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Environmental and Psychological Factors Contributing to Student Achievement in a High School Online Mediated Credit Recovery Program

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Approval Page

This dissertation was submitted by Sheila B. Huckabee under the direction of the persons listed below. It was submitted to the Gardner-Webb University School of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Gardner-Webb University.

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Abstract

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School districts around the country have sought to mitigate students' reasons for dropping out through a variety of approaches. A repeated theme in the dropout research is student course failure in key academic subjects needed for on-time promotion with grade-level peers. The crux of the problem is that within the traditional classroom environment, a significant number of students do not demonstrate the required level of academic skills and knowledge needed to pass specific state and district mandated courses, which ultimately decreases their ability to advance to the next grade and graduate in 4 years.

The purpose of this dissertation study was to determine if a unit-based mastery approach to credit attainment, delivered in an online mediated environment, helped to build specific content knowledge and skills targeted as weaknesses for students in prior attempts at the course in the traditional classroom. Specifically, the study sought to determine if one district's approach to credit recovery with its emphasis on relearning and retesting previously failed content led to greater student mastery in high school courses needed for promotion or graduation as measured by pre and posttest unit scores and the overall course achievement of 70% set by the state of South Carolina. The study also measured the on-time promotion rates of students who qualified and participated in the program as well as the impact of the program on the school's on-time promotion rate.

Finally, this study determined to what external or environmental conditions of the program students attributed their success or failure in learning in the online mediated environment and the extent to which internal psychological factors contributed to their success or failure in the program. Relevant subscales of motivation such as self-efficacy, intrinsic goal orientation, extrinsic goal orientation, control of learning beliefs and test anxiety as well as subscales of self-regulatory learning strategies such as rehearsal, elaboration, organization, critical thinking, metacognition, time and study environment management, effort regulation, peer learning, and help seeking were analyzed.

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Chapter 1: Introduction

Nature of the Problem

Each year, about a third of American high school students, 1.2 million young people, leave school without a diploma (Barton, 2005; Bridgeland, Dilulio, & Morrison, 2006). A policy information report presented by Educational Testing Services, appropriately entitled *One Third a Nation*, cited a number of independent researchers' estimations of the national high school graduation rates ranging from 66.1 % to 71.0%. Currently, state-by-state graduation rates range from an 88% high in Vermont to a 48% low in the District of Columbia (Barton, 2005). Inconsistencies in how states calculate high school completion contribute to the blurry graduation picture; nonetheless, the trend data are clear. Upon reaching its peak at 77.1% in 1969, national completion rates dropped in 2000 to 69.9%, where they have hovered ever sense (Barton, 2005). Complicating matters further, the graduation picture has been even more dismal when subgroup performances were examined. A report entitled the *Silent Epidemic* by Bridgeland et al. (2006) showed that only about half of African American, Hispanic, or Native American students graduate from high school. The corresponding dropout data also showed higher percentages of minority populations who do not complete high school. For example, the National Center for Education Statistics (2008) reported that the status dropout rate, which included those 16- through 24-year-old students who do not finish high school with a diploma or its equivalent credential, a General Educational Development (GED), declined nationally from 14.6% in 1972 to 9.3% in 2006. Nonetheless, of the 9.3% dropout rate, 5.8% were white, 10.7% were black, and 22.1% were Hispanic.

Researchers have identified several factors which contribute to a student's failure

to graduate with his or her class, including four broad categories submitted by the Center for Social Organization of Schools (Balfanz, 2007). The categories include

> 1) students who dropout due to "life events" outside of school (pregnancy, arrests, a need to work); 2) students who "fade out" after generally promoting on time each year but seeing little to no connection between school and "real life" become too bored with school to stay; 3) students who are "pushed out" because they are perceived to be too dangerous or difficult to keep in school; and 4) students who are simply "failing to succeed" in the traditional environments and support systems of today's modern high schools. (Balfanz, 2007, p. 3)

With regard to the category of students "failing to succeed," further studies associated with the Bill and Melinda Gates Foundation have substantiated that dropping out of school is a slow process of disengagement for most students, not a single point of frustration in Grades 9-12 (National High School Alliance, 2007). For example, according to the Center for Research on the Education of Students Placed At Risk, "there is a regular progression in the process of student dropout: 1) course failures; 2) being left back to repeat a grade; 3) increased student discouragement and alienation from school; and finally 4) dropping out" (LaPoint, Jordan, McPartland, & Towns, 1996, p. 5). Another study conducted by Allensworth and Easton (2005) through the Consortium of Chicago School Research also concluded that most students who leave high school prior to graduation do so because they are "failing at schoolwork and are subsequently behind their age-level peers in school" (p. 4). Therefore, being "on- track" with grade-level peers is "highly predictive of whether students eventually graduate" (Allensworth & Easton, p. 4). Finally, Bridgeland et al. (2006) contributed to the research on low high school

completion rates by interviewing former dropout students and delineating the top five reasons cited by dropouts themselves as major factors for leaving school. Accordingly, 47% of dropouts interviewed said they left because classes were not interesting; 43% said they had missed too many days and could not catch up; 42% said they spent time with people who were not interested in school; 38% said they had too much freedom and not enough rules in their lives; and 35% said they were failing courses in school repeatedly.

Research and experience have verified that the epidemic of low high school completion rates is a multi-faceted problem. School districts around the country have sought to mitigate students' reasons for dropping out through a variety of approaches. The common mission in all of the initiatives is to redefine the high school experience for students who do not fit the traditional model and to connect students with high level learning opportunities in a way that best meets their individual needs. The thrust of this study focused on those students representing the fourth category of high school dropouts, those failing to succeed in academic courses, and how one district responded to their individual needs to meet promotion standards.

Problem Statement

A repeated theme in the dropout research has been student course failure in key academic subjects needed for on-time promotion with grade-level peers. The crux of the problem has been that within the traditional classroom environments, a significant number of students have not demonstrated the required level of academic skills and knowledge needed to pass specific state and district mandated courses, which ultimately decreased their ability to advance to the next grade and graduate in 4 years. Additionally, students who were not promoted to the next grade with their peers have historically been twice as likely to drop out of school the following year. Students' lack of skills were

quantified by local districts or state regulations using a predetermined "pass score" which generally has fallen between 60% and 70%. Therefore, to earn a credit for a course, students must have shown mastery in the course standards at the prescribed pass score or higher. Students who did not meet the minimal pass score percentage were retained in that course for another attempt at passing and potentially were retained in that grade level depending upon local policies for retention and promotion. Allensworth and Easton's (2005) research in Chicago City Schools showed that students who were on-track by the end of their freshman year were more than three and one-half times more likely to graduate in 4 years than off-track students. In 2003, "a full 81% of Chicago students who were on-track after the freshman year finished in four years; while only 22% of off-track students graduated on time" (Allensworth & Easton, p. 4).

Background and Significance of the Problem

States have defined either the specific courses or the specific number of courses in a content area that students must pass for graduation. For example, in South Carolina, students must earn a total of 24 credits to graduate, including four credits of English, four credits of mathematics (with a minimum of Algebra 1), three credits of science, three credits of social studies (including United States history and Government and Economics), one credit of computer science, one credit of physical education or ROTC, one credit of foreign language or an occupational elective, and seven elective courses of the student's choice (South Carolina Department of Education, 2008). Districts, in turn, have broken down the graduation requirements into the number of credits students must earn per year to advance to the next grade. While this varies by district across the state of South Carolina, in general, students must earn at least one credit per year in mathematics, English, science or social studies, and one elective area to be promoted on grade level.

Allensworth and Easton's (2005) research comes to bear when we examine the South Carolina statewide failure rates for Grades 9-12 in 2004-05 (the last year the state released data). The data indicated that of the 628,309 students enrolled in Grades 1 through 12 in 2004-05, 16,836 high school students were retained in their grade. The highest failure rate for high school occurred in Grade 9 at 10,460 students (16.3%), followed by Grade 10 at 4226 students (8%), then Grade 11, at 1,231 students (2.9%), and finally Grade 12 at 909 students (2.4%) (South Carolina Department of Education, 2005b). The results by ethnicity and gender were more revealing as indicated by Table 1.

Table 1

South Carolina Percentage Failure Rates by Ethnicity and Gender 2004-2005 (n=16836)

	White		Black		Other	
Grade	Male	Female	Male	Female	Male	Female
9	13.9	10.2	24.1	18.9	15.2	11.8
10	7.4	4.7	12.5	9.1	7.4	5.5
11	2.9	1.5	5.3	3.0	3.7	2.0
12	2.3	1.6	4.0	2.1	2.6	2.2

*Percentages based on Grades 1-12 population retained, not just Grades 9-12 population.

The data showed that the lowest failure and grade retention rates occurred in the white female group followed by the other female group. African American male students had the highest retention rates followed by African American females. The highest grade retention rates for all subgroups occurred in Grade 9 followed by Grade 10. Not surprisingly, the state graduation rate for 2004-05 was 77.1% (South Carolina Department of Education, 2005b). The corresponding dropout rate for 2004-05 was 3.3%.

Males dropped out at a rate of 3.9% compared to 2.7% for females. White students dropped out at 2.8% compared to nonwhite students who dropped out at 3.9% (South Carolina Department of Education, 2005a). Recent data indicated that this problem is getting worse. Graduation rates for South Carolina during the last 2 years have taken a downward trend from 73.9% in 2005-06 to an all time low of 70.9% in 2006-07 (South Carolina Education Oversight Committee, 2005, 2006, 2007).

Emerging Strategies to Address the Problem

A growing number of school districts across the country have mitigated low promotion rates and lower than hoped for graduation rates through online solutions such as pure virtual courses, online-mediated or blended learning programs, and various models of credit recovery programs. "In its 2005 report, the National Center for Education Statistics found that, as of 2003, 36% of U.S. school districts had students participating in virtual courses for a total of more than 300,000 students" with that number expecting to explode in the future (Roblyer, 2006, p. 1). In South Carolina, a needs assessment conducted by the North American Council for Online Learning (NACOL) with over 200 responses from 55 school districts found that 50% of respondents included online learning opportunities in their school improvement plans (NACOL, 2008). Additionally, the survey found that two of the most commonly given reasons for online courses were to offer "catch up" curriculum for students behind in credits and to increase graduation rates (NACOL, 2008). The term "credit recovery" has been used in many districts to describe specific programs aimed at assisting high school students earn course credits at a faster, more individualized pace than is possible in the traditional environment. While the structure, procedures, and rules for credit recovery vary across the state and across the country, the common focus of all programs has been

the use of computer-based courses to enhance student content knowledge and skills in those courses previously failed in the traditional classroom but needed for promotion and graduation.

In the maturation and spread of online learning beginning first in higher education settings and later in K-12 education, two key questions have emerged. First, can students in online programs learn as well as or at significantly higher levels than students in traditional programs? Second, what conditions in the online environment most strongly predict academic success or failure? A seminal meta-analysis statistical review of 14 studies between 1999 and 2004 with 116 effect sizes from purely online K-12 programs revealed that web-based learning can have the same effect on measures of student achievement as that of traditional classroom instruction (Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer, 2004). Essentially, this study established that students in well-developed K-12 online courses were likely to learn just as well as students in well-developed traditional courses. The study also examined some of the variables of online learning that effect student achievement including the content studied online, the duration of use, frequency of use, grade level of students, the role of the instructor, the type of online school, timing of interactions, and the pacing of learning (Cavanaugh et al., 2004). Although the findings revealed that none of the aforementioned variables had a significant impact on student learning, the researchers noted some problems in the findings; most notably that the number of studies was too small and that too few studies reported detailed information (Cavanaugh et al., 2004). As a result, findings from this meta-analysis study have been viewed by other researchers in the field of online learning as indicators of tendencies rather than prescriptions for practice. The literature review outlined the breadth of face-to-face, virtual, and hybrid credit recovery models and their

impact on student learning. However, the general consensus among researchers reviewed in the literature is that the effectiveness of online learning on student achievement goals in K-12 education remains under-researched (Blomeyer, Clark, & Smith, 2005; Cavanaugh, 1999).

Theoretical Framework of the Study

Of interest in this study are the psychological factors (motivation and learning strategies) and environmental factors (social) to which students attributed their success or failure to earn credits in the online mediated environment and the degree to which those factors impacted the achievement of all students in all courses. In numerous online studies focused primarily on post-secondary distance education students, social and psychological readiness have been essential components for success (Liu, 2007). Miltiadou and Savenye (2003) used the work of four key researchers to define the constructs of motivation and its impact on the learner and on learning. Initially, motivation increases individuals' energy and activity levels (Maehr, 1984). Furthermore, motivation directs individuals toward certain goals (Dweck & Elliot, 1983). Motivation also promotes initiation of certain activities and persistence in those activities (Stipek, 1988). Finally, motivation affects the learning strategies and cognitive processes individuals employ (Eccles & Wigfield, 1985). Because online learning is highly learner autonomous, the student must accept his or her responsibility to make learning decisions and maintain active control of the learning process throughout (Corbeil, 2003). According to Miltiadou and Savenye (2003), there were three major categories of motivation. The first category included individuals' perceptions about their ability to accomplish a task, including self-efficacy, locus of control, and attributions. These constructs answered the question, "Can I do this?" The second category included

individuals' reasons or purpose for engaging in a task, including intrinsic or extrinsic goal orientation. These constructs answered the question, "Why am I doing this?" The third category involved individuals' techniques and strategies for accomplishing a task, including self regulation as they related to the employment of specific learning strategies. These constructs answered the question, "How can I do this?" The theoretical basis of this study examined the relationship between students' employment of motivation and learning strategies and their academic achievement in a high school online mediated environment. The causal factors impacting intrinsic motivation examined in this study included academic self-efficacy (Bandura, 1993), self-regulation as it relates to the employment of specific learning strategies to enhance learning (Pintrich & DeGroot, 1990; Zimmerman, 2002), goal orientation (Dweck & Elliott, 1983), and attribution (Weiner, 1985). Extrinsic motivation factors examined in this study included those environmental or institutional factors of time, place, social interactions with others, time management, and control of learning environment to which students may have attributed their success or failure in mastering the online course content. Causal attributions have been defined by Pintrich and Schunk (1996) as individuals' perceptions of the causes of various achievement outcomes. This study focused on students' locus of causality and the degree to which students attributed their academic success to internal factors or external factors and the degree to which the environmental attributes of the credit recovery program positively contributed to students' internal locus of control (Rotter, 1966) and thereby increased student achievement.

Setting of the Study

The setting of the study was a medium-sized suburban school district with 17,300 students in the upstate of South Carolina. The student population examined came from

three medium-sized suburban high schools with student enrollments of 1398, 1746, and 2092. The high school sites served as three mini studies within the larger single district case study. Similar to the trends noted at the state level, the district in the study has experienced 3-year decline in graduation rates. According to the South Carolina Annual School Report Card (South Carolina Education Oversight Committee, 2005), in 2005, the district had an 80% graduation rate with data that was self-reported and self-generated. However, in 2006, the state began pulling data directly from the statewide computer database system, and the district's graduation rate dropped to 68% (South Carolina Education Oversight Committee, 2006). In 2007, it declined once again to 62.3% (South Carolina Education Oversight Committee, 2007). Likewise, according to the South Carolina Department of Education, from 2003-2005, the dropout rate also sharply increased from 2.3% in 2003, to 4% in 2004, to a dismal 8% in 2005, then to 5.3% in 2006 (South Carolina Department of Education, 2003, 2004, 2005a, 2006). Not surprisingly, district failure and grade retention rates in high school also increased during this period. Table 2 shows the district's high school enrollment and retention figures for 2005-2007.

Table 2

District High School Enrollment and Retention Rates by Grade Level

Year	Total	Grade 9	Grade 10	Grade 11	Grade 12	Retained Students
2005	4689	458	202	119	8	787
2006	4859	445	175	96	4	720
2007	4946	398	203	149	5	753

Since 2005, district results have mirrored that of the state with the highest retention rates occurring at Grade 9 followed by Grade 10. Additionally, from 2005-2007, the district had only two intervention programs for high school students who failed academic courses needed for promotion: traditional summer school and virtual high school. Both of these interventions were limited by the fact that students could only make up one course at a time and students had to retake the entire course that was failed the first time in the traditional classroom no matter how high or low the original failing grade. Previous student learning in the course was not taken into account.

To mitigate promotion and graduation underperformance, the district implemented a credit recovery model offered through an online-mediated approach. Beginning in January 2008, credit recovery programs in all three high schools used computer-based courses with curriculum purchased from Apex Learning (Apex, 2009). The district selected Apex as the content-provider for three key reasons. First, it offered a wide range of courses for high school credit including college preparatory, honors, and advanced placement courses. Second, having gotten its start in high school virtual learning market with the advanced placement courses, Apex had a reputation of developing rigorous online curriculum. Unlike many computer-based learning programs designed for remediation, Apex was not considered a low-level skill and drill program. Courses were set up in units of study and had interactive lessons, writing assignments, quizzes, and unit tests. Third, Apex was well-correlated to the South Carolina standards and was endorsed by the National Collegiate Athletic Association (NCAA) Clearinghouse as accepted high school credit.

The district made Apex online credit recovery courses available to students in a lab setting at the high schools, but students could also easily access courses online from

home. In this district's model of credit and content recovery, the online courses served as a supplement to the traditional classroom and provided students with the relearning and retesting options not available in many high schools. In the credit recovery program, students who failed a course in the traditional classroom in the prior semester with a 60-69 final average could sign up to relearn and retest on only those specific units not mastered in prior attempts at the course in the traditional classroom. Classroom teachers helped students identify the units to complete in the online mediated environment, and mastery for the credit attainment within the Apex system was set at 70%. Students who mastered the previously failed units with a 70% or higher in the Apex curriculum successfully earned a passing credit for the course. The credit recovery program was a post-failure intervention. In keeping with other credit recovery models across the state and nation, students paid a minimal fee of $25.00 to participate in the program. The fee helped to ensure that students had a stake in their learning and did not waste a "seat" in the program that another student might need without some consequence.

The credit recovery model had the additional distinction of a full-time paraprofessional who served as the academic coach in each high school lab as well as certified teachers from each of the core content areas who worked as part-time tutors. The academic coach operated the Apex content management system, oriented students to the online curriculum environment, monitored student progress in the system, arranged peer and adult tutoring for students when needed, interfaced with classroom teachers to determine the specific units of study students needed to retake and retest in order to earn credits, and communicated results to parents and counselors upon the students' completion of the work. The addition of the academic coaches moved this intervention from a pure online intervention to an online-mediated or hybrid credit recovery model.

The face-to-face itinerate teachers worked in the lab as facilitators or tutors. They did not direct student learning; rather student needs directed the teaching they provided. In blended environments, the face-to-face teachers tend to have a higher stake in the curriculum selection and instruction. This model differed slightly from a blended environment in that teachers were simply there to be responsive to student needs, thus the description of the program as an online mediated environment. The study time frame was summer 2009. The summer session was selected because it had the highest student sample population and because it provided a distinct opportunity to measure the effectiveness of the online mediated program when students were not taking any additional courses.

Purpose of the Study

With the raw data at the national, state, and local levels pointing to twice the number of freshman than the number of graduates each year, it is clear that districts need to make a considerable investment in keeping students on the path to on-time graduation. Ultimately, this means improving the skills and content knowledge students understand and can demonstrate in the academic courses they take in high school. The purpose of this study was to determine if one district's approach to credit recovery with its emphasis on relearning and retesting previously failed content in an online mediated environment led to greater student mastery in high school courses needed for promotion or graduation. Specifically, the study sought to determine if students in the credit recovery program showed positive gains in courses taken in the online mediated environment as measured by pre and posttest scores on units they previously failed in the traditional classroom environment and if those gains cumulatively met the 70% or higher pass cut score to earn academic credit for the course and promote on time. Because of the significance of No

Child Left Behind (2001) subgroup performance, the study further examined if the academic gains or losses on pre and posttests were true of all students and all courses in the online environment or if there were differences in performance among gender, ethnicity, socioeconomic status, special education, or course type. Secondly, the study examined the extent to which successful attainment of credits positively impacted students in the program and the school's on-time promotion rates. Finally, and perhaps most importantly, the study analyzed the connection between the external environmental factors in the program including those associated with time, space, support, and the content delivery system, as well as students' internal conditions for learning, including those related to motivation and self-regulatory learning strategies, and overall student achievement in the program.

Research Questions

At the heart of any credit recovery program is the vital question of whether the program worked to help students master the content and skills they did not learn previously, and if so, why? The study sought to answer the following quantitative questions:

1. To what degree did the unit-based, online mediated approach increase achievement (the attainment of content knowledge and skills) in core academic courses needed for on-time promotion and/or graduation?

2. To what extent did the unit-based, online mediated approach impact the on-time promotion and/or graduation rate of students who participated in the program and the school's promotion rate by grade level?

This question was essential to this study because it had the potential to measure the program's viability as a graduation and dropout prevention strategy.

3. In terms of academic achievement and promotion, how successful was the online, mediated approach when factors such as gender, ethnicity, socio-economic status, special needs, and course type were measured?

Given that failure and retention rates nationally and statewide have been highest among African American males and females, it was noteworthy to determine if the credit and content recovery model mitigated those conditions in the district program.

These quantitative questions were designed to measure the program's impact on student learning in these high school settings, but they do not answer the vital question of why it may or may not have had an impact, which was needed to make the case that the program can and should be replicated in other settings. Therefore, this study also examined the following qualitative questions:

4. What was the relationship between external environmental factors in the online mediated environment and student achievement?

Included in these environmental factors were variables germane to online learning, including time, place, and support from significant others (Boyd, 2004). The researcher added one additional variable to the environmental factors: affinity with online learning to determine student perceptions on their technological and social readiness to learn online. The study measured student perceptions of their success in the program with regard to factors such as flexibility of time, flexibility of location, personal interaction with an academic coach or face-to-face teachers, engagement with online content delivery system, and the focus on condensed learning goals.

5. What was the relationship between the psychological internal controls of learning in the online mediated environment and student achievement?

Included in the psychological factors were elements of motivation such as

intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, academic self-efficacy, and test anxiety, as well as elements of self-regulatory learning strategy predispositions including rehearsal, elaboration, organization, critical thinking, metacognitive self regulation, time and study environment control, effort regulation, peer learning, and help-seeking strategies.

Type of Study

The study followed a case study model by selecting a single time frame (summer) to measure student performance in the credit recovery program. The researcher used a mixed-methods approach to research design. In the quantitative portion of the study, a single group, pretest-posttest pre-experimental design was used to collect ordinal data on student content knowledge gains and losses in the online curriculum using a pretest-treatment-posttest model. Gains and losses were analyzed using descriptive and inferential statistics to determine the overall effectiveness of the treatment on student learning. Then, students' gains or losses on specific units were also calculated to determine if the level of improvement in content knowledge and skills reached a 70% or higher pass cut score. The researcher analyzed both ordinal gains or losses scores and categorical pass cut scores by gender, ethnicity, socioeconomic status, special education, and by course type to determine the degree of predictability for success in the program for all students or for specific subgroups. In the case of the course type, the researcher sought to determine if there were significant differences in the academic gains or losses and the overall pass rates for some online courses over others.

The study also employed a descriptive design to collect qualitative data on why the program may have worked to improve academic achievement. Using both constructivist methodologies such as interviews and focus groups and empirical

methodologies such as the Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia, & McKeachie, 1991), the researcher analyzed those external learning environment factors and internal psychological factors to which students attribute their success or failure in the program.

Significance of the Study

This study was significant to field of online learning environments in public K-12 venues. First, much of the literature on virtual schooling has focused specifically on postsecondary education where practices have matured over decades of implementation and where users have grown to over 4 million students (22% of higher education enrollment) taking fully online courses (Picciano & Seaman, 2007). However, according to Picciano and Seaman, online learning in primary and secondary education has remained in the nascent stages. There was a need to "examine issues related to online instruction in K-12 schools in order to inform policymakers at the federal, state and local governing agencies to better use this technology to improve instruction" (Picciano & Seaman, p. 2). Unfortunately, most online learning research has been atheoretical, focusing only on descriptive studies of distance education programs, or comparison studies of academic outcomes in traditional face-to-face environments versus online learning environments, or media variable studies matching individual learner traits to online media. Researchers have agreed that additional studies of online learning that advance teaching and learning theory are needed (Diaz, 2000; Phipps & Merisotis, 1999). In higher education, researchers have begun to investigate the impact of both psychological and environmental conditions on student retention and achievement in online learning environments. These studies, reflected in the review of literature in Chapter 2, have begun to explore the role of motivation, specifically self-efficacy, goal

orientation, locus of control, and self-regulatory behaviors and their contribution to student achievement in online environments. However, even with these initial studies, more replication had been needed to validate results. There remains a major gap in the research on the impact of psychological and environmental conditions within pure virtual programs or hybrid virtual programs for K-12 learners. Research studies and practitioners have predicted that hybrid models of online learning will proliferate the K-12 arena because hybrid programs offer the balance of the two extremes (Maeroff, 2003).

Second, the literature on credit recovery, including which models have been most successful, their impact on student achievement, and the psychological factors that contribute to student achievement in this environment was not expansive. The majority of studies dealing with online credit recovery programs focused on the problem strictly as a ninth-grade intervention. Though appropriate, these studies have not fully explored the impact of recovery opportunities for all ages of high school students nor have they advanced the theoretical discussion of how to design online credit recovery programs which effectively increase student motivation and learning. Finally, as schools struggle to find economical ways to address students' lack of content knowledge and skills, models of successful credit recovery programs through innovative uses of online curriculum may provide districts with a financially viable intervention option. According to Maeroff (2003), online learning has the potential to better serve non-traditional or special needs students because it has the ability to differentiate instruction to meet the preferred learning style of all students. Ultimately, the most successful models of online credit recovery programs will capitalize on the research provided by this and other studies illuminating those environmental and psychological factors that are most predictive of student success.

Definition of Terms

Academic coach. The paraprofessionals who enrolled students into the credit recovery program, operated the Apex content management system, oriented students to the online curriculum environment, monitored student progress in the system, arranged peer and adult tutoring for students when needed, interfaced with classroom teachers to determine the specific units of study students needed to retake and retest in order to earn credits, and communicated results to parents and counselors upon students' completion of the work.

Academic achievement. For the purposes of this study, academic achievement represented the gains students made in the online unit-based curriculum from the pretest and experimental treatment to the posttest.

Apex. A digital, unit-based curriculum which provides a complete scope and sequence for a variety high school courses aligned to state and national standards and developed with comprehensive instructional content and formative and summative assessments (Apex Online Learning, n.d.).

Credit recovery. For the purposes of this study, credit recovery was a post-failure intervention for students who have failed a core academic course but did not fail the course substantially. Students with a 60-69 final average were given the opportunity to relearn and retest in the online mediated environment on only those units previously failed in the traditional classroom. Those who achieved 70% mastery score on all web-based unit posttests earned the passing grade for the class without taking the entire course again.

Environmental factors. Variables germane to blended online learning environments, including time, place, and support from significant others (Boyd, 2004).

The study examined conditions of flexibility of time, flexibility of location, personal interaction with academic coach or certified teachers assisting in the program, engagement with online content delivery system, and the focus on condensed learning goals.

Mastery learning. For the purposes of this study, mastery learning was set at students scoring 70% or higher on the online unit tests.

Psychological factors. Included in the psychological factors were elements of motivation such as intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, academic self-efficacy, and test anxiety, as well as elements of self-regulatory learning strategy predispositions including rehearsal, elaboration, organization, critical thinking, metacognitive self regulation, time and study environment control, effort regulation, peer learning, and help-seeking strategies.

Online mediated environment. A blended online learning model for the credit recovery program whereby students completed online courses but were supported by an academic coach, teacher, or tutors to provide academic, emotional, or organizational assistance.

On-time promotion. This term was used to describe those students who meet the required mastery cut score (70%) set by the South Carolina State Department of Education to advance to the next grade level in one academic year.

On-time graduation. The State of South Carolina had defined "on-time graduation" as a student who enters 9th grade at a particular point in time and graduates with a South Carolina diploma (not a GED or a certificate of attendance) in 4 years.

Retention. In this study, references to retention involved the act of holding a student back in the same grade he/she has previously attempted due to lack of skills or

content knowledge as demonstrated by the 70% pass score set by the State of South Carolina.

Unit-based online curriculum. Web-based course work set up in cohesive units of study designed around the content standards typically associated with a particular course. The units included the full learning cycle of direct instruction, guided practice, and independent formative and summative assessments.

Limitations

First, the study was limited by the fact that there was no control group; therefore, internal validity of the study came into question. According to Gall, Borg, & Gall (1989), at threat in a pre-experimental design are the extraneous variables associated with student history, maturation, testing, and instrumentation. An experimental design with a control group provides an estimation of these variables; however, it was not possible in a credit recovery model where the purpose was to measure the effectiveness of the new treatment, i.e. the online mediated curriculum on student achievement, to include a control group. The absence of a control group was not a serious threat to the internal validity of this experiment because students had recently failed the course in the traditional classroom environment, so little time and maturation had passed and no additional testing had been given to students between the conclusion of the course in the traditional environment and the experimental treatment in the online mediated content.

Second, this study was limited by the self-selected student sample that chose to take advantage of credit recovery options in the summer semester within the target high school settings. Some students who may have been eligible to participate in the program may not have elected to do so. Other students may have participated in the program during the previous fall or spring semesters. This case study did not reflect their input in

program statistics. Students also had to pay a minimal cost ($25.00) for the credit recovery opportunity and to complete course work for the program before or after school or during home hours. Those students without financial resources, transportation, or sufficient computer infrastructure in the home may not have taken advantage of the opportunity; therefore, the study will not provide a comprehensive view of all possible student performance in the program.

Third, the study was limited by the fact that 40 students took two different courses rather than just one course. The statistics on gains in achievement assumed independence in the data; therefore, it assumed a single instance of students taking one course each. Gains in the second course taken by the same student may be correlated. Finally, a portion of the study was limited in its sample population to those 293 of 417 students who chose to complete the Motivated Strategies for Learning Questionnaire *(*Pintrich et al., 1991). Some students did not choose to complete the survey, focus groups, or interviews; therefore, their data on what conditions contributed to student success or failure in the program was missing from the results.

Delimitations

Unlike other credit recovery models, this study was confined to those credit recovery students with a 60-69 final average. Students with a final course average of 59 or lower were not eligible to participate in the online mediated courses though they may have been successful in this environment if given that opportunity. Finally, mastery of course knowledge and skills in the online mediated environment was set at 70% on the computer generated assessments. Students were considered to have earned credit for the course when they scored a 70% or higher on only those units or standards teachers felt the students previously failed in the traditional classroom environment. The 70% mastery

level matched South Carolina's uniform grading policy pass cut score. Other districts with lower pass cut scores may have significantly higher results.

Chapter 2: Literature Review

Industrial Age to Information Age

Over the last 20 years, the most significant change affecting youth socially and academically has been the ubiquitous use of computers, most specifically, the Internet and other digital technologies (Tapscott, 2009). In 1994, only 30% of schools and less that 15% of homes had Internet access. At present, 100% of American schools and close to 50% of American homes not only have Internet access but use it daily to learn, shop, pay bills, select music, communicate with friends, meet new people, facilitate meetings, research topics, and a host of other basic life functions (Tapscott). The expansion of technology in all of its forms is forcing the end of the industrial model of conducting business and school and ushering in an information age of technologically-driven mass customization, what Kelly, McCain, and Jukes (2009) call the "age of the individual" (p. 13). Along with this changing customization, the very nature of what students are learning and how they are learning it in this information age is changing as well. Before, teachers were the main source of information for school-age students. Today, through the power of online search engines, vast amounts of information are readily available to students all hours of the day and night. Before, students relied on the black and white printed page for all information and were limited to those print sources they could afford to buy individually or receive free in school. Today, students receive online print information but also non-print information through full color graphics, digital images, and video all at the touch of their fingers for free in the public schools or for the low cost of a monthly internet service at home (Kelly et al.). Industrial model schools were mass production oriented, teaching the same thing to all students at the same time in the same way, while today's "Net Generation" prefer individual ways of learning and absorbing

information. Tapscott (2009) and other researchers of the Net Generation believe that the vestiges of the industrial model in public education have directly contributed to the growing numbers of high school dropouts. In support of this statement, a 2006 report from the Gate's Foundation revealed that 50% of Net Geners dropout of school because they find school boring; 7 of 10 said that they weren't motivated to work hard; and one third stated social factors such as needing to work or caring for children as major factors contributing to the dropping out (Bridgeland et al., 2006). Kelly et al. maintained that the industrial model has served students increasingly poorly for the last several decades, leading to the dismal 69% graduation rate in America. Additionally, Kelly et al. argued that

> in urban districts with substantial low-income or minority populations, this country has graduated less than half of its student population, and many of those who did graduate left academically deficient, unprepared for the world that awaits them after school, or required remedial instruction to be able to survive in college and life. (p. 5)

These researchers have proposed a shift from the traditional classroom's "broadcast learning" approach which features a teacher-centered, one-size-fits-all instructional model emphasizing what students should learn about, to a more "interactive learning" approach that is a learner-centered, one-size-fits-one instructional model emphasizing discovery and collaboration (Maeroff, 2003, p. 133). The term e-learning (electronic learning) has been used to cover a wide set of applications and processes, such as web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It has included the delivery of content via Internet, intranet/extranet (LAN/WAN), audio and videotapes, satellite broadcast, interactive TV, CD-ROM, and

more (Watkins, 2005, p. 17). E-learning has been delivered synchronously, asynchronously, or a combination of both. Asynchronous e-learning models have not used simultaneous interactions between the instructor and students. It has included email, listservs, audiocassette courses, videotaped courses, online computer-based learning programs, and web-based courses. Instruction was more flexible, allowing students to choose when and where they will interact with the curriculum (Talvitie-Siple, 2007). Interactive education offered through web-based online courses has enabled students to learn at their own pace, stop anytime, review as needed, test when they are ready, and get immediate feedback on their progress (Tapscott, 2009). According to Maeroff, online courses have the potential to serve non-traditional or special needs students more effectively than the traditional classroom, including overage students, part-time workers, migrant families, urban and rural students, disabled, and remedial students. A growing number of K-12 school districts have come to know what the chief academic officers of higher education realized some time ago—that online technologies are not a threat to the traditional public school, rather they provide exciting new options to make learning intrinsically motivating for many types of students including those who may have otherwise disengaged and dropped out of school.

Characteristics of Net Generation Learners

With the advent of computer-based and online learning, one of the chief questions school leaders have raised is whether today's students are uniquely more predisposed to learn through web-based resources. Several researchers have argued that the digital world has changed the thinking patterns of young students (Allen & Seaman, 2006; Kelly et al., 2009; Tapscott, 2009). Because students today are immersed from a very early age in digital technologies such as surfing the Internet, downloading files, chatting online, and

multitasking on the computer, a large cross-section of American young people have assimilated the skills it takes to survive in an online world. This wasn't true of their predecessors 10 to 15 years ago who have accommodated those skills from their analog experiences. The neuroplasticity of the brain has allowed it to adapt and reorganize how it processes information based on new input. Thus, researchers have proposed that long-term exposure to digital learning modalities has literally rewired students' brains to handle digital content more readily (Kelly et al.). Based on this rationale, Tapscott described eight distinct characteristics or norms for Net-Generation learners, including a strong desire for choice and customization, a unique need to collaborate when learning something new, an ability to scrutinize facts, and a passion for integrity, fun, speed, and innovation. Kelly et al. supported these norms describing digital learners as those who prefer information quickly from many multimedia sources, projects that allow for multitasking, learning stimuli that is active and engaging, the use of picture, video and sound over the printed word, random access to hyperlinks, and networking with others on assignments.

A critical question for those supporting online education has been whether online learning is merely a different way to serve the existing student base or whether it provides opportunities for a new and different kind of learner. In a survey on higher education online learning, 73.9% of chief academic officers reported that online courses were serving students who would not have been served at all in face-to-face programs. This response was higher in the southern states which answered that 79.5% believed the online programs provided a level of collegiate access to students who would not otherwise be able to attend college on campus (Allen & Seaman, 2006). In a comprehensive report on K-12 online learning published by the Sloan Consortium (Allen

& Seaman, 2008), school districts reported that online learning met the needs of range of students from those who needed extra help and credit recovery to those who wanted to take advanced courses. Likewise, in its issue on *Promising Practices in Online Learning,* the North American Council for Online Learning (2008) maintained that online learning was uniquely suitable to Net Generation students because it offered the advantage of personalization, along with both individualized attention and support when students needed it most. It provided students with a good, stable education regardless of where they lived and the opportunities in the local school district.

No Significant Difference

Nonetheless, researchers have not all agreed that computer-based learning, including such options as web-based courses, increase student academic performance. The first attacks on web-based learning came from educators, psychologists, and theorists who believed in a constructivist approach to learning (Roblyer, 2004). These critics claimed that learning should not be about transmitting discreet knowledge from one source to the learner through direct instruction, but rather that the learner should construct his own understanding of a concept based on a careful give and take between the teacher and learner. In a report to Congress on the *Effectiveness of Reading and Mathematics Software Products: Findings from the First Cohort* (2007), a study conducted by the U.S. Department of Education covering 9,000 students, researchers assessed the effectiveness of 15 education software products and found that after 1 year of testing there were no significant differences in academic achievement as measured by scores on standardized tests between students who used educational software and their peers who did not. Another focus of attacks came from Richard Clark's (1983) research where he asserted that "forms of media are delivery vehicles for instruction and do not influence learning"

(p. 453). Basing his views on former research on media influences, he concluded that differences in achievement were better attributed to the methods of the teacher not the technology (Roblyer, 2004).

What is clear from the literature regarding this debate is that the extensive growth and variety of online programs at both the higher education level and K-12 level have warranted increased studies to explore the relationship between a range of factors and successful online completion of courses (Liu, 2007). Moreover, the focus of e-learning research has begun to shift toward the theoretical principles underlying the use of the technology for the delivery of instruction (Benbunan-Fich, Hiltz, & Harasim, 2005). Roblyer (2004), author of a *Call for a National Research Agenda,* spoke passionately about the need for systemic research at the higher education and K-12 levels to uncover the unique pedagogical benefits of technology.

Higher Education Online Learning: Growth and Development

Since the 1990s, distance education has steadily increased in the United States at a rate unprecedented by other forms of technological innovations. The University of Phoenix offered an MBA program in 1989 totally online. Jones International University opened the first entirely virtual institution in 1993 (Paden, 2006). Between 1995 and 1998 distance education programs offering asynchronous online courses grew an astonishing 72% (Carnevale, 2002). In 2003, the first in the series of national annual reports on the state of online learning in U.S. higher education, *Sizing the Opportunity: The Quality and Extent of Online Education in the United States*, *2003* was released (Allen & Seaman, 2003). The major question it sought to answer was, "How many students are learning online?" The answer was 1.6 million in fall 2002. In fall 2003 that number grew to 1.9 million students. In fall 2004, the number was 2.3 million. By the

2006 report, nearly 3.2 million students nationally were taking at least one online course during the fall 2005 term, a substantial 35% increase over the previous year's study. By fall 2007, the number jumped to 3.9 million (Allen & Seaman, 2006, 2008). The numbers more than doubled over the 5-year data collection period initiated by the Sloan foundation. Although researchers have begun to ask what the impact of the economic downturn will be on the online course industry, most projections indicate that it will continue to increase the number of students who participate. Close to 70% of university chief academic officers now agree that there is competition to attract online students for degree programs (Allen & Seaman, 2006). The second question it answered was, "Who is learning online at the higher education level?" There was an existing belief that online opportunities appealed to a different kind of student. What they found was that online students were overwhelmingly undergraduates in associate programs (80%), 12% were taking graduate courses with the proportion of graduate level students being slightly higher in online environments compared to the overall higher education population, and 8% were working on a professional degree (Allen & Seaman, 2006). It also found that online students tended to be older, hold additional employment responsibilities and maintain higher levels of family responsibilities (Allen & Seaman, 2006). The final trend noted in the study was that larger universities invested in the technology infrastructure and online course development training first, followed quickly by smaller or specialized universities, thus the proportion of online students in the university setting was directly proportional to the size of the university.

There has been a great deal of diversity among higher education institutions on the delivery model used for online learning. Table 3 shows a modified prototypical course classification from the study on *Staying the Course: Online Education in the*

United States (Allen & Seaman, 2008, p. 4).

Table 3

Course Classifications for Online Learning in Higher Education

Proportion of Online Content	Type of Course	Typical Description
0%	Traditional	Course with no online technology used
1 to29%	Web-Facilitated	Course that uses web-based technology to facilitate a mostly face-to-face course
30 to 79%	Blended/Hybrid	Course that blends online and face-to-face delivery with substantial portions delivered online and reduced face-to-face meetings
80+%	Online	Course with most of the content delivered online

Universities have offered these different formats of online learning since the late 1980s with varying degrees of results. The critical questions posed by both supporters and non-supporters of online, blended, and other forms of computer-based learning at the higher levels has continued to be whether students receive a quality education in the online environment, if learning through an online modality has a positive impact on student achievement, and if so, what types of students are most successful in that environment.

Comparison Studies: Online versus Face-to-Face in Higher Education

According to Lynch and Dembo (2004), much of the distance education research in higher education has focused on three general areas: "descriptive studies of distance education programs, group academic outcomes comparison studies (distance versus face-

to-face class), and studies matching individual learner traits with media variables" (p. 2). The comparative studies in higher education online learning have primarily tried to distinguish the viability of various online learning models (distance, blended, purely online) in increasing student achievement. Current perception polls indicated that most chief academic officers believe that the quality of online instruction was equal to or superior to face-to-face learning. Fifty-six percent believe online learning was equal or superior to face-to-face; 15.5% believe it is superior to face-to-face. However, this was by no means a universal opinion. Almost one third of academic leaders continued to believe it was inferior to traditional instruction (Allen & Seaman, 2008). Proponents of online learning began in the late 1980s to identify studies in higher education that would show that online learning produced greater student achievement results, but the synthesis of the research has not been conclusive on either side. Clark (1983) asserted that media used in instruction does not affect learning. However, in a meta-analysis of studies on distance learning versus traditional learning, Sitzmann, Kraiger, Stewart, and Wisher (2006) found that in some cases, students in distance learning environments surpassed the achievement of students in traditional learning environments. Yet when the same instructional techniques were used in both venues, there was no significant difference. Zhao, Lei, Yan, Lai, and Tan (2005) found similar results in another meta-analytic study of the effectiveness of distance education. Their *no significant difference* conclusion was primarily drawn from two types of analyses: summary of 355 extensive studies that found no significant difference (Russell, 1999) and more recent meta-analyses (Cavanaugh, 2001). However, in looking at individual studies, the researchers found remarkable significant differences among cases that could not be generalized across studies because of variations in pedagogical and technological factors (Zhao et al.). Some of the studies

that showed profoundly superior outcomes included Nesler, Hanner, Melburg, and McGowan's (2001) study, which noted that online nursing students had higher scores related to professional socialization than did traditionally taught nursing students. In addition, Bernard et al. (2004) conducted their own meta-analysis of student achievement results in distance education versus the traditional classroom and found that academic achievement of online students surpassed that of students in traditional environments. The general consensus from the literature about purely online learning versus face-to-face learning supports the *no significant difference* stance; however, the mixed results clearly warrant more systematic study.

Comparison Studies: Traditional versus Blended Environments

Blended instruction including the terms hybrid, mixed model, and blended learning were all references to the same type of instruction, referring to courses that combine reduced face-to-face classroom instruction with online learning (Dziuban, Hartman, & Moskal, 2004, p. 2). Allen and Seaman (2004) defined blended courses as those in which 30% to 80% of course content is delivered online. A further distinction was made by Beck (2002) and Dziuban et al. that blended learning is more than merely a web-enhanced course where curriculum and tests are given online. It is a fundamental redesign of instruction from teacher-centered lecture to student-centered instruction, from one-way interaction between teacher and students to collaborative interaction between student-to-instructor and student-to-student, and from one assessment fits all to an integration of formative and summative assessments. According to the North American Council of Online Learning (2008), blended programs have not been as extensive as purely online models, but well-known blended programs in the United States have existed for some time, including the Odyssey Charter Schools in Nevada, Commonwealth

Connections Academy in Pennsylvania, the Chicago Virtual Charter School in Illinois, The Hoosier Academy in Indiana, the Kentucky Virtual School, the Community High School in Ann Arbor Michigan, and the Omaha Public School eLearning Program which is designed for credit recovery students. Although proponents of the blended instructional model believe that it represents the single greatest unrecognized trend in higher education today (Spanier as cited in Young, 2002), Allen and Seaman's (2006) research has revealed that blended learning enrollment has not continued to rise like its purely online counterpart. Rather, enrollments in blended programs have stayed the same from 2002-2004. Not surprisingly, blended learning studies in higher education have not garnered the same breadth or depth of research as purely online programs simply because the viable programs are not as ubiquitous. Nonetheless, some strong isolated case studies in two distinct areas, those comparing student achievement and student satisfaction across traditional, blended, and distance environments in higher education have produced mixed findings about the effectiveness of blended learning. For example in the area of student achievement, Kiser (2002) noted that students training to use Microsoft Excel performed better after instruction in blended learning classes versus a fully online class or traditional class. Al-Jarf (2004) found that ESOL students scored higher in a blended learning class than in face-to-face classes. Yet, Ward (2004) noted no significant difference in the grades of a statistics class taught both in a blended and traditional format. Reasons, Valadares, and Slavkin (2005) compared the final grades of two introductory undergraduate courses taught in online, blended, and traditional formats and found no significant difference between the blended and traditional formats but the online students outperformed the other two groups. Finally, Dziuban and Moskal (2001) studied undergraduate courses offered online, blended, and traditionally at the University of

Central Florida for 7 years and found that students in blended courses tended to outperform those taking online and traditional courses based on final grades in the course. However, follow-up research in 2004 revealed a leveling off of performance and no significant differences between the three modalities were evident (Dziuban et al., 2004).

Studies comparing student satisfaction in purely online, blended, and traditional environments were also mixed. One study conducted through the University of Colorado at Denver within the Foundations of Engineering, Science and Technology program (Tang, Byrne, & Lippitt, 2005) found that undergraduates appeared more or equally satisfied with the blended and online modes of delivery than with strictly classroom formats, but the university found that advantages of offering online or blended formats included improved distance support of faculty in the delivery of courses, effective delivery of tutoring for students, increased facility in sharing of digital course materials, greater sharing of faculty workload, effective development of virtual learning communities, increased facility in student feedback and assessment, and more effective program management and monitoring. Biggs (1999) also compared student perceptions of classroom instruction in traditional environments, blended environments, and fully online environments. He found that instructor support was rated highest in the traditional classroom followed by the blended environment. However, students rated interaction and collaboration between students as being highest in the blended class followed by traditional and then the fully online environments. Finally, a study by Akkoyunlu and Soylu (2006) used a questionnaire to ask 50 open-ended questions administered to students at certain intervals about the blended learning approach they were experiencing. The study sought to determine students' views on the blended learning environment with respect to their achievement levels and the frequency of their participation in the forum.

Researchers found that students' views on the blended learning environment diversified as achievement levels increased. Students on the lower end of the achievement level favored the online portion of the course less and the face-to-face instruction more. These students stated that they were not accustomed to using online environments and their comments noted that they participated less frequently in the online forum which caused their failure in the course. Conversely, students on the higher end of achievement enjoyed the computer time more and saw that forum as helpful to their learning. This study underscores the importance of helping students with lower achievement levels in a particular course navigate the online components of the blended learning environment.

According to Allen, Seaman, and Garrett (2007), the evolution from face-to-face to online to blended learning models has not been linear. Despite the notion by some that hybrid or blended models provide enhanced capacity and add value to the college-age student, universities have remained largely unconvinced about the merits of blended learning on student achievement. When collegiate academic leaders were asked to rate their degree of agreement with the statement, "in my judgment, blended courses hold more promise than fully online courses," on a 7-point Likert scale ranging from "1" for "strongly disagree" to "4" for "neutral" to "7" for "strongly agree," there was no strong level of agreement or disagreement. A modest 47% were neutral in 2003 and that number grew to over half (55%) in 2004 (Allen et al.). What appears more likely from the literature is that the move to blended learning was not part of most institutions of higher education paths to instructional change. Rather it was a discrete option some institutions are choosing on their own merits.

K-12 Online Learning: Growth and Development

The first online public school began in 1995 with the CyberSchool Project in

Eugene, Oregon to offer supplemental high school classes. By 1996, there were three online schools, the WebSchool in Orange County, Florida; The Cyber-School Academy, in Washington State; and the Concord Virtual High School in Maynard, Massachusetts (Kiekel, 2007). From 1996 to 2002, a dozen state departments of education created statewide virtual high school services (Zucker & Kozma, 2003). Seven different types of Internet-based learning programs in the K-12 venue have emerged since 1995 (Rice, 2006). First, there were nationwide programs from which students take individual courses but may or may not be enrolled in a physical school. The courses were fully online and credit was issued from either the physical school or another credit-granting agency. Second, there were university-affiliated programs where students take individual courses administered through a college or university. Students were generally dually enrolled in high school while they work on the college credit course. Third, K-12 public schools have seen a sharp increase in the number of statewide supplemental programs in which students take individual courses through a state-run online school but are enrolled in a physical school or cyber school within the state. Fourth, district level supplemental online programs have also experienced a sharp increase. These programs have been operated by local school districts with teacher developed or commercially purchased online curriculum that meets state requirements for graduation. The fifth type of online program included the single district cyber school model whereby districts operate the virtual high school through an alternative environment. Many of these models included a purely online or a blended model for learning. Sixth, there were also multi-district cyber schools, which are programs operated within individual school districts but opened to students from other school districts within the state. These programs have seen the largest growth in K-12 online learning. Finally, there are a growing number of cyber charter schools

which have been operated inside and outside the public education arena and have drawn upon students from across the state (Rice).

Online learning, while slower to catch on in the public school arena, has seen steady increases since 1995. The National Center for Educational Statistics reported in 2003 that 36% of U.S. schools, over 300,000 students, were enrolled in some form of virtual course (Roblyer, 2006). According to the State Educational Technology Directors Association (SETDA) (November, 2008), during 2004-05, 37% of school districts provided students with access to distance education opportunities with the highest use at the high school level followed by middle school; 57% of public high schools provided access to online learning; and 58% of districts surveyed reported that asynchronous (on demand) Internet instruction was the primary model of delivery for online courses. Two-way interactive video was the second highest mode of delivery. Roblyer (2006) reported that in 2004-05 enrollment trends indicated that 506,950 K-12 students took part in virtual courses, a 60% increase from 2002-03 statistics. By 2006, enrollments jumped another 38% to include 700,000 students working online. Of that group, 61% were high school students. By 2008, 44 states had virtual learning programs. Some states like Alabama, Florida, and Michigan had even passed state laws requiring school districts to create online or technology-enhanced courses which students must complete for graduation (SETDA).

Benefits of Online Learning in K-12 Education

The National Education Association predicted that by 2006 most school children would take at least one course online before graduating from high school. Likewise, the Peak Group estimated that by 2006, one million K-12 students would enroll in online courses (Kiekel, 2007). The Center for Digital Education (NACOL, 2008) reported

enrollment trends and showed that eight states experienced a growth rate of more than 50% in 2007-08, another eight states listed a growth rate between 25-50%, 13 states indicated a growth rate of 0-25% and two states had no growth at all. All indicators maintain that this kind of growth will continue with online learning. Moreover, states without any online learning programs appeared to be taking note of the trends and are evaluating the feasibility of implementing such programs. The rise in availability of computers both in public schools and in home settings has given credence to these predictions. A survey conducted by the National Center for Education Statistics (2005) to investigate trends in virtual learning indicated that 86% of students who participate in virtual learning accessed the courses from school, while 59% accessed them from home. Nineteen percent of school districts paid for computers for all students and another 10% paid for computers for some students. Eighteen percent of districts paid for Internet services for all students and 9% paid for Internet services for some students. Eight percent of school districts paid for software for students to access online curriculum for all students. The primary question surrounding this type of unprecedented growth in K-12 online students is why so many students have begun to choose this model for learning. Two studies have attempted to answer this question. First, a seminal study conducted by Picciano and Seaman (2008) through the *Sloan Consortium* was the first of its kind to not only identify the magnitude of online learning throughout the K-12 education system but to investigate reasons for that growth. This study found that in the K-12 arena, unlike in higher education, online learning was supportive of a wide range of student needs from those who sought extra help to those who had to take make up courses (e.g. credit recovery) as well as those who wanted to take college-level courses. A second observation in the study described the differences in the way K-12 online learning grew

compared to that of higher education. At the onset of online learning at the post-secondary level, college and universities responded rapidly to invest resources into the software, hardware, and faculty time to create their own delivery structures and online courses. Conversely in the K-12 domain, school districts have approached online courses more slowly rather than investing resources into creating their own course work. They have relied more heavily upon commercially bought online resources or state virtual course material.

In the second major study, the U.S. Department of Education surveyed districts and reported numerous reasons for the rise in e-learning options in K-12 education, including providing access to advanced placement and enrichment courses not otherwise available in the district, allowing failing students to repeat coursework, allowing ill or disabled students to work from home, providing an alternative for students who do not perform well within a traditional classroom setting, and accommodating a growing student population despite limited space within the brick and mortar high schools (Setzer, Lewis, & Greene, 2005). SETDA (2008) has also published four key benefits to online learning in the public schools. First, this organization maintains that recent statistics indicate that 40% of high schools do not offer full college preparatory curriculum; therefore, there has been a significant need for virtual learning to increase equity and access to better curriculum. For example, 80% of districts reported that they used distance learning for college preparatory courses because the course was not available on particular campuses. Additionally, 25% of districts used virtual learning to enhance advanced placement programs and 40% used virtual learning to offer dual credit college level courses. Second, statistics indicated the need for virtual learning to provide highly qualified teachers. According to the National Commission on Mathematics and Science

Teaching for the 21st Century, only 60% of public school math teachers in Grades 7-12 actually majored in math and only 66% of physical science students were being taught by teachers who had majored in physical science or were at least certified to teach it (SETDA, 2008). Online courses have provided a viable solution to a widespread problem in the United States. Third, supporters of virtual learning have touted the ability to instantly differentiate the learning environment for those students who are not a relative match with the traditional brick and mortar building including the average to above average learner who meets the characteristics of today's digital generation and seeks more self-directed, self-paced learning opportunities, the increasing number of students with autism who do not do well socially in the traditional school environment, the student who can work ahead of the game and wants to explore more challenging coursework, the student who has to work, is incarcerated, or needs homebound educational services due to illness. Fourth, virtual learning has supported those students who are credit deficient and need to catch up on previously failed coursework so that they may graduate on time with age-level peers. These credit recovery programs have the potential to significantly decrease the dropout rate and provide a way for students who have already dropped out to re-engage in school. In fact, 20% of all Florida Virtual students are seeking credit recovery courses (Picciano & Seaman, 2008).

Credit Recovery Models in K-12 Education

While the federal government, under No Child Left Behind (2001), expected students to take rigorous standards-based curriculum, it was up to each state to decide the number of credits and specific courses students need to pass to earn their diploma. The number of high school students who take at least one course online in order to satisfy graduation requirements has been growing rapidly (Setzer et al., 2005; Smith, Clark, &

Blomeyer, 2005; Watson, 2008; Watson & Ryan, 2006). In fact, Michigan has required that every high school student take at least one online course or have online learning substantially integrated into their high school course work in order to graduate (Picciano & Seaman, 2007; Watson & Ryan, 2006). Regretfully, graduation data across America have shown that simply requiring students to take specific courses and earn a minimum number of credits is not enough to ensure that a student will earn a high school diploma. Only about 75% of students who enter high school as freshman graduate in 4 years (National High School Alliance, 2007).

While virtual learning has not been a silver bullet that meets the needs of all students, it has, in the K-12 arena, begun to support students on both ends of the spectrum, including those self-directed and self-paced students who seek flexible learning opportunities as well as weaker academic students who did not pass a particular course in the traditional environment. The North American Council of Online Learning reported that as online learning began to move past the early adopter phase, the growth of programs has focused more on at-risk students who seek recovery opportunities to earn credits required for graduation (Watson, Gemin, & Ryan, 2008). The term "credit recovery" has been used to refer to students who have passed and received academic credit for a course they previously failed but needed for graduation (Watson et al.). Credit recovery has been distinguished from "first time credit" because the student has already met the seat hour requirement for the course but was unsuccessful in mastering the academic content and skills needed to earn a passing grade in the course. The overriding goal of most credit recovery programs has been to accelerate student learning by addressing the specific academic deficiencies noted in the first attempt at the course and to help students earn catch up credits to graduate on time. "Programs providing credit

recovery or addressing the needs of at-risk students have been delivered in almost every variation of time, location, and instructional method" (Watson et al., p. 7). Recently, however, a growing number of districts have used web-based, online programs (pure online and blended models) to serve credit recovery students. Although models of credit recovery programs vary across states and districts, a common thread among all programs is the student population. Credit recovery programs generally serve "at risk" students; that is, those students who have not met the academic standards for promotion for 1 or more years in school or who have gotten behind in school due to one or more non-academic indicators of risk including pregnancy, truancy, addiction, transience, poverty, or other family-related issues. The theoretical framework of these studies has been grounded in research on the negative impact of retention. Multiple studies conducted over decades have suggested that retaining students does more harm than good (Grissom & Shepard, 1989; Holmes 1989; Shepard & Smith, 1989). C. Thomas Holmes (1989), in his meta-analysis of 63 empirical studies, indicated that in 54 studies, retained students actually performed lower on tests of achievement than promoted students in the year after retention occurred. He found that retention harmed students' achievement, attendance, personal adjustment in school and attitude toward school. Grissom and Shepard (1989) conducted three large-scale studies of over 80,000 students to examine the retention-dropout relationship after controlling achievement. They found that students who repeated a year were 10 to 30% more likely to drop out of school and that dropouts were five times more likely to have repeated a grade than were high school graduates. A seminal study by the National Center for Educational Statistics (1995) identified eight characteristics to dropping out of school: retention in any grade or being "over-aged," gender, SES, ethnicity, family issues, standardized test performance, absenteeism, and

pregnancy, all of which were key characteristics of the population being served in credit recovery programs. Finally, in Legters and Kerr's (2001) report, researchers concluded that academic failure in a transition year like ninth grade is directly linked to the probability of dropping out since over 60% of students who eventually dropped out of high school failed at least 25% of their credits in ninth grade.

There has been a small body of research on the effectiveness of credit recovery programs, some of it positive and some of it negative. A study conducted by Simeroth (2007) to determine the factors contributing to successful completion of an online algebra course for high school students found that students who were taking the course to accelerate significantly out-performed students taking the course for reasons associated with interest in online venues and for credit recovery. Not surprisingly, the bulk of research studies of online credit recovery programs have targeted ninth grade promotion issues. Several studies on credit recovery came out of an incentive grant opportunity from the Texas State Department of Education targeted specifically at ninth grade transition programs and dropout prevention. For example, Fredelyn Christian (2003) looked at the impact of participating in a credit recovery program in the ninth grade toward promotion to the tenth grade. This quantitative study used descriptive statistics and logistic regression to analyze the relationship between the independent variables and student success, as measured by the student's advancement to tenth grade, to determine a student's odds of success if they participated in the credit recovery program. Researchers found that no statistically significant relationship existed between participation in the credit recovery program, gender, ethnicity, socioeconomic status, TAKS reading/language arts results or TAKS math results, and advancing to the tenth grade because only a small percentage of students took advantage of the credit recovery

opportunities. The researcher proposed that many of the students were disengaged with school long before ninth grade (the targeted intervention year). The study recommended that districts initiate multiple efforts to reconnect at-risk students with school by offering targeted support at the first sign of trouble. The study also found that while twice as many males as females qualified for the program, only four more males participated, supporting the latest research that more males than females are dropping out. It also pointed to the lack of connection the program made with the males. The study revealed that the odds of promotion were slightly higher if students participated in the online credit recovery program. The researcher hypothesized that this small success of the program may have been attributed to the fact that the program utilized strategies effective for at-risk students; namely, classes were small and provided one-on-one tutoring by a certified teacher and classes were accelerated so that students could regain credits quicker. The shortcoming of this study was that it provided no qualitative data about the factors which may or may not have contributed to student success or failure.

A second study out of Texas in the Weatherford Independent School District measured the effectiveness of a ninth grade online credit recovery program on attendance, GPA, number of credits earned, and number of discipline referrals by comparing students who participated in the credit recovery program with students who were eligible to participate in the program but did not (Christian, 2003). Results of the study showed positive effects on the credits earned selection criteria. Group 1 subjects (those who participated in the online credit recovery program) earned an average of 7.6465 credits while Group 2 subjects (those who were eligible to participate but remained in the traditional environment) earned an average of 6.6406 credits. Group 1 students earned enough credits to promote to the next grade and showed a positive

correlation for on-time graduation. Further qualitative studies are needed on the learning styles of students who participated in the program and instructional styles implemented in the online credit recovery program that lead to higher success in attaining credits.

Another district in Texas, Aldine Independent Schools, saw similar success in their online credit recovery program (Watson et al., 2008). In 2000, the district's traditional environment remedial program recovered 700 half-credits with at-risk students but by 2007, the online credit recovery program recovered 4,500 credits. Keys to the program's success included using peer tutors (National Honor Society students) to assist the at-risk learners participating in the online program and implementing a policy requiring all online students to pass the final exam in order to earn the credit. These two requirements increased teacher buy-in for the program and ultimately converted many teachers in the regular classroom into users of the online curriculum through a blended approach to help students earn initial credit for the courses needed for graduation. In the Florida Virtual School (FLVS), 20% of the students have taken purely online courses for credit recovery. School leaders in the FLVS program have long maintained that there is no difference in the performance of the credit recovery students and the students taking courses for initial credit. In 2006-07, a study of the program confirmed these assumptions as 90.2% of self-reported credit recovery students earned a pass grade in the online courses as compared to the 92.1% of other students taking online courses (Watson et al.). Proponents of the FLVS model like Cindy Lohan, the e-solutions manager of the program, attributed the success of credit recovery students to the fact that online learning gives all students the individual attention they need to be successful (Watson et al.).

Online credit recovery programs in Michigan's Jackson School District, Los Angeles Unified District in California, and Volusia County Schools in Florida all use a

blended approach working with online curriculum and a teacher in a lab setting to assist at-risk students in earning academic credits. The blended approach has allowed for more opportunities to differentiate instruction by using the computer management system to implement diagnostic tests which determine exactly which content students have already mastered and which content and skills teachers need to provide one-on-one assistance and instruction to help increase students' mastery of content (Watson et al., 2008). According to Watson et al., who reviewed numerous credit recovery programs for an article in *Promising Practices in Online Learning,* "motivating credit recovery students who have failed in the traditional classroom setting has been the key to success across credit recovery programs" (p. 14). They asserted that online learning has proven to be particularly well-suited for students recovering credit because the model (whether blended or purely online) allows for individualized instruction through the course management system and the teacher. The blended programs have shown increased results because they have provided the face-to-face support for those students who need it.

Factors Contributing to Success in Online Learning Environments

Studies about online course completion have taken two paths: studies of the characteristics of successful online students, including causal models of motivation, locus of control, and reading level (Bedard & Knox-Pipes, 2006; Diaz, 2000; Roblyer & Marshall, 2002; Watkins, 2005); and studies of the characteristics of online learning environment, including independent versus collaborative environments, levels of interactions, and manipulation of the technology management systems (Roblyer, 2004). Boyd (2004) described four major domains which contribute to learner success in online environments. These domains included technological factors, student personal factors, environmental factors, and learner characteristics. Because the current population K-12

education has been dominated by what Tapscott (2009) calls the "digital natives," these skills have become more prevalent throughout the general population. One study found that students encountered a number of different kinds of technical problems in their online courses, and that some students overestimated their computer skills (White, 2000). Additionally, Akkoyunlu and Soylu (2006) found that the level of achievement and confidence, even in a blended environment where a teacher can mitigate technology difficulties, decreased when student technology skills were not strong enough to navigate the learning environment.

The environmental factors impacting a student's success in an online course primarily deal with time, place, and support from significant others. The time factor was particularly troublesome for K-12 students because many students often choose an online course because they perceive that it will be more convenient and flexible around other schedule demands. While it is true that students can attend online classes whenever they choose, the general consensus from most researchers has been that online courses take more time than traditional classes (Capella University, 2001). Good time management skills were an essential quality of an effective online learner because students are often required to log on to an asynchronous discussion several times a week, meet course deadlines, and even work with virtual partners to solve problems (Boyd, 2004). A second environmental factor has to do with the student's physical workspace. Numerous studies linked exhibiting control over one's physical environment to effective online learning (Boyd, 2004; Liu, 2007; Lynch & Dembo, 2004). Students must be adept at knowing if they learn best in quiet or busy surroundings, alone or in the company of others, in comfortable, informal settings or in traditional classroom-like settings. According to Boyd, study time and space must include adequate lighting, comfortable seating, freedom

from distractions, and a general efficiency of use as it relates to the needs of a particular learner.

The third category of factors influencing student success in online learning was the personal or psychological characteristics of the students themselves (Boyd, 2004; Liu, 2007). Several key elements make up the personal or psychological readiness of effective online learners. First, the ability to navigate the delicate balance between the advantages of anonymity in the online environment and the complete isolation inherent in the environment was an important trait for e-learners, whether they were in a blended or pure online program. Successful online learners showed initiative and assertiveness by seeking help from instructors (Engineering Outreach, 2001), asking questions, creating studying teams, sending emails, and when necessary, picking up a phone and calling a classmate (Boyd). Successful online students were also highly self-motivated and self-disciplined (Engineering Outreach). Because online learning puts a greater responsibility on the learner, students must know how to pace themselves, complete assignments on time, and follow through with all the requirements of the course (Capella University, 2001). Research indicated a number of key motivational factors which play a role in online students' success. One factor was goal orientation, which is essentially the ability to articulate a keen understanding of why one is taking a particular course or program and what one wants from the program (Boyd). Another important motivating factor was the ability to exercise control over one's learning environment (Roblyer, 1999). In short, successful online students were highly motivated by their goals and typically exercised an ability to shape their learning experience.

Finally, successful online students exhibited qualities of honesty, integrity, and authenticity (Boyd, 2004). In Tapscott's (2009) eight characteristics of Net Generation

learners, integrity was cited as an important feature because online students complete the majority or at least a portion of their tasks physically unsupervised. “The standards of ethical behavior require that all students, regardless of learning medium, avoid such activities as cheating and plagiarism” (Boyd, p. 35).

Technological Readiness for Online Learning

With rapid growth of online education in the past 10 years (Allen & Seaman, 2005), researchers have conducted various studies to explore the relationship between a range of factors and successful online completion of courses. Technological readiness includes accessing and using the necessary hardware and software to achieve one's learning objectives (Miltiadou & Yu, 2000). A major hurdle for at-risk student involvement with technological factors has been consistent access to online hardware and software and the ability to use them to achieve learning goals. Many school districts have mitigated this factor by providing computers for students to use and time during the school day to complete online work. In the K-12 arena, blended and credit recovery programs were slow to take hold but have recently seen a sharp increase in student involvement because schools have recognized that online students need structured access to appropriate online technologies and assistance when they have problems with the technology. Numerous studies include student technology self-efficacy as one of the key contributors to student achievement online (Liu, 2007). Roblyer and Marshall (2002) conducted an important study using a newly developed Education Success Prediction Instrument to predict which high school students would be likely to succeed in VHS courses so that schools could provide a basis for counseling and support for students interested in taking online courses. Their study, using the instrument, found that the majority of students who demonstrated positive academic achievement online had some,

if not all, of the following characteristics: self motivation; prior experience with technology; a positive outlook toward the course content and distance learning format; and self-confidence in academic endeavors (academic self-efficacy). From that study, Roblyer and Marshall ultimately developed a list of nine characteristics they believed would accurately predict academic success in virtual courses. These included (1) internal locus of control, (2) internal motivation, (3) self confidence/self esteem, (4) responsibility, (5) degree of experimentation, (6) time management, (7) ability to set goals, (8) achievement motivation, and (9) self-reported computer technology skills. Osborne (2000), in a similar study, found these distinct factors for success, locus of control; computer confidence; enrollment encouragement; motivation; tenacity; and study environment. Of these six factors, the strongest predictors were study environment, motivation, and computer confidence. Osborn also developed an instrument to measure traits of online students. Using factor analysis, he reduced the factor most predictive of student success to the following six categories: computer confidence; locus of control; study environment; enrollment encouragement; tenacity; and motivation. Finally, two additional studies pointed out the significance of Internet self-efficacy and student satisfaction and achievement online. Wang and Newlin (2002a) and Maltiadou and Savenye (2003) emphasized the importance of self-efficacy for the content and self-efficacy for meeting the technology demands as significant factors contributing to positive learning outcomes. Joo, Bong, and Choi (2000) also found that a student's positive belief about using internet technology was an important variable for student success. Only one study did not recognize the importance of technology self-efficacy for online success. Lynch and Dembo (2004) found no significant relationship between Internet self-efficacy and academic performance, particularly with those students at

higher levels of achievement. The nature of a blended course is such that complete learner autonomy online is not necessary, which may have contributed to the lack of significance between the two variables. However, replication of the study at both higher education and secondary education levels could help researchers determine if this finding is isolated to a single case or can be generalized across blended environments. Schools should keep in mind that while the Net Generation is more likely to come to school with technology and Internet skills already intact, students in a K-12 setting may still need additional support from a mentor or teacher to ensure technology readiness; likewise, more secondary students need consistent access to computers than their online counterparts at the post-secondary level.

Social Readiness for Online Learning

Social readiness in the context of online learning involved "the degree of one's feelings, perceptions, and reactions to another intellectual entity in the computer mediated environment" (Lui, 2007, p. 11). In the online mediated environment, students have access to help and support from a face-to-face facilitator and from tutors. Students could choose to exhibit high levels of social interaction through help-seeking strategies and collaboration or low levels of interaction by doing all work at home via the Internet. Of interest in this research study was how well students managed the social interactions in the credit recovery program, specifically those interactions with the program facilitator which contributed to students' motivation to attend, complete work, manage their time, manage their study environment, and seek help. Moreover, the researcher also sought to determine the degree to which social presence impacted student achievement in all subgroups of students, in all courses, and at all times of the year. Research on academic self-confidence found that there are both environmental and institutional enhancers and

detractors to students' perception of themselves as learners in an online environment (Gibson, 1996). The enhancers included empathy on the part of the teacher, personal success in the course, progress toward the educational goal, and familiarity with the process of online learning. The detractors were unfamiliarity with the online process and the student's role in the learning environment, higher levels of autonomy than the student was ready for, skill deficiencies in reading, and the inability to juggle multiple responsibilities between personal and school life. Liu maintained that when the degree of social presence is high for the student in an online environment, interaction between teacher-student and student-student increases and learning outcomes improve. A study conducted by Talvitie-Siple (2007) to assess students' motivation to learn algebra in an online environment confirmed this assertion by showing that students with positive math attitudes, higher motivation, and higher degrees of social presence through strategies to diminish the transactional distance, passed the online course at higher rates. Although studies in higher education support online learning as an effective learning environment compared to the traditional classroom, some researchers report that 50-70% of online students do not complete the coursework (Roblyer, 2006). A common format for helping at-risk students succeed in online courses has been to offer time and/or space in a lab setting during the school day with a facilitator who has been trained to offer technological and social support. Hannum, Irvin, Lei, and Farmer (2008) found that with training a school-based facilitator can increase students' social presence in an online course which leads to greater course completion. In this study, the control group, which benefited from a trained para-professional who employed learner-centered principles such as assisting with technology problems, maintaining a positive learning environment, encouraging and monitoring attendance, helping students adhere to time factors, and encouraging active

self-pacing, had a significantly higher completion rate than those students who did not have the para-professional intervention. In short, strategic contact between the facilitator and students in this study increased performance. Passey (2000) asserted that online students often need strong social supports to ensure success. Bonk and Graham (2006), long-time supporters of blended environments for K-12 learners, maintained that support is often the missing piece in online programs targeted toward at-risk students. Foundations for successful online learning programs as evidenced from research from the Southern Regional Educational Board (2008) has also suggested that in addition to web-trained teachers and equitable access to technology resources, a system of support and monitoring of student work increases academic progress in the online environment (Roblyer, 2006). Finally, a study by Lynch and Dembo (2004), the basis of which this study was grounded upon, found that two of the five key factors in cultivating academic success in a blended learning environment at the higher education setting related to a student's ability to manage his/her study environment and maximize his/her ability to seek academic assistance when learning is breaking down. These two characteristics were critical indicators of social readiness to learn in the blended environment. Pintrich and DeGroot (1990) explained that students must be able to employ resource management strategies. Time management involved scheduling a time to study and planning weeks or months ahead. Environment management involved choosing a location to study, effectively using the study time for realistic goal setting, and choosing a location that gives students control over possible distractions or availability of supportive people. Help seeking referred to the process where students asked peers or instructors to clarify confusing course material to increase their achievement. These characteristics also had inherent ties to psychological factors such as self-regulation. Zimmerman (2002)

described self-regulated learners as proactive and resourceful at noticing the nuances of their environment and determining whether it matches their learning styles or learning needs. If necessary, self-regulators will change their environment to meet those needs. Online learners, especially, must employ wise decisions about their physical environment since they do not have a structured classroom in which to learn. Lynch and Dembo (2004) noted that "social environmental structuring strategies were important attributes of successful online learners" (p. 6). If access to a home computer was not readily available or was not conducive to the student's learning needs, he/she may have had to use a computer in a lab setting or library. In the blended environment, Lynch and Dembo found that time management and study environment management were significant factors in predicting performance. Regular on-campus meetings and the increased structure of a face-to-face teacher helping students manage their time increased students' social presence and had a positive correlation to achievement (Lynch & Dembo). The other key environmental and social attribute of successful online learning noted by Lynch and Dembo dealt with the learner's ability to seek academic assistance when the learning was breaking down. Many researchers have reported on the importance of help-seeking strategies in the online environment (Hara & Kling, 2000; Roblyer & Marshall, 2002; Wang & Newlin, 2002a, 2002b). Avoiding isolation in the learning process is a difficult task in purely online courses. Self-regulating learners used technology such as email, discussion boards, bulletin boards, or face-to-face discussions to reduce the social distance and to seek out technological or other human supports tools.

Psychological Readiness for Online Learning

Of interest in this research study were the motivation factors to which students attribute their success or failure in earning academic credits in the online mediated

environment, and whether those factors hold true for all students participating in the program and for all courses. Miltiadou and Savenye (2003) used the work of four key researchers to define the constructs of motivation and its impact on the learner and on learning.

> In general, motivation increases individuals' energy and activity levels (Maehr, 1984). Furthermore, motivation directs individuals toward certain goals (Dweck & Elliot, 1983). Motivation also promotes initiation of certain activities and persistence in those activities (Stipek, 1988). Finally, motivation affects the learning strategies and cognitive processes individuals employ (Eccles & Wigfield, 1985). (Miltiadou & Savenye, p. 5)

There were three major categories of motivation (Miltiadou & Savenye, 2003). The first category included individuals' perceptions about their ability to accomplish a task, including self-efficacy, locus of control, and attributions. These constructs answered the question, "Can I do this?" In a credit recovery scenario, these factors had the potential to outweigh all others in predicting student success in the course because having failed the course in the traditional environment, students may have had a negative belief about themselves as learners of the particular subject.

Self-Efficacy

Bandura (1993) asserted that students have different beliefs about their ability within different subject areas. A student with low self-efficacy in a particular subject will shy away from difficult tasks whereas a student with a strong sense of academic efficacy will view tasks as a challenge and persist further when things become difficult. Bong's (2004) study concurred with Bandura (1993) views by asserting that context strongly influenced a student's academic motivation. He found that a student's belief about his/her

ability to accomplish a task in a particular subject, the value or importance that student assigns the task, and the emotional reaction to the task have a positive relationship to a student's self-motivation to complete the task successfully. Personal perceptions of self-efficacy regulate how frequently and how well learners employ adaptive self-regulatory learning strategies which, in turn, contribute to a learner's motivation. Therefore, online learners with high personal self-efficacy believe that they have the innate ability to plan and carry out specific learning goals. According to Zimmerman (2002), "efficacious students were better at monitoring their working time, more persistent, less likely to reject correct hypotheses prematurely, and better at solving conceptual problems than inefficacious students of equal ability" (p. 87). They also exhibited higher levels of intrinsic motivation. Gibson (1998) noted that a key construct relating to online learners' persistence is their self-efficacy for learning at a distance. Moreover, a student's personal perception of competence in the online environment was directly related to his/her ability to manage their time effectively. Three signature studies focusing on higher education students in pure online environments confirmed the connection between personal self-efficacy and student performance in online environments. Wang and Newlin (2002a, 2002b) found that self-efficacy with the course content and with technology skills were highly predictive to learner performance in a course. Joo et al. (2000) determined that self-efficacy and self-regulated learning related significantly though indirectly through other self-efficacy variables to student achievement. Finally, a study by Zhang, Li, Duan, and Wu (2001) found that self-efficacy was positively related to a student's goal orientation and self-regulation skills. In the blended environment explored by Lynch and Dembo (2004), data indicated that personal self-efficacy for learning had a significant positive relationship to student motivation and student performance in the course. This

study confirmed the findings of Wang and Newlin, Joo et al., and Zhang et al. A student's perceived self-efficacy has a direct impact on a student's motivation (Bandura, 1993). It is the close relationship between these two factors that this study sought to explore more in depth. Could students in a credit recovery program overcome previously negative self-efficacy and motivation to find academic success in the online curriculum and, if so, what factors contributed to that success?

Locus of Control

Another construct influencing students' perceptions of ability was locus of control. Locus of control referred to a student's belief about the extent to which behaviors influence successes or failures (Rotter, 1966). Pintrich and Schunk (1996) purported that students with internal locus of control attributed their success to their own effort and abilities while students with external locus of control identify factors for success outside of themselves, including luck, task difficulty, or the actions of others. Both in the traditional classroom and in online environments, students with internal locus of control were more likely to achieve academically. In an early comparative study on a web-based statistics course and traditional course at the undergraduate level by Wang and Newlin (2002a), researchers found, surprisingly, that students who chose the online course exhibited higher external locus of control than students in the face-to-face classroom. However, when examining predictors of success in other online environments, researchers have found repeatedly that students with internal locus of control were more successful (Roblyer & Marshall, 2002). Later, Wang and Newlin's (2002a, 2002b) study of factors contributing to online learner retention found that selected learning styles, locus of control, motivation, and efficacy positively impacted retention in the course,

while Corbeil (2003), in a similar study, showed that self-directed learning readiness and locus of control propelled students to successful student achievement.

Attribution

Attribution theory involved a learner's perception of what causes academic success or failure (Pintrich & Schunk, 1996). Early interpretations of attribution included a close correlation to Rotter's locus of control (1966), but the distinction lay in the causality factor. A student with internal locus of control was likely to attribute the cause of his success or failure to personal factors, causal patterns, personal bias, prior knowledge, or individual differences, while the student with external locus of control attributed the cause of his success to environmental factors such as teacher feedback, social norms, or situational features. Attribution theory was significant to this study because two of the research questions sought to determine which environmental (external) and psychological (personal) factors of the online mediated credit recovery program students attributed to their success or failure. According to Miltiadou and Savenye (2003),

> these two general categories of perceived causes influence the actual attributions that will make in terms of whether they attribute their failure to low ability, lack of effort, bad luck, a hard test, a bad mood, fatigue, unfairness, anxiety, or just about any other explanation, justification, or excuse students produce for failure at a test or task. (p. 8)

Goal Orientation

The second category of motivation included individuals' reasons or purposes for engaging in a task, including intrinsic or extrinsic goal orientation. These constructs answered the question, "Why am I doing this?" Goal Orientation (Pintrich et al., 1991)

determined the degree to which the learner participates in the learning task to meet a personal challenge or attain personal mastery of the content. Research on goal placement identified students' goals as being mastery based (intrinsic motivation) or performance based (extrinsic motivation). Miltiadou and Savenye (2003) described learning-goal-orientated individuals as those students who were willing to extend their learning beyond the minimum requirements. They pursued the learning process as long as they perceived that they were making progress. They sought out challenging tasks and increased their effort in the face of difficulty. Conversely, performance-goal-oriented individuals were those individuals who were concerned with positive evaluations of their abilities in comparison to others, such as higher grades. These students were focused on how they were judged by others (such as peers, teachers, or parents). They wanted to look smart, and they tried not to seem incompetent. For these reasons, they avoided challenging tasks and exhibited low persistence when they encountered difficult work. Students who set specific and proximal goals for themselves displayed superior achievement and perceptions of personal efficacy (Zimmerman, 2002). Online learners with higher levels of intrinsic goal orientation rather than extrinsic goal orientation persisted when learning became more difficult and regulated their study habits and help seeking strategies to master the content. Overall, they exhibited higher levels of motivation. Several researchers have tied this quality to successful online learning in higher education. In online retention studies, Beatty-Guenter (2001) noted that goal orientation was a significant attribute to learners who completed online courses. Thompson (1998) positively connected goal orientation to student performance in online courses. Likewise, numerous research studies (Curry, Haderlie, & Ku, 1999; Schrum & Hong, 2002; Whipp & Chiarelli, 2001) found that students who are either intrinsically or extrinsically goal

oriented generally perform higher in online environments than those who are not goal oriented at all. In the blended environment explored by Lynch and Dembo (2004), data indicated that intrinsic goal orientation also had significant positive relationship to student motivation and student performance in the course. These two components of motivation appeared many times in the research as predictors of online success. It should be noted here that there are other factors of motivation, namely the values ascribed to a specific learning task, control of learner beliefs, and affective factors such as test anxiety that have not been studied extensively in the literature on online learning.

Self-Regulation and Learning Strategies

The third category involved individuals' techniques and strategies for accomplishing a task, including self regulation as they related to the employment of specific learning strategies. This construct answered the question, "How can I do this?" Self-regulation referred to a students' ability to understand and control their learning (Schunk & Zimmerman, 1994). According to Miltiadou and Savenye (2003) self-regulated learners exhibit control over their learning by employing specific cognitive strategies that helped them make sense of what they were learning, metacognitive strategies that helped them plan and monitor their learning, and intrinsic motivation strategies that helped them control emotions and distractions to stay focused on the task. According to Zimmerman (2002) "self-regulation is not a mental ability or an academic performance skill; rather it is the self-directive process by which learners transform their mental abilities into academic skills" (p. 2). Thus, if a student fails to understand something he is learning, then he or she must possess the "self awareness and strategic knowledge to take corrective action" (Zimmerman, p. 2). When students obtained this skill they were better able to manage their strengths and weaknesses as a learner and

employ specific strategies to help themselves learn. These actions fed upon themselves because they increased student self-satisfaction and motivation to continue their learning. Pintrich and DeGroot (1990) concluded that at there was a positive relationship between motivation and self-regulated learning components in student academic performance. They also found a positive correlation between effort as an attribution of achievement and the use of self-regulatory behaviors. If students perceived that their effort, help seeking strategies, and specific learning strategies would have a positive outcome on their learning, they were more likely to be self-motivated and to proactively use the self-regulatory skills that contribute to positive student achievement (Little, 2008). When students used self-regulatory behaviors they experienced two benefits: They maximized their learning and they improved their beliefs about themselves as a learner (academic self-efficacy) (Little). In a lynchpin study, Lynch and Dembo (2004) investigated the role of learner self-regulation in a blended learning environment. Using a Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991), Lynch and Dembo found that five self-regulatory attributes were likely to be predictive of academic performance in a blended environment in higher education, motivation (including intrinsic goal orientation and self-efficacy for learning and performance); time management; study environment management; help seeking; and Internet self-efficacy. Student performance was operationalized in final course grades and self-efficacy related most significantly to successful learner outcomes. Finally, a study conducted by Little in a high school setting, using the same Motivated Strategies for Learning Questionnaire (Pintrich et al.) as the Lynch and Dembo study, determined if there was a relationship between students' demographic characteristics (age, gender, subject area, previous grade in subject and reason for taking the online course) and academic achievement (final grade and Standards

of Learning (SOL) exam) in a pure online high school program. Using a pre-post questionnaire, Little determined if a student's initial self-reported goal orientation, academic self-efficacy, learning strategies, and attribution were accurate predictors of academic achievement in the course. Finally, the study sought to determine if there was a significant difference in students' pre-course measures on the above items and post-course measures on those items and whether the pre- and post-measures correlated to the students' levels of academic achievement. Little found that age, grade in school, and previous grade in subject area were useful predictors of final course grade and SOL exam. 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 scores. Effort regulation was the only motivational strategy that changed significantly from the pre-course score to post-course score. The change was consistent for both mid and high level achieving students. Zimmerman maintained that a learner's personal choice and control over learning are central to the development of self-regulation strategies, which in turn plays a key role in the development of learner autonomy. Since online learning is highly learner autonomous, even in a blended or mediated environment, the student must ultimately accept the responsibility to make learning decisions and maintain active control of the learning process (Corbeil, 2003).

Gaps in the Literature for Online Learning

The body of research on the environmental and psychological factors directly affecting online learner success is rich at the higher education level; moreover, there have been several important factors which have emerged consistently throughout the literature, though not all of these factors have demonstrated the same level of significance on

student achievement across multiple studies. However, there have been fewer studies measuring environmental and psychological factors in high school settings, and an even smaller body of research on the effectiveness of online learner models with at-risk students in credit recovery online models, who have experienced one or more failures on the traditional classroom. Scribner (2007) maintained that correlations have been found between motivational elements identified by learning theories and the motivation to engage in learning in an online environment with older learners, yet these should not be generalized to younger populations. Net Geners have different technological experiences than adults (Tapscott, 2009). Moreover, high school students do not have the same set of needs, motivational triggers, technical experiences, or cognitive abilities as adults (Prensky, 2006; Roblyer & Marshall, 2002). This study will add to the body of research on credit recovery program effectiveness as it relates to earning academic credits and promotion rates in schools. It will also expand the literature on how the institutional elements of a blended environment increase student achievement. Finally, it will provide needed research on the psychological factors that most influence at-risk students' academic achievement in a blended or online-mediated environment.

Chapter 3: Methodology

Introduction

The primary purpose of the study was to determine if the credit recovery program delivered in an online, mediated environment successfully increased the academic achievement of those students who met the criteria to enter the program and who subsequently chose to do so; if the program had a positive impact on the participating students' and the schools' on-time promotion rates; and if there was a correlation between student perceptions of specific environmental and/or psychological factors and academic achievement in the online mediated learning environment. The study utilized a case study design to examine the academic achievement of a representative student sample from three different high school settings within a single district. The researcher used a mixed-methods approach to research design. Creswell (2003) described mixed methods studies as those which base knowledge claims on pragmatic grounds using a consequence-oriented, problem-centered approach to collect both quantitative and qualitative information strategically and sequentially. In this mixed method design, the researcher strategically implemented the quantitative, consequence-oriented procedures to answer the question of whether the program worked to achieve specific student achievement goals, including for whom it did or did not work best, then utilized qualitative research procedures to answer why the program did or did not work for some students.

Research Design

The quantitative portion of the study used a single group pretest-posttest design. This pre-experimental design model, denoted by 0 X 0 (Gall, Gall, & Borg, 2003), involved three steps: (1) subjects were given a pretest; (2) subjects were given the

experimental treatment; and (3) subjects were given a posttest to measure the dependent variable again. While considered weak by most researchers because it does not include a control group, this design has been common to educational research. The independent variables included selected demographic conditions inherent in those students participating in the program. The specific independent variables manipulated in the quantitative portion of the study included demographic categories associated with race/ethnicity, gender, socio-economic status, special education, and course taken. The experimental treatment was the unit-based, online-mediated curriculum (Apex Learning, 2009) implemented within the specified structure of the district's credit recovery program. The dependent variable analyzed in this study was the academic achievement of students who participated in the programs as defined by an increase of content knowledge in skills in specific courses taken in the credit recovery program. The effects of the experimental treatment were determined by comparing the pretest and posttest scores on all units taken in a course of study. The researcher further calculated the extent to which gains from the experimental treatment (online curriculum) led to an overall categorical pass score of 70% or higher for students in the program. Ordinal gains and losses and categorical pass/fail data were analyzed by specific subgroups and by course through descriptive and inferential statistics.

The qualitative portion of this study used a descriptive research design, employing both constructivist methodologies such as interviews and focus groups to obtain student perception data on the environmental conditions of the program that students most often attributed to their success or failure. The environmental variables investigated in the interviews and focus group data collection included those from the literature review, time; space; help-seeking, and online learning readiness. These variables match the

"resource management strategies" utilized by Pintrich and DeGroot (1990) to measure the extent to which students use self-regulatory strategies to increase their learning. The qualitative portion of the study also employed empirical methodologies, such as a survey, to determine the specific psychological variables students attributed most to their success or failure. The independent variables under investigation in the survey data collection were components of motivation (intrinsic goal orientation, extrinsic goal orientation, self-efficacy, control of learning beliefs, test anxiety), self-regulatory learning behaviors (rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation), and resource management strategies (peer learning, help seeking, time and study environment management, and effort regulation). The primary purpose of the survey was to determine if particular motivation, learning strategies, or resource management subscales were significant predictors of academic success in the online mediated program for all students and for relevant subgroups. In mixed method research design, Creswell (2003) described a "two phase, sequential project in which the second phase elaborates on the first phase" (p. 114). In this study, the order of the research questions intentionally dictated the sequential nature of the research design with the quantitative design phase appearing first to provide the data on the program's impact on student achievement and the qualitative design phase appearing second to provide additional information about the variables which correlated to student success or failure in the program.

Quantitative Phase

Research Questions

The following questions framed the research:

1. To what degree did the online mediated approach increase achievement (attainment of content knowledge and skills) in core academic classes needed for on-time

promotion and/or graduation (as measured by pre and posttest gains on individual units within a single course and by calculating an overall achievement of 70% or higher on all units attempted within a course)?

2. To what extent did the online mediated approach impact the on-time promotion and/or graduation rate of students who participated in the program and the school's overall promotion rates by grade?

3. In terms of gains in content knowledge and skills, how successful was the online mediated approach in increasing academic achievement of students when factors such as gender, ethnicity, free and reduced socio-economic status, special education, and course type are measured?

Data Analysis and Procedures

Questions 1, 2, and 3 used quantitative data collection methodology to measure academic growth on specific unit-by-unit pre and posttests. In Question 1 specifically, the researcher examined two distinct measures of academic achievement. First, the study analyzed the level of student gains and losses in content knowledge and skills within a course taken. The dependent variable was academic achievement, defined in this study as increased content knowledge and skills within specific units targeted as weaknesses in students' prior attempts at the course in the traditional environment. The online curriculum (Apex, 2009) administered in the mediated environment was the experimental treatment in the study. Units selected for students to complete in the Apex online curriculum were those two to four units they failed in the traditional classroom environment in the semester prior to the experimental treatment. Therefore, students in the sample did not all do the same number of units nor the same unit content. The researcher collected ordinal data to show the academic gains or losses from pretest to

posttest for each unit the students took to determine if the experimental treatment (online mediated curriculum) had a positive or negative impact on the dependent variable (student achievement). Then the researcher calculated a mean gain which showed the average gain across all units taken by an individual student. The mean gain was reported for the overall population and by course as well as for each school site population and school-based course. Second, the study analyzed pass/fail scores to determine whether the level of gain reached the categorical "pass" cut score of 70% for the student to earn credit for the course. The distinction here was that a student could in fact achieve gains in the course knowledge and skills as a result of the experimental treatment without those gains being high enough to earn credit for the course. Overall student achievement within a course was measured by averaging all units attempted by an individual student in the online mediated curriculum to determine if a cumulative 70% or higher course pass rate was achieved. According the South Carolina Uniform Grading Policy (South Carolina State Department of Education, 2007), students must earn a 70% or higher to receive high school credit for all courses.

Question 2 focused on the extent to which the online mediated approach impacted promotion rates of students who participated in the program and on the school's promotion rates. Student promotion rates were defined in the study by the percent change in students who advanced from one grade to the next in one academic year. Therefore, the researcher examined the overall promotion rate of the overall sample population (i.e. the district) and the promotion rates at each school site. In the analysis, the researcher calculated promotion within the program (district and school), promotion rate without the program (district and school), and promotion rate as a result of the program's implementation (district and school). Finally, promotion analysis also included a

disaggregated observation of promotion rates by Grades 9-12 to determine if the program had an impact on those grades where state and district data showed the highest failure rates (Grade 9).

Question 3 elaborated on Question 1 by asking how successful the credit recovery program was in increasing academic achievement of students when factors such as race/ethnicity, gender, socio-economic status, special education, and course type were considered. Therefore, the mean gain was disaggregated by course and by relevant subgroups to determine if there were differences in gains or losses in content knowledge and skills among the subgroup variables as compared to the majority population. A mean gain percent was calculated for the overall group by course, and by relevant single variable subgroups. For the analysis of gains by subgroup, a liner regression model was used to predict the relationship between the variable *x* (student gains) and variable *y* (selected subgroups). The original linear regression model included five variables: gender (male/female); race (white, African American, Asian, Hispanic, and American Indian); special education (IEP = yes, IEP = no); socio-economic status (free lunch, reduced lunch, full pay lunch); and Apex course.

To analyze pass/fail performance by subgroups a logistic regression model was used to determine the odds of passing the course and the specific subgroup variables under investigation. The original logistic regression model included the variables of gender (male/female), race (white, African American, Asian, Hispanic, and American Indian), special education (IEP = yes, IEP = no), socio-economic status (free lunch, reduced lunch, full pay lunch), and Apex course type (13 different courses).

Qualitative Phase

Research Questions

4. What was the relationship between external environmental factors in the online mediated environment and student achievement?

5. What was the relationship between psychological controls of learning in the online mediated environment and student achievement?

Data Analysis and Procedures

The secondary focus of the study answered the qualitative question of why the program did or did not work for specific students. This portion of the study employed a descriptive research design. Question 4 and Question 5 used a combination of constructivist methodology techniques including focus groups and interviews to add depth and internal validity to the study as well as empirical methodologies through application of designated scales dealing with motivation and self-regulatory learning strategies using the Motivated Strategies for Learning Questionnaire (MSLQ) to determine the environmental and psychological factors students most attributed to their success or failure in the environment. In Question 4, the researcher explored environmental or structural factors of the program through interviews and focus groups around those specific themes the literature indicated were important to student success in online learning. Those variables included time, space, support, and affinity with online content delivery system. During the course of the experimental treatment, the researcher conducted two focus groups and 10 interviews per school site in a 2-week period, for a total of 30 interviews and six focus groups for the entire study for a total of 36 students. Participants were selected from a smaller sample of the population based on those students who had parent consent to participate in the focus group and online survey.

Parents were informed about the study through a parent notification letter (see Appendix A) and consented to allow their students to participate in the study with their signatures on a parent consent document (see Appendix B). Individuals within the smaller sample size were selected for the interview and/or focus group through a systematic process using every third name on the list (Creswell, 2003). Interviews and focus groups were recorded through handwritten notes and with a recording device to ensure accuracy in the transcription of student responses. The study reported the descriptive themes which emerged from student responses about time, space, support, and affinity with the online content delivery system. Transcribed notes from the interviews and focus groups were read to get a general sense of the range of student responses about a particular theme. Then, student answers were coded into "chunks of similar responses" by taking the text data and labeling it with an *in vivo* term, or a term that defines that response (Rossman & Rallis, 1998, p. 171). Similar responses were combined to create concise categories of answers about the themes of time, space, support, and affinity to online learning (Creswell). Simple descriptive statistics on student responses to these themes were reported by school and for the overall population.

In Question 5, the study further examined the correlation between the intervening psychological variables related to motivation and self-regulatory learning strategies and achievement in the credit recovery program. The researcher used the Motivated Strategies for Learning Questionnaire with the smaller sample size population who had consent to participate in the survey. The instrument was administered to determine if there was a correlation between those intervening psychological variables inherent in motivation and self-regulatory learning strategies which students most attribute to their success or failure in the learning environment and their overall achievement in the program (final grade in

the online mediated course). The instrument was divided into two sections: The first part on motivation included the subscales of intrinsic goal orientation, extrinsic goal orientation, task value, control beliefs, self-efficacy for learning and performance, and test anxiety; and the second part on learning strategies included the subscales of rehearsal, elaboration, organization, critical thinking, and metacognitive self-regulation. For the students participating in the MLSQ, the researcher employed multiple regression tests to determine if there was a correlation between the internal controls of learning (in all individual motivation and learning strategy subscales) and academic achievement and the extent to which a combination of factors came into play with students who had highest or lowest gains in the program. Additionally, the researcher ranked student performance in the course from highest to lowest and divided the scores into deciles. A frequency distribution was calculated for each subscale indicating where students in the highest and lowest deciles scored on the Likert scale questionnaire.

Participants

Participants in this study were derived from a population of students in Grades 9-12 from each of the three high school settings who have failed one or more core academic courses (English, math, science, or social studies) needed for on-time promotion and/or graduation within the final grade range of 60-69. Students who failed a core subject with a grade of 59 or lower will not be offered the experimental treatment. The sample under study in this research was a convenient sample that was further limited by those students who met the 60-69 final grade criteria and who chose to enter and complete the program. The researcher chose to report in the pass/fail results of the study the number of students who did not complete the program; however, those students' gains or losses on pretest-posttest results will not be included in the statistical analyses. The summer time frame for

the case study was selected because it afforded the largest sample size of eligible students.

Instrumentation and Data Sources

Apex Content Delivery System. Academic achievement in this study was defined as increased content knowledge and skills. The study used the Apex course curriculum delivered in the online mediated environment as the experimental treatment. Pre and posttest gains and pass/fail data analyzed in this study were gathered by reporting student achievement performance on the Apex content delivery system. The goal was to measure if the student benefited academically by using the online mediated curriculum. All Apex courses utilized in the study were full credit courses organized into 12 units of study and mapped to national and state standards (Apex Learning, 2009). The state of South Carolina required all districts to select online content providers from an approved list of vendors whose coursework had been aligned with South Carolina state standards (South Carolina Department of Education, 2009). Apex was approved through the South Carolina Department of Education (2009) as an aligned content provider. Each unit in the Apex software included a pretest, unit lessons, activities, quizzes, and a final unit posttest. Formative and summative assessments were embedded in all units and diagnostic pretests determined student learning paths throughout the course. Highly qualified classroom teachers selected the units students must complete from the Apex curriculum based on those units the students failed in the traditional classroom. Students confirmed their need to complete the unit by taking and failing the unit pretest. If a student passed the initial pretests for the units he or she was assigned or ultimately completed the units and passed the final posttests with a 70% or higher pass score, students earned a Carnegie unit of credit for the course. Courses from Apex used in the

credit recovery program included only those courses needed for promotion or graduation. The district core courses were listed as English 1, English 2, English 3, English 4, Algebra Tech. 1, Algebra Tech. 2, Algebra 1, Algebra 2, Geometry, Geometry Tech. 3, Math Tech. 4, Pre-Calculus, Calculus, Physical Science, Chemistry, Biology, Applied Biology 1, Applied Biology 2, Physics, Ancient Global Studies, Modern Global Studies, United States History, Government, and Economics. Table 4 provides a detailed breakdown of the initial course data the researcher collected for each student participating in the program. Student demographic data was collected by using the SUNS # in the state student management system.

Table 4

Student Achievement Data in Apex

Student Name	Course Title	Units to Complete	Pretest Score	Posttest Score	Gains/ Losses	Original Grade	Final Grade in APEX
Student A							
Student B							

Focus Groups and Interview Instruments. The researcher developed the focus group and interview questions with the intent to uncover descriptive information about those external environmental themes inherent in the online learning environment which students attribute to increased or decreased academic achievement. The data that emerged from these collection techniques will be categorical and will be transcribed and calculated for the frequency of responses by school and by district to describe students' perceptions of their experiences in the online mediated environment (Creswell, 2003). The researcher asked eight key questions about the learning environment to provide a framework for

student thinking and to ensure that the data collected answered Question 4 of the research questions. The focus group and interview instrument included two general questions about the learning environment: "1) Was the online learning environment different from your regular classroom environment and if so, what differences stood out to you in the online learning environment? 2) Of the differences you listed in the first question, which conditions supported your learning? Which conditions made it harder for you to learn?," followed by six specific questions about the learning environment including questions about time, space, support for learning, and affinity for the online content delivery system (see Appendix C). To ensure the validity of the interview and focus group instrument, the questions were validated through traditional reviews of the instrument by experts in the field of online learning (South Carolina State Department of Education, Director of Virtual School) and district research specialist with a background in educational measurement and statistics (K. Andrews, personal communication, 2009). To ensure the researcher's accuracy in interpreting student responses into appropriate categories, transcribed notes were analyzed through peer debriefing (Creswell, 2003) with one outside researcher evaluating the district's online and blended learning programs (M. Spradley, personal communication, 2009). The findings from the interviews and focus groups were also reviewed by the district research specialist (K. Andrews, personal communication, 2009).

A Demographic Data Collection Page was provided to students with the online Motivated Strategies for Learning Questionnaire (see Appendix D). All students were asked to fill out the demographic data sheet consisting of age, gender, ethnicity, grade in school as of Fall 2008, and why they were taking this course. The demographic information helped the researcher disaggregate the anonymous survey results by the

relevant subgroups under review throughout the study.

The Motivated Strategies for Learning Questionnaire (MSLQ) (see Appendix D) assessed students' motivational orientations and their use of different learning strategies during a particular course (Pintrich et al., 1991). It was a self-report instrument based on the social-cognitive view of motivation and learning strategies, and operated under the principles that "motivation is dynamic and students can learn and control their learning strategies" (Little, 2008). The instrument, previously validated through the University of Michigan where it was used with over 1,000 undergraduates, was subjected to the usual statistical and psychometric analyses, including internal reliability coefficient computation, factor analyses, and correlations with academic performance and aptitude measures (Pintrich et al). Students were asked at registration if they would like to participate in the questionnaire on day three of the course. Parent permission forms and informed consent letters were reviewed with participants and parents. Only those students and parents who elected to participate and signed the consent form in the MSLQ were given the online questionnaire.

The MSLQ was set up in a Likert scale with response options of 1 (not at all true of me) and 7 (very true of me). The researcher used the entire MSLQ, which consisted of 31 items on motivational factors, 31 items on specific learning strategies, and 19 items on student management of resources. The 62 items associated with motivation and learning strategies were used to specifically answer Question 5 regarding the psychological factors students attributed to their success or failure in the environment. Table 5 shows the motivation section of the instrument, the corresponding subscales, and the question items associated with that subscale. Table 6 shows the same information for the learning strategies section of the survey. The 19 items concerning the student management of

different resources in the learning environment were used to validate data collected through interviews and focus groups to answer Question 4. Table 7 shows the management of resources subscales and items associated with that subscale. The researcher obtained permission from the authors of the survey to alter questions slightly so that they were applicable to online courses and online learning. The researcher made no changes to the content of the questionnaire.

Table 5

MSLQ: Motivation Section and Subscale Item Listing

Value/Expectancy Components	Definition	Items
Intrinsic goal orientation	Degree to which students participate for reasons of curiosity, challenge, mastery	1, 16, 22, 24
Extrinsic goal orientation	Degree to which students participate for reasons of grades, rewards, outside recognition	7, 11 13, 30
Task value	Students' evaluation of how important, useful, or interesting the task is	4, 10, 17, 23, 26, 27
Control of learning beliefs	Students' belief that their efforts will result in positive outcomes	2, 9 18, 25
Self-efficacy for learning and performance	Students' expectancy for success and confidence in ability to perform tasks	5, 6, 12 15, 20, 21, 29 31
Test anxiety	Students' negative thoughts that disrupt test performance	3, 8, 14 19, 28

Table 6

MSLQ: Learning Strategies Section and Subscale Item Listing

Learning Strategies Component	Definition	Items
Rehearsal	Simple tasks such as reciting and naming to help with short-term memory	39, 46, 59, 72
Elaboration	Strategies such as paraphrasing, note-taking, summarizing to store information long-term	53, 62, 64 67, 69, 81
Organization	Strategies to help the learner select information to focus upon	32, 42 49, 63
Critical thinking	Strategies to apply previous knowledge to new situations to solve problems or make evaluations	38, 47, 51 66, 71
Metacognitive self-regulation	Strategies to promote awareness, knowledge, and control of cognition	33, 36, 41 44, 54, 55 56, 57, 61 76, 78, 79

Table 7

MSLQ: Self-Regulatory Resource Management Strategies and Subscale Item Listing

Self Regulation Component	Definition	Items
Time and study environment	Students' ability to regulate their time and study environment	35, 43, 52 65, 70, 73 77, 78
Effort regulation	Students' ability to control their effort and attention even with distractions or disinterest	37, 48, 60, 74
Peer learning	Students' ability to collaborate with peers to increase their learning	34, 45, 50
Help seeking	Students' ability to seek out and manage the support of others when they need it	40, 58, 68, 75

Limitations

The study was limited by the fact that there was no control group; therefore,

internal validity of the study came into question. According to Gall et al. (1989), at threat in a pre-experimental design are the extraneous variables associated with student history, maturation, testing, and instrumentation. An experimental design with a control group provides an estimation of these variables; however, it was not possible in a credit recovery model where the purpose was to measure the effectiveness of the new treatment, i.e. the online mediated curriculum on student achievement, to include a control group. The absence of a control group was not a serious threat to internal validity of this experiment because students had recently failed the course in the traditional classroom environment, so little time and maturation had passed and no additional testing had been given to students between the conclusion of the course in the traditional environment and the experimental treatment in the online mediated content.

The study was further limited by the sample which included only those students who elected to enter the program. Several students may have qualified to participate, using the 60-69 final average in the course from the traditional environment criteria, but elected not to do so. Because the study did not include random sampling, results will be harder to generalize across wider settings where different rules about participation in credit recovery programs may prevail. A second problem in the sample included the fact that 40 students took a second course within the allotted time frame of the study. The statistics assumed independence in the data, i.e. one course per student. With duplicate students in the 417 sample size, gains calculated in the second course attempted by 40 students may have been correlated because the student already had the experience of online learning and the knowledge of the first course. A final problem with the sample occurred with the survey, interview, and focus groups. While all students were invited to participate in the online Motivated Strategies for Learning Questionnaire, only 293

students chose to participate and had parent permission to do so.

Typical problems inherent in the collection of data via interview were also limitations in the study. These included variations of interviewers' elicitation of responses, variations, and bias of the interviewer in coding responses, lack of trust of interviewer, and response effects (Gall et al., 2003).

Chapter 4: Results

A repeated theme in dropout literature has been that within the traditional classroom environments, a significant number of students have not demonstrated the required level of academic skills and knowledge needed to pass specific state and district mandated courses, which ultimately decreased their ability to advance to the next grade level and graduate in 4 years. The purpose of this study was to determine if one district's online mediated approach to credit recovery succeeded in increasing the academic knowledge and skills of students in high school courses needed for promotion and to determine which environmental and psychological components of the program students most attributed to their success or failure. This chapter presents the results and analysis of the pretest-posttest gains, pass/fail percentages, promotion rate performances (by grade, by school, and for the district), the focus group and interview descriptive data, and the Motivated Strategies for Learning statistical data. First, a report on the demographic and course enrollment data by school and by district is presented. Then, an analysis of the quantitative portion of the study is reported, including the results of the gains calculations and pass/fail calculations in academic achievement by overall student performance, by school, by course, and by relevant subgroup performance as they relate to the research questions. Finally, an analysis of the qualitative research questions is presented as it relates to the research questions. This section of the chapter includes the descriptive statistics on the environmental factors students most attributed to their success or failure in the learning environment as compared to those subscales on the Motivated Strategies for Learning Survey which measured similar environmental factors. It also includes a quantitative analysis of the psychological factors related to motivation, learning strategies, and resource management strategies to determine those internal or self-

regulatory factors that students most attributed to their success or failure in the program.

Demographic and Course Enrollment Characteristics

In the study time frame (summer), a total of 440 courses or credit attempts were recorded in the online mediated environment of the credit recovery program. Eighteen students had incomplete data, completing only minimal work within a single unit; therefore, they were removed from the data set. Five additional students were removed because incorrect student identification numbers did not allow access to their demographic data for analysis. Of the remaining 417 students, 32 were duplicates in that a single student took two courses rather than one course. Statistical analyses performed on the sample population were calculated in terms of 417 because that was the number of course instances in the program; however, this represented only 385 total students who participated in the program. Table 8 shows the Apex Course frequencies by school and the total number of participants by course.

Table 8

Apex Course Frequency by Location

Frequency	School A	School B	School C	District
Algebra 1	4	2	6	12
Algebra 2	3	6	6	15
American History	8	11	4	23
Applied Biology	6	2	5	13
Biology 1	3	7	20	30
Chemistry 1	2	4	6	12
Chemistry 1 Honors	0	1	0	1
Chemistry Tech 1	0	1	0	1
English 1	22	37	29	88
English 2	11	27	11	49
English 2 Honors	0	1	0	1
English 3	11	11	5	27
Geometry	11	13	8	32
Government and Economics	1	1	2	4
Global Studies	3	0	5	8
Math Tech. 1	7	4	7	18
Math Tech. 2	14	23	16	53
Math Tech. 3	2	1	3	6
Modern Global Studies	0	4	0	4
Physical Science	1	0	3	4
Spanish 1	9	0	1	10
Spanish 2	2	4	0	6
Total	120	160	137	417

The students in the credit recovery program during the target time frame were

diverse with respect to demographic characteristics. Specifically, there were 166 females, 249 males, 151 white students, 233 African American students, 15 Hispanic students, and 2 Asian students, 196 full-pay students, 34 reduced pay students, 185 free lunch students, and 80 special education students.

Results from Research Question 1: Gain Score Analysis

Question 1 of the study asked to what degree the online mediated approach in the credit recovery program increased student achievement. Gains were calculated by finding the difference between a student's posttest and pretest scores on individual units within a course. Depending upon where the student scored on the pretest, gains could have ranged from 1 to 100 points. Students with no gain or a negative gain were also calculated. For each student, a mean gain sore was calculated across all units taken by the student. Mean gains could have been based on one to four credit recovery units depending upon how many units the student failed in the traditional classroom. The mean gain score represented the average point gain across all units taken by an individual student. Mean gains were calculated for the overall student population in the credit recovery program, by course, and by school. Finally, the percentage of students who had any gain greater than zero was calculated to determine the extent to which students benefited by participating in the program. The percentage demonstrating positive gain was calculated for the overall population, by course, and by school. Table 9 displays the gain score analysis for the entire study population by course. Courses with fewer than 10 students were not included due to low sample size. When sample sizes drop below 10, the mean gain can be artificially high or low due to anomalies in the sample (Gall et al., 2003).

Table 9

Gain Score Analysis by Course

Course	n	Mean Gain	% Demonstrating Gain
All District	417	38.14	97.67
Algebra 1	12	35.50	90.00
Algebra 2	15	38.71	100.00
American History	23	54.70	100.00
Applied Biology	13	36.38	83.33
Biology 1	30	38.96	93.10
Chemistry 1	12	37.43	90.91
Chemistry 1 Honors	1	-	-
Chemistry Tech. 1	1	-	-
English 1	88	33.86	100.00
English 2	49	35.39	97.87
English 3 Honors	1	-	-
English 3	27	40.80	100.00
Geometry	32	34.82	96.67
Global Studies	8	-	-
Government & Economics	4	30.79	100.00
Math Tech. 1	18	42.34	100.00
Math Tech. 2	53	43.43	100.00
Modern Global Studies	4	-	-
Physical Science	4	-	-
Spanish 1	10	23.500	100.00
Spanish 2	6	-	-

*Mean gain and the percent of student, demonstrating positive gains were only present for courses with more than 10 students.

Mean gain scores ranged from a high of 54.69 in American History to a low of

23.50 in Spanish 1. In the courses with the largest sample sizes (English 1) the average gain for students from pretest to posttest was 33.86 points. All 88 students (100%) in English 1 made a gain of greater than zero in the online mediated course. Likewise, in Math Tech. 2 (a course where students take the second half of Algebra 1 college preparatory curriculum), students had an average gain of 43.43 points and 100% of students who took the online mediated course made gains. No courses in the study, even those with sample sizes too small to report in Table 9, had negative mean gains. The lowest percent gain reported occurred in Applied Biology 1 where only 83.33% of students made a gain in scores. The mean gain scores across all courses were fairly consistent in the 30-40 point range.

Table 10 presents the same gain analysis information by school with just those courses in each school that had a sample size of at least 10 students.

Table 10

Gain Score Analysis by School and by Course

Course	School	n	Mean Gain	% Demonstrating Gain
All	A	120	44.82	100.00
	B	160	41.06	100.00
	C	137	28.44	92.62
English 1	A	22	44.05	100.00
	B	37	31.60	100.00
	C	29	27.16	100.00
English 2	A	11	42.08	100.00
	B	27	40.44	100.00
	C	11	54.55	100.00
English 3	A	27	40.81	100.00
	B	11	37.48	100.00
	C	5	-	-
Geometry	A	11	35.15	100.00
	B	13	37.45	100.00
	C	8	-	-
Math Tech. 2	A	14	54.88	100.00
	B	23	49.13	100.00
	C	16	25.52	100.00

*A, B, C denote different school sites where program was implemented in the district.

Schools A and B had similar average gains in the program with mean gain scores

of 44.82 and 41.06, respectively. By comparison, School C showed a mean gain of 28.44 across all courses. An examination of specific courses with sample sizes of at least 10 students showed a similar discrepancy in mean gain scores for School C. English 1 and Math Technology 2 had lower mean gains for School C as compared to Schools A and B. Likewise, Schools A and B had 100% of students make gains in all courses offered. School C had nine courses where 100% of students made gains. The percent of students making gains in the other seven courses at School C were as low as 60.00% in Applied Biology (n = 5), 66.67% in Math Tech 3 (n = 3), 80.00% in Algebra 1 (n = 6), 83.33% in Chemistry (n = 6), 85.71% in Geometry (n = 8), 89.48% in Biology 1 (n = 20), and 90.90% in English 3 (n = 5). Low sample size may have been a factor.

Results from Research Question 1: Pass/Fail Analysis

Question 1 also required the researcher to analyze whether course gains in the program resulted in students who earned a sufficient cut score of 70% to receive credit for the course. While gains in content knowledge and skills quantified that students learned, the final grade in the Apex course quantified whether or not students learned enough to meet the minimum competency to receive credit for the course. To calculate pass rates, posttest scores across all units taken were averaged to determine if the student met the threshold of 70%. Table 11 shows the pass percentages for the overall study population, the pass percentages by course for the overall study population, and the pass percentages by course for each school.

Table 11

Pass Percentages by Apex Course and Location

Course	District		School A		School B		School C	
	n	% Passing	n	% Passing	n	% Passing	n	% Passing
Overall	417	86.09	120	95.00	160	96.88	137	65.69
Algebra 1	12	91.67	4	100.00	6	100.00	2	83.33
Algebra 2	15	86.67	3	66.66	6	100.00	6	83.33
Am. History	23	86.96	8	87.50	11	100.00	4	50.00
Ap. Biology	13	76.92	6	100.00	2	100.00	5	40.00
Biology 1	30	83.33	3	100.00	7	100.00	20	75.00
Chemistry 1	12	100.00	2	100.00	4	100.00	6	100.00
Chemistry 1 H	1	100.00	0	-	1	100.00	0	-
Chem. Tech.1	1	100.00	0	-	1	100.00	0	-
English1	88	89.77	22	100.00	37	100.00	29	68.97
English 2	49	89.80	11	100.00	27	96.30	11	63.63
English 2 H	1	100.00	0	-	1	100.00	0	-
English 3	27	88.89	11	90.90	11	90.91	5	80.00
Geometry	32	90.63	11	100.00	13	100.00	8	62.50
Global Studies	8	75.00	3	66.67	0	-	5	80.00
Gov't & Econ.	4	50.00	1	100.00	1	100.00	2	00.00
Math Tech 1	18	88.89	7	100.00	4	100.00	7	71.43
Math Tech 2	53	73.59	14	92.86	23	86.95	16	37.50
Math Tech 3	6	83.33	2	100.00	1	100.00	3	66.67
Mod. Global St.	4	100.00	0	-	4	100.00	0	-
Physical Science	4	50.00	1	100.00	0	-	3	33.33
Spanish 1	10	90.00	9	88.89	0	-	1	100.00
Spanish 2	6	100.00	2	100.00	4	100.00	0	-

*All sample size data presented (even those courses with fewer than 10 students).
**The denotation of (-) indicates that no students were present in the course at that school.

The pass rate for all courses taken was 86.10%. This figure was significant because 359 of 417 students across three high school settings were successful in earning credit(s) in core academic courses needed for promotion or graduation. District pass rates varied by course. The range in pass percentages was as low as 50% in Physical Science (4 students) and Government and Economics (4 students) and as high as 100% in six courses including Chemistry 1, Chemistry 1 honors, Chemistry Tech. 1, Modern Global Studies, English 2 honors, and Spanish 2. However, five of the six courses with 100% pass rates had class enrollments of fewer than six students. In English courses with larger student sample sizes, such as English 1 (88 students), English 2 (49 students), and English 3 (27 students), students performed consistently well with an average 89% pass rate. In math courses with larger sample sizes, such as Geometry (32 students) and Math Technology 2 (53 students), students had a more inconsistent pass rate with Geometry students passing at a 90% pass rate and Math Technology 2 students passing at 73% pass rate.

Pass rates also varied by location. As with the gain score analysis, School A and School B performed consistently high with 95.00% and 96.88% of students passing their courses respectively. School A had a 100% pass rate in all courses except English 3 (90.9%), Global Studies (66.6%), Math Technology 2 (92.8%), and Spanish 1 (88.8%). School B had a 100% pass rate in all courses except English 2 (96.3%), English 3 (90.9%), and Math Technology 2 (86.9%). School C, on the other hand, had only a 65.69% pass rate with its overall population. By contrast to the other two schools, School C had a 100% pass rate in just two of 13 courses, Chemistry 1 (6 students) and Spanish 1 (1 student). An examination of pass rates across courses by high school settings revealed significantly lower pass rates in School C as compared to Schools A and B in the

following courses: Government and Economics – 0% (2 students); Physical Science – 33% (3 students); Math Technology 2 – 37.5% (16 students); Applied Biology – 40% (5 students); American History – 50% (4 students); Geometry – 62.5% (8 students); English 2 – 63% (11 students); and English 1 – 68.9% (29 students).

Results from Research Question 2: Promotion Analysis

Question 2 in the study asked to what extent the online mediated approach to credit recovery positively impacted the promotion and/or graduation rates of students in the program. To answer this question, it was necessary to eliminate the duplicate count of students participating in the program. During the study time frame, 385 different students took 417 credits. All students participating in the program needed to pass all courses taken in the credit recovery environment in order to promote to the next grade because all courses offered in the program were core academic courses. Of the 385 participants, 304 students did promote to the next grade. The promotion rate of all students who participated in the program was 79.50%, which approached but did not match the promotion rate of the general high school population who promoted without summer school, credit recovery, or any other credit attainment program at 86%. If the program had not been implemented, the district's promotion rate would have been 76.70%. The district's promotion rate as a result of the program was raised to 85.17%. Table 12 shows the district promotion rate summary overall and by Grades 9 -12.

Table 12

District Promotion Rate Summary Overall and by Grade

Grade	Promotion rate within program	Promotion rate without program	Promotion rate with program
All	79.48%	76.70%	85.17%
Grade 9	82.54%	71.39%	82.64%
Grade 10	72.95%	78.31%	85.46%
Grade 11	82.43%	86.09%	92.42%
Grade 12	50.00%	73.40%	73.40%

At all grades, the online mediated credit recovery program had a positive impact on the promotion rates of students within the program and on the district promotion rates. The highest promotion rates within the program occurred at Grade 9 with 82.54% of students promoting to the next grade. The greatest change in the grade level promotion rates also occurred at Grade 9 where the promotion rates without the program would have been 71.39%, but with the program was 82.64%, representing an11.25% improvement. The lowest promotion rate of students participating in the program occurred at Grade 10 with a 73.00%. Tenth grade students participating in the program did not do as well as students at other grade levels in passing the courses in the online mediated environment. However, the promotion rate at Grade 10 for the district did improve from 78.31% to 85.46%, due to the implementation of the program. Grade 11 students in the program performed just slightly lower than the ninth grade students with a promotion rate of 82.43%, but eleventh grade had the highest promotion rate of any grade level (92.42%) as a result of the program. It is important to note that data in this study reflected only one

semester (summer) of the credit recovery program within an academic school year. The program was implemented in the fall and spring semesters, but those numbers and their impact on promotion rates by school and grade level were not calculated here. It is probable that promotion rates across the district for Grades 9-12 would be even higher if the other fall and spring semesters of credit recovery had been included in the study. Additionally, the district implemented a Maymester session of credit recovery in the online mediated environment for seniors before their projected graduation in June. Seniors at risk of not graduating due to failed courses in the second semester completed credit recovery during that time; therefore, they are not included in this study. Only the senior data for students who participated in the summer credit recovery after graduation were included (4 = seniors). The promotion rate within the program for the four seniors was 50%. Only two of the four seniors graduated as a result of the program. The promotion rate without the program represented the district's graduation rate as 73.40% for the class of 2009 without the summer graduates from the credit recovery program. The graduation rate with the program (summer session only) remained at 73.40%.

Analysis of gains and of pass/fail data in Research Question 1 indicated some discrepancy in the program success across the three high school settings. Promotion rates by school were also analyzed to determine if the program had a similar impact on promotion percentages in all three high schools (see Table 13).

Table 13

Promotion Rates by School and by Grade

Grade	School	Promotion rate within program	Promotion rate without program	Promotion rate with program
All	A	81.25%	79.76%	86.96%
	B	84.40%	76.75%	85.29%
	C	72.73%	72.91%	82.69%
Grade 9	A	85.97%	75.31%	87.46%
	B	77.42%	68.89%	78.05%
	C	84.29%	68.02%	83.00%
Grade 10	A	77.50%	73.80%	87.23%
	B	86.67%	79.86%	88.81%
	C	51.35%	72.91%	78.57%
Grade 11	A	73.33%	88.17%	91.38%
	B	94.12%	85.99%	94.10%
	C	72.00%	83.53%	90.95%
Grade 12	A	33.00%	76.90%	76.90%
	B	-	68.70%	68.70%
	C	100.00%	75.50%	75.5%

Promotion rates within the credit recovery program for the overall population were not consistent across schools. In School A, 81.24% of students promoted to the next grade as a result of the courses passed in the credit recovery program. In School B 84.40% of students promoted, while in School C 72.73% of students promoted. However,

in all three school sites, the promotion rate was positively impacted by the credit recovery program. In School A, the promotion rate without the program would have been 79.76% but with the program was 86.96%, an increase of 7.20%. In School B, the promotion rate without the program would have been 76.75% but with the program was 85.29%, an increase of 8.54%. In School C, the promotion rate without the program would have been 72.91% but with the program was 82.69%, an increase of 9.78%.

Promotion rates by grade for students within the credit recovery program showed some variability across school sites. Ninth grade students in the credit recovery program at School A promoted at a rate of 85.97%, at School B 77.42%, and at School C 84.29%. However, ninth grade also saw the greatest improvement in promotion rates as a result of the program across the three high schools. School A increased its promotion rate in ninth grade by 12.15%, moving from a 75.31% promotion rate to an 87.46% promotion rate. School B also increased the promotion rate by 9.16%, moving from 68.89% to a 78.05% promotion rate. School C increased its freshmen promotion rate by 14.98%, moving from 68.02% to 83.00%. Tenth grade students within the credit recovery program had the most disparate promotion rates across school sites. In School A, 77.50% of students in the program promoted; in School B, 86.67% of students in the program promoted; while at School C, only 51.35% of students promoted. School A saw the greatest change in promotion rates in tenth grade as a result of the program, moving from 73.80% to 87.23% (13.43% improvement). School B saw an 8.95% improvement as a result of the program, moving from 79.86% promotion to 88.81%. School C saw a 5.66% improvement at the tenth grade level, moving from 72.91% to 78.57%. Eleventh grade students within the credit recovery program at School B (94.12%) surpassed Schools A (73.33%) and B (72.00%) in promotion rates significantly. Though eleventh grade students had the

highest promotion rates overall, > 90%, students at this grade had the lowest percent improvement in promotion rates. School A improved its promotion rate in Grade 11 by 3.21%, moving from 88.17% to 91.38%. School B improved by 8.11%, moving from 85.99% to 94.10%. School C improved by 7.42%, moving from 83.54% to 90.95%. Twelfth grade data only included four students across the three school sites. It also included only those seniors who did not take the credit recovery option in the Maymester before graduation in June. School A had only one of three seniors pass the course to earn summer graduate status. School B had no seniors in the summer session. School C had only one student who did pass the course and earn summer graduate status.

Results from Research Question 3: Subgroup Analysis

Question 3 asked how successful the online mediated approach was in predicting academic gains and pass/fail performances when factors such as race/ethnicity, socio-economic status, special education, gender, and course type were analyzed. The purpose of this question was to determine if students from No Child Left Behind (2001) subgroups were as likely to make academic gains and to ultimately pass the course as a result of the treatment (online mediated approach) as majority population students. For the analysis of gains by subgroup, a linear regression model was used to determine the relationship between student gains and selected subgroups. The original linear regression model included five variables: gender (male/female); race (white, African American, Asian, Hispanic, and American Indian); special education (IEP = yes, IEP = no); socio-economic status (free lunch, reduced lunch, full pay lunch); and Apex course. The regression test utilized only 13 of the 22 Apex courses where student enrollments were equal to or greater than 10 ($n \geq 10$) to avoid instability in the parameter estimates due to anomalies in the small sample size (Gall et al., 2003). Those courses included Algebra 1,

Algebra 2, American History, Applied Biology, Biology 1, Chemistry 1, English 1, English 2, English 3, Geometry, Math Tech 1, Math Tech 2, and Spanish 1. Pretest scores were included as a covariate to control for wide differences in student pretest scores. In other words, using pretest scores as a covariate ensured that student gains from the selected subgroups were compared based on similar pretest scores. Table 14 presents the regression summary information for the original five subgroups in the model.

Table 14

Regression Summary

Source	DF	Sum of Squares	Mean Square	F value	P value
Pretest 1		147037.88	147037.88	635.24	<.0001
Gender	1	25.25	25.25	0.11	0.7413
Race	1	610.87	305.43	1.32	0.2679
IEP	1	97.20	97.20	0.42	0.5172
Free/Reduced	2	1394.61	697.30	3.01	0.0498
Course	12	11261.57	938.46	4.05	<.0001

Using .05 as a level of significance, three variables were removed as a main effect from the model: gender, race, and special education (IEP). This meant that a statistically significant difference in gains was not clearly evident by gender, race, or special education. Gains made by males could not be judged to differ from the mean gains made by females. Differences in mean gains also were not observed by ethnic subgroups, and students with IEP could not be judged to make gains that differed from students without an IEP. Two variables remained in the model, free and reduced lunch students ($p = .0498$) and the Apex course ($p = .0001$), indicating that mean gains differed by a student's lunch

status and the course a student took.

The coefficient of determination (R^2)is the proportion of variability in the data set and provided a measure of how well future outcomes were likely to be predicted by the model (Borg, Borg, & Gall, 2003). The percentage of variance in student gains made in the online mediated environment explained by the independent variables (lunch status and Apex course) was $R^2 = .50$. R^2 statistic provided information about the goodness of fit of the model in terms of how well the regression line approximated the real data points. $R^2 = .50$ indicated a moderate to high "goodness of fit" which meant that the model could explain 50% of the variance in gains for the significant subgroups.

Once the variables that remained in the model were identified (free and reduced lunch and Apex course), it was necessary to determine the regression coefficient to explain the variability in the gains. Table 15 shows the regression coefficient (b) for each of the remaining subgroup variables. Regression coefficients that were positive indicated that students in that category were predicted to make higher gains than students in the corresponding reference group. Negative coefficient numbers indicated that gains in that subgroup were predicted to be lower than gains made by students in the reference group. The reference variable for the free and reduced lunch subgroups was the full pay students. The reference variable for all Apex courses was English 1 because it was the course with the highest student enrollment (89 students).

Table 15

Regression Coefficients for Subgroups in the Model

Parameter	Reference Variable	Regression Coefficient	Standard Error
Intercept		71.72	1.99
Pretest		-0.92	0.04
Free lunch	vs. Full Pay	1.79	1.17
Reduced lunch	vs. Full Pay	5.71	1.91
Algebra 1	vs. English 1	-9.05	3.34
Algebra 2	vs. English 1	-3.21	2.99
American History	vs. English 1	3.88	2.42
Applied Biology	vs. English 1	-4.52	3.88
Biology 1	vs. English 1	-2.26	2.04
Chemistry 1	vs. English 1	-3.83	3.56
English 2	vs. English 1	-0.76	1.86
English 3	vs. English 1	1.89	2.40
Geometry	vs. English 1	-2.96	2.21
Math Tech 1	vs. English 1	0.25	2.94
Math Tech 2	vs. English 1	-10.88	2.03
Spanish 1	vs. English 1	-5.56	4.40

Pretest was included in the model as a covariant to control for variability in pretest scores. Controlling for pretest scores, the free and reduced lunch variables had positive regression coefficients. At any pretest score, free lunch students gained 1.79 points more than the full-pay lunch students. Similarly, for any pretest score, reduced

lunch students gained 5.71 points more than the full-pay lunch students. In the Apex course variable, American History, English 3, and Math Tech 1 had positive regression coefficients. For any selected pretest score, students in American History gained 3.88 points more, students in English 3 gained 1.89 points more, and students in Math Tech. 1 gained .25 points more than students in English 1. Conversely, eight Apex courses had negative regression coefficients indicating that at any pretest score, students in Algebra 1 gained 9.05 points less, students in Algebra 2 gained 3.21 points less, students in Applied Biology gained 4.53 points less, students in Biology gained 2.25 points less, students in chemistry gained 3.83 points less, students in English 2 gained .76 points less, students in Geometry gained 2.96 points less, students in Math Tech. 2 gained 10.88 points less, and students in Spanish 1 gained 5.58 points less.

Unlike gains data, pass/fail variables are dichotomous by nature. Therefore, to analyze pass/fail performance by subgroups a logistic regression was used. The logistic regression was calculated using the same 13 Apex courses where student enrollments were equal to or greater than 10 ($n \geq 10$). The original logistic regression model included the variables of gender (male/female), race (white, African American, Asian, Hispanic, and American Indian), special education (IEP = yes, IEP = no), socio-economic status (free lunch, reduced lunch, full pay lunch), and Apex course type (13 different courses). Backward elimination was used to select those independent variables to include in the model. In backward elimination, all independent variables are initially entered into the regression equation. In successive steps, the variable which contributes the least to explaining pass/fail performance is eliminated. Upon completion, all variables included in the model satisfy the level of significance selected. Pretest scores were included as a covariate to account for the likelihood that passing the test with at least a 70% score may

be dependent upon where the student scored initially on the pretest. For example, students with higher pretest scores may have been more likely to achieve the necessary passing score; therefore, using pretest as a covariate ensured that statistical analyses made fair comparisons between students' pass/fail performance holding all other factors constant. Using .05 as a level of significance, two subgroups were removed as a main effect from the original logistic regression model: gender and race/ethnicity (see Table 16).

Table 16

Logistic Regression for Subgroups Removed from the Model

Effect	DF	Wald Chi–Square	P-value
Gender	1	0.4721	0.7898
Race/Ethnicity	4	1.7153	0.1903

For the effect to remain in the model, the p–value had to be <.05. Neither gender with a p-value of .79 nor race/ethnicity with a p-value of .19 entered into the model as significant. Therefore, neither gender nor race predicted passing or failing the course.

Conversely, using .05 as a measure of significance, four variables were kept as main effects from the original model: special education (IEP) and socio-economic status (F/R lunch), Apex course type, and pretest (see Table 10). The likelihood of passing the course was predictable in some way by the nature of these variables.

Table 17

Logistic Regression for Subgroups in the Model

Effect	DF	Wald Chi-Square	P-value
Pretest	1	1.2119	*0.2709
IEP	1	5.1244	0.0236
Free/Reduced lunch	2	6.3369	0.0421
Apex Course	12	21.1958	0.0476

Pretest was included in the model as a covariate although it was not found to be a significant predictor of whether a student passed the course. Including pretest in the model ensured that comparisons of students within subgroups were made holding as many variables as possible constant (with the student's pretest score being a significant variable to hold constant). The $\aleph^2$ value of 5.12 ($p < .023$) was statistically significant, which justified keeping special education status in the model. The $\aleph^2$ value of 6.33 ($p < .04$) was statistically significant, which justified keeping free and reduced lunch status in the model. The $\aleph^2$ value of 21.20 ($p = .05$) was statistically significant to keep Apex course in the model. Therefore, the logistic regression equation in Table 17 indicated that students with an IEP, with free or reduced lunch status, and students registered in particular Apex courses had a different likelihood of passing the course than students not in these categories.

Once the main effects were identified (special education, socio-economic status, course type, and pretest scores) it was necessary to determine the regression coefficient for log–odds ratio equation. When you exponentiate the regression coefficient, the result

is the odds ratio, which, in this study, determined the likelihood of a particular subgroup achieving a passing cut score for the course of 70% or higher. Table 18 presents regression coefficients for the variables that remained in the model. The 13 courses in Apex with at least 10 students enrolled were individually included in the test. Courses with fewer than 10 students were removed. The standard error is also presented.

Table 18

Logistic Regression Parameter Estimates

Parameter	DF	Regression Coefficient	Standard Error
Intercept	1	1.72	0.42
Pretest	1	0.01	0.01
IEP	1	-0.59	0.26
Free lunch	1	0.26	0.23
Reduced lunch	1	1.51	0.62
Algebra 1	1	-0.18	0.68
Algebra 2	1	1.21	1.06
American History	1	0.55	0.59
App. Biology	1	-0.49	0.62
Biology 1	1	-0.53	0.39
Chemistry 1	1	13.61	66.79
English 2	1	0.01	0.41
English 3	1	0.11	0.51
Geometry	1	0.18	0.51
Math Tech 1	1	0.64	0.78
Math Tech 2	1	-1.05	0.37
Spanish	1	-0.46	0.82

Each variable remaining in the model had a degree of freedom equal to one (df =

1). Five variables produced a regression coefficient that was negative: special education (IEP), Algebra 1, Applied Biology, Biology 1, and Math Tech 2. The negative coefficient when inserted into the logistic regression equation was significant because it produced an odds ratio that was less than one. An odds ratio of less than 1.0 indicated that students in that subgroup or course were less likely to pass the course than the reference group. Nine variables in the model had a positive regression coefficient, yielding odds ratios greater than 1.0, which implied a greater likelihood of passing the course. There were strong positive regression coefficients in three variables: reduced lunch subgroup (1.51), Algebra 2 (1.21), and Chemistry 1 (13.61). Table 19 presents the odds ratio estimates for all variables remaining in the model. The equation to determine the log-odds ratio is $\ln(\frac{p}{1-p})$. The regression coefficients (b) presented in Table 18 were used in the formula to determine the odds ratio for each variable. The odds ratios for all variables in the model were compared to a reference group. For example, the special education variable compared the students with an IEP (y = yes) to the students without an IEP (n = no). Free and reduced subgroups were compared to full-pay students. Specific courses within Apex were compared to English 1 because it was the course with the largest student enrollment (89 students). Pretest remained in the model as a covariate to ensure that comparisons of students within subgroups were made holding as many variables as possible constant.

Table 19

Odds Ratio Estimates for Variables in the Model

Effect	Reference Group	Odds Ratio	95% Confidence Limits	
Pretest		1.01	0.99	1.02
IEP	Y vs. N	0.56	0.33	0.92
Free Lunch	vs. Full Pay	1.29	0.82	2.03
Reduced Lunch	vs. Full Pay	4.53	1.34	15.39
Algebra 1	vs. English 1	0.83	0.22	3.18
Algebra 2	vs. English1	3.35	0.42	26.46
American History	vs. English 1	1.74	0.54	5.57
Applied Biology	vs. English 1	0.61	0.18	2.08
Biology 1	vs. English 1	0.59	0.27	1.26
Chemistry 1	vs. English 1	undefined	<0.01	>999
English 2	vs. English 1	1.01	0.45	2.26
English 3	vs. English 1	1.12	0.41	3.05
Geometry	vs. English 1	1.20	0.44	3.24
Math Tech 1	vs. English 1	1.91	0.41	8.81
Math Tech 2	vs. English 1	0.35	0.17	0.72
Spanish 2	vs. English 1	0.63	0.13	3.16

The log-odds ratio predicted how much more effective one subgroup was over another in passing the course with pretest scores as a constant. In Table 19 the same six variables which had the negative regression coefficients had odds ratios less than 1. The odds of a special education student passing a course is .56 the odds of a student without

an IEP passing the course. Certain courses also had a lower odds ratio indicating that students were less likely to pass the course based on something about the online course itself. Those courses were Algebra 1 (odds ratio = 0.832), Applied Biology (odds ratio = 0.613, Biology 1 (odds ratio = 0.586), Math Tech. 2 (odds ratio = 0.351) and Spanish 1 (odds ratio = 0.634). Positive odds ratios were found for reduced lunch students (odds ratio = 4.532), Algebra 2 (odds ratio = 3.346), and Chemistry 1 (odds ratio undefined). The odds that a student receiving reduced lunch would pass a course were nearly four times (or 4:1) the odds that a full-pay lunch student would pass a course. The odds that a student taking Algebra 2 would pass the course were approximately 3 times or (3:1) times the odds that a student in English 1 would pass the course. One course, Chemistry 1, had an undefined odds ratio because 100% of students in Chemistry 1 passed the course. The odds for chemistry was undefined (1/0 = undefined) so the odds ratio was also undefined.

Confidence intervals were calculated to determine how each category (IEP, lunch status, Apex course) compared with its respective reference group. Confidence ranges were defined by lower and upper limits. Confidence intervals that do not include the value of 1 in the range indicated that the odds of success for that variable did not differ from the odds of the reference group. Two variables met the threshold of 95% confidence in the odds remaining true. First, the confidence interval for special education students, which had a negative regression coefficient, was 0.334-0.924 supporting the statement that the odds of a student without an IEP succeeding in the course differed significantly from the odds for students with an IEP. Specifically, the odds of a student without an IEP passing a course were two times (or 2:1) the odds of a student with an IEP passing a course. Second, the confidence interval for Math Tech 2, which also had a negative regression coefficient, was 0.171-0.719, supporting the statement that the odds of a

student in English 1 passing a course were nearly three times the odds of students in Math Tech 2 passing the course.

Results from Research Question 4: Environmental Analysis

Question 4 explored the environmental and structural components that students most attributed to their success or failure in the online mediated credit recovery program. The literature revealed four common themes—time, space, support, and affinity with the online learning strategies—as primary factors for online learning success. Interviews with 10 students per school site (30 students total) and two focus groups per school site (30 students total) were conducted to determine students' perceptions of the impact these themes had upon their learning in the online mediated environment. Student responses were transcribed and coded using Creswell's (2003) steps to qualitative data analysis and interpretation. Student responses were analyzed to generate general descriptive statements about each theme. Unique responses were left as they were originally stated by the student, while similar responses were combined into one representative statement to create a concise subset of descriptions about each theme. Tables 20-27 present the nominal data collected from the interviews/focus groups (60 students total) and display the frequency distribution of student perceptions for each question by school (frequency A, B, C) and for all students. Descriptive statements with a cumulative frequency of 0-6 students who affirmed that statement were determined by the researcher as those conditions students believed to have had a low impact on their learning. Descriptive statements with student affirmation in the 7-15 range were determined to have had a moderate impact on student learning. Descriptive statements with a cumulative frequency of 16 or higher responses were determined to have a significant impact on student learning.

The first question in the interview and focus group was a general question: Was this learning environment different from your regular classroom learning environment? If so, what differences in this environment stood out to you? Table 20 presents the descriptive statistics of student responses.

Table 20

Differences in the Learning Environment versus Traditional Class

Differences	Frequency by School			All	%
	A	B	C		
I got immediate feedback on incorrect work and could re-do missed work	0	3	3	6	10.0
I had access to more individual teacher help	4	2	2	8	13.3
There were less distractions	6	3	3	12	20.0
I got to work independently	7	3	2	12	20.0
I got to set my own pace	3	9	8	20	33.3
There was step-by-step instruction on the computer	4	9	9	22	36.7
The content on the computer made it harder to learn	2	2	3	7	11.7

*Frequency and cumulative frequency data reflects more than one answer per student.

Responses from Question 1 contained both positive and negative perceptions about the online mediated learning environment compared to the traditional classroom environment where students were unsuccessful in the course originally. A few students (10.0%, n = 6) perceived that getting immediate feedback on incorrect work and being able to redo missed items was a difference in the online mediated environment from the traditional classroom. Three responses were perceived by a moderate number of students

to be different in the online mediated environment compared to the traditional classroom, including having access to individual help from the face-to-face teacher (13.3%, n = 8), having less distractions in the learning environment (20.0%, n = 12), and working independently (20.0%, n = 12). Two responses were perceived strongly by students to be different in the online mediated environment including, setting their own pace (33.3%, n = 20) and having a step-by-step instructional format on the computer program (36.7%, n = 22). One negative response (noted in the last line of the Table 20) was reported by a relatively low number of students. Some students felt that learning the content on the computer was more difficult than learning the content in the traditional classroom (11.7%, n = 7).

Question 2 asked students to reflect upon the conditions listed in Question 1 to determine which of the differences they cited were most supportive of their learning and which were not supportive of their learning: Of the things you listed above, which conditions supported your learning? What conditions made it harder for you to learn? Table 21 displays the frequency of responses by school, overall, and the percentage of all students responding to each theme.

Table 21

Difference in the Online Mediated Environment and Supports for Learning

Responses	Frequency by School A	B	C	All	% of all students
Supportive of Learning					
Working independently	1	2	2	5	8.3
Face-to-face teacher support	3	6	1	10	16.7
Flexibility of pace	0	7	6	13	21.7
Flexibility in the learning environment	5	6	3	14	23.3
Instructional format of online courses	4	11	5	20	33.3
Non-supportive of Learning					
Too much reading on the computer	1	1	0	2	3.3
Too many distractions in the lab	3	0	0	3	5.0
Online learning did not match my learning style	3	3	3	9	15.0

*Frequency and cumulative frequency data reflects more than one answer per student.

Table 21 indicated that a small number of students felt that working independently in the online mediated environment was supportive of their learning (8.3%, n = 5). Three environmental conditions were perceived by a moderately high percentage of students to be supportive of their learning including, face-to-face teacher support (16.7%, n = 10), flexibility of pace (21.7%, n = 13), and flexibility in the learning environment (23.3%, n = 14). In their statements about the flexibility in the learning environment, students described conditions such as “being allowed to listen to music on their headphones while they worked,” or “having a quiet lab space with little to no distractions in which to concentrate,” and having a “less stressful” or “less competitive”

environment as examples of favorable or flexible conditions for learning (Anonymous, personal communication, June 10, 2009). Students perceived the instructional format of the online courses to have the most impact on their learning (33.3%, n = 20). Students specifically stated that the "step-by-step instructional sequence, the audio component that read to them, getting immediate feedback on missed work, and having the study guides and quizzes" as examples of conditions they strongly favored in the online mediated environment (Anonymous, personal communication, June 10, 2009). Fewer students perceived the differences in the online mediated learning environment as a hindrance to their learning. Factors perceived to have a relatively a low negative impact on learning were too much reading on the computer (3.3%, no = 2) and too many distractions in the lab setting (5.0%, n = 3). Nine students (15.0%) felt that the online learning format did not match their learning style and therefore had a negative impact on their learning.

Question 3 asked students to reflect on how they used their time in the online mediated learning environment to best meet their learning needs: How did you organize your time in the learning environment? Responses about time were harder to differentiate into discreetly different and parallel categories. Many students used combinations of strategies to control the time constraints of completing their work to "recover" credit. Table 22 displays the most common responses as they were described by students.

Table 22

Student Organization of Time in the Online Mediated Environment

Use of Time	Frequency by School			All	% of All Students
	A	B	C		
Worked in the lab for part of the day only	0	0	2	2	3.3
Organized time by pacing units per day	1	1	3	5	8.3
Worked in the lab full day only	0	1	5	6	10.0
Worked in the lab (day) and at night (home)	3	2	7	12	20.0
Prioritized easier work first then harder work within units to manage time	6	8	1	15	25.0
Had no strategy for time; did things in order	9	4	2	15	25.0

*Frequency and cumulative frequency data reflects more than one answer per student.

A relatively low number of students felt that they were able to get their work done by working in the lab part of the day (3.3%, n = 2), pacing themselves to complete a certain number of units per day (8.3%, n = 5), or by working in the lab for a full day (10.0%, n = 6). A moderate number of students felt that they had to work in the lab during the day and at home at night to complete their work on time (20.0%, n = 12). Likewise, a moderate number of students felt they had to prioritize the easier work in each unit first and move to the harder work later to use their time most effectively (25.0%, n = 15). Another moderate group of students felt that time was not a factor in their learning and chose to do the units in the order they were presented (25.0%, n = 15). The question on time had the most varied and evenly divided responses from students. There were no responses that represented a significant number of students who described their time management strategies in similar ways.

Question 4 also addressed the time factor by asking students to reflect upon the

time of year they took the online mediated credit recovery program: How did taking the credit recovery course in the summer time affect your learning? The study time frame included only the summer session of credit recovery. This time of year was chosen because it had the highest students sample population. Table 23 presents student responses about the time of year and the impact it had on their learning the content.

Table 23

Student Perceptions of Summer Time Session of Credit Recovery

Summer Time	Frequency by School			All	% of All Students
	A	B	C		
Teachers provided more individual help	0	1	2	3	5.0
There were fewer demands and distractions	3	5	5	13	21.7
I could concentrate on one course at a time	2	3	10	15	25.0
I was more motivated/focused on my learning	6	10	2	18	30.0
I did not have content teacher support	1	0	0	1	1.6
I found it harder to be motivated in summer	0	0	1	1	1.6
Summertime had no effect on my learning	3	1	0	4	6.7

*Frequency and cumulative frequency data reflects more than one answer per student.

The data showed that summertime was a positive factor for students overall. A relatively low number of students attributed the positive impact of taking credit recovery in the summer as related to the additional support provided by teachers in the program (5.0%, n = 3). However, two factors were perceived by a moderate number of students to have a positive impact on their learning during the summertime session, including the fact that students felt they had fewer demands and fewer life distractions in the summer (21.7%, n = 13), and that they could concentrate on only one course at a time in the

summer (25.0%, n = 15). The most significant positive impact of the summer session was that students felt more extrinsically motivated to succeed and more focused on their learning needs (30.0%, n = 18). A small number of students felt that taking the online mediated credit recovery program in the summer was not supportive of their learning. These students felt that they did not have enough content-specific teacher support in the summer (1.6%, n = 1 student) or that they found it harder to be motivated in the summer (1.6%, n = 1). Four students felt that summertime had no effect on their learning (6.7%).

Question 5 asked students to reflect upon the learning space: Were you a student who chose to take credit recovery on campus or at home? Why or how did you choose the space for your learning? Table 24 presents the frequency distribution for student responses by school and for the overall population.

Table 24

Student Selection of Space in the Online Mediated Program

Responses about Space	Frequency by School A	B	C	All	% of All Students
Use of Lab Space					
I came to the lab only to take the unit tests	1	0	0	1	1.6
I came to the lab because I had no computer at home	3	1	2	6	10.0
I came to the lab daily to get help from teachers	4	6	9	19	31.7
There were too many distractions at home	11	8	9	28	46.7
Use of Home Space					
I was more comfortable and flexible at home	1	1	0	2	3.3
There were fewer distractions at home	0	3	1	4	6.7
Use of Home and Lab Space					
I used both home and school as needed to finish work	2	2	3	7	11.7

*Frequency and cumulative frequency data reflects more than one answer per student.

The majority of students chose to complete the online credit recovery program at school. Relatively low numbers of students interviewed felt that they needed the school lab only to take the unit tests (1.6%, n = 1), which was the bare minimum required in the program, or because they had no computer at home (10.0%, n = 6). A significant number of students stated that they came to the school lab setting because they could get help from a face-to-face teacher (31.7%, n = 19) and that they had too many distractions at home (46.7%, n = 28). A small number of students preferred taking the online course work at home because they believed there were fewer distractions at home than in the lab

setting (6.7%, n = 4) or because they were more comfortable and flexible at home (3.3%, n = 2). Seven students felt that they needed both the lab setting and the home setting in order to finish their work (11.7%, n = 7).

Question 6 evaluated student perceptions about sources of help in the online mediated program: Did you get help in learning when things got difficult? If so, from whom and when did you get help? Table 25 presents the frequency distribution on student help sources by school and for the overall population.

Table 25

Support of Assistance in the Online Mediated Environment

Source of Assistance	Frequency by School			All	% of All Students
	A	B	C		
Some Assistance					
Computer tools in Apex	0	2	4	6	10.0
Tools outside of Apex	0	5	2	7	11.7
Academic coach	7	0	2	9	15.0
Peers, parents, or siblings	4	6	6	16	26.7
Teacher	12	13	11	36	60.0
No Assistance					
I preferred to work independently	2	1	0	3	5.0
I needed no help	2	1	1	4	6.7
I didn't feel like anyone could help me	1	0	0	1	1.6

*Frequency and cumulative frequency data reflects more than one answer per student.

The majority of students interviewed did seek help in learning the content. A relatively small number of students sought help from the computer tools available in the

online software system (10.0%, n = 6). A moderate number of students sought help from online tools on the internet outside of Apex software system (11.7%, n = 9) or from the paraprofessional (academic coach) in charge of the program (15.0%, n = 9). The most significant help sources perceived by students were peers, parents or siblings (26.7%, n = 16) or from the face-to-face content teachers (60.0%). A relatively low number of students did not seek help because they preferred to work alone (5.0%, n = 3), felt they needed no help (6.7%, n = 4), or felt that there was no one qualified to help them (1.6%, n = 1).

Question 7 asked students to examine their affinity with online learning environment in terms of how well they believed they were able to learn the subject matter on the computer and to state what conditions made it easier or harder to do so: How well were you able to learn the subject matter in the online format? Table 26 presents the frequency distribution of student responses by school and for the overall population.

Table 26

Student Affinity with the Online Mediated Learning Environment

Online Curriculum Responses	Frequency by School A	B	C	All	% of All Students
Ease of Learning on the Computer					
The computer curriculum refreshed what I learned in the traditional class	2	0	0	2	3.3
Support from teacher made learning easier	3	1	1	5	8.3
Immediate feedback and the ability to correct mistakes made learning easier	2	2	1	5	8.3
The environment matched my learning style	3	2	5	10	16.7
I preferred working alone and at my own pace	3	5	7	15	25.0
The step-by-step instructional format helped me	5	14	6	25	41.6
Difficulty of Learning on the Computer					
The online format was unfamiliar	0	1	0	1	1.6
My subject is harder to learn online	0	1	2	3	5.0
Online format did not match my learning style	2	4	0	6	10.0

*Frequency and cumulative frequency data reflects more than one answer per student.

The majority of students perceived the online learning component of the program to be an effective way to learn the content due to specific environmental factors. A small number of students attributed their ease of learning in the online environment to the fact that the content on the computer refreshed what they already learned in the traditional classroom (3.3%, n = 2). A small number of students stated that the ability to get immediate feedback about incorrect responses and to redo missed work made learning the content online easier (8.3%, n = 5). A small group also found that the support of the face-

to-face teacher helped make the online learning easier (8.3%, n = 5). A moderate number of students believed the online format matched their learning style (16.7%, n = 10) and that working independently at their own pace made learning online easier (25.0%, n = 15). A significant number of students believed that online instructional delivery of the content in a step-by-step format had the biggest impact on their learning online (41.6%, n = 25).

Conversely, 10 students in the interviews and focus groups believed that learning the content online in the mediated credit recovery environment was difficult. One student (1.6%) attributed the difficulty to the unfamiliarity of the online content management system (Apex). Three students (5.0%) felt that the specific course they were taking was harder to learn online because of something about the nature of the course itself. These students did not generalize that all courses would be hard to learn online; rather that the course they were taking was harder to learn on the computer. Finally, six students (10.0%) did not feel that online learning matched their learning style.

Question 8 focused student examinations on how well the Apex content delivery system itself supported their learning of the content in the online mediated learning environment. Students were asked to identify online support features specific to Apex that helped or hurt their learning: What qualities in the way Apex presented the content helped or hurt your learning? Table 27 presents the frequency distribution of student responses to online learning tools by school and for the overall population.

Table 27

Apex Online Tools That Helped or Hindered Student Learning

APEX Tools	Frequency by School A	B	C	All	% of All Students
Online Help Features					
Notes	0	0	3	3	5.0
Progress report feature	1	2	1	4	6.7
Online dictionary and vocabulary support	0	2	3	5	8.3
Practice tests and test format	1	1	6	8	13.3
Study guides	2	4	3	9	15.0
Step-by-step presentation of content	5	4	1	10	16.7
Audio and video component	2	4	10	16	26.7
Non-Help Features in Apex					
Amount of reading	1	0	0	1	1.6
Check all that apply question format	0	0	1	1	1.6
Progress report feature	0	0	2	2	3.3
Misspell feature	0	0	5	5	8.3

*Frequency and cumulative frequency data reflects more than one answer per student.

While the majority of students found the online features to be somewhat helpful to them, no one feature was cited by a significant number of students. Features that relatively few students perceived to have a positive impact on their learning were the notes (5.0%, n = 3), the progress report (6.7%, n = 4), and the online dictionary (8.3%, n = 5). A moderate number of students found some features to be supportive of their learning, including the practice tests and test format (13.3%, n = 8), the study guides

(15.0%, n = 9), and the step-by-step instructional format (16.7%, n = 10). A more significant number of students found the audio and video features helpful for their learning (26.7%, n = 16). Conversely, a small number of students found that the Apex online features hindered their learning including the "check all that apply" questioning format (1.6%, n = 1), the amount of reading (1.6%, n = 1), the progress report feature (3.3%, n = 2), and the misspell feature (8.3%, n = 5).

Results from Research Question 5: Psychological Factors in the MSLQ

Question 5 in the study investigated the psychological factors students perceived to be important to their learning in the online mediated credit recovery program. The purpose of the question was to determine what correlation, if any, existed between students' perceived motivation and self-regulatory learning strategies and their success in the program. The dependent variable in this statistical test was the final grade students earned in the Apex online course(s). This variable was selected because it represented the mean of all unit tests taken in the online mediated environment during the study. The independent variables were subscales of motivation including intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and test anxiety, as well as the subscales for self-regulatory learning strategies including rehearsal, elaboration, organization, critical thinking, metacognitive self regulation, time and study environment management, effort regulation, peer learning, and help seeking. A general linear regression test was used to predict students' final grades in the Apex course. The researcher selected this test because there was an unbalanced design with disproportionate groups.

Since parental consent was required, 293 of the 418 students participated in the Motivated Strategies for Learning Questionnaire. This figure represented 61.3%

participation in the online survey. Student scores were connected to their questionnaire responses through an anonymous, unique student identification number. Participating students' final Apex grades were ranked from highest to lowest and divided into deciles. The highest decile contained those students who scored in the top 10% in their final Apex grade with the range representing 86.6 as the lowest grade and 100 as the highest grade. Similarly, the lowest decile contained those students who performed in the bottom 10% in their Apex final grade with a range of a lowest grade of 13.3 and a highest grade of 63.0. A comparison was made between the scores of students in the highest decile and lowest decile. The intent was to compare the most disparate student scores (highest decile = 51 students and lowest decile = 52 students) with respect to the independent variables in the MLSQ to predict academic success or failure in the program based on those variables.

The independent variables were put into the linear regression model in a stepwise fashion (Gall et al., 2003). The stepwise selection process essentially asked which variables were the best predictors to include in the model given the intended outcome. Using $\int entry = .05$ as a level of significance, two variables were kept in the model. The following variables were eliminated from the model: intrinsic goal orientation; extrinsic goal orientation; task value; self-efficacy for learning; rehearsal; elaboration; organization; critical thinking; metacognitive self regulation; time and study environment; effort regulation; and help seeking. Table 28 displays the linear regression model for the remaining variables, including the regression coefficient, the standard error, the f statistic and the level of significance (P –value).

Table 28

Linear Regression for the MSLQ Variables

Variable	Regression Coefficient	Standard Error	F - value	P - value
Intercept	64.62881	2.60207	616.90	< .0001
Control of learning beliefs	0.30171	0.11702	6.65	0.0104
Peer learning	0.50418	0.13419	14.12	0.0002

The coefficient of determination (R^2) was used in the context of this statistical model because the main purpose of the test was to predict the final grade in the Apex course based on the selected subgroup variables. Seven percent (R^2 = .07) of the variance in the Apex final course grade was explained by control of learning beliefs and peer learning. Control of learning beliefs was kept as a main effect (F = 6.65, P = .01). Control of learning represented one of the "expectancy subscales" in the motivation section of the questionnaire and referred to students' beliefs that their efforts to learn would result in positive outcomes. Therefore, there was a significant correlation between students' final Apex grade (Apex grade = mean of all unit tests taken) and their belief that efforts would produce a passing grade (Pintrich et al., 1991). Similarly, peer learning was kept as a main effect (F = 14.12, P = .0002). Peer learning represented one of the "resource management" components of the learning strategies section of the questionnaire and referred to the degree to which students felt they could collaborate with their peers to help clarify course material and reach insights they would not have reached on their own (Pintrich et al.). Therefore, there was a significant correlation between students'Apex final course grades and their use of peer support and collaborative learning

opportunities.

In the questionnaire design, there were four questions which measured the variable control of learning belief. Those questions included: (1) If I study in appropriate ways, then I will be able to learn the material in the course; (2) It is my fault if I do not learn the material in this course; (3) If I try hard enough, then I will understand the course material; and (4) If I don't understand the course material, it is because I didn't try hard enough. Students could earn a total of 28 points in the control of learning subscale depending upon how they answered each question on the Likert scale related to that variable (1 = not at all true of me or 7 = very true of me). Table 29 shows the frequency distribution for the students who participated in the MSLQ and scored in the highest and lowest deciles for the variable of control of learning belief.

Table 29

CLB Frequency Distribution by Highest and Lowest Deciles

Subscale	Point Ranges			
Decile Descriptor	7 – 14	15 – 19	20 – 23	24 – 28
Control of Learning Beliefs				
Lowest Decile	14	20	13	3
Highest Decile	1	9	26	14

*n (number of students) = 51 in lowest decile and n = 50 in highest decile.

In the control of learning belief variable, 34 of the lowest performing students who completed the questionnaire did not perceive that positive work efforts and positive beliefs about themselves as learners on the coursework in the online environment would lead to positive results in their final grade, while16 lowest decile students did perceive that their work efforts would lead to positive results. Conversely, with the highest

performing decile, only 10 students did not perceive that control of their learning beliefs about the course content would lead to better results while 40 of the students believed that it would lead to better results on their final grade.

Fewer questions were included in the peer learning score. Students responded to the following key questions: (1) When studying for this course, I often tried to explain the material to a classmate or friend; (2) I try to work with other students from this class to complete the course; and (3) When studying for this course, I often set aside time to discuss the course material with a group of students from the class. Students participating in the survey could earn a total of 21 points depending upon their answers to the Likert scale.

Table 30 shows the differences in where students in the highest and lowest deciles scored in peer learning to further explain the significance noted in the linear regression test.

Table 30

Peer Learning Frequency Distribution by Highest and Lowest Deciles

Subscale	Point Ranges			
Decile Descriptor	3 – 6	7 – 10	11 - 14	15 – 21
Peer Learning				
Lowest Decile	13	16	7	10
Highest Decile	8	6	19	18

*n (total number of students) = 46 lowest decile and n = 51 highest decile.

Table 30 showed that 29 students in the lowest performing decile did not utilize peer learning opportunities while only 17 students did. Conversely, 37 students in the

highest performing decile utilized peer learning opportunities and only 14 students did not.

Chapter 5: Discussion, Conclusions, Recommendations

Introduction

This chapter discusses the research questions, conclusions, significance, and recommendations of the study. The purpose of this case study was to determine if one district's online mediated approach to credit recovery succeeded in increasing the academic knowledge and skills of students in high school courses needed for promotion and to determine which environmental components of the program and psychological factors of the students they most attributed to their success or failure. The study utilized a pre-experimental design to analyze quantitative information about the academic gains, pass rates, and promotion rates of all students in the credit recovery program across three high school sites as well as specific subgroup performances including gender, ethnicity, free and reduced lunch, special education, and course. The study also analyzed qualitative student perception data on the environmental and psychological factors including those associated with the control of the study environment (time, space, support, and affinity for online learning), motivation, and self-regulatory learning strategies which predicted student success in the program. This chapter reflects upon the quantitative and qualitative data collected to determine the major conclusions of the study findings and makes recommendations for policy and for future research on the implementation of blended or hybrid online learning programs for high school students.

Overview of the Quantitative Research

A review of the literature highlighted that the number of high school students taking at least one course online in order to satisfy graduation requirements has grown rapidly in the United States (Setzer et al., 2005; Smith et al., 2005; Watson, 2008; Watson & Ryan, 2006). The North American Council of Online Learning (Watson et al., 2008)

reported that online learning has moved past the early adopter phase with the highest growth of programs focused more on at-risk students who seek recovery opportunities to earn credits required for graduation. The overriding goal of most credit recovery programs has been to accelerate student learning by addressing the specific academic deficiencies noted in the first attempt at the course and to help students earn catch up credits to graduate on time. In this context, this study sought to determine to what degree a blended learning or online mediated approach to credit recovery helped students master the core content knowledge and skills required for credit attainment and promotion to the next grade. Beck (2002) and Dziuban et al. (2004) differentiated blended learning as more than merely a web-enhanced course where curriculum and tests are given online; it is a fundamental redesign of instruction from teacher-centered lecture to student-centered instruction, from one-way interaction to collaborative interaction between student-to-instructor and student-to-student, from one assessment fits all to an interaction of formative and summative assessments. The purpose of the study was not only to determine if the online mediated approach positively impacted student learning and course performance but also to determine if the approach worked for all subgroups of students and for all courses equally well. Therefore, the following questions framed the quantitative research: (1) To what degree does the online mediated approach increase achievement (attainment of content knowledge and skills) in core academic classes needed for on-time promotion and/or graduation (as measured by pre and posttest gains within a single course and by calculating a overall achievement of 70% or higher on all units attempted within a course); (2) To what extent does the online mediated approach impact the on-time promotion and/or graduation rate of students who participated in the program and the school's overall promotion rates by grade; and (3) How successful in

terms of gains in content knowledge and skills and in promotion rates is the online mediated approach in increasing academic achievement of students when factors such as gender, ethnicity, free and reduced socio-economic status, special education, and course type are measured?

Gains Discussion

To what extent did the online mediated approach increase student achievement as measured by pre and posttest gains?

Based on the pre-experimental design of the quantitative portion of the study, students were given a pretest on the course they failed in the traditional environment. Then they were given the experimental treatment (online mediated curriculum), and then they were reassessed on a posttest. Gains were calculated by subtracting the difference between posttest and pretest scores. The central findings on the gains students made in the program were significant. First, 98% of the 417 students who participated in the online mediated credit recovery program across the three high school settings made academic gains in content knowledge and skills for the course(s) they were taking. Almost all students learned more in the online mediated course as a result of participating in the program. Further, there was very little variability in the percentage of students making gains by course, with eight courses having 100% of students making gains (Algebra 2, American History, English 1, English 3, Government and Economics, Math Technology 1, Math Technology 2, and Spanish 1), five courses with equal to or greater than 90% of students making gains (Algebra 1, Biology 1, Chemistry 1, English 2, Geometry), and one course where 83% of students made gains (Applied Biology). Courses with sample sizes below 10 were excluded from this calculation. Second, the gains from pretest to posttest were high. The mean gain across all courses taken showed a

38-point increase in performance from pretest to posttest. Similarly, gains were observed in all individual courses from as low as a 24-point gain in Spanish to as high as a 55-point gain in American History. One could argue that gains were expected since students had already taken the course one time the previous semester in the traditional environment and were reengaging with the course again in the online mediated environment. However, the pretest served a control for the prior learning by confirming that students did have deficits in their content knowledge and skills before doing the Apex online curriculum. Time between the original course taken and the credit recovery course taken was also controlled by ensuring that all students in the sample population had the same amount of time elapse between failing the course originally and reengaging with the course in the online mediated environment. One may also argue that average gains were so high (38 mean gain) because the pretest scores were so low. This was true. The mean pretest score across all subjects was 35.6, with the lowest pretest score of 2 occurring in Math Tech. 2 and the highest pretest score of 70 occurring in several courses: Chemistry; Spanish 1; Biology 1; English 1; English 2; and Global Studies. Low pretest scores indicated the level of deficiencies in students' content knowledge and skills which the experimental treatment (online curriculum) mitigated. As evidence of how the program impacted student knowledge and skills, the mean posttest score across all subjects was 73.6, with the lowest posttest score of 6 occurring in Math Tech. 2 and the highest posttest score of 100 occurring 25 times in the following courses: American History; Applied Biology; Biology 1; English 1; English 2; English 3; Math Tech. 1; and Spanish 2. Strong performances on the posttests across multiple courses and overall gains averaging at 38 points indicated that students did learn at high levels within the online curriculum.

School setting emerged as a factor in gains analysis, which was not originally

expected. When the mean gain scores for the three different school sites were calculated, there was some variability by school and by course in the gains students made. For example, School A and School B saw similar mean gains across all courses taken (44 points and 41 points, respectively). However, School C only showed a 28-point mean gain. Similar disparities were seen in two courses: English 1 (mean gain = 44 points for School A, mean gain = 32 points for School B, and mean = 28 points for School C) and Math Tech. 2 (mean gain = 55 points for School A, mean = 49 points for School B, and mean gain = 26 points for School C). These were courses with the highest student enrollments; therefore, sample size was not a factor. The percentage of students making gains was also different by setting. Schools A and B had 100% of their students make gains and School C had 93% of students make gains. The researcher attempted to control for school site variability in the following ways: (1) the same type of student was recruited for the program at all three sites (students with a 60-69 average in their first attempt at the course in the traditional environment); (2) the same online curriculum was used in all three sites (Apex); and (3) the same training, support, and schedule were used in all three sites. Academic support for students was provided by content specific certified teacher tutors and one paraprofessional academic coach who managed the online curriculum and student participation in the online environment. However, while gains were consistently seen across all school sites in the study, high levels of gains may be a factor that is not easily generalized across different settings without stricter experimental designs to control for human error.

Pass/Fail Discussion

Central to Research Question 1 was not only did students make academic gains in content knowledge and skills in the online mediated program, but did they make enough

gains to reach the 70% pass threshold to earn credit for the course?

Across the study sample population, the program was effective in helping students earn the credit they needed in core academic subjects. In this study population, 86% of the 417 students passed the course they were taking in the online mediated environment after having failed it in the traditional classroom. This pass rate was impressive given that all 417 students were not able to achieve the 70% pass score through traditional classroom options, but 359 students were able to pass the course in the online mediated environment. However, the study uncovered a noticeable variability in the pass rates by course and by school. Course variability was expected. For example, in examining course pass percentages, there were 6 courses which had a 100% pass rate (Chemistry 1, Chemistry 1 honors, Chemistry Tech. 1, English 2 honors, Modern Global Studies, and Spanish 2). However, five of the six courses had fewer than 10 students in the course; therefore, sample size may have been a factor. Three courses had pass rates > than 90% (Algebra 1, Geometry, and Spanish 1). Eight courses had pass percentages > than 80% (Algebra 2, American History, Biology, English 1, English 2, English 3, Math Tech. 1, and Math Tech. 3). Three courses had percentages > than 70% (Applied Biology, Global Studies, and Math Tech. 2). Lowest pass rates occurred in Government and Economics (50%) and Physical Science (50%). Both had fewer than 10 students enrolled; therefore, low sample size may be a factor. The qualitative research in question 4 of the study may have provided some insight on the discrepancy in pass rates by course. In the interviews and focus groups, when asked what differences, if any, stood out to them in the online mediated environment compared to the traditional classroom environment, 11.7% (7 students) responded that learning their subject matter on the computer was harder than in the traditional classroom. In a separate question which asked what factors helped or hurt

your learning, 15.0% (9 students) specifically stated that their learning style did not match the online learning format for their course. Students responding negatively to the online course content in these two questions were enrolled in Math Tech. 2, Algebra 2, Geometry, Physical Science, and Chemistry where some of the pass rates were lower. In the interview, students further remarked that "science and math courses were not conducive to learning by reading" (Anonymous, personal communication, June 10, 2009). Given this comment, it is likely that these courses may have required more manipulation of data, more problem solving, more constructivist learning opportunities, which may have been harder to simulate on the computer. The blended learning environment with face-to-face teacher support should have mitigated some of the learning difficulties students were having with the online curriculum. Based on the data, it did help in Chemistry where there was a 100% pass rate, and to some degree with Geometry and Algebra 2, where there were 90% and 87% pass rates, respectively. However, the blended environment was not as effective for students in Math Tech 2 where only 74% of the students passed.

As with the gain analysis, school setting emerged as an unexpected factor. School A and School B performed consistently high with 95% (n = 120 students) and 97% (n = 160 students) pass rates, respectively. School C, on the other hand, had only a 66% (n = 137 students) pass rate. The differences in pass rates were further noted by looking at individual course pass percentages. Sharply lower pass rates in School C as compared to Schools A and B were noted in the following courses: Government and Economics – 0% (2 students); Physical Science – 33% (3 students); Applied Biology – 40% (5 students); American History – 50% (4 students); and Geometry – 62.5% (8 students). However, low sample sizes in the courses might have been a factor. In courses where sample sizes

were above 10 students in all three high schools, there were also discrepancies in pass percentages for the following courses: English 1 (100% passing = School A, 100% passing = School B, 69% passing = School C); Math Tech 2 (93% passing = School A, 87% passing = School B, and 38% passing = School C); and English 2 (100% = School A, 96% = School B, and 63% = School C). Although the overall pass rate of the program appeared to be moderately high at 86%, it is evident from the study that School A and School B did something qualitatively different in the program to achieve pass rates greater than 95%, while School C only achieved a pass rate of 66%. A conclusion that one may draw from this study is that high gains and pass percentages are not conducive to generalize across settings even with the same type of program in the same district. In this study, there remain too many other variables to control which may have impacted student results, including the quality of the help provided by the teachers in the blended setting, the amount of support from peers students chose to use, the relationship and skill of the academic coach whose job was not only to monitor student progress in the content management system, but also to motivate, encourage, and direct students to help sources when learning was impeded in the online environment. Further qualitative study as a follow-up to this quantitative analysis is needed to shed light on what variables made a difference in pass rates among the schools.

Promotion Discussion

To what extent does the online mediated approach impact the on-time promotion and/or graduation rate of students who participated in the program and the school's overall promotion rates by grade?

National statistics have confirmed that students who are not promoted to the next grade with their peers have historically been twice as likely to drop out of school the

following year; therefore, being on-track with age level peers is highly predictive of a student graduating high school (Allensworth & Easton, 2005). Question 2 of the research study got to the heart of why schools must devise different ways outside the traditional classroom to address student deficits in content knowledge and skills in those courses needed to promote and to graduate. Results from the study have already confirmed that students did learn at high levels in the online mediated credit recovery program (38-point mean gain in subjects taken), and that they passed their courses at a high rate (86%), but the question remained whether the program had an impact on the district's and individual schools' promotion rates. The data indicated that 385 students (non-duplicated count) took 417 credit-bearing courses and of those, 304 students promoted to the next grade in the fall semester. This number was significant because all 385 students would have failed their grade and failed to promote without the opportunity to participate in the program. The promotion rate of all students who participated in the program was 79% which approached the 86% promotion rate of students who promoted on time with their grade-level peers without the intervention of summer school, credit recovery, or virtual high school. The promotion rate of the district overall improved to 85% with the implementation of the program (impact on district promotion includes the summer session of credit recovery). The highest increase in promotion rates for the district occurred at Grade 9 where the promotion rates would have been 71% without the program but rose to 83% with the program. This improvement was significant in light of state and national research showing ninth grade as having the highest retention of all grades in high school. Allensworth's and Easton's (2005) research in Chicago City Schools confirmed that students who were on-track by the end of their freshman year were more than three and one-half times more likely to graduate in 4 years than off-track

students. The second highest increase in promotion rates occurred at Grade 10 where the promotion rate would have been 71% without the program but rose to 83% with the program. Grade 11 showed a 6.33% point increase in promotion rates due to the program. Grade 12 data is not reflective of the program's full impact on that grade. The study data included only summer participates from Grade 12 (Maymester senior students were excluded from the study time frame). The 50% promotion/graduation rate of Grade 12 students in this study represented only two of four students who passed their course in the summer and were subsequently counted on the district graduation rate. It is important to note (though not officially a part of this study), that the district graduation rates increased from 61.0% in 2008 to 73.4% in 2009. Although the summer credit recovery data did not significantly impact the 12.4 percentage point increase in graduation rate, seniors who participated in the credit recovery program in the fall, spring, and Maymester sessions were included in the district's 2009 graduation rate.

School setting was not a major factor in analysis of promotion rates. There was some disparity in the promotion rate within the program between School A (81% promotion), School B (84% promotion), and School C (73% promotion) because this data is tied to both students' gains and pass percentages where disparities have already been discussed. However, all three high school sites showed a consistent positive improvement in their promotion rates as a result of the program. School A changed its promotion rate from 80% without the program to 87% with the program. School B changed its promotion rate from 77% without the program to 85% with the program. School C changed its promotion rates from 73% without the program to 83% with the program. It is noteworthy to mention that the study involved only the summer session of credit recovery. The district offered credit recovery in the fall to a limited group of seniors who

were not on target to graduate on time and in the spring to all students who met the criteria to enter the program, which was earning a failing grade in the original course attempt with a 60-69 average. It is certain that the actual impact on district and school promotion rates were higher than those reported as part of this study because of the limited time frame of the case study format.

Subgroup Discussion

How effective was the online mediated approach in increasing student achievement when factors such as race, ethnicity, socio-economic status, special education and course type were involved?

A study reported by the National Center for Educational Statistics (1995) identified eight characteristics to dropping out of school: retention in any grade or being "over-aged;" gender; socio-economic status; ethnicity; family issues; standardized test performance; absenteeism; and pregnancy. Many of these categories represent students routinely served in credit recovery programs across the nation. The purpose of this question was to determine if students from traditional No Child Left Behind (2001) subgroups were as likely to make academic gains and to ultimately pass the course as a result of the treatment (online mediated approach) as majority population students. For the analysis of gains by subgroup, a liner regression model was used to predict the relationship between the variable *x* (student gains) and variable *y* (selected subgroups). The original linear regression model included five variables: gender (male/female); race (white, African American, Asian, Hispanic, and American Indian); special education (IEP = yes, IEP = no); socio-economic status (free lunch, reduced lunch, full pay lunch); and Apex course. Courses with enrollments fewer than 10 students were removed from the model. Pretest scores were included as a covariate to control for wide differences in

student pre and posttest scores and ensured that comparisons between students groups were made using similar pretest scores. Gender, race, and special education were not significant in the linear regression test and were therefore removed from the model. In the online mediated environment, there was no significant difference in the gains made by females and those made by males; no significant difference in gains made by majority populations as those made by minority populations; and no significant difference in the gains made by non-special education students and those made by students with an IEP. Eliminating these subgroups was a positive outcome in light of district and state failure/retention rates that have historically shown higher numbers of males, African Americans, and special education students retained in their grade and subsequently more at risk of dropping out. The online mediated approach was successful in leveling the playing field for those two subgroups in terms of gains in content knowledge and skills. However, it is important to note that gains analysis, while meaningful to measure whether learning has occurred, does not mean that students in these subgroups learned enough to pass the course. Further analysis of pass/fail results by subgroup is needed to paint a complete picture.

Two variables were kept as a main effect from the original linear regression model to analyze student gains: socio-economic status (F/R lunch) and Apex course type. Therefore, the likelihood of making gains in the course was predictable in a positive or negative way by the nature of these variables. Controlling pretest scores, the free and reduced lunch variables had positive regression coefficients. This outcome was a significant finding because it showed that something about the online learning environment (time, space, support, and affinity with the online curriculum) had a positive impact above and beyond the impact it had on the full pay students. For example, for

every point gained in the online mediated course for full pay students, free lunch students gained 1.79 points higher and reduced lunch students gained an astounding 5.71 points higher. Analysis of the environmental conditions which may have contributed most to the positive gains free and reduced lunch students made occurs in the discussion of Research Question 4.

In the Apex course variable, American History, English 3, and Math Tech 1 had positive regression coefficients. For every point gained by students in English 1, students in American History gained 3.88 points higher, students in English 3 gained 1.89 points higher, and students in Math Tech. 1 gained .25 points higher than students in other courses. Conversely, eight Apex courses had negative regression coefficients indicating that for every point gained in English 1, students in Algebra 1 had 9.05 points lower, students in Algebra 2 had 3.21 points lower, students in Applied Biology had 4.53 points lower, students in Biology had 2.25 points lower, students in chemistry had 3.83 points lower, students in English 2 had 76 points lower, students in Geometry had 2.96 points lower, students in Math Tech. 2 had 10.88 points lower, and students in Spanish 1 had 5.58 points lower. It was hard to determine in this study why certain courses were easier or harder to learn online without a curriculum analysis of the course content. Student interviews (for question 4 of the study) did confirm that some courses were more challenging to learn online. It is important to note for general program improvement purposes that students in these courses may require additional time, academic support from face-to-face teachers, or additional coaching and monitoring by the academic coach to achieve gains at the rate of other courses. However, further qualitative study to determine the distinct connection between the specific environmental factors in the online mediated environment and course content is recommended so that districts know how to

maximize their efforts to help students learn the content in those courses that continue to present a challenge to students in both the traditional environment and the online and blended environments.

Results from the pass/fail analysis produced a slightly different impact on subgroup performance. To analyze pass/fail performance by subgroups a logistic regression model was used. Results from the logistic regression were calculated on the same 13 Apex courses where student enrollments were equal to or greater than 10 ($n \geq 10$). The original logistic regression model included the variables of gender (male/female), race (white, African American, Asian, Hispanic, and American Indian), special education (IEP = yes, IEP = no), socio-economic status (free lunch, reduced lunch, full pay lunch), and Apex course type (13 different courses). Pretest scores were included as a covariate to account for the likelihood that passing the test with at least a 70% score may be dependent upon where the student scored initially on the pretest. The logistic regression equation indicated that gender and race were removed as main effects from the model; however, students with an IEP, free or reduced lunch status, and students registered in particular Apex courses had a different likelihood of passing the course than students not in these categories. The regression coefficient for log-odds ratio equation was determined. Positive regression coefficients indicated that students had a greater chance of passing the course while negative coefficients indicated that students were likely to pass the course. Five variables produced a regression coefficient that was negative: special education (IEP); Algebra 1; Applied Biology; Biology 1; and Math Tech 2. Special education students were not significantly different in the gains analysis because students from that category were able to make gains roughly equivalent to those gains by students without an IEP. However, with pass/fail analysis there was a significant

difference in special education student performance compared to students without an IEP. When the confidence interval was calculated to determine the strength of the odds ratio, confidence interval for special education students did not include the value 1 (0.334-0.924), supporting the statement that students without an IEP in the sample population were nearly 2:1 times more likely to pass the course than students with an IEP with a 95% confidence level of the odds remaining true. Therefore, although the online mediated environment produced pass rates for the overall population at 86%, a significantly lower pass rate was evident for the special education population.

Pass rates also varied negatively for the four Apex courses (Algebra 1, Applied Biology, Biology 1, and Math Tech 2). Most notably, the confidence interval for Math Tech 2 also did not include the value of 1 (0.171-0.719), supporting the statement that students in Math Tech 2 were nearly 3:1 times less likely to pass the course compared to students in the reference Apex course (English 1). These results point to areas of further support and development in the online mediated environment. It is clear that the program did not have the same impact on all students and all courses. Special education students and students trying to master the second half of Algebra in the Math Tech 2 course did not get all their learning needs met on the online mediated environment.

On the other hand, nine variables in the model had positive regression coefficients which, when plugged into the regression equation, produced higher odds of passing the course. Strong positive regression coefficients were noted in the reduced lunch subgroup (1.51), Algebra 2 (1.21), and Chemistry 1 (13.61) courses. Smaller positive coefficients were found with free lunch students (0.26), and American History (0.55), English 2 (0.005), English 3 (0.11), Geometry (0.18), and Math Tech 1 (0.64) courses. Most notably, reduced lunch students were nearly 4:1 times more likely to pass the course than

full pay students. Algebra 2 students were 3:1 times more likely to pass the course than students in the reference course (English 1). Chemistry 1 students in the sample population had the highest odds to pass the course than any other course in Apex. The online mediated approach appeared to be most supportive of those students on reduced lunch.

Clearly, the blended model utilized in this study worked extremely well for some students. There were no significant differences in performance by gender or by race in gains or pass/fail analysis, which has positive implications on raising the achievement of males and African American students who have shown higher failure and retention rates in the district and across the state. Moreover, the program had a positive impact on free and reduced lunch students' performance, with these two subgroups outperforming the full-pay group in gains and pass/fail performance significantly. The course pass rate variability uncovered in this research question is harder to analyze without a complete review of the online curriculum, but the results from the study were helpful to pinpoint those courses which may require additional academic support (especially Math Tech 2, which had the lowest overall gain and pass percentage). Further qualitative study about the exact needs of the students in the designated subgroups may help districts fine tune the environmental support factors to produce higher pass rates in the future.

Overview of Qualitative Research

Studies about online course completion have taken two paths: research on the characteristics of successful online students, including causal models of motivation, locus of control, and reading level (Bedard & Knox-Pipes, 2006; Diaz, 2002; Roblyer & Marshall, 2002); and research on the characteristics of online learning environment, including independent versus collaborative environments, levels of social interactions,

and manipulation of the technology management systems (Roblyer, 2004). Along those lines, Boyd (2004) described four major domains which contribute to learner success in online environments. These domains included technological factors, student personal (psychological) factors, environmental (social) factors, and learner characteristics. Of interest in this study were those environmental and psychological factors that students most attributed to their success or failure in the online mediated environment. First, according to Boyd, the environmental factors impacting a student's success in an online course primarily deal with time, place, and support from significant others. The researcher in this study included an additional environmental variable called "affinity with the online learning" which pulled in an aspect of the technological readiness that Boyd described as a separate factor for student success in the online environment. The reason for adding the technology affinity component into this study's environmental variables was due to results generated from Akkoyunlu and Soylu (2006), where researchers found that the level of achievement and confidence, even in a blended environment where a teacher can mitigate technology difficulties, decreased when student technology skills were not strong enough to navigate the learning environment.

Second, another set of factors influencing student success in online learning was the personal or psychological characteristics of the students themselves (Boyd, 2004; Liu, 2007). Several key elements make up personal or psychological readiness for effective online learners. Research has identified a number of key motivational factors which play a role in online students' success. Boyd (2004) found that goal orientation, specifically the ability to articulate a keen understanding of why one is taking a particular course and what one wants from the program, was a significant factor for academic achievement online. Roblyer (1999), in an early study for him, found that the ability to exercise control

over one's learning environment was an important factor for students who experienced academic success in online environments. In a later study, Roblyer and Marshall (2002) used the Education Success Prediction Instrument to identify nine characteristics that accurately predict academic success in virtual courses, including internal locus of control, internal motivation, self confidence/self esteem, responsibility, degree of experimentation, time management, ability to set goals, achievement motivation, and self-reported computer technology skills.

In light of prior research on both purely online and blended learning programs in higher education and the K-12 arena, the qualitative portion of this study sought to answer which environmental and psychological factors students in the online mediated credit recovery attributed most to their success or failure. The purpose of this research was to shed light on the reasons why students experienced success in the program (as was noted in the quantitative analysis) and to uncover ways to improve the program, predict academic success, and support student achievement more fully. Interviews with ten students per school site (30 total) and two focus groups per school site (24 students total) were conducted to determine students' perceptions of the impact these themes had upon their learning in the online mediated environment. Student responses were analyzed to generate general descriptive statements about each theme. Unique responses were left as they were originally stated by the student, while similar responses were combined into one representative statement to create a concise subset of descriptions about each theme. Descriptive statements with a cumulative frequency of 0-6 students who affirmed that statement were determined by the researcher as those conditions students believed to have had a low impact on their learning. Descriptive statements with student affirmation in the 7-15 range were determined to have had a moderate impact on student learning.

Descriptive statements with a cumulative frequency of 16 or higher responses were determined to have a significant impact on student learning.

Environmental Factors Discussion

What is the relationship between external environmental factors in the online mediated environment and student achievement?

The literature revealed four common themes: time; space; support; and affinity with online learning strategies (including technological readiness) as primary factors for online learning success. Students first responded to questions about the general learning environment to compare/contrast it with the traditional learning environment where they had not been successful previously and to reflect upon the things in the online mediated learning environment that supported or hindered their learning. Sequential instructional format and control of pace emerged as significant differences in the online mediated learning environment. Significance was determined by 16 or more student contributions of the descriptive statement. First, the most significant difference noted by students was that the computer presented information in a "step-by-step" instructional format. Twenty-two students (37%) felt that they could learn the content better on the computer. In the interview, students said that "there were no surprises from the computer like in the regular classroom" (Anonymous, personal communication, June 10, 2009). Several students noted that the computer "never got off the subject" or "presented extra information that was not needed" (Anonymous, personal communication, June 10, 2009). These students showed an affinity for the sequential instructional design and the predictable format in online units with frequent checks for understanding, quizzes, and tests. Second, 20 students (33%) felt that having control of the pace of their learning was a major difference between the traditional and the online mediated environment. Students

in the interview and focus groups stated that, “I can speed up on the things I understand and spend longer on the things that confuse me,” or “I don’t have to try to keep up with the teacher or the other students” (Anonymous, personal communication, June 10, 2009). Student commentary about controlling the pace was focused on how the online curriculum allowed them to customize or differentiate the class to meet their needs. Students used the term “less pressure” to contrast the online learning environment from the traditional classroom (Anonymous, personal communication, June 10, 2009). Results from this study support conclusions from Watson et al. (2008), who reviewed online credit recovery programs and determined that online learning is particularly well suited to students recovering credit because the model allows for individualized instruction.

The second interview question allowed students to get specific about which of the differences (stated in question 1) in the credit recovery program were most supportive of their learning and which were least supportive of their learning. Again, the highest response, 33% of students (n = 20), noted that the biggest support for their learning was the instructional format of the online course. Students further elaborated in their responses to question 2 on the factors in the instructional format they favored including, “the study guides and practice quizzes” (7 students), “the step-by-step instructional sequence” (6 students), “the immediate feedback on incorrect work followed by the opportunity to redo missed items” (5 students), and “the audio component that read the material aloud for them” (2 students) (Anonymous, personal communication, June 10, 2009). The second highest response students cited as supportive of their learning was the flexibility in the learning environment (23%, n = 14). Here students discussed the “less competitive atmosphere in the credit recovery program, the fewer number of distractions in classroom noise and behavior in the credit recovery program, and comfort in the

learning space" as factors influencing their preferences (Anonymous, personal communication, June 10, 2009). Finally a moderate number of students favored controlling the pace of their learning (22%, n = 13).

On the other hand, a moderate number of students (15%, n = 9) also felt that the online learning did not match their learning style. Here students stated that "they were bored just reading all the time," or "they couldn't get the material without a live teacher presenting things step by step" (Anonymous, personal communication, June 10, 2009). These comments are helpful to the field of online learning and blended learning for at-risk K-12 students because they stress the need to screen students as candidates for online learning courses. Students who have little to no independence may not be as successful in blended or purely online programs.

Time Discussion

According to Boyd (2004), good time management skills are an essential quality for effective online learning. Time was an important environmental factor in the summer credit recovery session because students were given a limited amount of time to complete the work (two weeks). A clear benefit of an online curriculum model was that it could be accessed at any time of day at home by students. However, as a support for students, a school lab was open from 9:00 a.m.-3:00 p.m. each day for 2 weeks. Students in the interview and focus group responded to two questions about time: (1) What strategies (if any) did they use to organize their time in a way that helped them learn the content better?; and (2) What impact did the time of year (summer) have on their learning? According to student perceptions, organization of their time in the learning environment was not a significant factor for success. Fifteen students (25%) responded that to get the work done, they did utilize a time management strategy whereby they prioritized easier

work first in the units and then did the harder work. Others took advantage of the credit recovery model that allowed them to work in the lab during the day and finish incomplete work at night (20%, n = 12 students). These students used time and the flexibility of controlling the content to determine what they could do quickly and what would take them longer. They used time in the day and at night flexibly to meet their needs. Prior responses about having control over the pace of their learning may have influenced student responses to questions about time. That is, students who felt they could control the pace of their learning at will, may not have seen time as a discriminating factor for their success in the program.

Conversely, just as many students (25%, n = 15) admitted they had no strategy for managing their time. These students went through the content presented to them sequentially and trusted that they would finish the work on time. No students reported that they did not have enough time to complete the work. One possible reason why time may not have been reported as a factor for failure in the program was the blended structure of the program. It was the primary job of the academic coach to keep students moving forward in the content and to note when students had not logged in to work on their course. If a problem was detected with students not keeping up with their work, the academic coach contacted those students immediately by email, phone, or in person in the lab setting to talk with them about any problems they were having with the work and to mitigate those problems with a teacher tutor or a pep talk about getting their work done. Students may not have perceived time to be a negative pressure point if the structure of the program adequately supported their ability to get the work done on time.

On the other hand, taking the course in the summertime was a significant factor in student success. According to student perceptions in the interview, 18 students (30%) felt

more motivated and focused on their learning in the summer. Students responded that "I could work on the course in pieces and take my time in the summer" or "I knew I had to really work to understand the content because I was giving up my summer break time" (Anonymous, personal communication, June 10, 2009). For these students, summer seemed to be a motivator to do their best work. Additionally, 15 students (25%) felt that being able to concentrate on one course at a time in the summer was an advantage. During the regular school year, if a student was doing a credit recovery class online, he or she would also have four other courses going on in the traditional environment. However, in the summer session, 22% (13 students) reported that they had fewer demands on their time and fewer distractions to their learning. A follow-up study that compared student results in the summer to those of the spring and fall semesters could shed light on whether time of year produces different results in student gains, pass rates, and promotion rates.

Space Discussion

Another environmental factor for success in online learning from the literature had to do with the students' ability to exhibit control over their physical workspace (Boyd, 2004). Studies have indicated that students must be adept at knowing if they learn best in quiet or busy surrounds, alone or in the company of others, in formal or informal settings (Osborne, 2000). Space was a significant factor cited by students in this study in determining their success in the program. Although students were free to do the credit recovery course online at home in their own comfortable space, the majority of those students interviewed, 47% (28 students), decided to do their work in the lab at school because there were too many distractions at home. Another 32% (19 students) said that they preferred the lab at school because they could get help from the face-to-face teacher.

Given the nature of the at-risk student population in the program, it is not surprising that more students chose the lab setting to do their work instead of home. This finding is supported by previous research studies, including Hannum et al. (2008) who found that at-risk students were more apt to succeed in online courses if time and space were offered in a lab setting with a trained facilitator to offer technological and social/academic support. Lynch and Dembo (2004) also found with higher education students that two of the key factors predicting success in a blended learning environment were the ability to manage the study environment (including time and space) and the ability to seek academic assistance when needed. Finally, Pintrich and DeGroot (1990) stressed that students who exhibited control of their learning environment, including choosing an appropriate location to study, using study time effectively, and eliminating distraction, consistently performed better than students who did not.

Support and Help-Seeking Discussion

Bonk and Graham (2006), long-time supporters of blended environments for K-12 learners, maintained that support has been the missing piece for at-risk learners in an online environment. Lynch and Dembo (2004) defined help-seeking as the process whereby students asked peers or instructors for help to clarify misconceptions or mitigate confusion. Students interviewed as a part of this study cited support as a significant environmental factor to their success in the program. Thirty-six students (60%) said that they regularly got support from the face-to-face teacher in the lab setting. Another 27% (n = 16) reported that they got help from peers, parents, or siblings. Interestingly, students who responded favorably to the support component strategically chose the source of help that best suited their needs. For example, one student said, “I mostly got help from the academic coach. I didn’t use the classroom teachers because I didn’t like

the way my last year's teacher taught the material, so I didn't trust him. I also got help from people sitting near me who had already taken the course. That was good for me and wouldn't have been allowed in the regular classroom" (Anonymous, personal communication, June 10, 2009).

Students who were interviewed also likened the support they received from teachers to that received by peers because the teacher was more of a tutor or facilitator in the learning environment not the driver of the curriculum, saying, "I got help from a teacher and my friends. There was always someone who knew a little about it. At home, my parents don't remember the stuff as well as a teacher" (Anonymous, personal communication, June 10, 2009). These results confirmed what Passey (2000) concluded in an earlier study, which was that at-risk online learners often need strategic support to increase performance.

Affinity for Online Learning Discussion

Miltiadou and Yu (2000) defined technological readiness as the ability to access and use the necessary hardware and software to achieve one's learning objectives. Questions 7 and 8 in the interview asked students how well they were able to learn the content online. It also asked students to name those online components that most supported or detracted from their learning. When asked what made it difficult or easy to learn online, 42% (25 students) responded that the sequential step-by-step instructional format made learning online easier. Another 25% (15 students) cited that controlling the pace of the curriculum supported their learning. This data confirmed what students noted in interview questions 1 and 2 as qualitative differences between the traditional learning environment and the online environment. A majority of the students interviewed preferred the online curriculum and felt that they learned the content better in the online

mediated environment. When students described their learning experience, they said, "It was easier on the computer because it (the software) included an outline of all the things you needed to know" (Anonymous, personal communication, June 10, 2009). Others said, "I could really take my time and think about my answers." Others liked the redo option that offered new test items on a test retake, saying, "We could go back to material and look up what we didn't do well on the test and then we could re-test" (Anonymous, personal communication, June 10, 2009).

A very small number of student responses (10) in the interview and focus group indicated that the technology of the online format made it harder to learn their content. Of these, one student noted that the online learning platform was too unfamiliar; six students did not feel that the online platform matched their learning style; and three students felt that something in the nature of their course made it harder to learn online. A lack of affinity for the online learning environment may not have been cited as a significant detractor for student learning because students were given a thorough orientation of the online curriculum before beginning the units of study and received technological support from the academic coach throughout their work in the course as needed. The positive response to this support structure confirms prior conclusions by Hannum et al. (2008); at-risk students can succeed in a blended learning environment when technological support is provided. When asked which online tools helped or hurt your learning, the audio and video components received the most significant positive responses from 30% students. Students had a moderate positive response to the sequential format of the lessons, the study guides, and the practice tests. A small number of students (8.3%, n = 5) expressed dislike for the misspell feature that counted their answers wrong if they misspelled a word.

Psychological Factors Discussion

What is the relationship between the psychological internal controls of learning in the online mediated environment and student achievement?

Miltiadou and Savenye (2003) analyzed three major categories of motivation. The first category included individuals' perceptions about their ability to accomplish a task including self-efficacy, locus of control, and attribution. These constructs answered the question, "Can I do this?" In an online credit recovery scenario, these factors have the potential to loom large in student performance because students have already had a negative experience with the course in the traditional environment. The second category of motivation included the individuals' reasons for engaging in the task, including intrinsic and extrinsic goal orientation. These constructs answered the question, "Why am I doing this?" Finally, the third category of motivation included individuals' techniques and strategies for accomplishing a task including self regulation as it relates to the employment of specific learning strategies. This construct answered the question, "How can I do this?"

Keeping with this theoretical basis, 239 of the 417 students (61%) in this study responded to the Motivated Strategies for Learning Questionnaire, which measured student perceptions on the following psychological factors: the value components of intrinsic goal orientation; extrinsic goal orientation and task value; the expectancy components of control of learning beliefs and self-efficacy for learning and performance; the affective component of test anxiety; the cognitive and metacognitive learning strategies of rehearsal, elaboration, organization, critical thinking, and metacognition; and the resource management strategies of time and study environment control, effort regulation, peer learning, and help seeking. These factors became the independent

variables with student achievement (final Apex grade) as the dependent variables. A general linear regression test was used to predict students' final grades in the Apex course, with the final grade representing the mean of all unit tests taken. The independent variables were put into the linear regression model in a stepwise fashion to determine which of the variables could adequately predict student outcomes. Using $\int entry = .05$ as a point of significance, two variables were significant to remain in the model: the expectancy component control of learning beliefs (F = 6.65, P = .01) and the resource management strategy peer learning (F = 14.12, P = .0002). Control of learning beliefs was defined by Pintrich et al. (1991) as a student's belief that his or her efforts would result in a positive outcome. Students responded to four statements on a Likert-style questionnaire and rated how like themselves the statement was. The statements included: (1) if I study in appropriate ways, then I will be able to learn the material in this course; (2) it is my own fault if I don't learn the material in this course; (3) if I try hard enough, then I will understand the course material; and (4) if I don't understand the course material, it is because I didn't try hard enough. There was a significant relationship between students scoring in the highest decile on their final Apex grade in the course (86-100 final average) and control of learning beliefs. The expectancy component, control of learning beliefs, is closely aligned with Rotter's (1966) definition of locus of control. It referred to the extent to which a student believed that his/her behaviors influenced success or failure in the task at hand. Pintrich and Schunk (1996) purported that students with internal locus of control attributed their success to their own effort and abilities while students with external locus of control identified factors for success outside of themselves. Students completed the MSLQ on the third day of the course. They had

ample time to experience the computer-based curriculum and online mediated learning environment before responding to the survey. The statements to which students responded represented a clear slant toward qualities of internal locus of control as they focused on student effort management and personal accountability. Therefore, the results to this study confirmed earlier studies that students with higher internal locus of control and control of their learning beliefs performed better academically (Roblyer & Marshall, 2002; Wang & Newlin, 2002a; 2002b) than students without internal locus of control. It is possible that the environmental factors discussed previously, most notably the step-by-step instructional format of the curriculum (41%), the control of the pace of their learning (37%), and fewer distractions to their learning (22%), contributed to students' beliefs that they had more control of their learning.

Peer learning was also found to be a significant predictor of success in the online mediated environment. Pintrich et al. (1991) defined peer learning as the extent to which students collaborated with their peers to clarify course material and reach insights that they may not have attained on their own. Peer learning was a resource management strategy encouraged in the online mediated environment. Thirty percent of students interviewed (16 students) took advantage of peer learning opportunities and reported that they positively impacted their learning. Moreover, the nature of the interactions between the face-to-face teacher and students in the online mediated environment was more of a facilitator/tutor relationship than a traditional teacher/student relationship. Sixty-six percent of students interviewed (36 students) reported soliciting help from the teacher when they could not get the content from the computer independently. Thirty percent of students (16 students) reported getting help from peers, parents, or siblings. The blended learning model encouraged students to utilize the help sources available to them. By

strategically utilizing support structures such as peers and teachers, the at-risk students showed characteristics of self-regulatory behaviors. According to Miltiadou and Savenye (2003), self-regulated learners exhibit control over their learning by employing specific cognitive strategies that help them make sense of what they are learning. Results from this study support what Little (2008) discovered about self-regulatory behaviors in an online environment. That is, if students perceived that their effort, help-seeking strategies, and specific learning strategies would have a positive outcome on their learning (control of learning beliefs), they were more likely to be self-motivated and to proactively use the self-regulatory skills (i.e. peer learning) that contribute to positive student achievement.

Implications of the Quantitative and Qualitative Findings

The results on student achievement in online credit recovery programs across the United States have been varied, at best. Two factors seem to have emerged from the review of the literature to explain the variability in results. First, the type of student enrolled in the online course and their purpose for taking the online course has been an important factor. In a study of online programs, Simeroth (2007) concluded that students who were taking courses to accelerate significantly outperformed students who were taking courses to recover credits. Similarly, Christian (2003) studied a credit recovery program geared towards increasing the promotion of ninth grade at-risk students who were behind their grade-level peers to tenth grade. The researcher concluded that the odds were only slightly higher for students to promote if they participated in the online credit recovery program.

Though not measuring the exact same variables, this study presented clear contradictions to Simeroth's (2007) and Christian's (2003) findings which may support

school districts' continued funding and refining of online learning options for at-risk students. First, 98% of the at-risk population in this study made gains in the program and gains for many were substantial (mean gain = 38 points). Additionally, gains were noted across all subgroups except in eight specific Apex courses where student gains did not match gains made by the reference course (English 1). There was a significant positive difference in the gains made by free and reduced students, most especially with those students on reduced lunch, indicating that the structural supports in the online environment met the needs of the reduced lunch student.

Second, the at-risk students in this study achieved a high pass rate percentage (86%). Some variability occurred in pass rates by school site which implies a potential qualitative difference in how the program was implemented and by specific subgroups (special education and certain Apex courses), which implies that the model does not work as well for all students. However, there was a significant positive difference in pass rates for free and reduced lunch students that may have been a product of the learning environment variables because computers, academic support, time during the school day, and a quiet space were provided by the school. The overall results from this study supported earlier credit recovery studies where course gains and course pass rates were positively impacted by the program, including two credit recovery studies conducted in Texas where at-risk students earned credits in the online credit recovery environment faster than their at-risk counterparts in the traditional remedial environment (Christian, 2003; Watson et al., 2008). Additionally, pass results in this online mediated environment approached but did not reach success rates purported by Florida Virtual Schools, which has long maintained that 90% self-reported credit recovery students successfully passed the course and earned credit compared to 92% of students who passed the online courses

for initial credit.

Third, the at-risk students in this study promoted at a rate of 79% which approached the traditional mainstream population promotion rate of 86% and improved the district's overall promotion rate to 85%. The highest promotion rates were noted for ninth grade, which has been strongly connected to increasing high school graduation rates and decreasing dropout rates. Other studies on credit recovery models have not seen significant promotion rates with ninth grade students (Simeroth, 2007), which provides some impetus for districts to determine which specific supports provided in this credit model most impacted the ninth grade students' promotion.

A second factor that has emerged to explain some of the variability in student performance across credit recovery studies has been the type of program (fully online or blended) and the support structures in place to assist student learning. Akkoyunlu & Soylu (2006) conducted a qualitative study to determine student affinity with blended versus purely online learning environments with respect to their achievement level. They found that students at the lower end of achievement favored more face-to-face instruction from a teacher in the blended environment over the online portions. Likewise, Watson et al. (2008) determined that a blended environment was well-suited to the high school credit recovery student because it allowed for individualized instruction through a course management system and face-to-face teacher support.

The model analyzed in this study followed more closely to a blended approach than a purely online environment, which may have accounted for a great deal of the model's success in student gains, credit attainment, and promotion. Qualitative data analyzed in question 4 of the research study strongly suggests that the blended or online mediated approach may have been a significant factor contributing to the positive student

performance. Environmental conditions that students found most supportive of their learning were the sequential step-by-step instructional format in the online curriculum, the ability to control the pace of their learning, access to a learning space that had fewer distractions, the ability to focus on one course at a time (in this case during the summer session), and the support from face-to-face teachers and peers when the course content became difficult. Additionally, results from the psychological questionnaire confirmed that students who took advantage of the collaborative learning environment in the online mediated program to work with peers and teacher tutors performed higher than those who did not. The structural supports provided in the blended environment (time, space, support) may have given the at-risk students in this study population more of a sense of control of their learning. The psychological analysis conducted with the Motivated Strategies for Learning Questionnaire found that those students who had internal locus of control and made a connection between their hard work and positive learning outcomes performed significantly higher than students who did not. The qualitative findings from this study provide rich descriptive information about what at-risk learners need to be successful. Additionally the blended learning environment may have been a factor explaining why some of the other psychological factors in the MSLQ were not significant in this study. For example, students regularly received help from teachers, peers, and the academic coach so help seeking may not have been a discriminating factor. Likewise, effort regulation may not have been factor because student effort or lack thereof was monitored by the academic coach to ensure that students stayed on task. Districts, however, may want to prescreen students on both the psychological and environmental variables analyzed in this study to determine which specific support strategies targeted students. There are inherent financial implications of replicating the model, including the

purchase of a credible online content provider that correlates with state and local standards, the hiring of an academic coach who actively recruits students into the program and works in a supportive role to keep students motivated and on task to complete the assignments, and provides technological support when needed, the computer hardware infrastructure and lab space, and the employment of teacher tutors during and after school hours. There is also a regular classroom teacher buy-in component that is not investigated in this study, but critical to the program's success. Students did not take the entire course again in the online mediated environment; they took those units that that traditional classroom teacher and the pretest confirmed as weaknesses for the student.

Limitations of the Study

One major limitation of this study is that credit recovery programs differ in design, location, target student audience, and program components. Some programs offer purely online, some offer blended, and some offer traditional formats. Therefore, it is difficult to generalize quantitative gains and pass/fail results, and promotion across different credit recovery settings. These findings may be generalized to some extent to blended learning environments that target at-risk students; however, there are other variables in the program which are difficult to control such as the level and quality of support provided by the face-to-face teachers and academic coach, time of year, and quality of the online curriculum.

A second limitation of this study was a lack of longitudinal perspective. The online mediated credit recovery program was offered to students for a total of five semesters in the district, but this study only looked at one sample population in the summer session. Information provided by students in the environmental analysis suggests

that pass rates may not have been as high if the study had included the fall or spring semesters because students had to take a full course load during the regular school day and work in the credit recovery online course after school and on weekends from home. Additionally, districts' promotion rates reported in this study only include those students who took credit recovery in the summer session. Fall and spring credit recovery students may have positively impacted the promotion rates beyond what was presented here.

Third, the study is limited in design due to the fact that there was no control group; therefore, internal validity of the study came into question. According to Gall et al. (2003), at threat in a pre-experimental design are the extraneous variables associated with student history, maturation, testing, and instrumentation. An experimental design with a control group provides an estimation of these variables; however, it was not possible in a credit recovery model where the purpose was to measure the effectiveness of the new treatment, i.e. the online mediated curriculum on student achievement, to include a control group. The absence of a control group was not a serious threat to the internal validity of this experiment because students had recently failed the course in the traditional classroom environment, so little time and maturation had passed and no additional testing had been given to students between the conclusion of the course in the traditional environment and the experimental treatment in the online mediated content.

Finally, the study is limited in the student sample population in two areas. Students had to self-select into the credit recovery (they were not randomly selected) based on meeting initial criteria for entrance including having a 60-69 final average in the first attempt at the course and their having the time, interest, and nominal fee ($25.00) to participate in the program during the summer. Therefore all students who could have been a part of the study were not represented. Second, the students who took the

Motivated Strategies for Learning Questionnaire were also self-selected based on parent permission.

Recommendations for Future Studies

Some isolated studies measuring the effectiveness of blended learning environments on high school student achievement have been conducted, but it remains an under-researched area of online learning. Scribner (2007) argued that correlations have been found between motivational elements identified by learning theories and the motivation to learn in online environments with adults, yet these should not be generalized to younger populations. This study attempted to study those environmental and psychological factors that predicted success in a blended learning environment focused on the most at-risk learners and to correlate those factors with achievement gains. In a broad sense, it did provide information about what environmental and psychological factors the at-risk group as a whole believed positively or negatively impacted their learning. However, the study stopped short of connecting environmental and psychological readiness factors to specific subgroups and students taking specific courses. A qualitative follow-up study that explores the specific connections between those variables would strengthen the body of research on high school blended learning environments and strengthen what high schools could do to better support struggling learners.

Additionally, gains, pass rates, and promotion within this online mediated credit recovery program showed variability by school site. Although attempts were made to control the potential differences in school sites by using the same profile for the sample population, same online content provider, same programmatic structures, and same training for the adults facilitating the program, there remained too many other variables to

control which may have impacted student results. One follow-up study to this research could measure through qualitative methodology the nature and quality of the help provided by the teachers in the blended setting, the amount and type of support from peers or significant others students chose to use, as well as the relationship and skill of the academic coach whose job was to not only monitor student progress in the content management system, but to motivate, encourage, and direct students to help sources when learning was impeded in the online environment.

Finally, one aspect that was not explored in this study was the teachers' perceptions of the online mediated credit recovery program. A companion study to this research could measure the teacher perceptions of student achievement in the online mediated environment including those teachers who serve as tutors and those from the traditional classroom which must support student participation in the program.

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Appendix A

Parent Letter

Dear Parent(s):

As part of our ongoing efforts to improve how we offer online courses in Rock Hill Schools, we are conducting a research study concerning students' motivation and learning strategies in the credit recovery program. 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 while retaking the course in the credit recovery program. The survey will take approximately 20 – 25 minutes and will be administered on the third day of the course. 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. However, the information your child shares will help us improve services and support to all students who take online credit recovery classes in the future. Your child may also be asked to participate in a focus group and/or interview about the credit recovery program at the end of the course. We extend to you and your child our deepest gratitude for your participation in this research study.

In order to include your student's responses as part of the research, we need your permission. Attached is the Informed Consent Document which gives you more information about the research procedures and how the information will be used. After you have reviewed the form, please check the box "I consent" or "I do not consent" and sign your name at the bottom of the page.

Appendix B

Informed Consent Document

Informed Consent Document

For the Study: Environmental, Motivation, and Learning Strategy Factors in Online Credit Recovery Programs

RESEARCH PROCEDURES
This research project is designed to evaluate the effectiveness of the online mediated Credit Recovery Program during the summer 2009. It will specifically examine the learning environment factors, motivation factors, and learning strategies students use to complete online credit recovery courses. If you agree to allow your child to participate, your child will complete an online survey on the third day of the course. The survey will ask students questions about your child's motivation to learn and the strategies he/she uses to learn in the online environment. A random selection of students will also be asked to participate in a short focus group and/or interview with a district office employee about the effectiveness of the credit recovery program to their learning needs.

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

BENEFITS
There are no direct benefits to your child for participating in this study other than to further research in online mediated learning environments and help the district improve its Credit Recovery Program.

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 this 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 Rock Hill Schools and for a doctoral dissertation by Sheila Huckabee (shuckabe@rock-hill.k12.sc.us) at Gardner-Webb University. You may contact Sheila Huckabee, Executive Director of Secondary Education at 981-1048 or Dr. Allen Eury at Gardner-Webb University at aeury@gardner-webb.edu if you have questions or comments regarding your rights as a participant in this research.

This research has been reviewed according to Gardner-Webb University procedures governing your participation.

CONSENT

- I have read the Informed Consent Document and agree to allow my child to participate in the study

- I have read the Informed Consent Document and DO NOT agree to allow my child to participate in the study

My signature below confirms the response checked above represents my wishes on participation in this study.

_____ _____

Student Signature *Parent Signature*

Appendix C

Interview and Focus Group Questions

Interview/Focus Group Questions

Introduction:
Think for a minute about the learning you have been doing in the credit recovery program this summer. The purpose of this interview is to determine what conditions in the learning environment may have helped or hindered your academic success. I will be asking you a series of questions to get you to think about the time, space, support, online curriculum format, and

General Question:

1. Was the online learning environment different from your regular classroom learning environment? If so, what differences in this environment stood out to you?

2. Of the things you listed above, which conditions supported your learning? What conditions made it harder for you to learn?

Time:

3. Did you organize your time in the learning environment to help you be successful in the course? If so, how?

4. How did taking this credit recovery course in the summer session affect your learning?

Space:

5. Were you a student who chose to take credit recovery on campus or at home?

6. Why or how did you choose the space for your learning?

Support:

7. Did you seek help in learning when things got difficult? If so, from who and when did you get help

Online Curriculum:

8. How well were you able to learn the subject matter in the online format?

9. What qualities in the way APEX presented the content helped or hurt your learning?

Appendix D

Motivation Strategies for Learning Questionnaire

DEMOGRAPHIC INFORMATION

1. Gender Male_____ Female_____

2. What year will you graduate from high school? _____

3. Class level:

   Freshman____ Sophomore_____ Junior_____ Senior_____

4. Ethnic background:

   Black_____ Asian-American_____ Caucasian_____ Hispanic_____ Other

5. How many classes did you take last semester? _____

6. How many hours a day are you working on this summer course? _____

7. Are you currently or have you ever received special education services?

   YES NO

8. Reasons for taking this class (answer YES or NO for each item).

   a. fulfills promotion requirement YES NO

   b. is required of all students in high school YES NO

   c.. will help improve my academic skills YES NO

9. How did you find out about the credit recovery program?

   a. from the report card message YES NO

   b. from the Academic Coach YES NO

   c. from the school website YES NO

   d. from a friend YES NO

   g. from a counselor YES NO

Part A. Motivation

The following questions ask about your motivation for and attitudes about this credit recovery class. The class is referred to as an "online mediated class" because it is taught with online content from APEX but supported by an Academic Coach and teacher. Remember there are no right or wrong answers; just answer as accurately as possible. Use the scale below to answer the questions. If you think the statement is very true of you, circle 7; if a statement is not true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

1	2	3	4	5	6	7
not at all true of me						very true of me

1. In an online mediated class like this, I prefer course material that really challenges me so I can learn new things.
2. If I study in appropriate ways, then I will be able to learn the material in this online mediated course.
3. When I take a test I think about how poorly I am doing compared with other students in this online mediated course and in other courses.
4. I think I will be able to use what I learn in this online mediated course in other courses.
5. I believe I will receive a successful grade in this class this time.
6. I'm certain I can understand the most difficult material presented in the readings for this online mediated course.
7. Getting a good grade in this class is the most satisfying thing for me right now.
8. When I take a test I think about items on other parts of the test I can't answer.
9. It is my own fault if I don't learn the material in this course.
10. It is important to me to learn the course material in this online mediated class.
11. 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.
12. I'm confident I can learn the basic concepts taught in this online mediated course.
13. If I can, I want to get better grades in this class than most of the other students.

14. When I take tests, I think of the consequences of failing.

15. I'm confident I can understand the most complex material presented by the computer instructor in this course.

16. In an online mediated class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.

17. I am very interested in the content I am learning in this online mediated course.

18. If I try hard enough, then I will understand the course material.

19. I have an uneasy, upset feeling when I take a major unit test in this online mediated course.

20. I'm confident I can do an excellent job on the assignments and tests in this online mediated course.

21. I expect to do well in this online mediated class.

22. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.

23. I think the course material in this online mediated class is useful for me to learn.

24. Even when I have the opportunity to skip learning activities in this online mediated class, I choose to do all course assignments that I believe I can learn from, even if they don't guarantee a good grade.

25. If I don't understand the course material, it is because I didn't try hard enough.

26. I like the subject matter of this course.

27. Understanding the subject matter of this course is very important to me.

28. I feel my heart beating fast when I take an exam.

29. I'm certain I can master the skills being taught in this class.

30. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.

31. Considering the difficulty of this online mediated course, the teacher and academic coach who are here to help me, and my skills in this subject, I think I will do well in this class.

Part B. Learning Strategies

The following questions ask about your learning strategies and study skills for this online mediated class. Again, there are no right or wrong answers. Answer the questions about

how you study in this class as accurately as possible. Use the same scale to answer the remaining questions. If you think the statement is very true of you, circle 7; if a statement is not at all true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

1	2	3	4	5	6	7
not at all true of me						very true of me

32. When I study the readings for this online mediated course, I outline the material to help me organize my thoughts.

33. While participating in this online mediated class, I often miss important points because I'm thinking of other things.

34. When studying this online mediated course, I often try to explain the material to a classmate or friend.

35. I usually study in a place where I can concentrate on my course work.

36. When reading for this course, I make up questions to help focus my reading.

37. I often feel so lazy or bored when I study for this online mediated class that I quit before I finish what I planned to do.

38. I often find myself questioning things I hear or read in this online mediated course to decide if I find them convincing.

39. When I study for this class, I practice saying the material to myself over and over.

40. Even if I have trouble learning the material in this class, I try to do the work on my own, without help from anyone.

41. When I became confused about something I'm reading for this class, I go back and try to figure it out.

42. When I study for this course, I go through the readings and my class notes and try to find the most important ideas.

43. I make good use of my study time for this course.

44. If course readings are difficult to understand, I change the way I read the material.

45. I try to work with other students from this class to complete the course assignments.

46. When studying for this course, I read my notes and the course readings over and over again.

47. When a theory, interpretation, or conclusion is presented in class or in the readings, I try to decide if there is good supporting evidence.

48. I work hard to do well in this class even if I don't like what I am asked to do.

49. I make simple charts, diagrams, or tables to help me organize course material.

50. When studying for this course, I often set aside time to discuss course material with a group of students from the class.

51. I treat the course material as a starting point and try to develop my own ideas about it.

52. I find it hard to stick to a study schedule.

53. When I study for this class, I pull together information from different sources, such as the online lectures, the readings, activities, and quizzes.

54. Before I study new course material thoroughly, I often skim it to see how it is organized.

55. I ask myself questions to make sure I understand the material I have been studying in this class.

56. I try to change the way I study in order to fit the course requirements and the online instructor's teaching style.

57. I often find that I have been reading for this class but don't know what it was all about.

58. I ask the on site academic coach or content teacher to clarify concepts I don't understand well.

59. I memorize key words to remind me of important concepts in this class.

60. When the course work is difficult, I either give up or only study the easy parts.

61. I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying for this course.

62. I try to relate ideas in this subject to those in other courses whenever possible.

63. When I study for this course, I go over my notes and make an outline of important concepts.

64. When reading for this class, I try to relate the material to what I already know.

65. I have a regular place set aside for studying.

66. I try to play around with ideas of my own related to what I am learning in this online mediated course.

67. When I study for this course, I write brief summaries of the main ideas from the readings and my notes.

68. When I can't understand the material in this course, I ask another student in this class for help.

69. I try to understand the material in this class by making connections between the readings and the concepts from the online lectures.

70. I make sure that I keep up with the weekly readings and assignments for this course.

71. Whenever I read or hear an assertion or conclusion in this online mediated class, I think about possible alternatives.

72. I make lists of important items for this course and memorize the lists.

73. I report to the school site to complete this online mediated class regularly.

74. Even when course materials are dull and uninteresting, I manage to keep working until I finish.

75. I try to identify students in this class whom I can ask for help if necessary.

76. When studying for this course, I try to determine which concepts I don't understand well.

77. I often find that I don't spend very much time on this online mediated course because of other activities.

78. When I study for this class, I set goals for myself in order to direct my activities in each study period.

79. If I get confused taking notes from the computer, I make sure I sort it out later.

80. I rarely find time to review my notes or readings before an exam.

81. I try to apply ideas from course readings in other class activities such as lectures and discussion.