintrich, 2001; Bong, 2004). Additional research illustrating the interactions between motivation, goal orientation, and academic achievement show domain or subject specific components such as Bandura's (1982) findings that goal placement and motivation are influenced by the particular domain and beliefs regarding performance capabilities. Students who have made good grades in a particular subject before are more likely to exhibit higher levels of

motivation based on higher goal levels and self-efficacy which, in turn, leads to high achievement levels (Bandura, 1993; Zimmerman, et al., 1992).

Previous research on gender in online environments show that more females enroll in online courses than males (Smith, et al., 2005), and this was true for this study (although this difference was not significant). There is no available data for relative success rates in high school online courses based on gender, but previous research on gender and achievement in face to face environments is mixed. Oberman's (2002) study showed that girls had skill levels equal to boys in Computer Science although they reported lower levels of self-concept and self-efficacy. In math and science, girls have lower levels of perceived ability (Debacker & Nelson, 2000; Hyde, Fennema, & Lamon, 1990), but in terms of achievement, males and females perform similarly (Malpass, O'Neil, & Hocevar, 1999). In this study, gender was a predictive variable for SOL exam score but not final course grade. The boys' mean SOL exam was higher but the girls' mean final course grade was higher (although neither of these differences was significant). These conflicting results do not allow the researcher to make a definitive claim about the impact of gender on academic achievement.

Predicting achievement by motivational strategies. The relationship between the motivational strategy levels and academic achievement was examined. The results of these analyses are predicted by the literature, including the seemingly varied results. The first analysis of the relationship between pre-course measures and academic achievement indicated that intrinsic goal orientation and self-efficacy for learning and performance were useful predictors of final course grade. Internal attribution, critical thinking, self-

efficacy for learning and performance, extrinsic goal orientation, time and study environment management, and elaboration were useful predictors of SOL exam score. These two models had one variable in common, self-efficacy for learning and performance. This variable has been shown to be a useful predictor of achievement in previous studies by Bandura (1993) and Zimmerman, et al. (1992). Previous studies incorporating the MSLQ show similar findings; self-efficacy and task value (not measured in this study) were the variables most highly associated with cognitive strategy use and higher student achievement (Pintrich & DeGroot, 1990).

The second model for predicting academic achievement using SOL exam score included internal attribution and extrinsic goal orientation as predictive variables. Internal attribution has been shown to be associated positively with academic achievement (Georgiou, 1999) so this result is consistent with previous findings. The inclusion of extrinsic goal orientation as a predictor for achievement is not generally predicted by literature. However, using the SOL score as the measure of academic achievement changes the academic context and is suggested as reasonable by research. Kaplan and Midgely (1997) specifically address the notion of performance on standardized tests and suggest that some performance-oriented strategies (that are usually associated with negative achievement) might instead be appropriate in some contexts. Examples of such behavior include skipping a difficult question on a standardized test. Varying strategy use depending on the task is a component of the social cognitive framework of motivation, and the differences in models generated by this study are therefore consistent with the literature.

Changes in motivational strategy measures. This study did not confirm the researcher's hypothesis that the student's motivational strategy measures would significantly change throughout the course of the student's online course experience. This hypothesis was formed based on the social cognitive framework of motivation and self-regulated learning (Duncan & McKeachie, 2005) that assumes that motivation is dynamic and learning strategies can be learned and brought under control of the student within the bounds of academic contexts. Analysis of the differences in pre-course and post-course measures showed that only one variable, effort regulation, changed significantly, and the post-course values were lower than the pre-course which cannot be explained by the literature. However, there were other results that can be explained by the social cognitive framework; particularly the measure for self-efficacy for learning and performance which increased and extrinsic goal orientation which decreased over the course of the students' online experience (although neither of these measures was significant).

Possible explanations for the lack of significant change could be that many of the pre-course measures were high. For example, the mean pre-course score for self-efficacy for learning and performance was 5.725 (on a 7-point scale) with standard deviation 1.164. The post-course measure was 5.768 with standard deviation 0.167. This data showing a higher score (with less variability) is consistent with the literature. The lower effort-regulation score at the end of the students' online course is difficult to explain, although it is possible that the intense nature of the course due to the tight scheduling timeframe influenced the students' perceptions at the end of their online course experience.

Another possible explanation for these unusual results is the timing of the administration of the pre and post-course survey instruments. The pre-course survey was administered at the beginning of the students' course. However, each of the students decided for themselves when they would begin. Once registration and payment was received, each student was assigned an email account and a login and password to access their course and told that they could begin whenever they wished. Once a student chose to begin, the first activity that was presented to him/her was the pre-course survey. It could be reasonably assumed that the student's level of enthusiasm for learning and motivation would be very high at this point.

The post-course survey was administered once a student completed his/her online course. Each student's progress was monitored by the researcher so that once a student finished his/her course and a grade had been assigned, the researcher could email the student to request participation in the post-course survey. For this reason, the response rate for the post-course survey was lower than that of the pre-course. Also, it is reasonable to assume that by the time students completed the post-survey, their levels of motivation would be very low since they were no longer engaged in their online course. In general, this variable is something to examine further, especially by collected measures during the students' online course experience (as opposed to just at the beginning and end) and within an online course that spans a longer timeframe.

This study examined the relationship between motivational strategies and academic achievement, and the findings do not point to any results that differ greatly from that of face to face learning environments. The previous literature that states that

successful online students must have strong internal locus of control and internal motivation for achievement (Roblyer, 2002-2003) suggests that the motivational strategy measures should, at the very least, remain consistently strong or even possibly improve throughout the duration of the online learning experience. This "lack of evidence" can be considered evidence in another form, and this leads the researcher to question other factors external to the student that impact the online learning experience. These factors could possibly include the design of the online course and the role of the online mentor.

A year-long high school course that students complete over the summer is intense and rigorous simply due to the compressed timeframe. It is not unreasonable to assume that it would be difficult for students to sustain a high level of self-efficacy for the duration of the online course especially when the level is fairly high to begin with. However, (and perhaps more importantly) if the design of the online course does not allow students to appropriately pace themselves and scaffold the overall learning experience, the design could perhaps negatively impact the students' levels of motivation, self-regulation and self-efficacy for learning.

Even if the design of the course does provide such scaffolding opportunities for students to monitor their motivational strategies, awareness on the part of the online mentor is also necessary, especially with younger learners (Smith, et al., 2005). Mentors must know how *and* systematically provide learners with feedback to help students adjust and learn to monitor their behaviors. The environment of the online learning experience should contribute to the learner, and the online mentor should provide assistance in assessing goals and self-efficacy. Based on the findings of this study, the researcher

asserts that besides effort, motivational strategy level, and skill, educators need to examine the impact of additional monitoring and support by the online mentor and the framework for such support provided by the design of the online course.

Recommendations for Practice

The researcher cautions that although the model developed in the study to predict SOL exam score was statistically significant, it measured only one aspect of academic achievement- academic content only. Other measures of achievement, such as the student's final course grade are representations of more than just content knowledge. It is tempting in an era of high-stakes testing to focus on methods to improve test scores, but this is not the researcher's intent. It is hoped that educators will seek to support the development of students' motivational strategies to provide students with richer academic experiences such that the fallout from these experiences are higher test scores as opposed to academic structures designed with a solitary goal of passing an end of course test.

Examining student's motivational strategies prior to the start of their online course experience is useful for educators to identify possible areas of weakness. Instruments such as the MSLQ should not be administered with the intent to keep students away from learning opportunities but instead used in a diagnostic manner to allow students to develop skills before (or during) their online course experience. The researcher suggests that the most important factor contributing to online student achievement could be the design of online environments that specifically supports the students' use and modification of the various motivational strategies that influence higher achievement. Online courses should have embedded learning strategy suggestions as part

of the overall design. And, the student's online mentor should provide feedback at regular intervals about the effectiveness of their current motivational and self-regulatory habits to foster the development of these skills.

Recommendations for Further Research

The timeframe of this study was limited; students were required to complete their online course before the start of the next academic school year. Most began their study at the end of June and completed it during the middle of August. Therefore, one recommendation for further study is to examine students participating in online courses over a longer time period such as a traditional semester or full academic year. Additionally, examining motivational measures at different points of the course would be useful in determining if and how students shift their goals and strategies based on the nature of the academic activities. This measure would be especially useful if the online environment is structured so that students are given feedback at regular intervals about their motivational and self-regulatory habits. At the very least, the post-course survey should be administered near the end of the student's online course experience; perhaps during the student's final module, as opposed to waiting until the student was completely finished with the course and no longer engaged in the academic experience.

The two predictive models for academic achievement (measured by final course grade and SOL exam score) developed in this study varied greatly. This difference points to the differing nature of the tasks involved that these measures represent. In this study, the *task value* sub-scale of the MSLQ was not included. This variable has been shown in previous research (Bong, 2001) to influence student motivation. Because the two

predictive models in this study differed so greatly, further studies should include this sub-scale measure to look for any relationship between the values a student assigns to a particular academic task and academic achievement.

In the larger context, research examining achievement frequently raises the question of assessment. Many researchers talk about academic "success" as either passing or failing a course. However, the one student is this study who failed his online course was able to demonstrate mastery of the content area skills via his passing score on the SOL exam. Given the contradictory results between final course grade and SOL exam score, researchers need ways to examine and measure the occurrence of meaningful learning by some variable other than final course grade or SOL exam score. One possibility would be to measure the level of mastery of content before instruction begins. Measures of student's previous knowledge and organization of previous knowledge were not measured in this study. Therefore, this impact on the student's academic achievement was not taken into account. Future studies should include content area assessments to determine the student's knowledge and skill level prior to beginning their online course so that this mediating variable can be isolated.

Another possibility is to investigate the student's reading and writing abilities. Students must depend on their reading comprehension abilities to master content delivered online. Additionally, students must possess strong written communication skills in order to effectively engage with their online mentor and adequately demonstrate their level of understanding of the academic content. Therefore, future studies should include

measuring reading comprehension and written communication levels to identify their impact on academic achievement in an online learning environment.

There were 9 students who dropped their online course and were not included in this study. However, understanding why these students dropped is important for online educators. Is there a common profile that describes these students? Is there an absence of some academic trait that could be developed or supported before a student begins their online course? Further research to answer these questions is warranted.

Finally, this study examined self-reported measures of motivational strategies. Previous research (Pintrich & DeGroot, 1990) indicates that self-reported measures can be used effectively but suggests that results be replicated by other means such as structured interviews or other behavioral measures. This study included only quantitative measures obtained by survey instruments. Future studies should employ the techniques suggested as a form of member checking.

Appendix A

Email request sent to parents

Dear parent(s):

As part of ongoing assessment of *The Online Academy*, we are conducting research concerning students' strategies for learning in online classes. If you and your child agree to participate, your child will be asked to complete an online survey that asks him/her questions about his/her study strategies prior to and after taking their online class. The surveys will take between 10 and 20 minutes each. Participation is completely voluntary, and there is no penalty if your child decides not to participate, or you do not wish to give your consent for his/her participation. There is no compensation for participation; however, we extend you and your child our deepest gratitude!!

In order to include your student's responses as part of our research, we need your permission. Attached is the Informed Consent Form. It is also pasted below this message. After you have reviewed the form, please reply to this email. Please type "I consent" or "I do not consent" in the message. Thank you for your consideration and prompt response.

The Online Academy Staff

Informed consent form

For the Study: Student Learning Strategies

RESEARCH PROCEDURES
This research project is designed to evaluate The Online Academy during the summer, 2007, specifically targeting strategies students use to learn. If you agree to allow your child to participate, your child will complete an online survey at the beginning and at the end of their course study. This survey asks students questions about their study strategies and takes between 10 and 20 minutes.

RISKS
There are no foreseeable risks for participating in this research.

BENEFITS
There are no benefits to your child as a participant other than to further research in online learning environments.

CONFIDENTIALITY
The data in this study will be confidential. Only the researchers will have access to the data collected. Your child's name will not be included on any of the survey responses. While it is understood that no computer transmission can be perfectly secure, reasonable efforts will be made to protect the confidentiality of your transmission.

PARTICIPATION
Your child's participation is voluntary, and he/she may withdraw from the study at any time and for any reason. If he/she decides not to participate or if he/she withdraws from the study, there is no penalty. There are no costs to you, your child, or any other party.

CONTACT
This research is being conducted by the staff of The Online Academy and for a doctoral dissertation by Anne Little (alittle@gmu.edu) at George Mason University. You may contact the Director of The Online Academy, Dr. Priscilla Norton at (703) 993-2015 or by email at pnorton@gmu.edu if you have any questions. You may also contact the George Mason University Office of Research Subject Protections at 703-993-4121 if you have questions or comments regarding your rights as a participant in the research.

This research has been reviewed according to George Mason University procedures governing your participation in this research.

CONSENT
I have read this form and agree to allow my child to participate in this study. I am granting this permission by replying to this email and typing "I consent" in the message box. If you do not want to grant permission, please reply and type "I do not consent" in the message box.

The George Mason University Human Subjects Review Board has waived the requirement for a signature on this consent form. However, if you wish to sign a consent, please contact Anne Little at alittle@gmu.edu

Appendix B

Email sent to students

Dear student:

As part of ongoing assessment of *The Online Academy*, we are conducting research concerning the strategies students use to learn in their online learning classes. If you are willing to help us, you will be asked to complete an online survey that asks questions about your learning strategies before and after you complete your online class. The surveys will take between 10 and 20 minutes each. Participation is completely voluntary, and there is no penalty if decide not to participate. There is no compensation for participation; however, we extend you our deepest gratitude!!

In order to include your responses as part of our research, we need your agreement. Attached and pasted below is the Informed Assent Form. After you have reviewed the form, please reply to this email. Please type "I agree" or "I do not agree" in the message. Thank you for your consideration and prompt response.

The Online Academy Staff

Informed assent form

For the Study: Student Learning Strategies

RESEARCH PROCEDURES

This research project is designed to evaluate The Online Academy courses during the summer, 2007, targeting the learning strategies student use to complete their course. If you agree to participate, you will complete an online survey at the beginning and at the end of your course study. This survey asks you questions about your study strategies and takes between 10 and 20 minutes.

RISKS

There are no foreseeable risks for participating in this research.

BENEFITS

There are no benefits to you as a participant other than to further research in online learning environments.

CONFIDENTIALITY

The data in this study will be confidential. Only the researchers will have access to the data collected. Your name will not be included on any of the survey responses. While it is understood that no computer transmission can be perfectly secure, reasonable efforts will be made to protect the confidentiality of your transmission.

PARTICIPATION

Your participation is voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate or if you withdraw from the study, there is no penalty. There are no costs to you or any other party.

CONTACT

This research is being conducted by the staff of The Online Academy and for a doctoral dissertation by Anne Little (alittle@gmu.edu) at George Mason University. You may contact the Director of The Online Academy, Dr. Priscilla Norton at (703) 993-2015 or by email at pnorton@gmu.edu if you have any questions. You may also contact the George Mason University Office of Research Subject Protections at 703-993-4121 if you have questions or comments regarding your rights as a participant in the research.

This research has been reviewed according to George Mason University procedures governing your participation in this research.

ASSENT

I have read this form and agree to participate in this study. I am granting this permission in my reply to this email by typing "I agree" in the message box. If you do not want to grant permission, please reply and type "I do not agree" in the message box.

The George Mason University Human Subjects Review Board has waived the requirement for a signature on this consent form. However, if you wish to sign a consent, please contact Anne Little at alittle@gmu.edu

The Online Academy

Strategies for Learning Questionnaire

The following questionnaire consists of short demographic questions and 48 multiple choices questions. It should take you no more than 20 minutes to complete.

Thank you for your participation.

What is your online academy login name/learn number?

learn

Name of course you are taking online:

In the past, what grade have you typically earned in this subject?

Gender: Male o Female o

Age:

What grade will you be in this fall?

Have you ever taken an online course before? Yes o No o

Why did you sign up for this course?

	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.	o	o	o	o	o	o	o
2. I believe I will receive an excellent grade in this class.	o	o	o	o	o	o	o
3. I'm certain I can understand the most difficult material presented in the readings for this course.	o	o	o	o	o	o	o
4. Getting a good grade in this class is the most satisfying thing for me right now.	o	o	o	o	o	o	o
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.	o	o	o	o	o	o	o
6. I'm confident I can learn the basic concepts taught in this course.	o	o	o	o	o	o	o

8. I'm confident I can understand the most complex material presented by the instructor in this course.	o	o	o	o	o	o	o
9. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.	o	o	o	o	o	o	o
10. I'm confident I can do an excellent job on the assignments and tests in this course.	o	o	o	o	o	o	o
11. I expect to do well in this class.	o	o	o	o	o	o	o
12. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.	o	o	o	o	o	o	o
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.	o	o	o	o	o	o	o
14. I'm certain I can master the skills being taught in this class.	o	o	o	o	o	o	o
15. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.	o	o	o	o	o	o	o

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 class or in the readings, 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 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 concepts from the course activities.	o	o	o	o	o	o	o
37. I make sure that I keep up with the weekly readings and assignments for this course.	o	o	o	o	o	o	o
38. Whenever I read or hear an assertion (claim) or conclusion in this class, I think about possible alternatives.	o	o	o	o	o	o	o
39. Even when course materials are dull and uninteresting, I manage to keep working until I finish.	o	o	o	o	o	o	o

40. 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
41. I rarely find time to review my notes or readings.	o	o	o	o	o	o	o
42. I try to apply ideas from course readings to other class activities.	o	o	o	o	o	o	o

When you are finished, please check to make sure you have answered all of the questions. Then click the Send button to submit your responses. Thank you!

Send

.....

Appendix D

Email sent to students to complete post-course survey

Now that your course is all over, I am writing to ask you a favor. I actually need help from all of the students as they finish their online course. I am working on my PhD and am collecting data. I have an online survey that I would like to ask you to take. The questions ask you about your experiences in this online course that you just finished.

It is located at:
http://toa.gmu.edu/courses/intro/module/post.aspx

It should not take you very long to take it and it does help me with my "homework"- so thank you in advance!!

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