

INVESTIGATING PREDICTIVE FACTORS FOR ONLINE COLLEGE COURSEWORK  
SUCCESS AMONG HIGH SCHOOL STUDENTS

by

Kenneth Franklin Tidwell, Jr.

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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## ABSTRACT

This study seeks to examine the relationship of motivation and self-regulated learning with online college course completion among dual enrolled high school students in Northwest Iowa. The purpose of this study is to determine if there is a predictive relationship between high school student self-efficacy, intrinsic value, test anxiety, cognitive strategy usage and self-regulation strategy usage and successful completion of an online college course. A predictive correlational study was performed. A convenient sample of 23 high school students from one urban Northwest Iowa school district was utilized. Students were surveyed regarding these traits using the Motivated Strategies for Learning Questionnaire (MSLQ). Once survey responses were attained, binary logistic regression modeling was used to determine the strength of predictor variables to predict the final course grade of passing or failing. The study determined there was not a significant predictive relationship between variables and successful course completion. It is suggested that further study be conducted with a larger sample.

*Keywords:* motivation, online learning, dual enrollment, self-regulation, motivated strategies for learning questionnaire.

### **Dedication**

I dedicate this work to my wife, April. Thank you for supporting me in all my varied degrees and continuing to encourage the diverse paths our life's journey together has traveled. You have long been the example of an excellent educator that I aspire to be.

## **Acknowledgments**

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### **List of Abbreviations**

American Psychological Association (APA)

Chief Academic Officer (CAO)

Community College Research Center (CCRC)

Family Educational Rights and Privacy Act (FERPA)

Educational Success Prediction Instrument (ESPRI)

International Business Machines (IBM)

Institutional Review Board (IRB)

National Alliance of Concurrent Enrollment Partnerships (NACEP)

Learning Management System (LMS)

Motivated Strategies for Learning Questionnaire (MSLQ)

No Child Left Behind (NCLB)

Self-Regulated Learning theory (SRL)

Socioeconomic Status (SES)

Statistical Package for the Social Sciences (SPSS)

Talented and Gifted (TAG)

Variance Influence Factors (VIF)

## **CHAPTER ONE: INTRODUCTION**

### **Overview**

Across the nation, 48 states provide dual enrollment opportunities with various higher educational institutions through policy or law impacting approximately 1.4 million high school students in 2011 (Iowa Department of Education, 2017). Thomas, Marken, Gray, and Lewis (2013) indicate that that number could exceed two million. Over the past four decades, dual enrollment programs have taken on numerous forms, but in recent years, literature states an increase in access to and enrollment in online college coursework among high school students (Harris & Stovall, 2013). In this chapter, background information related to dual enrollment will be presented. Furthermore, this study's problem statement, purpose statement, significance, research questions and definitions will be provided.

### **Background**

As previously stated, dual enrollment partnership that offer high school students the opportunity to earn credit has been available in various forms for more than 40 years in the US. Moreover, multiple terms have been used to identify process and programs for high school students to earn college credits to include dual enrollment, dual credit, and joint enrollment as well as categorizing instructional delivery methods such as on-campus, credit by exam, at the high school, and distance/online (Crouse & Allen, 2014). When considering dual enrollment (high school students enrolled in a college course for credit) in light of the modality of online learning, Lang (2016) affirms the rarity of research connecting the two: dual enrollment and online learning. Neither does there appear to be an agreed upon or developed framework that informs research on dual enrollment in general let alone via online learning (Pretlow & Wathington, 2014). Regardless, populist authors still advocate online learning as a probable

solution facing educational reform (Christensen, Horn, & Johnson, 2011; Draves & Coates, 2011). For example, Stephen F. Austin University developed online dual credit math courses for small, rural high schools in Texas to assist schools and students overcome limitations of distance, affordability, and district teacher. As stated previously, dual enrollment possesses a long history in America's educational landscape.

Early programs attempted to provide academically high-achieving students in secondary education the opportunity for challenging and engaging studies that were often above the level of their peers as early as the 1970s (Lichtenberger, Witt, Blankenberger & Franklin, 2014; Lochmiller, Sugimoto, Muller, Mosier, & Williamson, 2016). According to Barnett, Gardner, and Bragg (2004), the 1980s marked an increase in community college interest in offering dual enrollment opportunities. While the original intent for many of these programs was to provide opportunity for academically high-achieving students, the 1990s ushered and expanded to include average and at-risk, low-achieving high school students (Lichtenberger et al., 2014). Into the 2000s, dual enrollment programs gained greater state emphasis as policy makers and educational leaders recognized the potential of dual enrollment experience increasing enrollment at higher educational institutions (Mansell & Justice, 2014). As recent as the 2010s, national attention related to the completion initiative of a higher education credential to promote a highly skilled workforce has once again shifted the emphasis of dual enrollment programs to refocus on more traditional career and technical education programs in fields such as allied health, advanced manufacturing, and engineering technologies (Community College Research Center, 2012; Lichtenberger et al., 2014). In a similar fashion, modalities of instruction have changed over the years, too.

Early programs often required high school students to attend college courses on campus. However, with growth in popularity, college courses began being taught by either community college instructors or high school instructors qualified by the community colleges. Both approaches can still be readily found across the nation. More recently, distance and online courses have gained in enrollments as previously cited. Citing limitations of access associated with smaller and rural public schools, research indicates the Central region of the nation is more likely to utilize online dual enrollment options to increase access while decreasing costs of instruction and student travel (Allen, 2010).

Historic developments pertaining to the evolution of dual enrollment programing involves social shifts as well. Social advantages commonly associated with dual enrollment involve savings of time and money (Crouse & Allen, 2014). Concerns related to student loan debt and increased debt due to increased time to completion of a higher educational credential promote dual enrollment as often times students can complete college courses at a much lower tuition rate and sometimes free (Course & Allen, 2014; Mansell & Justice, 2014; Pretlow & Wathington, 2014). Earlier emphases on high-ability learners focused offerings on more traditional collegiate course work that reflected a student's track most likely to a four-year higher educational institution. However, social policies for dual enrollment programs have changed across the nation promoting opportunities in access to previously excluded student groups. Taylor (2015) reported high school students of color and low-income high school students who participated in dual enrollment programs increased the likelihood of attending college and graduating with a credential for both groups over students who did not participate in dual enrollment programs in similar student cohorts. This is an example of social promotion to equitable access for a wider student population than previously advocated. Legislators also

recognize dual enrollment opportunities as a resource for everyone from enriching high school students who have maxed out secondary honors courses to promoting access for students going into trade programs to industry and business interests with workforce needs to families reducing expenses on a college education (Kronholz, 2011). In the end, growth in dual enrollment opportunities for high school students may be the result of economic development policies that recognize the importance of both college readiness and high education credential attainment (Grubb, Scott, & Good, 2017).

Tinberg and Nadeau (2013) argued that high school students in dual enrollment programs face unique and distinctive challenges for adjusting to collegiate expectations for learning due to social and psychological development needs related to their younger ages in comparison with traditional college students. Furthermore, high school students often face other demands appropriate to the high school environment such as extracurricular activities that may compete with the rigors of college level coursework. As dual enrollment programs grow in utilizing online learning, the distinctive needs of high school students require thoughtful consideration of the learner nature for success in online college course work. Previous researchers and theorists have determined learner autonomy as a substantial influence in online learning success (Kearsley, 2000; Jung, 2001).

Research shows that self-perceptive levels of learner autonomy are related to perceptions and practices of self-regulated learning since perceptions lead to decisions which lead to behaviors that impact academic achievement (Cubukcu, 2009). In this light, it seems conceptually appropriate to examine academic success of high school students enrolled in an online college course through a self-regulated learning theory lens. This theory as advocated by Pintrich (2000) posits that self-regulation facilitates the processes and relations between the

learner and the learning environment. Furthermore, the degree of awareness of self-regulation effects learning achievement outcomes (Pintrich, 2000). Considering the autonomous nature of the online, asynchronous learning environment, early identification of self-regulated learning theory factors of motivation and self-learning strategy usage as predictors for high school students' success in an online college course appears prudent for exploration.

### **Problem Statement**

Online learning continues to grow across the nation in both participation and acceptance. Lochmiller et al. (2016) states that online dual enrollment participation in Kentucky has doubled from 2009-2010 to 2012-2013. Others advocate for continued growth in online learning as a means to increase access to postsecondary education in spite of concerns regarding high school student college readiness (Lang, 2016). Iowa does not specifically track how many high school students enroll in online college courses; however, one community college's Institutional Research department indicated growing dual enrollments in online courses over the past few years (Volk, E., personal communication, Feb. 27, 2017). This localized trend reflects similar growth across the state with a reported 60% increase in dual enrollment participation from 2008 to 2016 (Iowa Department of Education, 2017, April). Currently, 37.6% of total community college enrollments in Iowa are jointly enrolled high school students as of 2017 providing early college opportunities to an all-time high of 49,868 secondary students across the state. (Iowa Department of Education, 2018). Unfortunately, Iowa legislation promoting growth in dual enrollment opportunities provides little guidance for identifying college-ready high school students or those who may need additional support to be successful in any dual enrollment programs let alone online college coursework. Furthermore, while state-level mandates increase access for high school students in postsecondary learning to include online classes, the national

2020 College Completion initiative announced in 2009, calls for greater increases in student completion at the postsecondary level that has seen little progress in the first five-years (Pierce, 2015). The problem is community college leaders in Iowa possess limited options for identifying high school learner factors that predict successful online college coursework completion to assist them in meeting both state access mandates and the national student completion initiative goals.

### **Purpose Statement**

The purpose of this correlational, predictive study is to investigate the suitability of applying motivation scale variables (self-efficacy, intrinsic value and test anxiety) and self-regulated learning strategy usage variables (cognitive strategies and self-regulation strategies) as predictors of course completion as reported by the student's final grade (pass/fail) for high school students in an online college course. Using the Motivated Strategies for Learning Questionnaire (MSLQ) as developed by Pintrich and DeGroot (1990), this study seeks to identify the relationship strength of predictor variables within each scale: self-efficacy, intrinsic value, and test anxiety (motivation scale) and cognitive strategy use and self-regulation (self-regulated learning scale) among high school students enrolled in a college online course with the criterion variables of the course final grade (see Table 1).



Table 1

*Definitions of MSLQ Scale Variables (Pintrich, Smith, Garcia, & McKeachie, 1991)*

Motivational Scale Variables	Motivational Factor Variable Definitions	Self-regulated Strategy Usage Scale Variables	Self-regulated Strategy Usage Variable Definitions
<i>Self-Efficacy</i>	One's appraisal of and confidence in the ability to master a given task	<i>Cognitive Strategy Usage</i>	One's awareness of applying mental processes for learning
<i>Intrinsic Value</i>	One's perception of reasons for participating in a learning task that reflect the motivation of learning as a goal unto itself	<i>Self-Regulation Strategy Usage</i>	One's awareness and control of cognitive and metacognitive activities or behaviors that assist understanding of material
<i>Test Anxiety</i>	One's cognitive and emotional experience as exhibited by worry or a preoccupation with performance that can impact performance		

The motivation factors refer to how self-appraisal and confidence, goal orientation, and affective concerns about performance impact high school students' perceptions decisions, and behaviors resulting in successful completion of online college course work. Furthermore, high school student success in online course completion related to decisions and behaviors such as employing rehearsal, elaboration, organization, and planning among other cognitive self-regulating learning strategies may provide insight for K-12 and community college leaders to better prepare and support dual enrollment learners. Various studies reflect these variables predictive attributes in student populations ranging from middle school through college in a variety of course offering modalities (Pintrich & DeGroot, 1990; Yukselturk & Bulut, 2007; Aydin, 2015; Cohen & Magen-Nagar, 2016).

This study intends to administer the MSLQ to high school students from an urban K-12 district in XYZ Community College's Northwest Iowa merged area. It anticipates an enrollment population of 350 high school students from three public high schools dually enrolled in online college coursework. The problem is K-12 and community college educators lack a clear framework regarding predictive factors for high school student success in online college courses nor possess a tool to identify students as college ready or requiring additional support to be successful in online college courses.

### **Significance of the Study**

This study is built upon research conducted by Pintrich and DeGroot (1990) that examined predicative variables for student success among eighth grade students. Other studies have applied the same research in student populations to include high school students in high school courses and college students in college courses (Yukselturk & Bulut, 2007; Aydin, 2015; Cohen & Megan-Nagar, 2016). There exists a nascent body of research related to dual enrollment success, however many studies reflect descriptive methodologies that are limited in their ability to reach generalizable conclusions (Community College Research Center, 2012; Lochmiller et al., 2016). Allen (2010) reports an overall lack of empirical statistical research regarding high school students participating in postsecondary course work. Finally, research indicates that dual enrollment studies focus their attention on whether participation in dual enrollment effects academic achievement with little focus on how participation effects learning performance (An, 2015). Therefore, this study aims to contribute significant empirical research specifically examining predictive student variables that promote academic success among high school students in online college courses which is currently absent.

Recent research in the area of identifying possible predictors of high school student success has been primarily confined to doctoral dissertation research. In 2013, Rankin sought to identify factors related to high school student persistence in online college courses. Employing a revised version of the Educational Success Prediction Instrument (ESPRI), his descriptive study determined that prior academic success, confidence in technology access and use, confidence in their ability to achieve, and belief in their own organizational skills showed significant statistical relationship with online college course success among high school students (Rankin, 2013). Unfortunately, since Rankin's defense and approval, the instrument developer no longer advocates the ESPRI's use as a predictive instrument (Roblyer, M., personal communication, Sep. 1, 2016). Another doctoral study at the University of Houston using the *SmarterMeasure* instrument suggests pre-course evaluative instruments administered before taking online college courses offered predictive insights and may improve high school student success rates (Grubb, 2011). Unfortunately, this study's tool is a commercial instrument that may prove cost prohibitive in many settings.

The MSLQ is an older and public domain tool with confirmed validity and reliability in numerous studies. Furthermore, its moderate predictive attributes have been accepted across a wide range of student ages (middle school to college) and across course modality platforms (Pintrich & DeGroot, 1990; Yukselturk & Bulut, 2007; Aydin, 2015; Cohen & Magen-Nagar, 2016). The MSLQ is available as an 81-question survey that possesses reliability and validity at the subscale level allowing for specific scales to be confidently utilized to shorten the survey. A shorter version of the MSLQ will be utilized since the survey audience is high school students to examine the scales of motivation and self-regulated learning strategies as published by Pintrich and DeGroot (1990). The entire survey as well as scale/subscale resources are available through

public domain access. The MSLQ may serve two practically significant purposes. First, it may allow the researches to identify learner profiles for high school student success related to motivation and self-regulated strategies. Secondly, it could reveal an affordable and accessible tool for community college leaders to better monitor and assist high school students' dual enrolled in online college courses to increase success and achieve 2020 Completion initiative goals.

### **Research Questions**

**RQ1:** How accurately can course completion be predicted from motivation as identified by self-efficacy, intrinsic value, and test anxiety using the MSLQ instrument among high school students enrolled in a college online course?

**RQ2:** How accurately can course completion be predicted from self-regulated learning strategy usage factors of cognitive strategy usage and self-regulation strategy usage using the MSLQ instrument among high school students enrolled in a college online course?

### **Definitions**

1. *Cognitive Strategy Usage* – self-awareness of applying intellectual process for learning such as rehearsal, elaboration, and organization of concepts to aid learning mastery (Pintrich et al., 1991)

2. *Dual Enrollment* – high school students enrolled in a college-level course whereas they complete all assignments normally expected to be completed as part of a college course (Community College Research Center, 2012)

3. *Intrinsic Value* – concerns a student's perception of participating in a learning task for reasons such as challenge or curiosity and sees value for learning as goal unto itself (Pintrich et al., 1991)

4. *Self-Efficacy* – self-appraisal of and confidence in one’s ability to master a task (Pintrich et al., 1991)

5. *Self-Regulation Strategy Usage* – refers to the awareness and control of cognition and metacognition activities such as planning, monitoring and regulating of behaviors to assist in learner understanding of the material (Pintrich et al., 1991)

6. *Test Anxiety* – consists of a cognitive and emotional component as exhibited in worry, concern, or preoccupation with performance and affective arousal aspects of anxiety that can impact performance (Pintrich et al., 1991)

## **CHAPTER TWO: LITERATURE REVIEW**

### **Overview**

Research related to post-secondary student academic success in online courses is widely available. Research regarding student academic success in online courses at the post-secondary level as well as online learning in secondary education began has increased across the nation since 2000 (Barnett & Stamm, 2010). Similarly, with the growing acceptance of online learning in secondary schools, dual enrollment participation opportunities have increased (Taylor, Borden & Park, 2015). However, research related to high school student success in online collegiate coursework tends to focus on long-term outcomes such as increasing collegiate enrollment rates and persistence to postsecondary degree completion after students have graduated high school (Jones, 2014; Xu & Jaggars, 2014; Haxton, Song, Zeiser, Berger, Turk-Bicakci, Garet, Knudson & Hoshen, 2016). Unfortunately, targeted research exploring possible learner traits as predictive of dual-enrollment academic success at the course level continues to lag. In this chapter, the theoretical framework for this study is presented. Research related to dual-enrollment such as program structure, benefits and challenges for dual-enrollment approaches, academic success in online learning environments and a summary is discussed providing an overview of scholarly considerations.

### **Theoretical Framework**

The theoretical framework for this study is Pintrich's (1990) Self-Regulated Learning (SRL) theory. His theory reflects a social-cognitive framework that incorporates other elements from various theories (Schunk, 2005; Zhu, Au, & Yates, 2016). Pintrich (2000) argues that student self-regulated activities facilitate relations between learner and environment and influences academic success. According to Zimmerman (2002), self-regulated learners exhibit

awareness of their own learning, determine individualized goals, decide strategies to reach these goals, and monitor their behaviors increasing the motivation to succeed. Research indicates that the decision to participate in dual enrollment programs as secondary students is primarily an internal influence and indicates self-awareness provides researchers a foundation to consider how SRL theory traits impact student success for this study (Ozmun, 2013).

SRL learning theories are rooted in research by Bandura and others almost five decades ago related to self-regulatory practices, goal setting, and self-efficacy to name a few (Zimmerman, 1989). While versions of SRL theories circulate, variations of systems possess equivalent main ideas to understanding how students are academically successful in the learning environment. Zimmerman (1989) focuses on learner initiative (motivation) and self-direction (metacognition) themselves through efforts to acquire skills and knowledge rather than dependence on others to ensure learning. Similarly, Pintrich stresses the importance of understanding both motivational and cognitive aspects to the human experience of learning for the purpose of achieving greater academic success among students (Wolters & Pintrich, 1989). Others identify similar characteristics among SRL theories as an overall cyclical learning process impacted by cognition, metacognition, motivation, emotion, and employing skills for learning that can be learned and developed (Broadbent, 2017).

Recognizing similarities between SRL frameworks and specifically between Zimmerman and Pintrich's approaches as core constructs for the field of endeavor, there exists considerable differences. Wolters and Pintrich (1989) identify the latter's approach to understand self-regulation within a specific context and the former's focus on SRL without reference to specific contexts. While Zimmerman and Pintrich are widely discussed in the literature regarding SRL

over the last three decades, many slightly varying constructs have been put forward for consideration and further research (Cho & Shen, 2013).

For this study, Pintrich's SRL theory serves as the foundational construct due to its direct relationship to the Motivated Strategies for Learning Questionnaire (MSLQ). Pintrich's theory is represented by four phases of self-regulation and four areas of self-regulation as observed within each phase (Schunk, 2005). The phases should not be considered linear in relation as they may be exhibited at any time during the learning task. The four phases identified are "forethought, planning and activation," "monitoring," "control," and "reaction and reflection" (Schunk, 2005). Within each phase is the interplay of cognition, motivation, behavior, and context for learning. While many theories of SRL recognize the importance of metacognitive strategies, student control of their effort, and cognitive learning strategies, Pintrich (1990) argues that these are not enough to connect predictively towards student academic success due to the complexities of secondary students. Predictivity requires an understanding of student motivation to use strategies and engage in self-control for learning success (Pintrich, 1990). By connecting motivational variables to interaction with cognitive, behavioral, and contextual factors, researchers gain clarity on how motivation affects self-regulation and success (Schunk, 2005).

Pintrich's (2004) SRL theory informed the development of the MSLQ. The MSLQ contains 81 question items resulting from multiple instrument trials with over 1,000 college students at the University of Michigan and then expanded to public, private, and community colleges for trial in 1988 (Pintrich et al., 1991). According to the *MSLQ Manual*, the final version identified two scales: motivation with six learner traits and self-regulation with nine learner traits (Pintrich et al., 1991). However, before the publication of the instrument manual, Pintrich and DeGroot (1990) were already examining how each trait within a given scale



functioned independently of the entire instrument in terms of statistical analysis. Previous researchers have identified and confirmed the goal of creating an instrument that is also modularized in order to target specific traits in a given study (Karadeniz, Buyukozturk, Akgun, Cakmak, & Demirel, 2008; Ilker, Arslan, and Demirhan, 2014; Aydin, 2015). The MSLQ's acceptance in the literature in its entirety and in its specific sub-scale traits, this present study has followed previous researchers in relation to studying predictability of SRL traits among secondary students utilizing the same 44 questions identified by others as appropriate for this study's target population (Pintrich and DeGroot, 1990; Karadeniz et al., 2008; Ilker, Arslan, and Demirhan, 2014; Aydin, 2015).

This self-report instrument requires students to rate themselves on motivational and self-regulation items. The motivational items in the instrument assess intrinsic orientation, test anxiety, and self-efficacy as self-reported by students to reflect their own understanding of themselves. The self-regulation items include questions to identify the student self-awareness magnitude for both cognitive and self-regulated learning strategy usage such as rehearsal, elaboration, organization, planning, monitoring, and time management among others (Pintrich & DeGroot, 1990; Pintrich et al., 1991; Schunk, 2005). The following presents the theoretical considerations for each trait related to motivation and self-regulation as they pertain to student academic success in general.

### **Motivation**

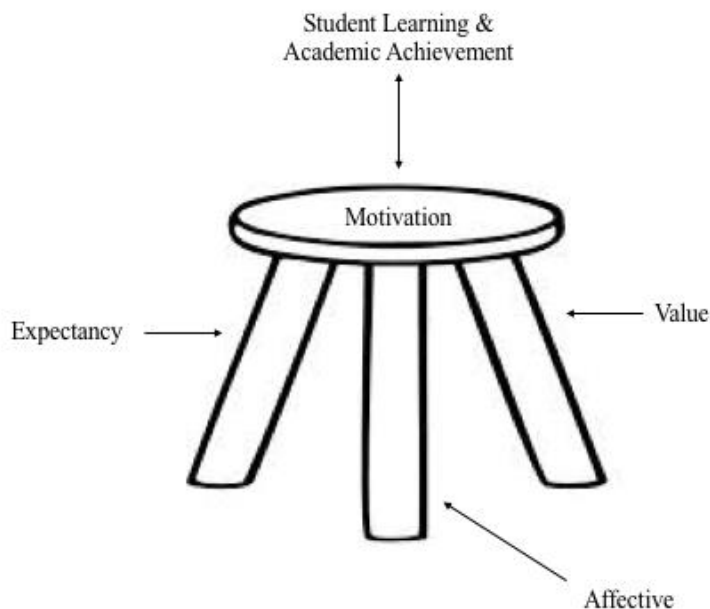
Researchers previously identified learner motivation as a key component for academic success. Bandura, as cited by Miller (2011), argues that motivation is conceptualized as a final domain of learner processes whereas in a modeled event, the learner displays a matching pattern of behavior. It is this underlying aspect whereas learners seek to learn or accomplish a behavior

thus positively impacting learning accomplishment (An, 2015). Miller (2011) states that children reproduce behavior they see as having favorable outcomes. When placed in the learning moment, the literature on motivation highlights the relationship between learner motivation to learn the content or task under consideration with incentives. Incentives that impact a learner's motivation may be external incentives or vicarious incentives deemed as favorable for the learner as well as self-incentives related to individual preference, social comparative biases, and internal standards (Miller, 2011). Motivation as a force that impacts academic success is also seen as one of the strongest influences on college grades (An, 2015).

Pintrich et al. (1991) leverages motivation not as a stand-alone phenomenon but rather a factor that possesses observable sub-factors that can be studied. Motivation as a concept of the learner has been postulated in various forms by researchers, however it is generally presented as possessing three factors: an expectancy component, a value component and an affective component (Pintrich & DeGroot, 1990). First, learner motivation is impacted by the learner's belief that they are able to perform the learning task before them. Pintrich and DeGroot (1990) extend beyond the learner's own belief to identify the learner's acceptance of their responsibility to complete the learning task as vital. Secondly, motivation consists of a value element whereas the learner perceives a favorable reason for mastering the learning task. Various researchers identify the internalized value aspect differently, yet diverse scholars present concepts identifying an underlying theme for motivation as the reason why a student chooses to learn a topic or skill (Pintrich & DeGroot, 1990). Finally, motivation is informed by an affective aspect within the learner. Student moods and attitudes about school and learning impact the development of goals and therefore motivation (Schunk, 2005). Pintrich and DeGroot (1990) report prior research in this area demonstrates students who expect they are capable in a learning

task and who value the content or behavior being learned employ behaviors leading to positive educational outcomes. It is also noted that students who feel favorably towards a learning goal are prone to self-identify and change cognitive and self-regulating behaviors in pursuit of attaining academic goals (Schunk, 2005).

For this study, the concept of motivation is a key theoretical construct. Motivation, when linked to learner engagement, presents a likely rationale for the relationship between dual enrolled students and academic success (An, 2015). Variations of SRL theories address the concept of learner motivation as a significant paradigm for academic success. This study envisions Pintrich's theory as a stool whereas student learning and academic success rests upon the stool's seat (motivation). Prior research indicates a relationship between learner motivation and online course success whereas high degrees of motivation show significant correlations to instructional success in online coursework (Puzziferro, 2008). It is postulated by this researcher that motivation is a germane construct to examining the predictability of academic success among high school students enrolled in college-level online coursework. Yet, motivation is too complex a concept to stand alone. Learner motivation can be understood as supported and impacted by the learner's expectancy, value, and affective orientation to the content or behavior to be learned as depicted in Figure 1.



*Figure 1:* Motivation as depicted as a stool as conceptualized by the researcher.

Each of the components of motivation (expectancy, value, and affective) are represented in the 44-question version of the MSLQ used by researchers to examine self-efficacy, intrinsic value, and test anxiety among secondary students (Pintrich & DeGroot, 1990; Ilker, Arslan, & Demirhan, 2014). The following presents literature findings specifically related to the value and nature of self-efficacy, intrinsic value, and test anxiety as they apply to the motivation scale of the 44-question MSLQ.

### *Intrinsic Value*

The basic definition for the concept of intrinsic value refers to learners' internal interest and enjoyment in subject or skill they are learning as summarized by various researchers (Pintrich & DeGroot, 1990; Ryan & Deci, 2000; Wolters 2004; Ryan, Shim, & Makara, 2013). Citing numerous studies, Pintrich and DeGroot (1990) recognize student beliefs related to a specified task to be learned is an important key component to motivation and student performance in academics. Research highlights the validity of the MSLQ finding that among the

motivational traits identified by the instrument, intrinsic value levels were positively interrelated and predicted academic achievement (Schunk, 2005). This same positive correlation between learner intrinsic value levels has been confirmed in other studies among various student populations (Joo, Kim, Kim, & Chun, 2011; Hoffmann, Ivcevic, Zamora, Bazhydai, & Brackett, 2016; Kiefer & Pennington, 2017). The following is a review of research regarding the impact of a student's intrinsic value beliefs as predictors of academic achievement among secondary, post-secondary, and online learners.

Seminal research exploring the relationship between task intrinsic value among secondary students in positive correlation to academic success showed no significant differences among genders (Pintrich & DeGroot, 1990). Furthermore, Pintrich and DeGroot (1990) identified high levels of intrinsic value among secondary learners correlated to higher levels of cognitive strategies and self-regulation strategies indicating an association that positively impacted learner success. Likewise, as a construct for predicting student success among secondary students, intrinsic value has similar results when tested with other instruments. Researchers, using a different motivation instrument to measure student levels of intrinsic value, have found similar validity and positive correlations while citing no significant relationship impact due to gender differences (Kiefer & Pennington, 2017). These findings lead to the conclusion that the perception of intrinsic value of the process of learning a specific task or body of content transcend gender differences indicating a universal sub-factor of motivation increasing academic success among secondary students.

Similarly, studies of the same trait among college students show positive correlations in relation to academic achievement. Before examining intrinsic value using the MSLQ among secondary students, researchers examined post-secondary students to determine the instrument's

validity and reliability. Garcia and Pintrich (1996), examined 365 college students citing reasonable evidence that intrinsic value was a mediating influence facilitating learning success. Early success with the MSLQ to examine the relationship between intrinsic value and academic success led to other studies. Citing Pintrich and DeGroot's (1990) findings, Joo et al. (2011) examined the same construct among community college students reporting statistical importance of intrinsic value among college learners for academic success in the compacted learning ecosystem of a two-year degree.

While secondary and post-secondary student research regarding intrinsic value and its positive link to academic success is available, research related to online learners reveals mixed results. Intrinsic value is shown to a positive impact on many student outcomes to include academic achievement (Pintrich & DeGroot, 1990; Chiu & Xihua, 2008; Steinmayr & Spinath, 2009; Dietrich, Dicke, Kracke, & Noack, 2015). On the other hand, in a study of online college math students, intrinsic value of the task was shown to have no statistical significance on learning assessment outcomes related to examining volition support in online classes to promote student regulation and success (Kim & Bennekin, 2016). It should be noted that in this study, targeted research into the role of intrinsic value was not the aim and may have negatively influenced the reporting of the impact of intrinsic value as cited by the researchers (Kim & Bennekin, 2016). However, Joo et al. (2011) specifically annotate a finding of limited power for intrinsic value among online university students. They report, "...intrinsic value did not affect flow. This result does not align with previous studies reporting intrinsic value as an important predictor and academic achievement" (Joo et al, 2011, p. 40). Given the body of research indicating a positive correlation between intrinsic value as a predictor of learning success, the

study postulated that the finding might result from the limited sample group of adult learners in online courses that had previously not been studied (Joo et al., 2011).

Despite mixed findings among specific online learner populations, intrinsic value is a well-studied construct. Moreover, the relationship between students' internal awareness of the value they discern for the learning task and academic success is represented in various student populations. The robustness of literature related to student success as predicted by level of intrinsic value among secondary and post-secondary provides theoretical strength notwithstanding mixed findings related to online learners as appropriate for this predictive study concerning high school student academic success in college level online courses.

#### *Test Anxiety*

The affective domain of motivation as identified in the MSLQ examines the degree in which students cognitive and emotional experience is exhibited by worry or over fixation concerning academic performance (Pintrich et al., 1991). The motivational trait of test anxiety is present in both the full MSLQ and the abbreviated version used to study its influence on academic success among secondary students (Pintrich & DeGroot, 1990). The role of test anxiety in student learning success is well documented in its linkage to metacognition, cognitive strategies, and has mixed findings quantifying student effort and persistence going back four decades (Culler & Holahan, 1980; Benjamin, McKeachie, Lin, & Holinger, 1981; Hill & Wigfield, 1984; Tobias, 1985). Pintrich and DeGroot (1990) reported among 173 secondary students surveyed with the 44-question MSLQ, higher levels of test anxiety correlated with lower levels of academic performance. Schunk (2005) confirms their findings indicating a negative correlation between both self-efficacy and performance among secondary students and argues for the predictive value of test anxiety as a determinant for student academic success. The following

is a review of literature regarding the impact of student levels of test anxiety as predictors of academic achievement among secondary, post-secondary, and online learners.

Von Der Embse and Hasson (2012) brought attention to the role of test anxiety in the context of increased high-stakes testing for accountability as part of No Child Left Behind (NCLB). “Increased emphasis on high-stakes testing is often accompanied with increased levels of test anxiety” (Von Der Embse & Hasson, 2012, p. 180). In this context, increased test anxiety is shown to have a negative relation with test performance for high school students and is supported by various other studies as cited by (Von Der Embse & Hasson, 2012). Similar findings are reported among international high school student populations. Unal-Karagüven (2015) examined test anxiety among 336 Turkish high school students finding that test anxiety scores were the best indicator for predicting student academic success in the sample. The body of research literature supports a negative correlation between levels of test anxiety as reported among high school students and their academic performance.

Additionally, research indicates a similar negative association between levels of test anxiety and academic success among post-secondary students. In 2006, Tatum, Lundervold and Ament reported, “Test anxiety among college students is a prevalent maladaptive response that can have deleterious effects on emotional as well as academic performance” (p. 478). In studying the relationship between emotional dysregulation as predictive of test anxiety, Hartman, Wasieleski and Whately (2016) reported high levels of test anxiety among 191 undergraduates at a public university led to difficulty focusing on a given task and negatively impacting scores on academic assessments. Other research identifies that mild test anxiety among postsecondary nursing students did not directly affect academic outcomes and found decreasing levels of test anxiety reported as students age increased (Dawood, Ghadeer, Mitsu, Almutary, & Alenezi,



2016). However, the same study concludes, “The results suggest the need for students to maintain a finest state of health and mind during examination as this is important for better academic achievement” (Dawood et al., 2016, p. 63.). Additionally, it is noted in the literature some degree of test anxiety might prove essential for better academic performance (Driscoll, Evans, Ramsey, & Wheeler, 2009). It appears from the literature severely high levels of test anxiety among college learners is an impediment to academic success.

Finally, Hedges (2017), citing high withdrawal rates among online students, reports online students scored significantly higher than traditional face-to-face students in test anxiety while recognizing online students who completed their course did as well as their traditional course counterparts. The researcher could not specifically connect online course withdrawal with test anxiety, but she advocates for further study and understanding of factors such as test anxiety and persistence as they relate to online student academic success. Similarly, Yan, Taylor, and Cao (2017) examined 209 online students and found that high-stake tests in distance learning without scaffolding assessments as preparation for exams led to higher levels of test anxiety, lower levels of seeking assistance, and negatively impacted achievement. Interestingly, this study reported a similar observation regarding age and test anxiety previously reported. Yan, Taylor, and Cao (2017) acknowledged test anxiety appears to decrease with age among online learners in their study and therefore advocated for online instructors and course designers to be more attentive towards younger students in the online learning ecosystem as they may need more assistance in overcoming test anxiety for academic success.

Overall, a negative correlation between test anxiety and academic success is prevalent throughout the literature. From Pintrich and DeGroot’s (1990) study that identifies test anxiety as a moderately predictive trait for academic success among secondary students to more current

literature that continues to support their finding, test anxiety is an appropriate SRL trait for consideration. Given the growing body of literature indicating test anxiety decreasing with age and this present study's focus on high school students' success, test anxiety among secondary students enrolled in post-secondary coursework is an appropriate trait to examine for predictive strength.

### *Self-Efficacy*

Self-efficacy as a social-behavioral concept possesses a long history in social science research. In the 1970s, research assigned self-efficacy a central role to learning and behavioral changes (Bandura, 1977). Three decades later, Bandura's and others' thoughts were confirmed via numerous studies and reinforced. Citing Bandura, Maddux (2000) states:

The basic premise of self-efficacy theory is that "people's beliefs in their capabilities to produce desired effects by their own actions" (Bandura, 1997, p. vii) are the most important determinants of the behaviors people choose to engage in and how much they persevere in their efforts in the face of obstacles and challenges. Self-efficacy theory also maintains that these efficacy beliefs play a crucial role in psychological adjustment, psychological problems, physical health, as well as professionally guided and self-guided behavioral change strategies (p. 335).

Huang' (2016) metaanalysis of 125 studies highlights varied results related to self-efficacy and learner achievement, yet his study recommends moderate predictive power of self-efficacy for learning achievement. The following presents research related to self-efficacy among secondary students, post-secondary students, and online students to show that self-efficacy represents a possible predictive learner trait appropriate for this study.

The authors of the 44-question MSLQ utilized in this study adhere to the importance of self-efficacy to learning as an expectancy component of student motivation to accomplish a learning task. Pintrich and DeGroot (1990) highlight that among secondary students, self-efficacy showed a positive relationship whereas high levels of student reported self-efficacy were linked to increased cognitive engagement and greater academic success. Similarly, other research on high school students revealed self-efficacy as an important factor in academic success (Motlagh, Amrai, Yazdani, Abderahim, & Souri, 2011). Consistent with the study above and others, Lee, Lee, and Bong (2014) confirmed a significant facilitative association between self-efficacy and academic achievement among secondary learners. Research evidence supporting the use of self-efficacy among secondary students as a predictive factor for academic success is plentiful.

Likewise, literature examining self-efficacy and academic success among post-secondary students is available. The instrument utilized in this study was first used to examine self-efficacy among other traits among 356 public, four-year university and 24 community college students (Pintrich et al., 1991). Later research confirms Pintrich and others' findings related to college student academic success and levels of reported self-efficacy. Komarraju and Nadler (2013) found high levels of self-efficacy among post-secondary students was a noteworthy predictor of academic success. "Students who are more confident and self-assured are more likely to report higher levels of academic performance. In particular, self-efficacy appears to serve an essential function by facilitating the use of various metacognitive strategies and resources that are crucial for academic success" (Komarraju & Nadler, 2013, p. 70). Jung, Zhou, and Lee (2017) reiterate the relationship between self-efficacy and college student academic goal achievement. While their study focused on gaps in understanding how self-efficacy and academic performance are

related, they confirmed that self-efficacy is a predictor of post-secondary learner academic success (Jung, Zhou, & Lee, 2017). Research supports the predictive value of self-efficacy to student academic performance among both secondary and post-secondary students.

Additionally, literature related to self-efficacy studies among online students is available. Recognizing that high school students spend a large amount of time using digital technology, Greene, Bolick, Caprino, Deekens, McVea, Yu, and Jackson (2015) identify a need for developing self-efficacy interventions whereas learners increase self-efficacy and goal orientation to promote success in the more autonomous online learning environment. Similarly, research confirms high academic performers reported higher self-efficacy and confidence in the online learning environment over those with lower reported self-efficacy (Kim, Park, Cozart & Lee, 2015). While the previous studies focused on online high school learners in relation to self-efficacy and academic success, research dedicated to post-secondary students reflects parallel findings. Research supporting the relationship between higher reported levels of self-efficacy and online student achievement is obtainable (Thompson & Lynch, 2003; Ergul, 2004; Artino, 2008; Hodges, 2008; Cho & Jonassen, 2009; Shen, Cho, Tsai, & Marra, 2013). While focusing on self-efficacy's impact on student satisfaction, research reports that post-secondary students who took more online courses reported higher levels of self-efficacy and by adding courses increased course satisfactory completion (Shen et al., 2013). Online post-secondary business students with higher levels of self-efficacy were shown to have positive relations with instructor interaction, LMS interaction, peer engagement, social interaction, and academic interaction which in turn may be beneficial towards academic success (Prior, Mazanov, Meacheam, Heaslip, & Hanson, 2016). Overall, the literature reports among online learners regardless of grade level or status, self-efficacy is a key trait for learner success.

The concept of self-efficacy is not a new construct and has been amply studied by researchers in relation to student success. Moreover, the relationship between students' confidence and academic success is represented in various student populations. The robustness of literature related to student success as predicted by level of self-efficacy among secondary, post-secondary and online learners is appropriate for this predictive study concerning high school students enrolled in college level online courses. Ozmun (2013) postulates that specifically among dually enrolled high school students, the construct of self-efficacy may be an important predictor of a high school student's success in college coursework.

### *Self-Regulation*

Self-regulation lacks a singular definition regarding learner behavior and its impact on learning success. Carver & Scheier (2016) postulate the construct means different things to different researchers but should not be solely aligned with self-control as it is generally understood in broad terms. Learners who exhibit self-regulation engage in examining their learning progress, goal setting, and reflective abilities to evaluate the efficacy of their learning approaches (Zimmerman, 1986; Pintrich & DeGroot, 1990; Pintrich, 2004; Crede & Phillips, 2011; Broadbent, 2017). Numerous studies cite the importance of learner self-regulation in relation to academic success in a broad sense regardless age, nationality, or learning environment modality (Pintrich & DeGroot, 1990; Korkmaz & Kaya, 2012; Ilker, Arslan, & Demirhan, 2014; Aydin, 2015; Tabatabaei, Ahadi, Bani-Jamali, Bahrami, & Khamesan, 2017; Pardo, Han, & Ellis, 2017). In this sense, self-regulation is seen as the controllable processes of the student to achieve their academic goals (Mega, Ronconi, & DeBeni, 2014). The following is specific overview consideration of Pintrich's application of self-regulation as examined by the MSLQ.

The factor self-regulation is also an important constructor for Pintrich's theory of SRL. "Self-regulation of cognition and behavior is an important aspect of student learning and academic performance in the classroom context" (Pintrich & DeGroot, 1990). The original and full 81-question version of the MSLQ identified nine traits under the factor of self-regulation: rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment, effort regulation, peer learning, and help seeking (Pintrich et al., 1991). These are understood as cognitive judgments and choice behavior traits that impact student learning (Pintrich, 2004). However, when researchers applied the MSLQ to secondary students discovered that the full array of scales examined in the 81-question survey with post-secondary students were not as prominently interacting in the 44-question instrument among secondary students. Factor analysis resulted in cognitive strategy usage sub-factor consisting of rehearsal, elaboration, and organization ( $\alpha = .83$ ), and the combination of effort management and metacognitive was used to create a self-regulation strategy usage sub-factor ( $\alpha = .74$ ) as applicable for secondary students using the 44-question MSLQ (Pintrich & DeGroot, 1990). More recent studies have confirmed the multidimensionality of self-regulation of cognition processes and behavior choice for learning emphasizing its active role in learning (Mega, Ronconi, & DeBeni, 2014; Wibrowski, Matthews, & Kitsantas, 2017). Overall, researchers present the construct of self-regulation as a diverse set of mental choices and behaviors employed by learners in the pursuit of academic goal achievement (Burnette, VanEpps, O'Boyle, Pollack, & Finkel, 2012). As stated previously, Pintrich and DeGroot (1990) identified among secondary students examined by the MSLQ, the self-regulation factor studied for predictive value of academic achievement was shown to possess two predictive sub-factors: cognitive strategy usage and self-regulation strategy usage. The following presents the body of literature

related to the subfactors of cognitive and self-regulating strategy usage and their association with academic success.

### *Cognitive Strategy Usage*

Cognitive strategy usage in this present study refers directly to activities associated with learner mental exercises that align for efficacy towards academic success. The 44-question MSLQ specifically identifies three cognitive strategies that help researchers develop and understand the sub-factor within self-regulation. The three strategies examined among secondary learners with the 44-question MSLQ are rehearsal strategies, elaboration strategies, and organizational strategies (Pintrich & DeGroot, 1990). Furthermore, these three have been shown to be repeated in research (Aydin, 2015).

Rehearsal strategies indicates student self-awareness of how often they employ saying words to themselves when reading for learning. “Basic rehearsal strategies involve reciting or naming items from a list to be learned. These strategies are best used for simple tasks and activation of information in working memory rather than acquisition of new information in long-term memory” (Pintrich et al., 1991). This theoretical definition has been confirmed in the research (Hallam, 2001). In a study of 139 high school music students, researchers report that among the cognitive strategies for learning used by students, rehearsal presented as a strong indicator for learning goal achievement (Uygun & Kilincer, 2017). Likewise, among 1157 high school students across 50 class domains, researchers found higher levels of rehearsal among successful students but discovered stronger relationships between high level learning cognitive strategies such as critical thinking with academic achievement (Kadioglu, & Uzuniriyaki-Kondakci, 2014). Similar findings are reported in various studies related to post-secondary and online students (Puzziferro, 2008; Wang & Wu, 2008; Klingsieck, Fries, Horz, & Hofer, 2012;

Broadbent & Poon, 2015). While rehearsal strategies may be questioned as to the most beneficial cognitive strategy, it presents itself in the literature as a valuable construct for this study's considerations.

The second construct that forms Pintrich and DeGroot's (1990) sub-factor of cognitive strategy usage among secondary students is elaboration. The MLSQ's definition of the strategies usage is as follows from Pintrich et al. (1991).

Elaboration strategies help students store information into long-term memory by building internal connections between items to be learned. Elaboration strategies include paraphrasing, summarizing, creating analogies, and generative note taking. These help the learner integrate and connect new information with prior knowledge (p. 20).

The usage of this strategies has been shown to positively correlate with greater cognitive strategies as a whole leading to increased academic success as opposed to students who did not report as high levels of its usage in their learning in a wide body of historical research (Corno & Mandinach, 1983; Weingstein & Mayer, 1986; Pintrich & DeGroot, 1990). Kadioglu and Uzuntriryaki-Kondakci (2014) highlighted in their study the practice of elaboration as understood in a mastery domain was still correlated with performance goals and academic achievement among high school students. Likewise, similar findings are reported to varying degrees among college and online learners in relation to elaboration as a cognitive strategy and achieving learning goals (Puzziferro, 2008; Broadbent & Poon, 2015).

Finally, the sub-factor of cognitive strategy usage as identified in the MSLQ version utilized for this study possesses the underlying construct of organization. Pintrich and DeGroot (1990) present this construct. This construct is conceptualized as the practice among students who aid their learning by outline chapters of reading and are intentional about academic time



management designating time for specific learning activities and allocating time values for different activities such as content reading, discussing, or exam preparation (Mega, Ronconi, & DeBeni, 2014). Pintrich et al. (1991) define organization as, “Organizing is an active, effortful endeavor, and results in the learner being closely involved in the task. They should result in better performance” (p. 21). The relationship between learner usage of organization and academic outcomes across different student populations (secondary, post-secondary, and online) is reported in various studies (Puzziferro, 2008; Bartels, Magun-Jackson, & Kemp, 2009; Klingsieck et al., 2015)

Overall, the research into the factor of cognitive skills usage among students shows significant correlations between learning outcome attainment and cognitive skills usage (Yamada, Oi, & Konomi, 2017). The two sub-factors of cognitive and self-regulating strategy usage are reported as being highly correlated meaning that where one is high among learners the other tends to be high as well. However, regardless the degree of their correlation they can be distinguished as two separate domains as when taken separately, cognitive strategy usage without self-regulation has been shown to negatively suppress academic success among secondary students (Pintrich & DeGroot, 1990).

### *Self-Regulation Strategy Usage*

Student control and usage of cognitive processes is one important aspect to understanding self-regulation, how those cognitive choices result in behavioral adaptations that promote learning and academic success is the concern of the Pintrich and DeGroot’s (1990) second sub-scale for self-regulation: self-regulation strategy usage. According to Zimmerman (1989), “Self-regulation learning strategies are actions and processes directed at acquiring information or skill that involve agency, purpose, and instrumentality perceptions by learners” (p. 329). The scale of

self-regulation as identified via the MSLQ first used among secondary students created the subscale of self-regulation by combining the results of metacognition and effort management (Pintrich & DeGroot, 1990). As stated earlier, cognitive strategy usage and self-regulation strategy usage were found to be highly correlated, but self-regulation strategy usage was initially shown to be a stronger predictor of the two for secondary student success (Pintrich & DeGroot, 1990). Schunk (2005) argues that when considering this sub-factor, one must remember that these strategies are affected by learner physical and psychological influences on knowledge and motivation. Many of these strategies are historically understood to also be learned skills for learners that with time and experience not only are employed at high frequency but are also more efficacious to achieving learning outcomes (Pintrich & Zusho, 2002; Schunk, 2005). The following are theoretical considerations for each construct as found in literature related to student academic success.

The construct of metacognition is related to the learner's ability to attain cognitive skills awareness and to control their practice (Tabatabaei et al., 2017). Mega, Ronconi, and DeBeni (2014) connect this strategy to how the learner is able to monitor one's thinking concerning cognitive strategy usage. Pintrich et al. (1991) define it as follows:

Metacognition refers to the awareness, knowledge, and control of cognition. We have focused on the control and self-regulation aspects of metacognition on the MSLQ, not the knowledge aspect. There are three general processes that make up metacognitive self-regulatory activities: planning, monitoring, and regulating (p. 23).

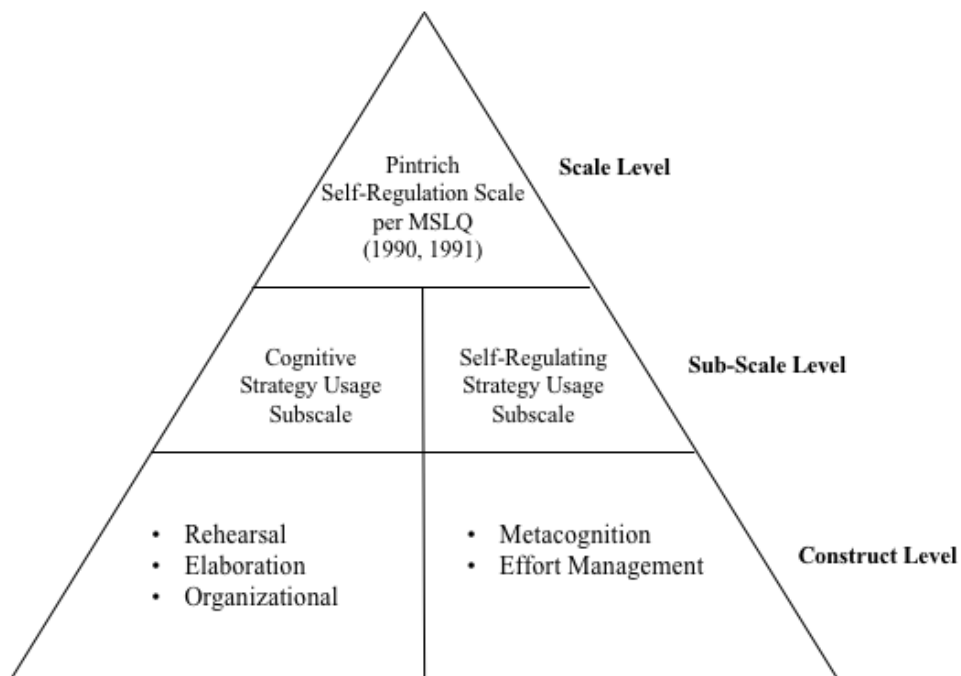
Research related to the relationship between learner academic success and metacognition, various studies support a positive relationship among secondary, post-secondary, and online students. Among high school students when considering the relationship between metacognition

and mastery goals, successful students reported high levels of both indicating students who had high personal learning goals were also in control of their cognition at higher levels while studying (Kadioglu & Uzuntriryaki-Kondakci, 2014). Arguing that metacognition practices may clarify how students self-regulate their learning for success, Dent and Koenka (2015) highlight the positive relation of both cognitive and metacognitive with academic performance among both elementary and secondary students while clearly reporting, “However, the overall correlation is significantly stronger for the metacognitive processes that allow students to self-regulate their learning and performance of academic tasks” (P. 459). Similar findings are reported in the literature for college-level students and online learners to various degrees of strength (Cho & Shen, 2013; Lehman, Hahnlein, & Ifenthaler, 2014; Broadbent, 2017; Tabatabaei, et al, 2017; Yamada, Oi, and Konomi, 2017). Current research lends credibility to the continued inclusion of metacognition as a construct within self-regulation strategy usage and its value for predicting academic performance.

The construct of effort management is not presented as clearly as a stand-alone construct for consideration throughout the literature. It may be combined with various other constructs related to self-regulation strategies such as such as self-planning or an undifferentiated positive and negative self-regulating practice (Zimmerman, 1989; Pardo, Han, & Ellis, 2017). For Pintrich and DeGroot (1990), effort management and regulation rests learner persistence at complications experienced in learning new content or working through tasks that may be considered boring as adapted from Zimmerman and Pons’ 1986 research. “Effort management is self-management, and reflects a commitment to completing one’s study goals, even when there are difficulties or distractions” (Pintrich et al., 1991, p. 27). This ability to control one’s facility when distracted or disinterested is presented as a distinguishable construct for self-regulation

strategy usage (Pintrich & DeGroot, 1990). Gbollie and Keamu (2017) identify among high school students that cognitive strategies such as rehearsal were reported more often as the preferred strategy among learners, yet effort regulation management was seen as being connected with motivation and with higher order self-regulation strategies that increased retention and completion rates especially among female students. Puzziferro (2008) reported among online college learners, significant differences in the usage of effort regulation among students who dropped or withdrew from a course as opposed to higher-achieving students. Similarly, among college online students, self-efficacy has been shown to positively impact effort regulation and academic success (Cho & Shen, 2013). In light of previous research, use of effort management strategies was published as significantly yet weakly associated with online student success via meta-analysis of studies conducted from 2004-2014 (Broadbent & Poon, 2015). The strength to which effort management and regulation is understood as relational to secondary, post-secondary, and online learner success is diverse. But, it is reasonable to recognize it is a construct valid for consideration in this study's purposes.

Current literature in the area of student self-regulation strategy usage is plentiful and generally provides data as to the overall positive relation with student academic achievement across student populations and learning modalities. The sub-factor of self-regulation and self-regulating strategy usage as part of SRL is reported as possessing undisputed importance specifically for online learners which is directly relevant to this study (Lehmann, Hahnlein, Ifenthaler, 2014). The author of this study provides the following figure to have a visual of the relationship as offered by Pintrich and DeGroot (1990) regarding self-regulation as a scale, self-regulation strategy usage as a sub-scale, and metacognition and effort management as constructs to better understand how students learn and are academically successful (See Figure 2).



*Figure 2:* Self-regulation scale depicted as a conceptual pyramid.

Given the scales, sub-scales, and constructs that form Pintrich’s SRL theory, usage of the MSLQ is appropriate for this study as the MSLQ has successfully been utilized in research related to middle-school and high school student motivation and success (Pintrich and DeGroot, 1990; Aydin, 2015). Schunk (2005) reports of the MSLQ scales of motivation and cognitive strategies (Schunk’s reference to Pintrich’s self-regulation scale), “The scales have good internal reliability and demonstrate moderate correlations with academic performance” (p. 90). Beyond the scales, the subscales of intrinsic value, test anxiety, self-efficacy, cognitive strategy usage, and self-regulation strategy usage have been shown to assess motivation and self-regulation in secondary and post-secondary learners (Pintrich & DeGroot, 1990; Pintrich et al., 1991; Wibrowski, Matthew, & Kitsantas, 2017). Due to the MSLQ’s recognition as reliable and valid, Schunk (2005) anticipates its continued and common use in future directions of research related to self-regulated learning in students.

An (2015) argues that historic participation in dual enrollment programs for high school students has been on a trajectory to double in a given eight-year span. Sadly, current research tends to focus on *if* participation leads to future academic success and attainment among participants rather than *how* participation influences academic performance (An, 2015). Likewise, given the increasing growth in online learning, there is an identified need by researchers to better understand and utilize SRL strategies to assist online learners achieve academic success (Broadbent & Poon, 2015).

Identifying this need, the researcher of this current study contends that SRL theory as proposed by Pintrich provides a structure to examine underlying learner attributes that may predict secondary learners inclined to succeed and those inclined to require additional assistance to be successful in online collegiate coursework. This contention is supported by multiple studies that indicate the importance of SRL as a determinant of the online learning experience specifically which is salient to this study (Cho & Shen, 2013). Efficacy is closely aligned with learner motivation and self-regulation as observable traits influence individual student academic success (Pintrich & DeGroot, 1990). Recent research indicates, "...academic motivation and engagement as a viable explanation for the relationship between dual enrollment and academic success" (An, 2015, p. 120). Furthermore, the body of literature presents Pintrich's theory as the most comprehensive arrangement of motivation and self-regulating strategies available (Broadbent, 2017). Therefore, Pintrich's SRL theory, is presented as an appropriate theoretical framework for this study. The MSLQ is recognized as an appropriate instrument to examine Pintrich's SRL theory for the scope of this study (Broadbent, 2017).

## **Related Literature**

Research into dual-enrollment student success suffers from a lack of clarity as dual-enrollment programming encompasses many different approaches and structures that lead to differing high school student experiences enrolled in collegiate-level coursework. The Community College Research Center (CCRC) at the Teacher's College, Columbia University defines dual enrollment as high school students enrolled in a college course and who complete all assignments that are part of the college course (Community College Research Center, 2012). However, there are many different iterations for that scenario to be applied. Allen's (2010) dual enrollment comprehensive literature review as part of foundational studies held at the City University of New York (CUNY) continues to provide one of the most thorough explications of the dual enrollment landscape. Of significance is Allen's (2010) need to highlight dual enrollment in general and more specific approaches to dual enrollment practices across the nation.

### **Dual Enrollment Structural Designs**

Conceptually, dual credit and concurrent enrollment refer to programs that allow high school students to complete secondary and postsecondary credit at the same time (Allen, 2010). It is important to note that this type of specific arrangement may be for college credit, but there is no requirement for it to be so. Citing others, Allen (2010) argues that this appears to be the terminology of choice in specific states. A survey of state approaches completed by Kim, Barnett, and Bragg (2003) indicated that the state of Illinois has differing definitions whereas dual-enrollment refers to students concurrently enrolled in both high school and college, dual credit indicating that the same course is providing credit for both high school and college, and articulation credit that align credit between secondary and postsecondary institutions.

Dual enrollment pathways have been used to describe the highly-structured programs that are prescriptive in nature that may reflect non-credit and credit college courses as seen in New York (Allen, 2010). This approach tends to reflect targeted courses in career and vocational areas rather than general studies in the liberal arts. Florida utilizes a similar approach and reports gains in college persistence after completion of high school (Community College Research Center, 2012).

Beyond differences in structural types, modalities too exasperate clarity related defining dual enrollment. A descriptive study examining dual enrollment in Kentucky identifies the majority of students in that state took dual enrollment, dual credit courses in a face-to-face format primarily on a college campus. However, in a four-year period, face-to-face instruction on high school campuses experienced growth (Lochmiller et al., 2016). The same study identified that online and off-site instructional delivery was also an option available to students and districts though at considerably lower rate of participation. In Texas, the creation of the early college high school model requires students to attend a third-site school that was neither the high school or the college offering credit to allow students the opportunity to earn both a high school diploma and associates degree simultaneously (Mansell & Justice, 2014). However, Texas is expanding online opportunities targeted at students in more rural areas (Harris & Stovall, 2013).

Iowa enacted through its Senior Year Plus legislation (Iowa Code 299A.8(1), 2015) definitions for Post-Secondary Enrollment Options (PSEO), Concurrent Enrollment, and Career Academies. In this format, similar terms are applied in different manners than other states as identified earlier. PSEO promotes rigorous academic pursuits by allowing high school students to enroll in college courses. By state code, all juniors or seniors in high school are eligible for



enrolling in community college courses if they meet the community college entrance requirements. Freshman and sophomores identified as gifted and talented may also enroll. However, school districts are given latitude as establishing criteria for gifted and talented designations locally. Students dual enrolled through the PSEO program typically take general studies transfer-level courses either on the college campus or online.

Concurrent Enrollment refers specially to a district-to-community college partnership that establishes on a contractual basis for student enrollments in both high school and college. It usually results in students taking college courses at the high school campus in face-to-face format with a college instructor or a high school instructor who has been qualified by the servicing community college. In rare circumstances, it allows for an entire high school class (for example an English class) to facilitate a restricted online course offering for a college class whereas the high school students are schedule a time period in the high school day to work on their online college course assignments.

Finally, Career Academies are a growing approach to the state's strategies for extending dual enrollment opportunities. However, Iowa's approach does not align with current national models but rather combine two-years of high school education with an associate degree program. These academies tend to provide Career and Technical Education opportunities to high school students such as allied health, police science, construction, or other trade related programs.

Into this milieu of structures, online modalities are now being added. As a configuration alone or as embedded in other dual enrollment structures, online learning extends opportunities to student groups geographically separated from dual enrollment opportunities such as presented in Harris and Stovall's (2013) study on rural high school student success in an online college math course. Nevertheless, while studies suggest the promise of online dual enrollment

coursework, very little research in terms of design, delivery, best practices, and problems guides policy-makers (Lang, 2016).

Dual enrollment as a term suffers from ambiguity as its application and implementation can look drastically different with similar components across states. This kind of broad field of meaning leads researchers to two conclusions. First, differences in program structure and modality make research difficult as too many variables arise when trying to compare programs in New York to those in Ohio for example. This creates concerns regarding the of lack of national data related to dual enrollment in the literature (Allen, 2010). Even when appealing to standardization through the National Alliance for Concurrent Enrollment Programs (NACEP), only those programs that reflect concurrent approaches, such as evidenced in Iowa, seem to be favored at the expense of other designs and implementations for dual enrollment (Allen, 2010).

Second, that the best and most pragmatic definition related to any study of dual enrollment must identify with the state or local definitions of the study regardless of how other groups use the same or similar terms. The context of each state's guidance is instrumental for localized and statewide studies; however, it should be recognized that the definition used in a study might also serve as a limitation for generalizations beyond the context examined. For this study, Iowa's guidance and definitions related to PSEO will be utilized.

### **Dual Enrollment Benefits**

The inarguable growth of dual enrollment opportunities since 2000 is rooted in a desire to leverage known and anticipated benefits related to academic success as a precursor to overall success in later life either through expanded career opportunities and/or increased greater financial reward. These benefits are perceived for both the individual and the communities in which they will live as adults. It is these benefits that seem to connect learners, parents, K-12

school systems, higher education, industry and policy makers to continue to call for the expansion of dual enrollment in terms of capacity and modality of learner. Research indicated benefits include increased access to higher education for all students, more challenging academic experiences for high school students, increased enrollments in higher education institutions both in the present and the future, cost savings to families and learners, and ultimately a more educated workforce. These benefits address current economic realities that underscore the necessity of a college-level education for future success and present hope and enthusiasm for expanding dual enrollment opportunities (Barnett & Stamm, 2010).

Early forays into dual enrollment programing focused on creating opportunities for the most advanced high school students in the 1970s (Lichtenberger et al., 2014). But as late as 2012, many programs across the nation continued to highlight access to collegiate-level course work for students considered high-achievers (Community College Research Center, 2012). However, in the years immediately to follow, the nation's push to increase college-level completion for more students due to future skilled-workforce concerns and financial support from groups like Lumina and the Gates Foundation have drawn attention to how expanding dual-enrollment to more students is in the nation's interests (Karp, 2015). Hoffman, Vargas, and Santos (2009) had previously pointed to emerging research indicating that expansion of dual enrollment opportunities to historically underserved students had promising results on college enrollment and degree attainment.

In this vein, more recent research indicates that historically underserved student populations such as students of color and low-income students have shown gains in college enrollment and degree attainment (Taylor, 2015). One example of expanding opportunities to more varied students is found in South Carolina. This study found that by expanding dual

enrollment opportunities to include Career and Technical Education (which often do not require the same pre-requisite requirements as college/university transfer courses), historically underrepresented students were more likely to persist than students dual enrolled in Transfer college coursework (D'Amico, Morgan, Robertson, & Rivers, 2013). By shifting the secondary level outcome from “everyone needs to go to a University” to focusing on learners’ preparation for workforce development, dual enrollment expansion in Career and Technical Education areas increases the opportunities available for a broader range of student than previously targeted.

By expanding the pool of students eligible to participate in dual enrollment programs and academic areas available, dual enrollment offerings provide an incentive to increase high school completion by providing more rigorous learning opportunities. “Dual enrollment programs offer students with high academic abilities a challenging alternative to remaining in their traditional high school programs” (Jones, 2014). Through accreditation such as NACEP, students experience learning environments designed to implement comparable college courses even if taken on high school campuses with high school teachers (Scheffel, K., McLemore, Y., & Lowe, A., 2015). Furthermore, non-advanced high school students appear to benefit from the demands of dual enrollment participation. Florida’s move to open dual enrollment options to all secondary students has shown increases to student enrollment in college courses within four years of ninth grade with the greatest increases found among Hispanic and African American students among all ethnicity demographics (Hoffman, Vargas, & Santos, 2009). Kanny’s (2015) qualitative study of Latino students showed that by adding dual enrollment options to high school students, these underrepresented students benefited not just from the academic rigors of the coursework but also indicated that early exposure to the college environment allowed them to

grasp the “hidden curriculum” of post-secondary academics increasing confidence to complete college-level work.

As mentioned previously, there exists a growing body of literature that indicates students who participate in dual enrollment options while in high school matriculate into higher education enrollments at a higher rate. Increased higher education enrollments benefits from two perspectives. First, higher education institutions may count dual enrolled students as part of state and federal reporting. For example, in the state of Iowa, a dual enrolled student is reported to the state as part of a community college’s 10-day census count during the Fall and Spring terms. This headcount is how the State determines the amount of state aid to a community college in the following fiscal and academic year. The counting of dual enrollment students as part of a community college’s overall enrollment number is more important financially at a time when nationally, community colleges have seen an overall decrease in enrollments from 2012-2015 and projections continuing that overall downward trend in the years to come (Juszkiewicz, 2016).

For students, earlier references to increases of underrepresented student population gains in enrolling in college courses after high school have seen in South Carolina and Florida among those students who participated in dual-enrollment programs (Hoffman, Vargas, & Santos, 2009, D’Amico et al., 2013). Among Wisconsin students, Wang, Chan, Phelps, and Washbon (2015) indicated that participation in dual enrollment programs provided high school students with academic momentum that confirmed benefits previously identified in research: increased likelihood of college enrollment after high school, retention, and credential attainment among community colleges. Beyond enrollment increases, students benefited in terms of degree attainment after high school. When examining remediation registration and credential attainment

in Tennessee for community college students who had previously participated in dual enrollment during high school, students who participated in dual enrollment were 3.4 times less likely to require remediation upon enrollment in higher education, 2.5 times more likely to graduate in two years and 1.5 times more likely to graduate in three years when compared to community college students who did not participate in dual enrollment (Grubb, Scott, & Good, 2017). Not all studies are as glowing.

Gubernatorial attention in the state of Virginia has led the state experience increases in dual enrollment participation since 2005 (Pretlow & Wathington, 2014). Overall, similar increases in enrollments and degree attainment that benefit both college and student were reported, but upon detailed review, gains were made disproportionately whereas minority groups and underrepresented student populations did not participate as much in dual enrollment and experienced little change in college enrollment and graduation (Pretlow & Wathington, 2014). In light of the many studies indicating benefits related to increased enrollment and degree attainment after participating in dual enrollment, current approaches by structure, modality, and policy do not present a panacea for increasing success among all learner populations and still require attention. However, in a general, sense it can be stated that dual-enrollment has benefited colleges with increased enrollments by increased student recruiting (Jones, 2014) and students with increased degree attainment in a broad sense.

Along the same line, one benefit touted by policy-makers and researchers is the benefit of cost savings through participation in dual enrollment. The ever-increasing costs associated with higher education can be a hindrance with concerns about student debt. A study of high school students in Texas indicated that high school students frequently identified financial savings associated with dual enrollment participation as a significant reason enrolling in a more rigorous

academic path in high school (Mansell & Justice, 2014). Previous research by Marshall and Andrews into one high school and one community college's dual enrollment partnership reported that parents saved between \$5,000-\$24,000 in tuition and fees (as cited in Jones, 2014). Moreover, students and their families receive cost saving benefits from dual enrollment participation due to decreasing the time to completion of a degree resulting in limiting the amount and time they were paying full tuition, fees, room & board, books and other fees since they earned credits faster or are further along in their program of study by previously completing college credits through dual enrollment (Lile, Ottusch, Jones, & Richards, 2017).

This kind of savings is the result of state or school district/community college agreements to cover costs during the dual enrollment years. For example, Iowa statute requires that community colleges either place a cap on the total cost of a course or entering into a contractual agreement for cost with a local school district for all dual enrolled students. This price is determined by the State's weighted funding formula which pays schools districts a prorated amount above the general state aid per pupil funding which is in turn paid to the cooperating community college. The net result for the student and their family is access to free college course work with the further stipulation that textbooks be included at no additional cost to the family. Various states have differing formulas regarding state level financial support that generally result in savings of some amount by participating in dual enrollment (Hoffman, Vargas & Santos, 2009, Kronholz, 2011; Mansell & Justice, 2014; Roach, Vargas, & David, 2015). In some states, students desiring to participate in dual enrollment do so with little financial support by their state and are ineligible for Federal financial aid since they are still in high school (Lang, 2016).

The benefits associated of increasing access to higher education while in high school, promoting increased greater matriculation to college, and potential financial savings for students who begin college-level work while in high school are all cited in current literature as contributing factors for expanding dual enrollment across the nation. While all sectors of higher education can be found to offer dual enrollment opportunities, the nation's community colleges provide the majority with 98% offering dual enrollment credit courses exceeding four-year private and public institutions (Taylor, Borden, & Park, 2015). In Iowa, by legislation, only community colleges can offer dual credit offerings under the current state funding scheme. Partially due to this fact, the literature also identifies many challenges to dual enrollment programing.

### **Dual-Enrollment Challenges**

The foremost challenge related to concerns surrounding dual-enrollment as an educational reform for opportunity is the question of quality. Due to various frameworks adopted by states individually, the resulting landscape is a patchwork of program structures, various policies regarding what courses high school students can and cannot take, and an emphasis for quality is underrepresented in the literature (Taylor, Borden, & Park, 2015). Jones (2014) reports expressed concerns by faculty at both the college and K-12 levels regarding quality and rigor of dual enrollment courses. Even with accrediting resources such as NACEP which require college courses taught on high school campuses and by high school instructors to reflect collegiate expectations for students, questions of quality remain due to various "chains-of-authority" and the readiness of high school teachers to teach at the collegiate level (Scheffel, McLemore, & Lowe, 2015). Additionally, dual enrollment creates competition within high



schools for the same students who might have previously participated in AP coursework further leading to questions of quality between the two programs (Jones, 2014).

When dual enrollment courses were primarily targeted at the most advanced high school students, concerns were present, however the student profile helped temper worries. As dual enrollment has expanded, questions of quality of learning related to college readiness of students has increased packaged as concerns that dual enrollment courses maintain college-level standards (Venezia & Jaeger, 2013). With the growth of dual enrollment into the online learning work, concerns of quality are still present especially when there is data indicating that dual enrollment students benefit the greatest when taking courses on the college campus with a college instructor (as cited in Lile et al., 2017). Barnett and Stamm (2010) reveal that there is little in terms related to research of the scope of dual enrollment online participation or student learning outcomes and yet, online learning continues to grow at faster rates in terms of enrollments at the college-level. And with previous research concerning the need for students to assume greater responsibility for his/her own learning (Xu & Jaggars, 2014), concerns of students not truly being prepared for the rigors of college coursework are increased when high school students enroll in online college courses.

In addition to concerns related to quality of courses in general and more specifically in the online realm for dual enrollment participants, equity concerns involving disparities in local and state policies need to be addressed. For example, the Oklahoma State Regents for Higher Education (OSRHE) stipulates that only high school students may participate in dual enrollment programs with 100% tuition waivers based on an assumption that only high school seniors are prepared for the rigors of college (Roach, Vargas, & David, 2015). Yet in Iowa, all 11th and 12th grade students and Talented and Gifted (TAG) tenth and ninth grade students as identified

by their district can participate with no additional restrictions beyond what a community college requires for all students (Iowa Department of Education, 2017, April). These are two examples of how state policy differs among states that raises concerns of equity to access to dual enrollment programs. In Virginia, Pretlow and Wathington's (2014) conveyed in regard to state policy:

Consistent with Govern Warner's goals, participation in dual enrollment did increase in Virginia after the 2005 policy change. However, it may have perpetuated the educational opportunity gap among student subgroups rather than help to decrease it, and unanticipated consequence of the policy change. (p. 52)

This example highlights that dual enrollment policy has the ability to inadvertently hinder those groups it intends to assist and must be continuously monitored to ensure equitable results.

Finally, local school district policies either serve a gatekeeper function or a pathway function. Texas' Early College program allows districts to create distinctive high schools specifically tailored to offer dual enrollment opportunities that are parallel to the traditional high school experience for students who choose to participate (Mansell & Justice, 2014). In South Carolina, districts established dual enrollment opportunities for students who had nearly mastered and completed the K-12 curriculum and required the permission of the student's high school principal to attend a community college during the high school years (D'Amico et al., 2013). Differing policies associated with whom may participate and by what modalities they may participate presents trepidation to students living in different regions of the country. Add online opportunities and there becomes greater variance due to preferences and beliefs of K-12 district leaders about allowing students access to online dual-enrollment. Variance of policy related to admittance, target populations, faculty credentials and financial support hinder

comparative results in research attempting to identify best-practices (D'Amico et al., 2013). Refer to Figure 3 for a graphic depiction of state policy differences for dual enrollment programing across the nation as of 2016.

[http://www.mtsac.edu/president/cabinet-notes/2016-17/ccjournal\\_Rise\\_of\\_Dual\\_Enrollment\\_Apr-May\\_2017.pdf](http://www.mtsac.edu/president/cabinet-notes/2016-17/ccjournal_Rise_of_Dual_Enrollment_Apr-May_2017.pdf)

*Figure 3: Variation across the nation on how states determine who pays for tuition in dual enrollment programs adapted from Education Commission of the States, 2016 for “The Rise of Dual Enrollment,” by D. Pierce, 2017, Community College Journal, April/May, p. 21.*

Linked to concerns about policy lead to alarms that have plagued community college credits, namely, issues of transferability. There is a concern that credits awarded through dual enrollment programs through community colleges may not transfer to other four-year institutions thus negating any benefit of completing the credits (Jones, 2014). Continuing issues of transferability from community colleges to four-year institutions is a considerable concern as the primary provider of dual enrollment credits continues to be America's community colleges.

### **Summary**

The results from this literature summary highlight the validity of applying Pintrich's SRL and the MSLQ as an appropriate instrument as the theoretical framework for this study and the continued growth of dual enrollment and indicate how growth in dual enrollment opportunities to include increased college online learning for high school students. Overall, research into this area of educational reform has indicated that dual enrollment has been on a continual improvement vector with various types of structures and approaches to providing college opportunities to high school students. Furthermore, what was once a prospect for only the most advanced students has now expanded to include opportunities for more students and includes both four-year college/university tracks and career and technical education. Current research

generally supports that dual enrollment reaps benefits of increased high school success, increased college enrollment after high school, and greater success in degree or credential attainment at the postsecondary level. Unfortunately, there continues to be a gap of specific research related to how high students are academically successful. This gap is present regarding success in current models of dual enrollment programming and is heightened with the anticipated growth in online collegiate opportunities for high school students.

Due to financial constraints and stakeholder calls for a greater trained and educated future workforce, the joining of dual enrollment through online learning is poised for growth. However, the learner characteristics needed to be successful in the collegiate online learning environment will be a challenge to overcome as many high school students continue to experience more traditional learning environments when it comes to their secondary education experience. Pintrich's Self-Regulated Learning theory with its emphasis on motivational and self-regulated strategies factors provides an opportunity to evaluate high school student self-awareness in these areas as well as correlating possible strategies that may assist high school counselors, teachers, principals and community college administrators in establishing best practices to assist future students succeed in the online collegiate environment.

The next chapter introduces the statistical methodology for this study. The proposed methodology addresses the gap in current research related to high school academic success in college-level online coursework as identified in Chapter Two. It provides information establishing the empirical rigor of the research design, and it identifies material regarding the study's instrumentation.

## **CHAPTER THREE: METHODS**

### **Overview**

Dual enrollment participation across the nation continues to expand. This expansion includes increased learning opportunities for high school students enrolled in online college classes. Unfortunately, little research has been conducted to identify what motivation or self-regulating learning strategies are beneficial for predicting high school student success in an online college course. For this study, the relationship between predictive variables and a criterion variable of student success is examined. In this chapter, research design, the research question, and null hypotheses are identified. Additionally, the participants and setting, research procedures, instrumental, and data analysis are discussed.

### **Design**

The research design selected for this quantitative study is predictive correlational. Predictive correlational designs are used to describe the extent to which an outcome behavior pattern can be predicted based on relational strength by predictor variables (Gall, Gall, & Borg 2007). Specifically, this study applies binary logistic regression to determine the strength of relationship between predictor variables (self-efficacy, intrinsic value, test anxiety, cognitive strategies and self-regulation strategies) and the outcome variable of student course completion since the criterion variable is categorically dichotomous (pass or fail). For the purposes of this study, the 44-question Motivated Strategies for Learning Questionnaire (MSLQ) was used to determine student awareness of both motivation and self-regulated learning factors. Participant scores on the MSLQ were analyzed to determine strength and weakness of predictor variables on the outcome variable student course completion (pass or fail) as reported by XYZ Community College. Utilizing final grade classifications of A, B, C, D, F, I, and W/X, dichotomous groups for

pass or fail were established whereas grades A to C represent passing and/or transfer eligible course completion and failing consists of student grades D, F, I or W/X. Grades of D were considered to be in the failing category in terms of academic achievement as it is a grade that is not often eligible to transfer between higher educational institutions. At XYZ Community College, final course grades of W/X are transcribed when a student drops a class before the financial aid refund cutoff (X) and after the financial aid cutoff date (W). Various studies utilize the statistical approach of establishing “pass or fail” categories as determined by final grades suggesting acceptable practice (Roblyer, Davis, Mills, Marshall, & Pape, 2008; Liu, Gomez, & Cherng-Jyh, 2009; Rankin, 2013; Fong, Zientek, Ozel, & Phelps, 2015; Lochmiller et al., 2016).

### **Research Questions**

The following research questions are proposed:

**RQ1:** How accurately can course completion be predicted from motivation as identified by self-efficacy, intrinsic value, and test anxiety using the MSLQ instrument among high school students enrolled in a college online course?

**RQ2:** How accurately can course completion be predicted from self-regulated learning strategy usage factors of cognitive strategy usage and self-regulation strategy usage using the MSLQ instrument among high school students enrolled in a college online course?

### **Hypotheses**

The null hypotheses for this study are:

**H<sub>0</sub>1:** There is no statistically significant predictive relationship between predictive motivation variables of self-efficacy, intrinsic value and test anxiety as measured by the MSLQ and the outcome variable of high school student completion of a college online course as reported by the student’s final course grade.

**H<sub>02</sub>:** There is no statistically significant predictive relationship between predictive self-regulated learning strategy usage variables of cognitive strategy usage and self-regulation strategy usage as measured by the MSLQ and the outcome variable of high school student completion of a college online course as reported by the student's final course grade.

### **Participants and Setting**

The participants for the study were drawn from a convenience sample of high school students located in Northwest Iowa during the Spring semester of the 2017-2018 school year. The school district is a large urban district with almost 15,000 students and three high schools. 64% of all students are classified as Free and/or Reduced Lunch (FRL) eligible during the 2015-2016 academic year indicative of a large portion of students who are classified as low Socioeconomic Status (SES) (Iowa Department of Education, 2017, April). Furthermore, the same report indicates a wide degree of student ethnic diversity with over 50% of students identified as white, 31% as Hispanic, five percent Black and 13% represented as Asian, Native American, Pacific Islander, and Multiethnic (Iowa Department of Education, 2017, April). The district enrolls over 4,000 high school students of which approximately 1,000 are dual enrolled at XYZ Community College in any given term. The district reported a 87.19% graduation rate by cohort in its current reporting year (IA Dept. of Education, 2017, April). XYZ Community College is located in the same urban center with the school district, but it serves an area that consists of six counties that are primarily considered rural areas in Northwest Iowa. The community college maintains an enrollment of 5,400 students of which 2,600 are dual enrolled students from all six servicing counties. The school district chosen for this study was done so because it provides the most total high school students to XYZ Community College's dual

enrollment program and is the only urban school district located in the community college's six county servicing region.

For this study, the number of participants sampled were 23 which does not exceed the minimum for a medium effect size. According to Gall et al. (2007), 66 students is the desired minimum for a medium effect size with statistical power of .7 at the .05 alpha level for a correlational coefficient hypothesis test. Citing others, Warner (2013) suggests the following formula to determine sample size for binary logistic regression:  $N \geq 10k$ , whereas  $k$  = number of predictor variables. Additionally, contingency tables were established for continuous variables to ensure that each cell has at least five frequencies in each cell (Warner, 2013). However, Warner (2013) argues that it is difficult to prescribe sample size for binary logistic regression. Notwithstanding, Warner (2013) postulates larger sample sizes prove helpful in regression analysis to overcome unforeseen weak effect sizes, violations of assumptions, or if measurements have poor reliability (p. 570). Larger  $N$ s may be needed to gain acceptable statistical power (Warner, 2013, p. 1034). Based on these considerations, for this study, a minimum sample size of 50 participants was sought ( $k = 5$ ) with the intent to exceed 100 participants to account for concerns related to frequency counts in each cell and assumption testing. This goal sample size is confirmed as appropriate in other empirical studies utilizing binary logistic regression to examine predictability of factors (Liu, Gomez, & Cherng-Jyh, 2009). Unfortunately, difficulty gaining parental consent and student completion of the MSLQ proved problematic resulting a sample size of 23 participants.

The sample came from three different high schools. Student were identified by the school district according to completed course registration at XYZ Community College for online classes. Per state legislation, students may be ninth through twelfth grade to enroll in dual credit



opportunities at the community college; however, underclassmen at the high school must be identified as Talented and Gifted (TAG) by the school district to participate in dual enrollment.

### **Instrumentation**

This study sought to determine the predictive relationship between variables related to motivation and to self-regulated learning strategies utilizing one instrument that has previously been used in similar studies and one outcome protocol. The instrument by which students reported their self-awareness of the variables under consideration was the Motivated Strategies for Learning Questionnaire (MSLQ). The protocol used to determine the impact of motivation and self-regulated learning strategies was the course final grade for the postsecondary online class defined as either pass or fail.

#### **Motivated Strategies for Learning Questionnaire**

The MSLQ was completed by high school students dually enrolled in a college-level online course at XYZ Community College. The full MSLQ consists of 81 questions related to self-reported factors: motivation and self-regulated learning. The full version explores nine variables under the motivation scale and seven variables under the self-regulated learning scale. The survey version used for this present study examines three variables within the motivation scale and two variables within the self-regulated learning scale. For this study, the 44-question version created by Pintrich and DeGroot (1990) was utilized (see Appendix A). Pintrich and DeGroot (1990) employed this version when examining the ability of the tool to predict academic success among of secondary students. This instrument has been used in numerous studies related to predicting student academic success supporting the instrument's content validity in various secondary student populations (Yukselturk & Bulut, 2007; Ilker, Arslan, & Demirhan, 2014; Aydin, 2015; Cohen & Magen-Nagar, 2016). The 44 questions of the MSLQ used in this study use a seven-point Likert-

type scale of likelihood statements (1 = not at all true of me, 2 = usually not true of me, 3 = rarely true of me, 4 = occasionally true of me, 5 = often true of me, 6 = usually true of me and 7 = very true of me). Within the motivation scale consists the variables self-efficacy, intrinsic value and test anxiety. Previous factor analysis for the variables reveal reliability scores of  $\alpha = 0.89$  (self-efficacy),  $\alpha = 0.87$  (intrinsic value) and  $\alpha = 0.75$  (test anxiety) (Pintrich & DeGroot, 1990). Within the self-regulated learning strategies scale consists the variables of cognitive strategy use and self-regulation strategy use. Pintrich and DeGroot (1990) showed the variables of cognitive strategy use ( $\alpha = 0.74$ ) and self-regulation to be reliable ( $\alpha = 0.83$ ). The variable of intrinsic value is represented by 10 questions in the abbreviated MSLQ utilized in this study. Self-efficacy is identified through eight survey questions. The trait of test anxiety is addressed in four questions with 13 questions identifying cognitive strategies. Finally, the MSLQ employs nine questions to identify self-regulation among study participants (Pintrich & DeGroot, 1990; Ilker, Arslan & Demirhan, 2014). Each variable is scored on a 7-point Likert-type scale whereas higher scores indicate greater student self-awareness of that particular variable and lower scores indicate less student awareness of that specific variable (Pintrich et al., 1991; Broadbent, 2017). See Table 2 for specific variable scoring details. Scoring for each variable is determined by the calculating the total survey score from multiple questions associated with each trait among study participant responses in the MSLQ (Pintrich et al., 1991).

Table 2

*MSLQ Variable Highest/Lowest Scoring*

Variable	Lowest Score (Not True of Me at All)	Highest Score (Very True of Me)
Self-efficacy	8	56
Intrinsic Value	10	70
Test Anxiety	4	28
Cognitive Strategy Usage	13	91
Self-regulation Strategy Usage	9	63

Boll, Campbell, Perez, and Yen (2016) report that various studies confirm the MSLQ tool can be utilized in its entirety (81-questions) or modified using only subscales to evaluate student self-awareness. MSLQ subscales have been shown to possess predictive validity in regards to students' final course grades providing justification for using the 44 questions identified for this study (Pintrich & DeGroot, 1990; Pintrich, Smith, Garcia, & McKeachie, 1993; Wibrowski, Matthews, & Kitsantas, 2017). The MSLQ is housed at the University of Michigan and permission for use is found at <http://www.soe.umich.edu/faqs/tag/education+and+psychology/#2>. The guide for this instrument *A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ)* is also available at same public website and is included in this study (see Appendix B).

### **Final Course Grades**

Final course grades were examined for correlation with student self-reporting of factors using the MSLQ. While recognizing concerns of validity and reliability for using grades to express student learning, Allen (2005) suggests that instructor attention and reflection on the meaning of validity in grading practices can positively impact the accuracy and meaningfulness of grading as appropriate measures for student learning. Other researchers argue that the term "academic success" is extremely complex and broad that it does raise concerns about validity, yet much of

current research into student success continues to report and accept grades or GPA as the measure of academic achievement (York, Gibson, & Rankin, 2015). Liu, Gomez, and Cherng-Jyh (2009) report course final grades in their community college study on retention and grades as letter grades, for example A, B, C, D, F, I or W/X, with identifying successful completion of a college course as a student receiving an A to C grade. Furthermore, the literature presents acceptance of using course final grades as an acknowledged standard when examining the predictive value of student characteristics in relation to academic success and course completion in community college online courses (Yen & Liu, 2009; Fong et al., 2015). For this study, the final grades of A, B, C, D, F, I & W/X will be used with grades A through C representing successful academic achievement in course work and grades of D, F, I, and W/X as representing the failing category as this is the grade reporting scheme of XYZ Community College.

### **Procedures**

Prior to initiating the study, the researcher conducted a comprehensive literature review identifying a gap relating to predictive variables of high school student academic success in college-level online coursework. After identifying the gap, a draft proposal was created and submitted for defense through the dissertation prospectus process. Upon successfully defending the dissertation prospectus, the researcher submitted the research plan to Liberty University's Institutional Review Board (IRB) for approval to proceed with the study. Approval from IRB was received on February 2, 2018 (See Appendix D). After receiving IRB approval, the researcher received verbal confirmation of continued formal institutional support to participate in the research study from both the Chief Academic Office (CAO) at XYZ Community College and the Executive Director of Secondary Schools at the proposed participating school district. Support letters from both institutions is found in Appendix C.

The researcher collaborated with high school principals to schedule meetings for the researcher to present the study to students and secure consent from students 18 years of age or older. Students under the age of 18 were provided forms for parent/guardian consent to participate. Liberty University IRB approved consent forms were utilized providing background information for the study along with consent items to be signed and sent back to each school's principal (see Appendix D).

Before the researcher met with students at each high school, XYZ Community College provided the researcher with a total high school student enrollment in online classes from the K-12 school district. On February 2, 2018, a total 267 students were identified and represent this study's total population across the three participating high schools. The researcher scheduled meetings on February 13, 2018 at HS2, February 14, 2018 at HS1, and February 15, 2018 at HS3. A total of 132 students attended the informational meetings. Attendance was taken by the researcher for each high school's informational meeting. The remaining 51% of the student population who did not attend an informational meeting was contacted by each high school's front office and provided a consent form with instructions for forms to be returned to each high school's front office by February 22, 2018. The researcher received 15 signed consent forms immediately after informational meetings from students 18 years of age and older, and the researcher received an additional four signed consent forms on February 22, 2018 for a total of 19 or 7% of the population. Unfortunately, this number did not meet the sample goals identified earlier for participants. In consultation with the researcher's committee chair, it was decided to initiate a second round of consent gathering.

After reporting the total consent forms to the Director of Secondary Education, it was asked of the researcher to continue to seek consent and to coordinate the effort with the school

district's parent/teacher conferences. The Director agreed to have a consent form attached to each student's mid-term report that would be given to parents at the conferences on March 1 and March 2, 2018. The researcher verified all students at each high school who did not turn in a consent form. The researcher then delivered new consent forms to be attached to each student's mid-term report by each high school's front office. Each consent form had the student's name identified on it to ensure the high school's front office staff knew which form went with which report due to the study's requirement of having two consent forms (one for students over the age of 18 and one for students under the age of 18). Consent forms were attached to student mid-term reports with instructions for high school staff to explain the consent form to students and parents as provided by the researcher to each high school principal on February 26, 2018. During February 2018, the researcher built an electronic version of the MSLQ using XYZ Community College's Survey Monkey subscription to be disseminated to study participants once all consent forms were received and the sample established.

The study sample was established by March 21, 2018 with a total of 24 participants providing consent. The researcher emailed the study participants a link to complete the MSLQ online. A second reminder was emailed to study participants to complete the survey on April 2, 2018. Study participants were required to enter demographic information to include identifying which high school was attended, grade-level, student age, and student sex before proceeding to the MSLQ questions. The researcher monitored online survey completion and communicated with study participants as errors were identified by the researcher such as missing or skipping a question on the survey. The online survey closed to student participants on May 14, 2018. Of the 24 study participants who gave consent, 23 fully completed the online survey. One student

completed the demographic section of the survey but failed to complete the questions of the MSLQ and was thus not calculated in the data analysis.

Survey Monkey data was scrubbed by the researcher to remove personally identifiable information from the surveys and transcribed to Excel spreadsheets for data analysis. Student names were removed and replaced with codes to protect student confidentiality. A cross-reference sheet for participant names and blind coded data was maintained in a double-locked secure office with access only available to the researcher. At the end of the archival period, five years from the date of the survey administration, all forms, survey data, and Excel spreadsheet data will be destroyed by the researcher.

At the end of the Spring 2018 term, final grades as reported by the instructors at XYZ Community College were coded as pass or fail by the community college's institutional research office and provided the information to the researcher for the purposes to perform data analysis. Final grades were categorized as pass/fail (pass = A to C, fail = D, F, I, & W/X) by the community college institutional research office per the researcher's instruction to create dichotomous group membership for the purposes of this study. One incomplete survey was removed from the study and no final grade examined. No pilot study was administered, as the validity and reliability of the for the survey instrument are available in the literature. All analysis was conducted using version 24.0 of International Business Machines' (IBM) Statistical Package for the Social Sciences (SPSS) software and reported following the latest edition of the American Psychological Association's (APA) writing guidelines. Furthermore, research findings were presented to the researcher's dissertation committee, the CAO at XYZ Community College and the curriculum subcommittee at the urban school district ensuring participant confidentiality.

## **Data Analysis**

Descriptive statistics were calculated for each of the variables (intrinsic value, self-efficacy, test anxiety, cognitive strategy usage, and self-regulation strategy usage) using SPSS 24.0. The descriptive statistics included the frequency count for each variable (intrinsic value, self-efficacy, test anxiety, cognitive strategy usage, and self-regulation strategy usage).

### **Predictor Variables**

Since the survey instrument data was ordinal (7-part Likert-type scales), the researcher decided to handle the variables as continuous (Hutcheson & Sofroniou, 1999; Laerd, 2015). The five predictor variables were chosen and calculated using the 44-question MSLQ instrument previously shown to have moderate predictive value among secondary students for academic outcomes (Pintrich & DeGroot, 1990; Aydin, 2015). All variable scores were coded according to the range scores provided by the instrument creators (Pintrich & DeGroot, 1990; Pintrich et al., 1991).

### **Criterion Variables**

The criterion variables for this study was final grade awarded to a high school student in an online college course as defined pass or fail. This variable was coded with “0” for a failing grade and “1” for a passing grade. The coding of the outcome confirms with procedures for conducting correlational, predictive research utilizing binary logistic regression as identified by Warner (2013).

### **Statistical Analysis**

Before analyzing the data, data screening was performed to identify any incomplete or inconsistent data (Warner, 2013). Assumption testing for binary logistic regression was identified and followed by the researcher according to Warner (2013). First, the assumption of dichotomous outcome variable was verified as having only two outcomes (Gall et al., 2007; Warner, 2013; Laerd,



2015). These scores were confirmed as being statistically independent and mutually exclusive. Next, the assumption that the model be correctly specified as having all relevant predictor and no presence of non-relevant predictors was detected. The variables examined in this study have been recognized as relevant among secondary students for predicting academic success (Pintrich & DeGroot, 1990; Aydin, 2015).

Furthermore, the assumptions of non-multicollinearity among predictor variables were examined to ensure low intercorrelations between predictor variables by examining Variance Influence Factors (VIF). The researcher also examined distribution of scores on the criterion variable for model stability. Assumption testing for binary logistic regression does not require as restrictive assumptions when compared to linear regression or discriminant analysis, but preliminary data screening as identified above is shown to helpful in establishing the validity of the overall model (Warner, 2013).

Binary logistic regression was performed. Then, results addressing goodness of fit of the models outputted using binary logistic regression were discussed. The Omnibus Tests of Model Coefficients returned a Chi-square value to see if the null model or constant-only model was statistically significant at  $p < .05$ . A Wald ration was reported for each logistic regression model (motivation and self-regulation). Results from Nagelkerke's  $R^2$ , Cox and Snell's  $R^2$  and Hosmer and Lemeshow test were used to address models' fit to survey data and strength of the models. Additional reporting components will include Wald statistics and estimated change in odds along with a 95% confidence interval. Effect size information in the form of odds ratio were presented along with prediction equations corresponding to each of the two research questions (Warner, 2013; Laerd, 2015). Finally, individual predictor information was presented to include model coefficients, statistical significance tests, and reporting on the nature of association between each

predictor variable and the outcome variable (Warner, 2013). Variable prediction was stated in the Classification Table and the Variables in the Equation table for the statistical analysis (Laerd, 2015). Once all analyses were performed, the researcher provided conclusions to fail to reject the null hypotheses.

### **Summary**

In Chapter Three, the correlational, predictive design was discussed. The research questions and the null hypotheses were presented. Setting and study participants were described. The instrumentation for this study was provided, and the procedures for selecting the sample and collecting predictor variable and outcome variable data were described. Finally, the data analysis was presented. Chapter Four provides the statistical findings for the current study.

## CHAPTER FOUR: FINDINGS

### Overview

In this chapter, the descriptive statistics will be discussed. Data screening procedures and the results of assumption testing for logistic regression analysis are presented. The outcomes for the null hypotheses will be reported, including the logistic regression results and the Chi square and odds ratios for each predictor variable of self-efficacy, intrinsic value, test anxiety, cognitive strategy usage, and self-regulating strategy usage.

### Research Questions

**RQ1:** How accurately can course completion be predicted from motivation as identified by self-efficacy, intrinsic value, and test anxiety using the MSLQ instrument among high school students enrolled in a college online course?

**RQ2:** How accurately can course completion be predicted from self-regulated learning strategy usage factors of cognitive strategy usage and self-regulation strategy usage using the MSLQ instrument among high school students enrolled in a college online course?

### Null Hypotheses

**H<sub>0</sub>1:** There is no statistically significant predictive relationship between predictive motivation variables of self-efficacy, intrinsic value and test anxiety as measured by the MSLQ and the outcome variable of high school student completion of a college online course as reported by the student's final course grade.

**H<sub>0</sub>2:** There is no statistically significant predictive relationship between predictive self-regulated learning strategy usage variables of cognitive strategy usage and self-regulation strategy usage as measured by the MSLQ and the outcome variable of high school student completion of a college online course as reported by the student's final course grade.

### Descriptive Statistics

Data were analyzed for the criterion variable, high school student academic success in an online college course as pass or fail, and the results can be viewed in Table 3. After one case was removed due to incomplete data, the sample included 23 high school students. There were 19 students who passed and 4 students who failed included in the study.

Table 3

*Frequencies for Criterion Variables*

	Frequency	Percent	Valid percent	Cumulative percent
Fail	4	17.4	17.4	17.4
Pass	19	82.6	82.6	100.0
Total	23	100.0	100.0	

Predictor variable scores were calculated based on ranges due to Likert-type scales in the instrument whereas intrinsic value had a score range of 10-70 and frequencies in the study are reported in Table 4. Self-efficacy had a score range of 8-56 and frequencies in the study are reported in Table 5. Test anxiety had a score range of 4-28 and frequencies in the study are reported in Table 6. Cognitive strategy usage had a score range of 13-91 and frequencies in the study are reported in Table 7. Finally, self-regulation strategy usage had a score range of 9-36 and frequencies in the study are reported in Table 8. Tables include only frequencies of predictor variables as identified in SPSS. Scores not listed had zero occurrences in the study.

Table 4

*Frequencies for Predictor Variable Intrinsic Value*

MSLQ Score	Frequency	Percent	Valid percent	Cumulative percent
33.0	1	4.3	4.3	4.3
35.0	1	4.3	4.3	8.7
41.0	2	8.7	8.7	17.4
42.0	1	4.3	4.3	21.7
49.0	1	4.3	4.3	26.1
50.0	1	4.3	4.3	30.4
51.0	1	4.3	4.3	34.8
52.0	2	8.7	8.7	43.5
54.0	2	8.7	8.7	52.2
56.0	4	17.4	17.4	69.6
58.0	2	8.7	8.7	78.3
59.0	3	13.0	13.0	91.3
64.0	1	4.3	4.3	95.7
65.0	1	4.3	4.3	100.0
Total	23	100.0	100.0	

Table 5

*Frequencies for Predictor Variable Self Efficacy*

MSLQ Score	Frequency	Percent	Valid percent	Cumulative percent
33.0	3	13.0	13.0	13.0
34.0	1	4.3	4.3	17.4
37.0	1	4.3	4.3	21.7
38.0	1	4.3	4.3	26.1
40.0	1	4.3	4.3	30.4
41.0	3	13.0	8.7	43.5
42.0	1	4.3	4.3	47.8
43.0	1	4.3	4.3	52.2
44.0	2	8.7	8.7	60.9
46.0	1	4.3	4.3	65.2
47.0	1	4.3	4.3	69.6
48.0	2	8.7	8.7	78.3
49.0	2	8.7	8.7	87.0
51.0	1	4.3	4.3	91.3
52.0	1	4.3	4.3	95.7
56.0	1	4.3	4.3	100.0
Total	23	100.0	100.0	

Table 6

*Frequencies for Predictor Variable Test Anxiety*

MSLQ Score	Frequency	Percent	Valid percent	Cumulative percent
4.0	2	8.7	8.7	8.7
7.0	1	4.3	4.3	13.0
8.0	1	4.3	4.3	17.4
12.0	2	8.7	8.7	26.1
13.0	1	4.3	4.3	30.4
15.0	2	8.7	8.7	39.1
16.0	1	4.3	4.3	43.5
17.0	1	4.3	4.3	47.8
18.0	1	4.3	4.3	52.2
19.0	1	4.3	4.3	56.5
20.0	1	4.3	4.3	60.9
21.0	1	4.3	4.3	65.2
22.0	1	4.3	4.3	73.9
23.0	1	4.3	4.3	78.3
24.0	1	4.3	4.3	87.0
25.0	2	8.7	8.7	91.3
26.0	1	4.3	4.3	100.0
28.0	2	8.7	8.7	
Total	23	100.0	100.0	

Table 7

*Frequencies for Predictor Cognitive Strategy Usage*

MSLQ Score	Frequency	Percent	Valid percent	Cumulative percent
45.0	1	4.3	4.3	4.3
51.0	1	4.3	4.3	8.7
53.0	1	4.3	4.3	13.0
55.0	1	4.3	4.3	17.4
60.0	1	4.3	4.3	21.7
61.0	1	4.3	4.3	26.1
62.0	3	13.0	13.0	39.1
65.0	1	4.3	4.3	43.5
68.0	2	8.7	8.7	52.2
69.0	1	4.3	4.3	56.5
70.0	3	13.0	13.0	69.6
72.0	1	4.3	4.3	73.9
73.0	1	4.3	4.3	78.3
74.0	1	4.3	4.3	82.6
76.0	1	4.3	4.3	87.0
81.0	1	4.3	4.3	91.3
84.0	1	4.3	4.3	95.7
88.0	1	4.3	4.3	100.0
Total	23	100.0	100.0	

Table 8

*Frequencies for Predictor Variable Self-Regulation Strategy Usage*

MSLQ Score	Frequency	Percent	Valid percent	Cumulative percent
27.0	1	4.3	4.3	4.3
33.0	1	4.3	4.3	8.7
34.0	2	8.7	8.7	17.4
36.0	3	13.0	13.0	30.4
37.0	1	4.3	4.3	34.8
38.0	1	4.3	4.3	39.1
39.0	1	4.3	4.3	43.5
42.0	3	13.0	13.0	56.5
43.0	1	4.3	4.3	60.9
45.0	3	13.0	13.0	73.9
47.0	2	8.7	8.7	82.6
48.0	1	4.3	4.3	87.0
49.0	1	4.3	4.3	91.3
57.0	1	4.3	4.3	95.7
63.0	1	4.3	4.3	100.0
Total	23	100.0	100.0	

A total of 19 females and four males completed surveys across the three high schools. Participant biological sex demographics by each high school were: HS1 = seven females and one males; HS2 = nine females and three males, HS3 = three females and zero males. By high school grade-level, a total of 20 seniors, two juniors, one sophomore, and zero freshmen participated in the study across all three high schools. Student participation by high school grade per high school is also reported (See Table 9). Participants ages were: 16 18-years of age, five 17-years of age, and two 15-years of age at the time of survey completion.

Table 9

*Participant Totals by Grade Level Per High School*

High School	12-Grade	11-Grade	10-Grade	9-Grade
HS1	7	0	0	0
HS2	10	1	1	0
HS3	2	1	0	0

In the “pass” group, there were 19 students included in the sample. Within this group, 16 female candidates and three male candidates were identified. There were seven students from HS1, 10 students from HS2, and two from HS3 in the “pass” group. Students in the pass group were in the following high school grade level during the administering of the MSLQ: 17 – 12th grade, one – 11<sup>th</sup> grade, one – 10<sup>th</sup> grade, and zero – 9<sup>th</sup> grade. Students by age are shown in Table 10.



Table 10

<i>Outcome Grouping by Age</i>		
	Pass	Fail
18 Years Old	13	3
17 Years Old	4	1
16 Years Old	0	0
15 Years Old	2	0
14 Years Old	0	0
Total	19	4

In the “fail” group, there were four students included in the sample. Within this group, three female participants and one male participant. There was one student from HS1, three students from HS2, and zero from HS3. Students in the fail group were in the following high school grade level during the administering of the MSLQ: three – 12<sup>th</sup> grade, one – 11<sup>th</sup> grade, zero – 10<sup>th</sup> grade, and zero – 9<sup>th</sup> grade. Students by age are shown in Table 10.

## Results

### Data Screening

The researcher conducted data screening on each of the predictor variables (intrinsic value, self-efficacy, test anxiety, self-regulation, and cognitive strategies) to look for any data inconsistencies by sorting the data for each variable and examining for inconsistencies. One survey was removed from the sample due to incomplete data. After data screening, the researcher identified a data error in coding one data point during transcription from Survey Monkey to Excel and corrected the inconsistency. The researcher did not identify any other data errors or inconsistencies. After the one case was removed, the resulting sample size was 23.

## Assumptions

According to Warner (2013), there are four assumptions required for logistics regression. First, the criterion variable must be dichotomous; the criterion variable in this study is successfully completing an online college course which is dichotomous with the two options of pass or fail. Second, there must be an absence of multicollinearity among the predictor variables. However, since each of the predictor variables in this study were continuous, the assumption of non-multicollinearity was examined between the five predictor variables using SPSS version 24. The assumption was met as all Variance Inflation Factor (VIF) analysis of predictor variables was between one and five. Third, Warner (2013) stated that the model must be specified and include all relevant variables and no irrelevant variables. After a comprehensive literature review, the researcher chose the predictor variables of intrinsic value, self-efficacy, test anxiety, self-regulation, and cognitive strategies. Based on the literature review, there are many proposed variables that may be relevant, however research related to usage of the MSLQ for the identified traits among secondary students is appropriate indicates the five listed (Pintrich & DeGroot, 1990; Pintrich et al., 1991). Fourth, Warner (2013) stated that the “categories on the outcome variable are assumed to be exhaustive and mutually exclusive” (p. 932). Each student’s final grade in the online college course was recorded as either pass or fail. No final grades awarded were considered both pass and fail. In this study, all assumptions required by Warner (2013) were met and the study proceeded to statistical analysis.

Warner (2013) also indicates that binary logistics regression does not perform well when many groups have frequencies less than five. In this study, it should be noted that there were only four candidates comprising the “fail” outcome group which is less than the recommended five. Warner (2013) cautions regarding cells with a frequency less than five. Some research

indicates that groups with low frequencies may be acceptable provided that the model is stable (Vittinghoff & McCulloch, 2006). They recommended that the frequency count assumption for predictor variables be relaxed in logistic regression analysis. In this study, the model appeared stable for the first null hypothesis, and thus, the group of candidates with the less than five cells were kept in the model.

### Results for Null Hypotheses One

A binary logistic regression analysis was used to test the relationship between the motivation predictor variables (intrinsic value, self-efficacy, and test anxiety) and the criterion variable (student final grade of pass or fail) at a 95% confidence level. Student final grade was coded as “0” for fail and “1” for pass. Predictor variables were treated as continuous since variable scores were in the form of Liker-type scales (Hutcheson, & Sofroniou, 1999).

The results of the binary logistic regression were statistically significant,  $X^2(3) = 8.109$ ,  $p = .044$ . The model was weak according to Cox and Snell’s ( $R^2 = .297$ ) and Nagelkerke’s ( $R^2 = .493$ ) (see Table 11). The model appeared to hold as there was statistically significant, predictive relationship between final course grade (pass or fail) and the predictor variables (intrinsic value, self-efficacy, and test anxiety). Hosmer and Lemeshow goodness-of-fit-test was run indicating  $p > .05$  signifying that predicted group memberships generated by the model did not deviate significantly from the actual group members for good model fit (See Table 12).

Table 11

<i>Logistic Regression Model Analysis for Motivation Variables</i>			
$X^2$	$p$	Cox & Snell $R^2$	Nagelkerke's $R^2$
8.109	.044	.297	.493

Table 12

<i>Hosmer and Lemeshow Test for Motivation Variables</i>			
Step	Chi-square	df	Sig.
1	3.207	8.000	.921

The researcher further investigated each predictor variable associated with the motivation scale. For the variable of intrinsic value, the Wald ratio was not statistically significant,  $X^2(1) = 1.062, p = .303$ . This result indicated that perceived intrinsic value of high school students taking online college courses in relation to passing or failing was not statistically significant. The odds ratio for intrinsic value was .854 indicating that higher scores of intrinsic value were .854 times more likely to pass than lower intrinsic value scores. However, this relationship was too small to be considered statistically significant, as indicated by the Wald statistic.

The researcher also investigated the predictor variable of self-efficacy. For the variable of self-efficacy, the Wald ratio was not statistically significant,  $X^2(1) = 2.584, p = .108$ . This result indicated that perceived self-efficacy of high school students taking online college courses in relation to passing or failing was not statistically significant. The odds ratio for intrinsic value was 1.293 indicating that higher scores of self-efficacy were 1.293 times more likely to pass than lower self-efficacy scores. However, this relationship was too small to be considered statistically significant, as indicated by the Wald statistic.

Thirdly, the researcher investigated the predictor variable of test anxiety. For this variable, the Wald ratio was not statistically significant,  $X^2(1) = 1.105, p = .293$ . This result indicated that perceived self-efficacy of high school students taking online college courses in relation to passing or failing was not statistically significant. The odds ratio for test anxiety was .854 indicating that higher scores of intrinsic value were .854 times more likely to fail than lower

test anxiety scores. However, this relationship was too small to be considered statistically significant, as indicated by the Wald statistic. Table 13 reports a summary of the logistic regression analysis for predicting participant passing or failing in relation to motivation variables of intrinsic value, self-efficacy, and test anxiety.

Recognizing the difference of significance values between the model and variable levels, the researcher compared predicted  $R^2$  and regular  $R^2$ . The comparison revealed a large difference between both values providing indication of overfit in the model. Therefore, the researcher failed to reject the null hypothesis.

Table 13

*Analysis Predicting Passing or Failing for Motivation Variables*

Predictor Variable	<i>B</i>	<i>SE</i>	Wald statistic	<i>p</i>	<i>df</i>	OR
Intrinsic Value	-.158	.154	1.062	.303	1	.854
Self-Efficacy	.257	.160	2.584	.108	1	1.293
Test Anxiety	-.158	.150	1.105	.293	1	.854

### Results for Null Hypotheses Two

A binary logistic regression analysis was used to test the relationship between the self-regulation predictor variables (cognitive strategy usage, & self-regulation strategy usage) and the criterion variable (student final grade of pass or fail) at a 95% confidence level. Student final grade was coded as “0” for fail and “1” for pass. Predictor variables were treated as continuous since variable scores were in the form of Likert-type scales (Hutcheson, & Sofroniou, 1999).

The results of the binary logistic regression were not statistically significant,  $X^2(2) = 1.070, p = .586$ . The model was weak according to Cox and Snell’s ( $R^2 = .045$ ) and

Nagelkerke's ( $R^2 = .075$ ) (see Table 14). The model did not hold, and there was not statistically significant, predictive relationship between final course grade (pass or fail) and the predictor variables (cognitive strategy usage and self-regulation strategy usage). Hosmer and Lemeshow goodness-of-fit-test was run indicating  $p > .05$  signifying that predicted group memberships generated by the model did not deviate significantly from the actual group members for good model fit (See Table 15). Thus, the researcher failed to reject the second null hypothesis.

Table 14

<i>Logistic Regression Model Analysis for Self-Regulation Variables</i>			
$X^2$	$p$	Cox & Snell $R^2$	Nagelkerke's $R^2$
1.070	.586	.045	.075

Table 15

<i>Hosmer and Lemeshow Test for Self-Regulation Variables</i>			
Step	Chi-square	df	Sig.
1	8.452	8.000	.391

The researcher further investigated each predictor variable associated with the self-regulation scale. For the variable of cognitive strategy usage, the Wald ratio was not statistically significant,  $X^2(1) = .746, p = .388$ . This result indicated that perceived cognitive strategy usage of high school students taking online college courses in relation to passing or failing was not statistically significant. The odds ratio for cognitive strategy usage was .932 indicating that higher scores of cognitive strategy usage were .932 times more likely to pass than

lower cognitive strategy usage scores according to the model. However, this relationship was too small to be considered statistically significant, as indicated by the Wald statistic.

The researcher also investigated the predictor variable of self-regulation strategy usage. For the variable of self-regulation strategy usage, the Wald ratio was not statistically significant,  $X^2(1) = .921, p = .337$ . This result indicated that perceived self-regulation strategy usage of high school students taking online college courses in relation to passing or failing was not statistically significant. The odds ratio for intrinsic value was 1.097 indicating that higher scores of self-regulation strategy usage were 1.097 times more likely to pass than lower self-regulation strategy usage scores according to the model. However, this relationship was too small to be considered statistically significant, as indicated by the Wald statistic. Table 16 reports a summary of the logistic regression analysis for predicting participant passing or failing in relation to self-regulation variables of cognitive strategy usage and self-regulation strategy usage.

Table 16

<i>Analysis Predicting Passing or Failing for Self-Regulation Variables</i>						
Predictor Variable	<i>B</i>	<i>SE</i>	Wald statistic	<i>p</i>	<i>df</i>	OR
Cognitive Strategy Usage	-.071	.082	.746	.388	1	.932
Self-Regulation Strategy Usage	.093	.097	.921	.337	1	1.097

### Summary

Chapter Four provided a summary of the data collected and the procedures that were used for analyzing the data. The data consisted of outcome variables as reported in participant final grades of pass or fail in an online college class and predictor variables of intrinsic value,

self-efficacy, test anxiety, self-regulation, strategy usage and cognitive strategy usage as reported among study participants using the MSLQ. The descriptive statistics were reported as well as the results from the logistic regression analyses. The analysis found statistical significance across the model for motivational factors (intrinsic value, self-efficacy, and test anxiety) but found no statistical significance across the model for self-regulation factors (cognitive strategy usage and self-regulation strategy usage). Further analysis found at the variable level, all predictor variables were not statistically significant predictors of final grades in an online college course among high school students. The research performed comparative analysis for the first null hypothesis between predicted  $R^2$  and regular  $R^2$  and determined overfit for the model. Due to the presence of overfit in the model for the first null hypothesis and no significance reported at either the model or variable levels in the second null hypothesis, the researcher failed to reject the null hypotheses. Chapter Five will discuss these statistical findings in relation to the related research and the implications of these results.



## **CHAPTER FIVE: CONCLUSIONS**

### **Overview**

Chapter Five will discuss the results of the statistical analysis related to the logistic regression related to the predictive value of intrinsic value, self-efficacy, test anxiety, cognitive strategy usage, and self-regulation strategy usage as identified in the Motivated Strategies for Learning Questionnaire. Implications of this study will be presented. Finally, suggestions for future research will be recommended.

### **Discussion**

The purpose of this correlational, predictive study is to investigate the suitability of applying motivation variables and self-regulated learning variables as predictors academic success among high school students in an online college course. The criterion variable was final grades (pass or fail) as reported by the partnering community college in Northwest Iowa who administered the online college course work. A grade of “pass” was awarded to students whose final grade in the online class was a letter grade of A, B, or C. A grade of “fail was awarded to students whose final grade in the online class was a letter grade of D, F, I, or W/X (Roblyer et al., 2008; Liu, Gomez, & Cherng-Jyh, 2009; Rankin, 2013; Fong et al., 2015; Lochmiller et al., 2016).

The predictor variables intrinsic value, self-efficacy, test anxiety, cognitive strategy usage, and self-regulation strategy usage as determined by completion of the MSLQ. All predictor variables were scored using a Liker-type scale and then tabulated as continuous variables in the statistical analysis. The traits examined were traits specifically identified by prior research using the 44-question MSLQ version (Pintrich & DeGroot, 1990). Other researchers have utilized this same version of the MSLQ to examine the same five traits among secondary students (Ilker, Arslan, & Demirhan, 2014).

The first research question in this study was, “How accurately can course completion be predicted from motivation as identified by self-efficacy, intrinsic value, and test anxiety using the MSLQ instrument among high school students enrolled in a college online course?” The null hypothesis associated with the first research question was, “There is no statistically significant predictive relationship between predictive motivation variables of self-efficacy, intrinsic value and test anxiety as measured by the MSLQ and the outcome variable of high school student completion of a college online course as reported by the student’s final course grade.” As stated earlier the model including all three variables was significant  $X^2(3) = 8.109, p = .044$ . However, further examination of the individual variables indicated no significant relationship with the outcome according to Wald scores previously reported. Recognizing the difference of significance between the model and variables, the researcher compared predicted  $R^2$  and regular  $R^2$ . The comparison revealed a large difference between values indicating overfit of the model. Therefore, the researcher failed to reject the null hypothesis. The following is specific discussion related to the motivation traits of intrinsic value, self-efficacy, and test anxiety.

### **Intrinsic Value**

Research suggests that the trait of intrinsic value has been shown to have predictive value with academic success. Schunk (2005), reporting on Pintrich and DeGroot’s (1990) study, identifies intrinsic value being positively correlated and predicted achievement among secondary students. Dietrich et al. (2015) report the validity of the construct as positively impacting academics by increasing engagement. When examining the teacher’s role in learning, teacher support and learning structure has been shown to increase intrinsic value and positively impact academic achievement among secondary and post-secondary students (Garcia and Pintrich, 1996; Kiefer & Pennington, 2017).

Pintrich and DeGroot (1990) identified that intrinsic value was not a significant predictor by itself in their study. However, more recent studies showed predictive value (Joo et al., 2011; Joo, Oh, & Kim, 2015; Hoffmann et al., 2016). The finding of no significant predictive value for intrinsic value among the participants in the current study would be considered surprising and contradictory to previous findings except for taking into account the low sample size. The low sample size yielded only two participants whose scores would have been considered on the lower range of the MSLQ scale and did not yield enough strength to account for the model fitting to the sample rather than the underlying model structure. The not significant finding for intrinsic value as predictive of academic success in this study should not be considered generalizable.

### **Self-Efficacy**

Research suggests that the trait of self-efficacy has been shown to have predictive value with academic success. Various studies advocate for the positive relationship between self-efficacy among learners and higher levels of academic success (Thompson & Lynch, 2003; Ergul, 2004; Artino, 2008; Hodges, 2008; Cho & Jonassen, 2009; Shen et al., 2013; Komarraju, & Nadler, 2013; Jung, Zhou, & Lee, 2017). However, metaanalysis of self-efficacy among learners and its impact on academic success shows varied results (Huang, 2016).

Notwithstanding, the literature identifies increased self-efficacy among online learners as a need for academic achievement (Greene et al., 2015).

Pintrich and DeGroot (1990) identified that self-efficacy was a significant predictor by itself in their study. This finding has been replicated throughout the literature across secondary, post-secondary, and online learning environments as indicated above. The finding of no significant predictive value for self-efficacy among the participants in the current study would be considered surprising and contradictory to previous findings except for taking into account the

low sample size. The low sample size yielded all 23 participants whose scores would be considered on the higher range of the MSLQ scale (possessing greater levels of confidence regarding the learning task), with four participants failing. The sample was not large enough to account for the model fitting to the sample rather than the underlying model structure to provide generalizable findings in the current study and should not be considered normative.

### **Test Anxiety**

Research suggests that the trait of test anxiety has been shown to have negative predictive value with academic success whereas lower scores in test anxiety serve as a possible indicator of academic success. Unal-Karagüven (2015) identified test anxiety among high school students to be negatively associated with performance in that higher levels of test anxiety in students diminished their academic performance. In relation to high stakes testing, researchers advocate for greater assessment, intervention, and prevention of severe test anxiety as this trait was shown to result in decreased examination scores (Von Der Embse & Hasson, 2012). Furthermore, Hedges (2017) specifically identifies test anxiety as a contributing factor among online student course withdrawal rates.

Pintrich and DeGroot (1990) conclude that in their sample test anxiety was not a stand-alone predictor however it did possess negative correlation with self-regulation factors that were predictive. Nonetheless, literature does argue for the predictive value of test anxiety for student success (Schunk, 2005). The finding of no significant predictive value for test anxiety among the participants in the current study would be considered surprising and contradictory to previous findings except for taking into account the low sample size. The low sample size yielded 10 passing participants whose scores would have been considered on the higher range of the MSLQ scale. This would seem to contradict much of the research in that higher levels of test anxiety

are reported has decreasing student success. The low sample may account for this discrepancy since there were not enough cases for the model to fit the underlying model structure.

Furthermore, levels of test anxiety may not correlate with severe high levels of test anxiety and may reflect acceptable levels of the trait that may produce positive academic results (Dawood, et al., 2016). Unfortunately, the low sample size in the current study obscures clarity for this finding and should not be considered generalizable.

The second research question in this study was, “How accurately can course completion be predicted from self-regulated learning strategy usage factors of cognitive strategy usage and self-regulation strategy usage using the MSLQ instrument among high school students enrolled in a college online course?” The null hypothesis associated with the second research question was, “There is no statistically significant predictive relationship between predictive self-regulated learning strategy usage variables of cognitive strategies and self-regulation strategies as measured by the MSLQ and the outcome variable of high school student completion of a college online course as reported by the student’s final course grade.” As stated earlier the model including two variables was not significant  $X^2(2) = 1.070, p = .586$ . However, further examination of the individual variables indicated no significant relationship with the outcome according to Wald scores previously reported. Since the model and variables were not significant, examining predicted  $R^2$  and regular  $R^2$  was not required. Furthermore, Hosmer and Lemeshow goodness-of-fit-test indicated  $p > .05$  signifying that predicted group memberships did not deviate significantly from the actual group and Cox and Snell’s and Nagelkerke’s tests indicated predictive power for the outcome as less than eight percent. Since the first binary logistic analysis for null hypothesis one indicated overfit problems, it is assumed that similar constraints were on the second model due to the low sample size. Thus, the researcher fails to

reject the second null hypothesis. The following is specific discussion related to the motivation traits of cognitive strategy usage and self-regulation strategy usage.

### **Cognitive Strategy Usage**

Research suggests that the trait of cognitive strategy usage has shown significant effects on academic achievement (Yamada, Oi, & Konomi, 2017). Ilker, Arslan, and Demirhan (2014) identified  $R^2$  ranges between .26 and .62 via confirmatory factor analysis indicating good levels of predictability of cognitive strategy usage for academic success among high school students. As examined by the 44-question MSLQ, this trait is identified by three cognitive strategies: rehearsal, elaboration, and organization (Pintrich & DeGroot, 1990). All three constructs have shown positive strength in relation to predicting student learning outcomes across various learner groups (secondary, post-secondary, and online) (Puzziferro, 2008; Kadioglu & Uzuniriyaki-Kondakci, 2014; Broadbent & Poon, 2015; Uygun & Kilincer, 2017).

Pintrich and DeGroot (1990) conclude that cognitive strategy usage correlated positively with other traits and was predictive of achievement among secondary students studied. This finding has been confirmed to varying degrees in the studies cited earlier. The finding of no significant predictive value for cognitive strategy usage among the participants in the current study would be considered surprising and contradictory to previous findings except for taking into account the low sample size. The low sample size yielded two passing participants whose scores would have been considered on the lower range of the MSLQ scale and all four in the failing group reported higher levels of cognitive strategy usage. This could be the result of the effect of the small sample on the model to yield enough strength to account for the model fitting to the sample rather than the underlying model structure. The not significant finding for

cognitive strategy usage as predictive of academic success in this study should not be considered generalizable.

### **Self-Regulation Strategy Usage**

Research suggests that the trait of self-regulation strategy usage has been shown to have predictive value with academic success. Prior research supports the claim of predictive value regarding increased levels of reported self-regulation among secondary students and academic learning (Wolters, Yu, & Pintrich, 1996). Much research has been done in relation to the constructs of metacognition and effort management as part of self-regulation strategy usage among learners. Dent and Koenka (2016) report significant strength and correlation of metacognition as being important to learning in secondary students. Similar findings are presented in relation to college-level students (Cho & Shen, 2013; Lehmann, Hahnlein, & Ifenthaler, 2014; Yamada, Oi, & Konomi, 2017).

Pintrich and DeGroot (1990) identified that self-regulation strategy usage as significant among secondary students in their seminal study using the 44-question MSLQ. The finding of no significant predictive value for self-regulation strategy usage among the participants in the current study would be considered surprising and contradictory to previous findings except for taking into account the low sample size. The low sample size yielded one passing participant with lower MSLQ scores in the range for self-regulation strategy usage and two in the failing group. Unfortunately, the sample size is too small to yield generalizable results due to the model fitting the sample rather than the underlying model structure. The not significant finding for intrinsic value as predictive of academic success in this study should not be considered comprehensive enough to apply to other samples.

## Implications

The research contributes to the knowledge base regarding the appropriateness of using the MSLQ to identify motivation and self-regulation traits among students as predictive of academic outcomes. Much research has been performed utilizing the MSLQ, its traits of motivation and self-regulation, and its appropriateness to generate data for predictive studies across many student groups (Schunk, 2005; Korkmaz & Kaya, 2012; Ilker, Arslan, & Demirhan, 2014; Aydin, 2015). This study is unique in its application of the MSLQ specifically to high school students enrolled in online college courses. While the study did not produce generalizable findings due to sample size considerations, it does present a model for further research among this specific learner group. Classification tables for both null hypotheses indicated the motivation variable regression model predicted 89.5% of passing students and 50% of failing students, and the self-regulation variables regression model predicted 100% of student passing and zero percent of the failing students for this specific sample. These results indicate potential predictive value of intrinsic value, self-efficacy, test anxiety, cognitive strategy usage, and self-regulation strategy usage.

Confirming the appropriateness of using Pintrich's (1990) model of SRL and specifically the use of the MSLQ presents two important implications. First, as dual enrollments in the nation rise, the MSLQ may provide an economical assessment tool to determine students who may need additional support since it is in the public domain. It is rare that educational leaders have access to a free instrument that has also stimulated much research as well as being a valid and reliable measure (Schunk, 2005). Secondly, it addresses the concern of limited empirical research findings involving high school students and dual enrollment (Allen, 2010); Lochmiller et al., 2016). Confirming the instrument and predictive value of the traits assessed provides



researchers, educational leaders, and policy makers empirical data for decision making regarding funding and enrollment policies for dual enrollment programs.

### **Limitations**

There are multiple limitations regarding the current study. Primarily, the error of small sample size was evident due to only 23 participants completing the survey and for the regression model. The small sample size most likely resulted in model overfit yielding unduly optimistic findings that may not really exist in the population and may only be applicable to the sample set (Babayak, 2004). Overfit results in analysis that is too close or exactly duplicates a specific sample set due to possessing more parameters than can justify the data thus extracting noise as if it represented the underlying model (Leinweber, 2007; Tetko, Livingstone, & Luik, 1995). Warner (2013) identifies that no specific procedure for determining sample size is available but provides different means to determine appropriate size with the encouragement to seek larger than minimal samples for logistic regression. Jamison (2004) also argues that attention to sample size is vital for making predictive determinations when using ordinal data. Unfortunately, the current research's sample did not meet any criteria for sample size requirements as previously indicated. Therefore, it is reasonable to conclude that the small sample size led to overfit of the model, and therefore, no findings from this study should be considered generalizable.

Furthermore, the current study's research sample size may also have negatively impacted results due to sample bias. Sample bias could be present in this study due to the low number of participants related to obtaining consent, the relative small total population of possible participants to start with, and/or unique characteristics of students choosing to participate in dual-credit course work while in high school leading to a lack of correspondence to any clear population from the sample (Warner, 2013; Lehmann et al., 2014; Fong, et al., 2015). Additionally, sample size for this

study is limited due to the requirement of parental consent to participate which is identified as a limitation in the research (Sanderson, 2010; Liu, Cox, Jr., Washburn, Croff, & Crethar, 2017).

This study is also limited due to researcher choice of how to input independent variables into the logistic model. Babyak (2004) identifies the acceptance and widespread usage of logistic regression analysis to answer scientific questions in psychosomatic research. The statistics guide for the researcher's home university does not address how to handle ordinal data from Likert-type scales as predictors and presents categorical predictor variables (Warner, 2013). However, statistical resources indicate that Likert-type scales such as used in this study must be treated as either continuous or categorical (Laerd, 2015). There appears no clear distinction for criteria regarding the decision to code predictor variables as either continuous or categorical (Labovitz, 1970; Hutcheson & Sofroniou, 1999; Jamison, 2004; Pasta, 2009, Warner, 2013). Specifically, Pasta (2009) argues that if ordinal variables are applied as continuous then the researcher accepts that interval values within scales are tenuous at best. If ordinal variables are applied as categorical, one must accept uncertainty that categories are evenly spaced and may unintentionally hide data from the model (Pasta, 2009). Regarding both decisions, Pasta (2009) states, "It turns out that it doesn't matter that much in practice – the results are remarkably insensitive to the spacing of an ordinal variable except in the most extreme cases" (p. 2). Hutcheson and Sofroniou (1999) advocate if the ordinal scale is composed from numerous questions of a Likert-type scale survey, then it is appropriate to handle the variable data as continuous. If continuous is chosen, Tabachnick and Fidell (2014) argue for adding an additional assumption of linearity test for the coefficients using a Box-Tidwell test. This test was not included in Warner (2013) and was not performed by the researcher. This may have led to the lack of contributory inferences in the study due to the cross-

sectional and correlational nature of the data as processed by the researcher's choice (Broadbent, 2017).

Finally, this study is limited by the usage of self-reporting assessment instrument. Self-report instruments may be subject to response bias and may not reflect real behaviors (Mega, Ronconi, & DeBeni, 2014). Furthermore, the self-reporting aspect of the MSLQ as created in the 1990s may not incorporate contextual differences between the traditional course environment and the current online learning environment (Broadbent & Poon, 2015; Broadbent, 2017). This limitation is identified throughout the literature concerning the MSLQ and its use in educational research (Pardo, Han, & Ellis, 2017; Crede & Phillips, 2011; Pintrich & DeGroot, 1990; Kadioglu, & Uzuntriryaki-Kondakci, 2014). Self-report assessments are reliant on student self-awareness and may be limited due to age and experience of high school students.

### **Recommendations for Future Research**

Due to the low sample size, it is recommended that future studies should include larger and more representative samples among high school students enrolled in online college level courses. Larger samples allow the regression model to fit the population rather than overfit the sample (Tseng, Gardner, & Yeh, 2016). Given the literature's acceptance regarding reliability and validity of the MSLQ, it is reasonable to conclude that the MSLQ and the traits of intrinsic value, self-efficacy, test anxiety, cognitive strategy usage, and self-regulation strategy usage would be applicable to high school students enrolled in online college courses. Further research is needed to confirm both the instrument and traits are predictive to academic achievement as reported for secondary learners in secondary courses, post-secondary learners in post-secondary courses, and amongst online learners in general. Also needed is research related to other dual-credit student characteristics such as the impact of biological sex, grade, ethnicity, type of course taken such as

vocation versus college transfer, and demographics related to motivation and self-regulation as identified in the MSLQ is predictive of academic success. Finally, this research did not consider all traits possible to be examined using the MSLQ. Other traits as associated with Self-Regulated learning theories need to be studied and may provide more generalized and conclusive statements regarding the predictive value for academic success (Gbollie & Keamu, 2017).

### **Summary**

Chapter Five discussed the findings of the study in regard to the two research questions and null hypotheses. Null hypothesis was not reject as the model did have a significant relationship. However, there was no significant relationship between the individual variables of intrinsic value, self-efficacy, and test anxiety and the outcome of passing or failing an online college course. Further examination indicated a discrepancy between predicted R2 and actual R2 was the result of overfit for the model due to low sample size. Null hypothesis two was rejected, and there was no significant relationship for the model or the individual variables of cognitive strategy usage and self-regulation strategy usage. Findings for the study were discussed, and implications were examined. Limitations of the study were discussed, including the small sample size error. In addition, recommendations for future research were suggested.

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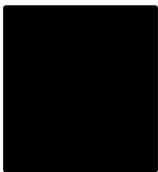
## **APPENDIX A**

The 44 questions for the Motivated Strategies for Learning Questionnaire (MSLQ) utilized in this study are located in the appendix of “Motivational and Self-regulated Learning Components of Classroom Academic Performance” by Pintrich and DeGroot (1990) at doi: 10.1037/0022-0663.82.1.33

**APPENDIX B**

*A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ)* is housed at the University of Michigan and is public domain at <http://www.soe.umich.edu/faqs/tag/education+and+psychology/#2>

### APPENDIX C



October 13, 2017

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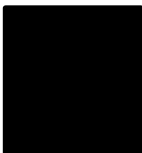


Dr. Mr. Tidwell,

The [redacted] Institutional Review Board has completed the review of your request to conduct research at [redacted]. We have approved the following requests:

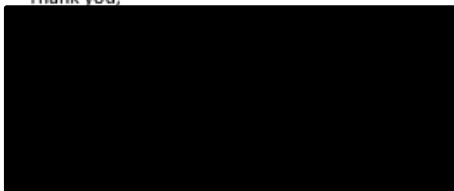
1. Access to the Spring, 2018 [redacted] enrollment report of online students.
2. Access to the College's survey subscription, Survey Monkey.
3. Access to final grades (P/F) of all [redacted] students enrolled in [redacted] online classes during the Spring, 2018 semester.

■



This approval is contingent upon receipt of proof of Liberty University's IRB approval for the study.

Thank you,





October 10, 2017

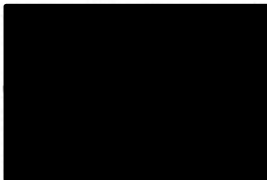
Mr. Tidwell,

The [redacted] has completed the review of your request to conduct research at [redacted] High Schools. We have approved the following:

- Students will be called to a central location.
- Students will be given a permission slip for the parents to sign to participate in the study.
- School will collect the permission slips.
- School will notify Mr. Tidwell when permission slips have all been collected.
- Mr. Tidwell will meet with all students in a central location where they will be given the survey using the student's [redacted] email address.

This approval is contingent upon receipt of proof of Liberty University's IRB approval for the study.

Thank you,



## APPENDIX D

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**LIBERTY UNIVERSITY.**  
INSTITUTIONAL REVIEW BOARD

February 2, 2018

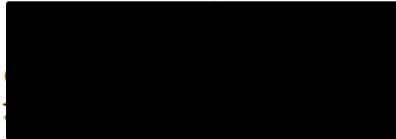
Kenneth F. Tidwell, Jr.  
IRB Approval 3123.020218: Investigating Predictive Factors for Online College Coursework  
Success among High School Students

Dear Kenneth F. Tidwell, Jr.,

We are pleased to inform you that your study has been approved by the Liberty University IRB. This approval is extended to you for one year from the date provided above with your protocol number. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases were attached to your approval email.

Thank you for your cooperation with the IRB, and we wish you well with your research project.

Sincerely,



**LIBERTY**  
UNIVERSITY.  
*Liberty University | Training Champions for Christ since 1971*

The Liberty University Institutional  
Review Board has approved  
this document for use from  
2/2/2018 to 2/1/2019  
Protocol # 3123.020218

## **PARENT/GUARDIAN CONSENT FORM**

Investigating Predictive Factors for Online College Coursework Success Among  
High School Students  
Kenneth F. Tidwell, Jr.  
Liberty University  
Educational Leadership/School of Education

Your student is invited to be in a research study examining predictive resources to identify high school student success in an online college course. He or she was selected as a possible participant because he or she is currently enrolled by Sioux City Community School District (SCCSD) in an online postsecondary course through Western Iowa Tech Community College. Please read this form and ask any questions you may have before agreeing to allow him or her to be in the study.

Kenneth F. Tidwell, Jr., a doctoral candidate in the School of Education at Liberty University, is conducting this study.

**Background Information:** The purpose of this study is to investigate how accurately course completion can be predicted student self-reported motivation traits by using the Motivated Strategies for Learning Questionnaire (MSLQ) instrument among high school students enrolled in a college online course and to investigate how accurately course completion can be predicted from student self-regulated learning strategies by using the same MSLQ instrument among high school students enrolled in a college online course.

**Procedures:** If you agree to allow your student to be in this study, I would ask him or her to do the following thing:

1. Complete the MSLQ survey via Survey Monkey by 28 Feb 2017 (anticipated). The survey instructions and link will be provided through Sioux City Community School District official email. It should take approximately 10 minutes to complete this survey.
2. To confirm your/ your student's SCCSD email: \_\_\_\_\_
3. At the conclusion of the students' 16-week college course, allow the researcher to collect final grades to perform data analysis.

**Risks and Benefits of being in the Study:** The risks involved in this study are minimal, which means they are equal to the risks students would encounter in everyday life. There will be no direct benefits from this study. Benefits to society include a better understanding of high school student achievement in dual enrollment programs.

**Compensation:** Your student will not be compensated for participating in this study.

**Confidentiality:** The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records. I may share the data I collect from your student for use in future research studies or with other

The Liberty University Institutional  
Review Board has approved  
this document for use from  
2/2/2018 to 2/1/2019  
Protocol # 3123.020218

researchers; if I share the data that I collect about your student, I will remove any information that could identify him or her, if applicable, before I share the data.

- Student data will be maintained as confidential since the researcher will need to link survey results with final course grades. However, personal identifiable information will be removed from the survey after it is completed and replaced with a blind code so that only the researcher will be able to identify a subject.
- All data will be maintained in a double-lock secured office that only the researcher has access to. After three years, the data will be destroyed or deleted.

**Voluntary Nature of the Study:** Participation in this study is voluntary. Your decision whether or not to allow your student to participate will not affect his or her current or future relations with Liberty University, Sioux City Community School District, or Western Iowa Tech Community College. If you decide to allow your student to participate, he or she is free to not answer any question or withdraw at any time without affecting those relationships.

**How to Withdraw from the Study:** If your student chooses to withdraw from the study, you or your student should contact the researcher at the email address/phone number included in the next paragraph. Should your student choose to withdraw, data collected from him or her will be destroyed immediately and will not be included in this study.

**Contacts and Questions:** The researcher conducting this study is Kenneth F. Tidwell, Jr. You may ask any questions you have now. If you have questions later, you are encouraged to contact him at 712-276-8733 ext. 1493 or [kftidwell@liberty.edu](mailto:kftidwell@liberty.edu). You may also contact the researcher's faculty advisor, Dr. Ellen Black, at [elblack@liberty.edu](mailto:elblack@liberty.edu).

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, 1971 University Blvd, Green Hall 1887, Lynchburg, VA 24515 or email at [irb@liberty.edu](mailto:irb@liberty.edu).

*Please notify the researcher if you would like a copy of this information for your records.*

**Statement of Consent:** I have read and understood the above information. I have asked questions and have received answers. I consent to allow my student to participate in the study.

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Signature of Minor

Date

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Signature of Parent

Date

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Signature of Investigator

Date

The Liberty University Institutional  
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2/2/2018 to 2/1/2019  
Protocol # 3123.020218

## **PARTICIPANT CONSENT FORM**

**Investigating Predictive Factors for Online College Coursework Success Among  
High School Students**  
Kenneth F. Tidwell, Jr.  
Liberty University  
Educational Leadership/School of Education

You are invited to be in a research study examining predictive resources to identify high school student success in an online college course. You were selected as a possible participant because you are currently enrolled by Sioux City Community School District (SCCSD) in an online postsecondary course through Western Iowa Tech Community College. Please read this form and ask any questions you may have before agreeing to be in the study.

Kenneth F. Tidwell, Jr., a doctoral candidate in the School of Education at Liberty University, is conducting this study.

**Background Information:** The purpose of this study is to investigate how accurately course completion can be predicted from student self-reported motivation traits by using the Motivated Strategies for Learning Questionnaire (MSLQ) instrument among high school students enrolled in a college online course and to investigate how accurately course completion can be predicted from student self-regulated learning strategies by using the same MSLQ instrument among high school students enrolled in a college online course.

**Procedures:** If you agree to be in this study, I will ask you to do the following things:

1. Complete the MSLQ survey via Survey Monkey by 28 Feb 2018 (anticipated). The survey instructions and link will be provided through Sioux City Community School District official email. It should take approximately 10 minute to complete this survey.
2. Confirm your SCCSD email: \_\_\_\_\_
3. At the conclusion of the students' 16-week college course, allow the researcher to collect final grades to perform data analysis.

**Risks and Benefits:** The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life. There will be no direct benefits from this study. Benefits to society include a better understanding of high school student achievement in dual enrollment programs.

**Compensation:** Participants will not be compensated for participating in this study.

**Confidentiality:** The records of this study will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records. I may share the data I collect from you for use in future research studies or with other researchers; if I share the data that I collect about you, I will remove any information that could identify you, if applicable, before I share the data.



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- Student data will be maintained as confidential since the researcher will need to link survey results with final course grades. However, personal identifiable information will be removed from the survey after it is completed and replaced with a blind code so that only the researcher will be able to identify a subject.
- All data will be maintained in a double-lock secured office that only the researcher has access to. After three years, the data will be destroyed or deleted.

**Voluntary Nature of the Study:** Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University, Sioux City Community School District, or Western Iowa Tech Community College. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

**How to Withdraw from the Study:** If you choose to withdraw from the study, please contact the researcher at the email address/phone number included in the next paragraph. Should you choose to withdraw, data collected from you will be destroyed immediately and will not be included in this study.

**Contacts and Questions:** The researcher conducting this study is Kenneth F. Tidwell, Jr. You may ask any questions you have now. If you have questions later, you are encouraged to contact him at 712-276-8733 ext 1493 or [kftidwell@liberty.edu](mailto:kftidwell@liberty.edu). You may also contact the researcher's faculty advisor, Dr. Ellen Black, at [elblack@liberty.edu](mailto:elblack@liberty.edu).

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, 1971 University Blvd, Green Hall 1887, Lynchburg, VA 24515 or email at [irb@liberty.edu](mailto:irb@liberty.edu).

*Please notify the researcher if you would like a copy of this information for your records.*

**Statement of Consent:** I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS IRB APPROVAL INFORMATION WITH CURRENT DATES HAS BEEN ADDED TO THIS DOCUMENT.)

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Signature of Participant

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Date

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Signature of Investigator

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Date