Doctoral Dissertations
Student Scholarship

Winter 2010

The role of personal and contextual variables in college students' academic achievement

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THE ROLE OF PERSONAL AND CONTEXTUAL VARIABLES IN

COLLEGE STUDENTS' ACADEMIC ACHIEVEMENT

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DISSERTATION

Submitted to the University of New Hampshire

in Partial Fulfillment of

the Requirements for the Degree of

Doctor of Philosophy

in

Psychology

December 2010

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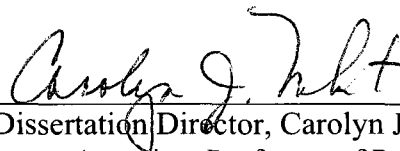
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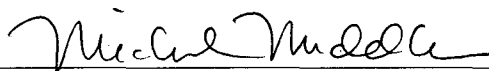
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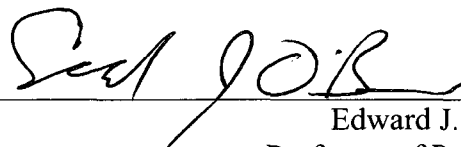
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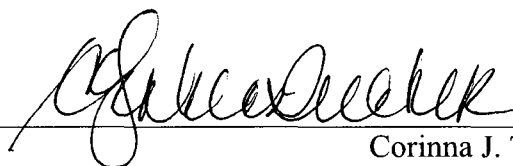
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DEDICATION

This dissertation is dedicated to my family, both biological and adopted along the way. I could not have gotten here without you.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

THE ROLE OF PERSONAL AND CONTEXTUAL VARIABLES IN

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By

Rachel A. Rogers

University of New Hampshire, December 2010

College matriculation rates are increasing but graduation rates are failing to parallel the increased enrollment. One reason for this discrepancy may be that many college students are unable to regulate their own learning. This dissertation examined the Self-Regulated Learning (SRL; Pintrich, 2004) model in students taking Statistics in Psychology and Research Methods. The inclusion of the constructs of possible selves and identity development in the SRL model was proposed, as was the Achievement Goal Questionnaire (AGQ; Elliot & McGregor, 2001), a measure of the 2x2 Framework of achievement goal orientation. These variables were assessed along with those included in the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia & McKeachie, 1993). Results indicated that possible selves and the AGQ are not useful predictors of the academic outcomes of test grade and expected final grade. Ego identity status, however, was a significant predictor of course outcomes. The best single predictor was self-efficacy for learning from the MSLQ. Multiple regression models accounted for 27-36% of the variance in test grades and 49-67% of the variance in expected final grades. Evaluation of strategy change over the course of a semester revealed that students do adjust their study strategies and motivational beliefs effectively.

CHAPTER I

INTRODUCTION

The United States college population is growing. According to a National Panel Report from the American Association of Colleges and Universities, "seventy-five percent of high school graduates get some postsecondary education within two years of receiving their diplomas" (2001). Today, college enrollment is viewed as a normative part of the life track for adolescents in the United States. Many high school students are no longer asked "Will you go to college?" but "Which college have you chosen?" or "What will your major be when you go to college?"

First hand experience as an instructor and anecdotal evidence from fellow instructors and professors reveal that students in college often do not have the skills necessary to do well in classes or effectively gain information. Nationwide reports support these observations. "Greater Expectations," a National Panel Report (Universities, 2002), and "A Test of Leadership," a report of the Commission appointed by Secretary of Education Margaret Spellings (Spellings, 2006), both claimed that students in college today are often underprepared for their studies. For example, students do not seem to know how to highlight readings appropriately, how to write in complete sentences, how to take advantages of all the academic resources at hand, or how to apply a variety of techniques in seeking solutions to problems. It is not the hours that are spent studying but the quality of the study that affects academic outcomes, and yet Williams and Clark (2004) demonstrated that students believe the amount of effort they expend in their studies is the best predictor of their academic performance when it is actually the worst predictor.

Although college attendance has risen in recent years, the graduation rate has not kept pace (Spellings, 2006). Only sixty-six percent of students graduate within six years of matriculation. With more students applying to and attending colleges and universities, dealing with underprepared students can become costly in terms of tuition, financial resources, time, tutors, effort, and even class space. In order to handle college work, pass their courses, and graduate, college students must learn effective study strategies, be able to self-motivate, and regulate their own learning.

There are several models of motivation and achievement for college students. One such model is the self-regulated learning (SRL) model. Because of the importance of self-regulation in college study, this dissertation is based on self-regulated learning theory.

Self-regulated learning was defined by Zimmerman (2008), a leading researcher on self-regulation, as "the degree to which students are metacognitively, motivationally, and behaviorally active participants in their own learning process" (p.167). Self-regulation is a cyclical process, and contains feedback loops that allow students to adjust their beliefs, effort, and the environment continuously. Adjustments are made based on performance, environmental cues, and self-awareness.

The process of self-regulation consists a series of phases of activity (Zimmerman, 2000). Planning for future efforts, or forethought, is composed of task analysis (i.e., goal setting and strategic planning) and self-motivational beliefs (i.e., self-efficacy, outcome expectations, intrinsic interest/value, and goal orientation). Once action has begun, self-regulation enters the volitional control phase, which includes self-control and self-observation. Pintrich (2004) divided this phase into two phases: monitoring (or self-

observation) and self-control. After the task is complete and feedback is received, self-regulation is in the self-reflection phase, which includes self-judgment and self-reaction (Zimmerman, 2000). These reflections are then used in subsequent forethought phases to plan for future behavior and make adjustments based on the new information.

Self-regulation is not an infallible process – it can collapse at each phase of the cycle (Zimmerman, 2000). Breakdowns can be clearly seen in the experiences of college students. Suboptimal levels of the constructs in the forethought phase of self-regulation could result in a lack of control over efforts toward goal attainment. Lack of self-awareness or self-control skills could cause a failure of self-regulation regardless of self-motivation. Limited feedback from the environment, students' inability to detect any feedback, or their rejection of feedback could lead to ineffective self-reflection, which would then affect the next cycle of activity toward goal attainment. A key principle of self-regulation is that it is a dynamic process in which the individual engages as he or she works toward a goal. Without feedback or reflection, adjustments cannot be made and regulation of behaviors does not take place.

The environment can influence self-regulation in either a positive or negative direction. If the environment provides no feedback or social cues, it is difficult for effective self-regulation to take place. On the other hand, the environment can provide modeling, scaffolding, or direct instruction on methods for becoming a better self-regulator. In fact, development of self-regulatory skill frequently requires social influence (Zimmerman, 2000). When instructors understand the relations between the variables included in SRL theory, they are able to provide better scaffolding, modeling, and more direct instruction (Bembenutty, 2009). With sufficient instructor interactions

with students, training in self-regulation can be differentiated to a particular student's needs.

Pintrich's (1995) version of self-regulated learning theory stated that personal characteristics, classroom characteristics, motivational variables, study strategies, and regulation strategies interact and are related to academic outcomes. This view of self-regulation differed in substantive ways from Zimmerman's (2000), which only focused on the cognitive components of self-regulation. In Pintrich's research, personal characteristics are traits inherent to the individual, such as age, sex, and ethnicity. Previous knowledge in the subject area is also commonly included in this group of variables. Classroom characteristics are those variables that are most often set by the instructor, such as the instructor's goals for the class, the amount of student interaction that takes place in the classroom, instructor behavior, the form that rewards take, and the difficulty of the task. In related literature, motivation is defined as "the process whereby goal-directed behavior is instigated and sustained" (Schunk, 1990, p. 3). In SRL research, common motivational variables are self-efficacy, goal orientation, test anxiety, and task value. Cognitive strategies for student learning are "thoughts and behaviors that a student engages in during learning that are intended to influence the encoding process" (Pintrich, 1989, p. 129). Cognitive learning strategies have been categorized into three groups: cognitive strategies (such as rehearsal, organization, elaboration and critical thinking), metacognitive strategies (such as planning, monitoring and self-regulation strategies), and resource management strategies (such as time and environment management, and help seeking). Motivation and cognition are two components of SRL theory that are controlled by the student.

The academic outcomes included in the SRL model include persistence at college or study, course choice, effort, and achievement. A great deal of SRL research focused on academic achievement in the form of test or course grades. These two outcome variables can potentially be explained by factors such as the persistence the student brought to his or her college career (as a metacognitive variable), why the student enrolled in the course (as a motivational variable), and how much effort the student put into his or her studies (as a regulatory variable). Therefore, it is possible to see persistence and effort variables mentioned as both outcomes (Garcia & Pintrich, 1994) and correlates of outcomes (Pintrich, Smith, Garcia, & McKeachie, 1993) in different studies.

The study of SRL has not always used these variables or Pintrich's (1995) definition. Zimmerman was one of the first researchers to label the process of actively pursuing knowledge "self-regulation" (Zimmerman & Martinez-Pons, 1986). At that time, the typical research approach was to explore the components of students' motivation to learn and their ability to do so. Zimmerman's early studies focused on identifying the self-regulatory strategies employed by students (Zimmerman & Martinez-Pons, 1986), validating an interview measure of self-regulatory processes (Zimmerman & Martinez-Pons, 1988), and applying a social-cognitive framework to the study of self-regulated learning (Zimmerman, 1989).

Pintrich (1989) strongly advocated for the inclusion of motivational constructs in the study of cognitive and metacognitive variables. He claimed that cognition and motivation must be coordinated by the individual in the context of a particular assignment and classroom in order for successful learning to take place. Pintrich's

conclusion was that motivation and cognition must be studied together, and he began

doing research to integrate these areas. In an early study of what would become SRL

Theory, Pintrich (1989) included value, expectancy and affect variables in his motivation

section and cognitive and resource management strategies in his cognition section. These

variables were correlated with four academic outcomes: exam grades, lab grades,

performance on papers, and final class grade in English composition, Introductory

Biology, and Introductory Psychology. Test grade and final class grades were

significantly, positively correlated with variables in all three classes (i.e., rehearsal,

organization, metacognition, time, effort management, intrinsic goal orientation, task

value, control beliefs, and expectancies for success). Lab and paper grades were

correlated with fewer strategies, but they were both significantly positively correlated

with metacognition, effort management, control beliefs and expectancy beliefs. This very

early study promoted the inclusion of motivational variables in SRL research, proved that

different academic outcomes are related to both cognitive and motivational variables, and

set the stage for later work on self-regulated learning.

Other studies using SRL theory in the 1980s and early 1990s were concerned with

identifying the variables that are correlated with academic outcomes and developing

different means of measuring them (Zimmerman, 2008). For example, Pintrich and his

colleagues (Pintrich et al., 1993) began developing a questionnaire on the basis of "a

general cognitive view of motivation and learning strategies, with the student represented

as an active processor of information, whose beliefs and cognitions are important

mediators of instructional input" (p. 801). The Motivated Strategies for Learning

Questionnaire (MSLQ) was not developed as a direct measure of SRL theory, but the

theoretical basis on which it was formed is essentially a self-regulated learning model. The MSLQ is therefore a useful tool for SRL research because of the inclusion of a variety of pertinent motivational and cognitive subscales in the same instrument. The subscales of the MSLQ, at various stages of development, have also been shown to correlate with academic outcomes such as exam, lab, and paper grades, as well as standardized test scores and final course grades (Pintrich, 1989; Pintrich & De Groot, 1990; Pintrich et al., 1993; VanderStoep, Pintrich, & Fagerlin, 1996; Wolters, 1998).

The current SRL model states that student and classroom characteristics, as well as motivational, cognitive, and metacognitive factors, interact and are related to academic outcomes such as choice of major or course, effort, persistence, and achievement. More specifically, the effect of personal and contextual variables on outcomes is mediated by motivational and cognitive processes (Pintrich, 2004). SRL theory is unique among motivational learning theories in that it includes constructs from several lines of research as well as specific cognitive and metacognitive strategies that students use to attain their goals (Zimmerman, 2000).

As will be discussed subsequently, the research on this model has examined a number of variables, but could expand upon the types of motivational measures and personal variables included. The research described in this dissertation examines achievement goal orientation, possible selves, and ego identity status to see if they contribute to the predictive value of SRL variables in explaining the particular academic outcomes of test and final course grades.

Figure 1 displays Pintrich's conceptualization of SRL theory (Zusho & Pintrich, 2003). In this diagram, the boxes indicate gross psychological constructs that are then

divided into individual constructs. The arrows connecting the boxes indicate the theorized direction of effects. Motivational and cognitive processes are thought to interrelate and to mediate the relations between personal and contextual variables and outcome variables, although the research to date has failed to show that this is true statistical mediation (Pintrich, 2004). The literature review that follows will be organized by the boxes of the diagram, with an eye to how each box relates to the others.

SRL variables, as measured by the MSLQ, have been used to predict course outcomes. For example, Zusho and Pintrich (2003) examined the relations between motivational processes, cognitive processes, and academic outcomes for students in a chemistry course. The final regression equation accounted for 31% of the variability in course grade. The only personal/contextual variable Zusho and Pintrich included was SAT-mathematics score, as a proxy for prior knowledge. SAT score did contribute significantly to the final equation, although its contribution diminished with the addition of motivational variables, suggesting partial mediation. It is possible that additional personal/contextual variables would increase the predictive ability of the MSLQ and enhance understanding of SRL.

The final MSLQ measure includes 15 subscales and 81 questions (Pintrich et al., 1993). The motivation component is broad and includes value components (intrinsic and extrinsic goal orientation and task value), expectancy components (control of learning beliefs, self-efficacy of learning beliefs) and affective components (test anxiety). The cognitive component of the questionnaire consists of four cognitive study strategies used by students (rehearsal, elaboration, organization, and critical thinking) and five metacognitive behaviors (time and study environment management, effort regulation,

peer learning, help-seeking and self-regulatory strategies). Some subscales could be divided along theoretical lines into separate constructs (e.g., self-efficacy could be split into expectancy for success and ability beliefs) but factor validation of the MSLQ loaded these items onto the same factor.

The college context is an excellent setting for the study of self-regulation (Pintrich, 1995). In college, students often live away from home and are only in classes for a few hours each day, so they do not have the benefit of monitoring by parents and teachers to ensure that academic work is being completed. Therefore self-regulation becomes more necessary for academic achievement. Also, a meta-analysis of study habits, skills and attitudes found that these cognitive and motivational constructs were related to college performance, but not high school academic performance (Credé & Kuncel, 2008). Understanding how self-regulation occurs for this population is also important so that instructors can direct their students well. Zimmerman (2000) stated that self-regulatory skills can and should be taught. Consequently, understanding how the components of self-regulation interact is important so teachers can communicate this information to students in useful ways. Brief meta-learning segments can easily be added to the traditional classroom lecture and, if attended to, would greatly improve students' college experiences. As students are better able to regulate their own learning using the resources at their disposal (i.e., self-awareness, adjusting behavior based on prior outcomes, seeking help from instructors and other campus resources), their learning outcomes should improve. Before this practice should be employed, however, we must have a strong grasp of how these constructs relate.

The nature of SRL theory, as outlined by Pintrich (2004) is general and flexible. In

the twenty years since this research began, the set of variables included in SRL studies has changed and our understanding of the variables themselves has changed as well. For example, in his early work, Pintrich (1989) only included the motivational constructs of intrinsic goal orientation, task value, control beliefs, and expectancy for success. Later work added text anxiety (Pintrich & DeGroot, 1990) and then extrinsic goal orientation (Pintrich et al., 1993). Goal orientation literature itself has progressed beyond the study of a single pair of goals to a set of three and then four goal orientations (Elliot, 1999; Elliot & McGregor, 2001). This expansion of goal orientations should be included in SRL research, yet researchers continue to use the MSLQ, which contains only intrinsic and extrinsic goal orientation subscales, as the sole measure of goal orientation in their studies (Lynch, 2006; Zusho & Pintrich, 2003). SRL theory is general in that it states that motivational variables of value, expectancy, and affect relate to cognitive variables of learning strategy, metacognition, and regulatory strategies and then influence academic outcomes, but does not specify how those variables should be measured. The MSLQ is one way of measuring SRL variables. Other, perhaps better, questionnaires are available and should be investigated.

The goal of this study is to examine the relation between self-regulated learning as defined by Pintrich (2004) and academic achievement in college students, with an emphasis on the elaboration of the personal/contextual, motivational and cognitive components of the model and an examination of students' change in strategies in response to feedback (i.e., test scores). Identity status is examined as a personal/contextual variable along with various demographic characteristics. The MSLQ includes fifteen variables that have been integral components of the scholarship of

teaching and learning, but are there useful variables that are not included in the MSLQ? Do students use strategies other than those assessed in the questionnaire? Possible selves (Markus & Nurius, 1986) and Achievement Goals, as operationalized by Elliot and McGregor (2001) are included as alternatives or additions to the motivation measures included in the MSLQ. The rationale for the inclusion of these variables is elaborated below.

Definitions

Before embarking on a literature review or establishing connections between the many variables included in SLR research, it is first important to define some of the terminology that will be used in this dissertation.

Achievement Goal Orientation

A major segment of academic motivation research has centered on students' goal orientations. Achievement goals are "a priori framework[s] for how individuals construe achievement situations as well as how they interpret, evaluate, and act on achievement information" (Ames & Archer, 1987, p. 409). Dweck (1986) and Nicholls (1984) both defined achievement goals by focusing on the individual's reasons for engaging in competence-related behavior. An individual's goal orientation then is the particular goal at play that directs behavior and interaction with the environment. Achievement goals are typically separated into at least two categories. Two common goal pairings are intrinsic/extrinsic and mastery/performance. The definitions of the pairs of learning goals in early goal orientation research were similar enough that some reviewers combined intrinsic and mastery goals and then extrinsic and performance goals (e.g., Ames & Archer, 1987).

Intrinsic motivation is defined as the drive to engage in a task because of internal reward factors such as interest. It is often contrasted with extrinsic motivation, or the drive to engage in a task for external rewards. In academic achievement literature, intrinsic motivation is often equated to wanting to learn for the sake of learning or learning to master new skills, and extrinsic motivation is equated to wanting to engage in a task to get praise from parents, good grades from teachers (Davis, Winsler, & Middleton, 2006). Intrinsic goals and mastery goals are both concerned with achieving internal rewards instead of seeking external rewards or signs, which is the focus of extrinsic goals and performance goals.

Possible Selves

The addition of possible selves to the SRL model is proposed. Markus and Nurius (1986) described possible selves as vivid, detailed, socially created, personal structures of the self in the future. Possible selves are separate and can differ drastically from the current self-concept. Possible selves are particular to each individual, are specifically elaborated by the holder, and have personally relevant meaning. They are also formed from the individual's socio-cultural and historical context. Possible selves have two major functions: they provide context for evaluating the current self and serve as incentives for reaching desired selves or avoiding feared selves (Markus & Nurius, 1986).

Possible selves provide context for interpretation of information about the self – drawing attention to information that relates to salient possible selves, whether positive or negative, and evaluating information in light of those possible selves (Markus & Nurius, 1986). The second function of possible selves is to help create an incentive to perform

goal-achieving tasks by forming cognitive goals or threats. In addition, Oyserman and Fryberg (2006) found that possible selves had a self-regulatory function. Therefore, possible selves variables are included in this dissertation research as motivational measures. Detailed possible selves can help the individual create pathways to achieve or avoid these future possibilities. Having an image of the self already in the desired future state is thought to be motivating, and having a detailed image of the self to work toward directs and focuses behavior (Markus & Nurius, 1986).

Identity Development

Erikson's theory of psychosocial development proposed that the important work of adolescence was to resolve personal identity crises (Erikson, 1968). According to Erikson, adolescents explore possible identities and then commit to some as their own. Following Erikson, Marcia (1966) classified individuals on the degree of exploration and commitment they should. Identity achieved individuals are those who have actively explored possible identities and have committed to specific choices. Individuals who are actively exploring, but have yet to commit to an option are in the identity moratorium status. Individuals who have committed to specific choices without exploring the options available to them are in the identity foreclosure status. Identity diffusions are those who have not explored options and have not yet made any commitments.

Identity status may be particularly useful addition to SRL research in the college population because college is an excellent setting for exploration and commitment to take place. It is likely that students will show variability in their level of commitment and exploration of identities, and by extension, college major courses. In addition to the cognitive processes that are available to college students because of their age, they are

also confronted with the need to select and pursue a major (i.e., an identity). The student's identity status may affect how he or she approaches academic assignments as well.

Summary

Pintrich (1989), Zimmerman (2000, 2008) and other researchers asserted that SRL theory can be used to explain variation in several academic outcomes. Persistence in degree attainment, choice of major or course selection, effort in studies, and achievement are all academic outcomes examined in the vast body of SRL research. This dissertation, like many of the studies in the area (e.g., Lynch, 2006; Patrick, Ryan, & Pintrich, 1999; Pintrich, 1989; Pintrich & De Groot, 1990; VanderStoep et al., 1996; Wolters, 1998; Zusho & Pintrich, 2003), is focused on examining how SRL variables relate to the course outcome variables of test grade and expected final course grade. Self-regulated learning theory is broad and it allows for the inclusion of a variety of constructs. This dissertation will investigate the inclusion of two constructs that are not traditional SRL variables as well as one alternate measure of goal orientation.

Organization

The following chapter contains sections on each group of variables in SRL theory. Because motivational and cognitive variables directly relate to academic outcomes, according to SRL theory, these two groups of variables will be addressed first. The presentation of past research will turn first to motivation and then to cognition. It is important to remember that SRL theory proposes that both types of variables are "in play" at the same time (see figure 1), and are thought to be related to one another. Finally, the discussion will turn to personal and contextual variables, such as age, sex,

academic task, teacher variables, and the proposed addition of identity status. Personal and contextual constructs are thought to influence academic outcomes, but indirectly through motivational and cognitive variables.

Chapter three will describe the participants, methods, and questionnaires included in this dissertation. Chapter four will present the results of the data collection and analysis. Chapter five will discuss the results and how the findings relate to the research questions of this study and to past research.

CHAPTER II

LITERATURE REVIEW

Introduction

Self-regulation appears to be crucial for effective college study. In academia, as in SRL research, learning is measured by performance in classes, especially in the form of test grades and final course grades. Self-regulation of learning behaviors should lead to better retention of material and problem solving skills, which should result in higher grades on tests and in overall course performance. As previously discussed, a number of factors make self-regulation especially crucial in college. SRL theory includes a diverse selection of variables that relate to the criterion variables under study - test grade and expected final grade. SRL theory also states that the three major groups of variables (personal/contextual, cognitive and motivational) relate to one another as well. Specifically, motivational and cognitive variables mediate relations between personal/contextual variables and academic outcomes. Motivational and cognitive variables also relate to one another. SRL research has examined the relations between the various components of the model, but few studies have examined the model as a whole. Also, the theory is several decades old and separate research has extended or altered the understanding of included variables since SRL was introduced. Current SRL research should include the best version of all constructs.

The goal in this chapter is to describe the research on each group of variables (or boxes) included in SRL theory, as seen in Figure 1. The nature of the research on SRL variables, however, makes the discussion of the literature along strict lines impossible

and some overlap will occur. For example, many studies on goal orientation (a motivational variable) also measure study strategies (cognitive variables). First, motivational constructs included in SRL will be discussed. Self-efficacy, task value, goal orientation and test anxiety are included in this box of variables. In this section of the chapter, possible selves will be introduced as a construct for potential inclusion in SRL research. Cognitive components of self-regulated learning will be discussed next. These components include the specific study strategies employed by students as well as the metacognitive and regulatory skills crucial for effective study. Finally, personal and contextual variables will be discussed. Personal variables include age, sex, ethnicity, and prior knowledge, and contextual variables include instructor and academic task variables. This section will introduce ego identity status for possible inclusion in SRL research as well.

Motivational Constructs

Motivation is a requirement for success in college. A meta-analysis of studies that included psychosocial and study skill factors revealed that the best overall predictor of college GPA was self-efficacy, a motivational construct (Robbins, Lauver, Le, Davis, Langley, & Carlstrom, 2004). Other top predictors of academic outcomes were achievement motivation, financial support, academic goals, academic-related skills, and social involvement. This meta-analysis revealed the great importance of motivational constructs, cognitive constructs, and personal/contextual variables for college study. It is interesting to note that three of the top six predictors of GPA were motivational variables.

In SRL theory, motivational constructs are mediators. They relate directly to academic outcomes and provide a link to outcomes for personal variables and cognitive

strategies. The motivational constructs traditionally included in SRL theory are self-efficacy, goal orientation, test anxiety, and task value (Pintrich, 2004).

Self-efficacy

Before engaging in any task that will be evaluated, students may ask themselves whether or not they have the abilities to succeed at that task. Bandura (1977) stated that self-efficacy is the "conviction that one can successfully execute the behavior required to produce the outcome" (p. 193). Bandura posited that self-efficacy would predict initiation, persistence, choice of activity, coping efforts, and active efforts to complete a task.

In Bandura's early writings on self-efficacy (1977) he hypothesized that accomplishments are the most valid way of gathering information about a person's abilities. Good information about abilities can also come from comparing one's own performance to classmates' performances. By comparing one's performance to peers' performance information is gathered about the normative performance level for that stage in development or time point in a semester. This information is also known as feedback and is used in the process of self-regulation.

Self-efficacy is a very important construct and Collins (1982) demonstrated the importance of self-efficacy for learners of all levels. Students were divided into high, average, and low math ability groups based on standardized tests and then given a self-efficacy measure and math problems to solve. Regardless of ability, high self-efficacy students solved more math problems correctly and decided to rework more incorrect problems than low self-efficacy students. This study showed that self-efficacy is an important component in persistence and outcomes.

Schunk (1985) articulated a model of classroom learning that includes personal characteristics, self-efficacy, locus of control, motivation, cognitive processes, classroom context, skill development and efficacy cues. Schunk's model included feedback loops in which outcomes and comparison to others affect self-efficacy beliefs. Self-efficacy beliefs were thought to affect the motivational beliefs students hold and the cognitive processes they use. This model is similar to the SRL model in that it includes many types of variables, but it is focused on how self-efficacy is affected by and affects classroom learning.

Self-efficacy is very useful in predicting academic outcomes. House (1995) referred to self-ratings of ability (i.e., self-efficacy) as self-concept. He asked college freshmen for self-rating of mathematics ability (among other variables). Ability ratings were the strongest consistent predictor of final grade in a finite mathematics course, accounting for 7.7 percent of the variance in scores for all students (7.2 for males and 8.4 for females). Chemers, Hu, and Garcia (2001) surveyed first year university students about general academic self-efficacy, stress, challenge-threat evaluations, as well as some traditional academic predictors. They found that academic self-efficacy predicts unique variance in expected performance on academic tasks, even when added to traditional predictors such as test scores and past performance.

Self-efficacy is often linked to positive outcomes (i.e., persistence, goal revision, goal-striving behavior), but Bandura (1977) hypothesized that high self-efficacy could be related to negative outcomes in the planning stage of goal processes. Students may schedule less study time if they feel sufficiently efficacious for a given task. In their study, Vancouver and Kendall (2006) asked psychology students to complete self-

efficacy, resource allocation, and goal level measures several times across an academic year. Self-efficacy was significantly and positively related to past performance and goal level but negatively related to planned study time. This negative relation was the equivalent of planning to study fifteen minutes less for each letter grade increase in course goal. Actual study time showed the same relation with self-efficacy as planned study time, though not as strong. When controlling for goal level, self-efficacy was significantly negatively related to performance, as measured by exam grades. Despite findings that higher self-efficacy is related to higher performance (Chemers, Hu, & Garcia, 2001; House, 1995; Williams & Clark, 2004), Vancouver and Kendall discouraged efforts to increase self-efficacy without efforts to increase actual ability which could lead to misconstrual of one's actual ability level and a corresponding decrease in preparatory time and performance. Vancouver and Kendall also showed that self-efficacy is related to previous outcomes, as Bandura (1977) predicted.

Self-efficacy is important for academic outcomes, but do students know the relation between self-efficacy and performance in a given subject? One study would indicate that college students do not. Williams and Clark (2004) asked students to rate how strongly different factors affected their exam performance immediately after taking an exam. Possible predictors included the student's self-rated effort and ability, type of exam, and the teacher's input in the learning process. Self-rated ability, which was measured using a self-efficacy framework, was the strongest actual predictor of exam performance but was a consistently low student-rated predictor. Teacher input variables were significant predictors of actual grade. Students rated their own effort as the most crucial determinant of their exam performance, but student effort was actually the least predictive of final

grade. High performers reported higher self-efficacy and greater importance of teacher input than low performers, but the two groups did not differ on amount of self-reported effort. It is interesting that effort is given more weight by students than ability, though the opposite is true. This finding shed light upon the attitudes of students when they claim that they should get a higher grade because they spent so much time working on it. Students see the quantity of effort expended as the best determinant of outcomes.

One major theory of how self-efficacy relates to outcomes is expectancy-value theory. Expectancy-Value Theory (Eccles, 2005; Eccles, Adler, & Meece, 1984; Wigfield & Eccles, 2000), in brief, states that achievement related choices are "most directly related to two sets of beliefs: the individual's expectations for success, and the importance or value the individual attaches to the various options perceived by the individual as available" (Eccles, 2005, p. 27). Expectancy-Value theory includes more variables than just expectancies and values and is important because it addresses conscious and noncoconscious choices, recognizes that individuals make choices based on their perspective of what is possible and because it recognizes that decisions are made in a social context.

In a discussion of expectancy-value theory in research with children and adolescents, Wigfield and Eccles (2000) reported that more specific expectancies (specific to domain/activity) are linked to more adaptive choices, greater persistence, and better performance in that domain or on that activity. Ability beliefs and expectations for success were strong determinants of grades and enrollment in future math classes. Ability-related beliefs and subjective values decline over the course of elementary and high school, but data were not collected into college. Expectancy-value theory has been

examined primarily using young students. It is assumed that these findings would extend to college samples, and further tests using college student participants should be performed.

Expectancies have been a very important part of academic achievement research for many years. Ability beliefs and expected success rate are important constructs in academic achievement research. Both types of expectancies are measured in the self-efficacy subscale of the MSLQ.

Goal Orientation

Goal orientation research, as briefly described above, often examined achievement goals in pairs (e.g., intrinsic/extrinsic), but not all researchers use the same terminology. The definitions of the pairs of learning goals in early goal orientation research were similar enough that reviewers collapsed across studies (e.g., Ames & Archer, 1987; Pintrich, Conley, & Kempler, 2004). Learning goals and mastery goals are both concerned with achieving internal rather than external rewards. Other versions of opposing goals are intrinsic goals (learning for personal reasons) and extrinsic goals (learning to earn rewards) as well as task-involved (learning for the sake of learning) and ego-involved goals (learning to demonstrate competence).

The different motivation orientations were associated with different outcomes. For example, intrinsic orientation has been linked to positive psychosocial constructs such as identity development, autonomy, competence and relatedness (Faye & Sharpe, 2008), higher self-efficacy and learning goals (Grant & Dweck, 2003), and preference for challenging assignments, curiosity, and independent mastery of material (Harter, 1981). Covington and Müeller (2001) asserted that intrinsic and extrinsic motivation have an

additive relationship, as did Pintrich, Conley, and Kempler (2003).

Dweck (1986) and Ames (1992) found interesting results in their studies comparing goal orientations, persistence or effort, and self-concept of ability. In both cases, self-concept of ability mediated the relation between goal orientation and effort. Mastery/learning goals were related to high effort regardless of self-concept of ability. Performance goals, however, were only related to high effort when ability conception is also high. Since performance goals are concerned with demonstrating ability to others, when ability is perceived as low students tend to reduce effort so that if performance is not satisfactory the student may use lack of effort as a rationalization for low achievement.

Lynch (2006) compared MSLQ subscales with final course grade for university students in several different courses and found that effort regulation, self-efficacy, and extrinsic goal orientation were all significantly related to course grade, together accounting for 17% of the variance. Cognitive strategies failed to significantly predict course grade, perhaps because there was a variety of courses represented in this study and different courses require different study strategies.

The intrinsic/extrinsic distinction is a compelling one, and those variables are included in the MSLQ. However, in pilot studies for this dissertation using the MSLQ, intrinsic and extrinsic goal orientations did not consistently significantly predict course outcomes. Other types of motivational variables may be useful additions to the MSLQ. Indeed, Pintrich (2000) called for further research to examine the fit of a newer achievement goal model, called the 2x2 goal orientation framework, into the SRL model. To understand the 2x2 framework, its precursors - mastery and performance goals, and

the Trichotomous Framework of achievement goals - must first be understood.

Elliot's (1999) work resulted in a Trichotomous Achievement Goal Framework with three parts: mastery goals, performance-approach goals (attempt to demonstrate competence), and performance-avoidance goals (attempt to avoid demonstrating incompetence). The approach-avoidance distinction is a matter of valence. Approach motivation is activated by desired possible events, and avoidance motivation is initiated by undesirable possibilities. Perceived competence is important in determining which type of performance goal will be active in a given situation for a given individual. If perceived competence is high, a particular task requiring that competency should evoke a performance-approach goal. Low self-efficacy would result in a performance-avoidance goal.

In a set of studies using the Trichotomous Framework, Elliot, McGregor and Gable (1999) were able to relate achievement goals to cognitive/metacognitive and motivational study strategies. These studies showed that each achievement goal orientation is related to a specific set of study strategies. Mastery goals were associated with positive strategies such as deep processing of material, persistence at tasks, and high effort, but were not associated with exam performance. Performance-avoidance goals were negatively related to deep processing of material and to performance, but positively related to surface processing and to disorganization. Performance-approach goals were associated with such strategies as surface processing of the material, high persistence and effort. Performance-approach goals were also positively related to performance on exams.

Mediational relations were also noted between goal and performance as posited

by Pintrich (2004). The effect of goal type (a motivational variable) on exam performance was mediated by persistence, effort, and disorganization (all cognitive variables; Elliot et al., 1999). Performance-avoidance goals were mediated by disorganization, and performance-approach goals were mediated by persistence and effort. It is curious that mastery goals had no relation to exam performance, since they were related to persistence and effort, which were positively related to performance. One of the important findings of Elliot et al. is that motivational goals are not necessarily directly related to performance. This study also demonstrated the importance of looking at individual types of self-regulated exam preparation (i.e., persistence, effort, organization) instead of measuring them all as one subscale, and provided further support for the approach/avoidance distinction of performance goals. The two performance goals were related to distinct sets of study strategies and were related to exam performance such that performance-approach orientation related to higher exam performance and performance-avoidance was related to lower exam performance. Pekrun, Elliot, and Maier (2006) applied the Trichotomous Framework to study the relations between achievement-related emotions and motivation in American and German college students. Their study with German students revealed that 1) mastery goals were positively related to enjoyment, hope and pride, and were negatively related to boredom and anger, 2) performance-approach goals were positively related to pride, anger and shame, 3) performance-avoidance goals were positively related to anger, anxiety and shame. Since emotions are important for engagement in classes and general academic work, understanding the relations between goals and emotions is important. This study was different from the previous studies on the Trichotomous Framework because it focused

on emotions instead of study strategies, scores or past performance; however, it did support the pattern of results found in previous studies, that is, mastery goals are linked to positive outcomes, performance-approach goals are linked to both positive and negative outcomes, and performance-avoidance goals are linked to negative outcomes.

The 2x2 Framework. Recent research on achievement goal orientations has expanded the two original goal orientations into four by adding the dimension of valence to both mastery and performance goal orientation (Elliot & McGregor, 2001). This resulted in a 2x2 framework of achievement goal orientations, which included mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goals. Pintrich (2000) called for research in SRL to examine this 2x2 framework to determine its fit with other motivational variables and its relation to cognitive processes and outcomes within the SRL model. Since performance goals, when split by valence, revealed opposite relations with outcome, might not mastery goals show the same relation? If mastery goals do have two forms (approach and avoidance), then past research using only one mastery goal may have yielded non-significant results because the combined relations mask each other.

In their early work on the 2x2 Framework, Elliot and McGregor (2001) examined both the Trichotomous Framework and the 2x2 framework in a series of three studies using undergraduate students. Results validated the four distinct goal constructs, showed that the 2x2 framework is superior to the Trichotomous Framework, and confirmed that the 2x2 framework has good reliability. The new goal, mastery-avoidance, was conceptualized as the desire to avoid losing competence and was consistently correlated with both performance-avoidance and mastery-approach goals due to the sharing of a

common dimension. In general, mastery-avoidance goals are correlated to some negative outcome variables, though not as many as performance-approach.

Each of the four achievement goal constructs had a distinct set of antecedent variables, processes and outcomes (Elliot & McGregor, 2001). Students who endorsed a mastery approach goal orientation were marked by a need for achievement, engagement in their classes, deep processing of material, and a low number of health center visits. Mastery avoidance goal orientation was associated with a high fear of failure, entity theory of intelligence, class engagement, disorganization, test anxiety, and emotionality. Performance approach orientation was linked to a need for achievement, fear of failure, surface processing of material, and high exam performance on both multiple choice and short answer questions. Finally, performance avoidance goal orientation was related to entity theory of intelligence, low deep processing of material, high surface processing of material, disorganization, test anxiety, emotionality, low performance on exams on both types of exam questions, and a high number of health center visits (Elliot & McGregor, 2001).

In Elliot and McGregor's (2001) study we see that the two mastery goals were not associated with exam performance, but the two performance goals were, and in different directions. Mastery goals were also associated with class engagement, while performance goals were not. Approach goals were associated with a strong need for achievement, but avoidance goals were not associated with this need. Avoidance goals, however, were associated with a high degree of test anxiety and entity theory of intelligence, while approach goals were not correlated with either trait. This study revealed that both performance and mastery goals were associated with positive traits and

outcomes. The cross of type of goal with valence is important, as it resulted in goals with different outcomes, and the 2x2 model should be used over the Trichotomous Framework of achievement goals. Pintrich, Conley and Kempler (2004) reviewed the literature on achievement goals and confirmed that the 2x2 Framework or the Trichotomous Framework should be used in goal orientation research over the two-part model. The two-part model is used in SRL research that relies on the MSLQ as its primary measure because the questionnaire includes only intrinsic and extrinsic motivation, so investigating the 2x2 framework could be very useful for SRL research.

Several researchers have continued research in this 2x2 model in the past decade. Karabenick (2003) compared help-seeking behaviors and help-seeking emotions to the four achievement goals. Three of the goals, mastery-avoidance, performance-approach, and performance-avoidance, were related to avoidance of help-seeking and students high in these goal orientations experienced more threat by seeking help. These results supported achievement goal theory, as performance goals are inherently concerned with demonstrating ability to others. Seeking help reveals that the student does not currently have competence for the given task and would thus produce threat evaluation. Mastery-avoidance goals were concerned with avoiding the loss of ability or skills: having to seek help might be seen as a confirmation that one's abilities are lacking. Mastery-approach goals, however, were unrelated to help-seeking avoidance and threat. Students high in this orientation have a desire to learn and are willing to engage a range of strategies to meet that goal.

Young (2007) used the 2x2 model to assess how well achievement goals predict GPA. Mastery-approach goals significantly and positively correlated with GPA, both for

an academic year and for the entire college career, while mastery-avoidance goals were significantly negatively correlated to the two GPA measures. Under the Trichotomous Framework, general mastery goals were unrelated to performance measures and were primarily correlated with emotional and experiential variables (i.e., self-efficacy, persistence). An unusual result in Young's (2007) study was that performance-approach goals were unrelated to GPA, and performance-avoidance goals were only negatively correlated with cumulative GPA. Multiple regressions to predict current year GPA and cumulative GPA revealed that mastery-approach goals added significantly to traditional predictors (SAT scores and high school class rank) for current year GPA, and mastery-avoidance goals added significantly to traditional predictors for cumulative GPA. It is interesting that performance goals were unrelated to the outcome variable of GPA. However, GPA is a more global measure of achievement than a final grade in a specific class, the outcome measure used in most research on the Trichotomous Framework. The fact that motivational variables are more predictive of outcomes when the measure is specific could explain the difference between the outcomes of this study and other research.

Research on goal orientations has advanced considerably since the development of the MSLQ and the articulation of SRL theory. The 2x2 framework is a relatively recent development in goal orientation research. The goals included in this framework have been related to various cognitive processes and outcomes, but the fit of this framework into SRL theory should be examined further. This dissertation considers the addition of the 2x2 framework of goal orientations in the SRL model.

Instrumental Goals. Another type of goal that may be motivational but that does

not fit neatly into performance or mastery goals is instrumental goals. Instrumental goals are those that are intermediate to achieving one's primary goals. For example, passing organic chemistry may not be valued for the content of the course, or for getting another A, but it is a necessary course to achieving the primary goal of becoming a physician. So, earning an A in organic chemistry would be an instrumental goal for becoming a physician, but only if the student has perceived instrumentality for the organic chemistry class. Miller, DeBacker, and Greene (1999) sought to establish that current course work could be valuable to students if it is seen as an important step in achieving long-term goals. They claimed that perceived instrumentality is important for intrinsic motivation to develop. Regression analyses showed that instrumentality explained a significant and unique portion of variance in intrinsic value. A separate regression showed that instrumentality also explained a significant, unique and larger portion of variability in extrinsic value than learning or performance goals. Thus, the long-term goals that a student holds are important for motivation and goal striving in the present.

Future-oriented motivational measures such as instrumental goals were predictors of a small but significant portion of college behavior (Malka & Covington, 2005). Since this portion was small, perhaps a different type of future oriented goal measure would account for a greater portion of college behaviors and be useful in SRL research. Possible selves are one such measure and will be discussed below.

Test Anxiety

Test anxiety has been conceptualized using a cognitive-attention model (Wigfield & Eccles, 1989) and has benefited from a long line of research that began in the 1950's and has continued to be an active part of educational and psychological research since

(Hembree, 1988). In his meta-analysis, Hembree noted that a great deal of studies on test anxiety to that date had been conducted with college student participants. The meta-analysis of the effects of test anxiety on academic performance revealed a negative effect of test anxiety such that low test anxiety students scored about 6 points higher than high test anxiety students. A similar effect was noted between test anxiety and GPA. Test anxiety also interfered with cognitive processes and led to negative emotions. At the time Hembree conducted his meta-analysis, the research noted no sex differences in test anxiety or in the affects of test anxiety on other variables.

Elliot and McGregor (1999) sought to integrate the Trichotomous Framework of motivation with test anxiety research in one study. They found the relation between performance-avoidance goals and Introductory Psychology test performance was mediated by test anxiety and worry. That is, the significant negative association between performance-avoidance goals and test performance was reduced to a nonsignificiant level when test anxiety was entered into the equation. Mastery goals were unrelated to exam performance, which was surprising given the emphasis placed on mastery goals in the literature. Performance-approach goals were positively related to exam performance. All of these relations were found in two separate studies. Long-term retention of test content was measured at the end of the semester with an unexpected test on the first exam material. Previous exam performance and SAT scores were positively related to long-term retention. Mastery goals were positively related to long-term retention of class information and performance-avoidance goals were negatively related to information retention, even when controlling for SAT scores. A combination of performance-approach goals to promote high test performance in the short-term and mastery goals to

promote retention of the material in the long-term may be best for successful college study.

Task Value

A great deal of research has been done on task value, which is included in Pintrich's (1989) model of SRL as a motivational variable. Eccles (2005) recently wrote a review of research on Subjective Task Value (STV) within the Expectancy-Value theory of achievement related choices. She outlined four components of STV: attainment value, intrinsic value, utility value, and cost. Attainment value is the personal importance of participating in a given task. This type of value is linked to identity such that individuals will have more attainment value for, and are more likely to participate in, tasks that will most confirm the characteristics they desire. Intrinsic value refers to the enjoyment, interest or significance that one holds for a given task independent of rewards or external pressures. Utility value indicates how well a task fits with an individual's long-term plans and goals. The final component of task value is the cost of participating. Cost may include anxiety, fear of damage to self-worth, fear of failure, and loss of time and energy. The Expectancy-Value model of STV is cumulative: the four components add to form the value for the task in question. In the SRL model, as outlined by Pintrich (1989; 2004), task value is included as a construct of affect, which is a motivational component.

Possible Selves

Instrumental goals and attainment value speak to the importance of long-term goals, or what the student wants to become, in academic research. Possible selves are images of the self in the future in desired or undesired situations. They are personally relevant, detailed, and thought to motivate individuals to achieve or avoid them (Markus

& Nurius, 1986). This dissertation proposes the inclusion of possible selves in the motivation section of the model.

The concept of possible selves has been examined in research concerning academic achievement primarily with middle- and high school students. The results of this work suggest that the inclusion of possible selves measures in research on college student achievement, particularly within a SRL framework, would be advantageous. For example, Anderman, Anderman and Griesinger (1999) demonstrated that academic possible selves and not social possible selves predicted change in GPA in early adolescents. Academic possible selves can be both positive (i.e., a goal to strive for) and negative (i.e., a state to avoid). Negative possible selves may be a motivational tool for academic success by presenting an image of the self in an undesirable state as something to avoid, but to regulate performance possible selves must be balanced and paired with the tools to realize them (Ruvolo & Markus, 1992). Balance in possible selves indicates that an individual has a positive possible self to achieve and a negative possible self to avoid in the same domain. In a study of African-American middle school students, balance in achievement-related possible selves was associated with higher scores on the math section of the state standardized test (Oyserman, Gant, & Ager, 1995).

In one study, Oyserman and colleagues studied the power of possible selves to regulate academic behavior and achievement (Oyserman, Bybee, Terry, & Hart-Johnson, 2004). They hypothesized that "only possible selves that are detailed and connected with specific behavioral strategies can sustain self-regulation over time" (p. 133). The researchers asked middle school students to generate both positive and negative possible selves and the strategies they use to attain or avoid them. Those students with more

expected or feared academic-related possible selves who also reported related concrete and detailed strategies were given high self-regulation scores. For example, one student with a high self-regulation score stated, "Next year I expect to be a straight A student (by studying at night), a high schooler (by practicing writing and doing my best). Next year I expect to avoid failing a grade (by doing all my work), and dropping out of school (by trying to do my best)." Students with higher self-regulation scores in the fall were rated by their teachers as having participated more in class, spending more time on school work, earning higher grades, and were less likely to be referred to summer school at the end of the school year. When the regressions used to evaluate these data were calculated using only the number of academic-related strategies instead of the self-regulation score to predict the outcome variables, the results were not as strong. When number of academic related possible selves was substituted into the regressions, results were significant for only class participation score and grades. Balance in academic possible selves significantly predicted only time spent on homework. Thus, the combination of personally relevant possible selves and detailed, concrete strategies to become the desired version of the self are motivating and result in sustained effort.

Pizzolato's interviews with students support this finding. She found that the 'college student' possible self was only achieved when student could pair it with procedural and conceptual schemas for how to enroll in college and for the strategies were necessary for success there (Pizzolato, 2006). High school students in Greece who have specific, well-elaborated possible selves have higher GPAs and put more effort into their schoolwork than do students with more general possible selves (Leondari, Syngollitou, & Kiosseoglou, 1998).

One benefit to the construct of possible selves is that interventions to help students develop appropriate possible selves are straightforward and produce results. Oyserman and colleagues developed an intervention to help middle school students think about their future, to produce detailed pictures of what they would like to become, and to identify possible forks in the road, roadblocks placed by others, and ways to solve the problems they may encounter along their path (Oyserman, Terry, & Bybee, 2002). At the end of the intervention, youth scored higher on concern about school, had more balanced possible selves, and had more plausible strategies to attain possible selves than students who had not participated in the intervention. The intervention students also had higher attendance and lower rates of discipline referrals at school than their peers. In a later iteration of the intervention, Oyserman, Bybee and Terry (2006) demonstrated that the intervention participants "generated more balanced academic possible selves, more plausible academic possible selves, and more feared off-track possible selves, setting the stage for self-regulation" (p. 194). Participants also had fewer absences, higher GPAs, and higher standardized test scores than non-participants. Results persisted one year later, at the end of ninth grade, when participants spent more time on homework, had better classroom performance, had higher GPAs, and had lower depression scores than their non-participant peers.

Hock, Deshler and Schumaker (2006) describe and support a possible selves intervention that can be used with learners at all levels of education. The intervention consists of explicit mentoring on setting goals, identifying possible roadblocks and identifying strategies to meet goals. Hock et al. (2006) tested their intervention with college freshmen athletes with encouraging results. One semester after completing the

Possible Selves Program, the students had more goals outside of athletics than prior to the intervention. Freshmen who did not participate in the program had fewer outside goals than when they started college. Six years after the study, participants had higher GPAs and graduation rates than non-participants. A replication of the study with student mentors guiding the program instead of a staff member showed that participants produced even more possible roles and goals than other groups or than participants in the first study. This study also showed similar results in that participants had higher retention rates and more participants were on schedule to graduate than non-participants. These studies demonstrate that interventions providing a social context for exploring and developing possible selves can mitigate the effects of subculture on possible self-development.

A considerable amount of research indicates that possible selves are related to personal and contextual variables such as ethnicity, interpersonal context, sex, and identity development (e.g., Lips, 2004; Oyserman & Fryberg, 2006; Unemori, Omeregie, & Markus, 2004). Because of the evidence of these relations, and because the construct of possible selves has been shown to serve a self-regulatory function, possible selves is included in this study as a member of the class of motivation variables. It is expected to act as a mediator between personal/contextual variables and outcomes.

Cognitive Constructs

Cognitive constructs are very important in the study of self-regulated learning. In fact, SRL research began by examining only the cognitive processes that students engage in when studying (Zimmerman & Martinez-Pons, 1986). Definitions of learning strategies vary, but one central feature is that the strategies are selected and employed by

the learner (Palmer & Goetz, 1988). The cognitive processes can be split into three major groups: cognitive strategies, metacognitive strategies, and resource management strategies (Pintrich et al., 1993). Cognitive strategies are information processing strategies and include rehearsal, elaboration, organization and critical thinking. These strategies help the individual take in information and make it more meaningful (Weinstein & Underwood, 1985). Metacognitive strategies are those that support the individual in his or her academic work by helping sustain an adaptive state of mind for learning and include attention monitoring and comprehension checks (McKeachie, Pintrich, & Lin, 1985). Resource management strategies are those that the student uses to regulate resources other than cognitive strategies, and include help seeking, effort regulation, and time and environment management (Pintrich et al., 1993). Often these sets of variables are measured simultaneously.

In the 1980's, learning strategies research turned to the development of programs to teach students how to use different learning strategies (Weinstein & Underwood, 1985). One such program was the Learning to Learn course at The University of Michigan (McKeachie et al., 1985). The Learning to Learn course was targeted to freshmen who were either anxious, minority, or athletes, because of the assumption that these three groups of students would need the most help in order to succeed in the classroom. The course taught students about how learning takes place, cognitive theory and research on the use of learning strategies, and then gave them lab experience using different learning strategies. The evaluation of the Learning to Learn course was the impetus for the development of the MSLQ. Students from this course (and an Introduction to Psychology course as a control group) completed a very early version of the MSLQ,

which included both cognitive and motivational scales. MSLQ subscales were compared to SAT scores and college GPA subsequent to the Learning to Learn course (where applicable). Results of the evaluation revealed that participation in the course was associated with an increase in the use of learning and study strategies and in expectancy for success. Participants in the course also saw an increase in GPA relative to nonparticipants, but they started out with lower GPAs and no statistical analysis of GPA change was reported. Finally, the researchers noted a significant interaction between anxiety and treatment condition on a single course grade. Students high in anxiety who participated in the Learning to Learn course earned higher course grades than highly anxious students from the Introduction to Psychology control course. The opposite result was shown for low anxiety students. This interaction led the researchers to emphasize the importance of examining motivational variables in the study of cognitive learning strategies. The importance of matching appropriate strategies to the task at hand was also emphasized.

Sperling, Howard, Staley, and DuBois (2004) performed two studies to examine the relations between metacognition, cognitive learning strategies, academic achievement, and motivational variables. They particularly wanted to examine the question of whether knowledge of cognition comes before self-regulation of cognitive processes. In the first study, the researchers correlated college freshmen's responses to questionnaires on knowledge of cognition, regulation of cognition, and use of study strategies. The results revealed that students who know more about cognition, as measured by the Metacognitive Awareness Inventory (MAI), scored higher on the covert processes subscale of the Learning Strategies Survey (LSS). Covert processes are the

internal cognitive processes that a student utilizes when studying, and are very similar to the cognitive subscales of the MSLQ. Students who scored higher on regulation of cognition also engage in more covert processes.

The second study of Sperling and colleagues' research (2004) compared subscales of the MAI to subscales of the MSLQ as completed by sophomore and junior education majors. Students were also asked to indicate their confidence in their test taking immediately before and during two tests. This study revealed once again that the knowledge and regulation of cognition were significantly correlated with use of learning strategies, as measured by the MSLQ. Students who reported greater knowledge of cognition also reported greater use of elaboration, organization, metacognitive self-regulation, and time and study environment management. Students who reported greater regulation of cognition on the MAI also reported greater use of organization, critical thinking, metacognitive self-regulation, time and study environment management, and effort regulation. Correlations between confidence levels and MAI subscales were "inconclusive" (p. 131).

These two studies revealed, with different groups of college students, that knowledge of cognition is related to the regulation of cognition, as measured by different questionnaires. Sperling's study failed to find significant correlations between strategies and academic achievement, as measured by the SAT and high school GPA. The authors point out that previous research comparing metacognitive strategies to achievement has been inconsistent and the relation between the two may not be direct. The model of SRL proposed by Pintrich (2004) does note that cognitive variables may be directly related to outcomes, or indirectly related to outcomes through motivational variables. The fact that

students who know more about cognition were those who also used more cognitive and regulatory strategies underlines how crucial it is for instructors to properly educate their students on the nature of cognition and the proper use of self-regulation in their academic pursuits.

In order to do well on academic tasks, students must be able to determine where their skills are weak and be willing to ask for help to improve. This ability requires a level of metacognitive monitoring that is not automatic for some students. Stavrianopoulos (2007) examined how goal orientation relates to metacognitive monitoring and help-seeking behaviors. The results of this study with undergraduate participants revealed that those with higher metacognitive monitoring accuracy (measured objectively) sought help more strategically and reviewed more strategically than students with low metacognitive monitoring accuracy. Relations between goal orientation and help-seeking did not support previous research (Karabenick, 2003; i.e., students high in mastery goals are expected to seek more help than students high in performance goals), but Stavrianopoulos believes this result may be because participants viewed the data collection as a test situation rather than a learning situation.

Effort regulation is a metacognitive strategy that students employ to help them achieve their academic goals and is characterized by continued expenditure of effort, even in the face of boredom or difficulty (Pintrich et al., 1993). A lack of effort regulation could easily lead to procrastination. Howell and Watson (2007) correlated the tendency to procrastinate with the four achievement goal orientations of the 2x2 Framework. Mastery-approach goals were negatively correlated with the tendency to procrastinate, as measured by two procrastination scales. Mastery-avoidance goals were

positively related to the tendency to procrastinate, as measured by one of the two procrastination scales. Both types of performance goals were not correlated with either procrastination scale. Regressions to predict the procrastination scales included the achievement goal orientations on step one and learning strategies variables on step 2. The two mastery goal orientations explain a significant proportion of the variance in procrastination scores, but this explanation loses significance when the learning strategies variables were added, so learning strategies are better predictors of procrastination than goal orientations. This mediation, where cognitive variables mediate the relation between motivational constructs and the outcome of effort expended, is consistent with Pintrich's SRL model. Lower reported use of cognitive strategies and greater disorganization significantly predict procrastination, which supports a similar finding in Elliot, McGregor, and Gable (1999). Goals and outcomes are not always directly related. For both scales, disorganization predicted the most variance in procrastination scores.

Howell and Watson (2007) also examined the relations between goal orientations and study strategies. Mastery-approach goals are significantly positively related to cognitive strategies, metacognitive strategies, and surface processing, and negatively related to disorganization and procrastination. Mastery-avoidance goals are significantly positively related to cognitive study strategies, surface processing, disorganization, and procrastination. Performance-approach goals are significantly positively related to cognitive strategies, meta-cognitive strategies, and deep processing. Performance-avoidance goals are significantly related to cognitive strategies, surface processing, and disorganization. The fact that surface processing is related to mastery goals is surprising as mastery-oriented students should be motivated to learn more about the topic than just

the surface facts.

VanderStoep, Pintrich and Fagerlin (1996) measured self-regulated learning variables for students in three types of introductory college courses: natural sciences, social sciences, and humanities courses. Students in each course were grouped based on performance (i.e., final course grade) and group differences in motivational, cognitive and metacognitive variables were examined. The results showed that high achieving students scored higher on the SRL variables across the three disciplines, indicating that SRL theory is not limited to a specific domain. Students in the natural sciences who were high achievers had higher scores for organization, metacognition, rehearsal and elaboration on the MSLQ than low achievers. High achievers in the social sciences scored higher on organization and rehearsal than low achievers. In the humanities, however, high achievers scored higher only on the organization scale of the MSLQ. It appears that the courses included in this research require different approaches to study for peak performance. It may be that the high achievers in each class recognized that fact and adjusted their study strategies accordingly.

Dahl, Bals, & Turi (2005) performed a study on Norwegian college students to examine the links between beliefs about knowledge and the use of learning strategies. Past research has shown that students tend to have one of two beliefs about intelligence: intelligence is fixed at birth and cannot be increased, and intelligence is not fixed and can be increased through effort (Dweck, 1986). Students can also believe that knowledge is simple and therefore should not be integrated, that the process of gaining knowledge is quick, and that knowledge is certain. These epistemological beliefs are measured with the Schommer Epistemological Questionnaire (SEQ). Intercorrelations between the

subscales of the SEQ and the MSLQ reveal that students who hold the belief that knowledge is not simple engage in more rehearsal, elaboration, organization, and metacognitive self-regulation. Students who believe that knowledge is not fixed engage in more elaboration, critical thinking, organization, and metacognitive self-regulation. The epistemological beliefs of quickness and certainty are related to virtually none of the cognitive and metacognitive strategies measured by the MSLQ. Dahl and colleagues then used regression analyses to predict the MSLQ cognitive and metacognitive strategies with the SEQ subscales. The results of these five regression equations reveal that organization and metacognitive self-regulation can be predicted by the belief that knowledge is not simple, and elaboration and critical thinking can be predicted by the belief that knowledge is not fixed. Rehearsal cannot be significantly predicted by the SEQ subscales. Rehearsal was also unrelated to metacognitive variables in the Sperling et al. (2004) research. It was interesting that the strategies were significantly predicted by only one SEQ belief each. Each regression equation explained only 21% of the variance in the study strategy or less. It is clear that from this study that the use of cognitive study strategies is explained by more than just epistemological beliefs. Motivational, personal, and contextual constructs all relate to cognitive strategy use, according to the SRL model (Pintrich, 2004). Dahl and colleagues proved that beliefs about knowledge and learning can explain some of the variance, but much of the variance in strategy use remains unaccounted for.

Cognitive study strategies research has demonstrated that cognitive strategies are linked to academic outcomes (McKeachie et al., 1985), knowledge of cognition (Sperling et al., 2004), metacognitive monitoring (Stavrianopoulous, 2007), goal orientation

(Howell & Watson, 2007; Stavrianopoulous, 2007), and are improved by interventions (McKeachie et al., 1985; Sperling et al., 2004). One important finding for SRL theory is that cognitive processes are best researched along with motivational variables as the motivational constructs add significantly to the understanding and prediction of academic outcomes. An important finding for educators is that courses to improve knowledge and practice of various cognitive study strategies are successful.

Research examining the links between cognitive processes and outcomes has not been a large part of the Zeitgeist in recent years, but VanderStoep et al. (1996) examined strategies used in different general domains of study, and found that different courses require different types of study behaviors for high outcomes. This dissertation examines study strategies used in two specific courses - Statistics and Research Methods in a Psychology department.

Personal and Contextual Constructs

Self-regulated learning theory claims that personal and contextual variables are related to motivational characteristics of students and the strategies they use in academic achievement efforts. SRL research has often defined context as the course subject under study (VanderStoep et al., 1996; Wolters & Pintrich, 1998) and as type of academic task (Pintrich, 1989), but classroom characteristics related to the specific instructor and personal variables such as sex, age, and ethnicity have been included in research as well. In the current study, personal variables include age, sex, ethnicity, and demographic variables. One aspect of the context was fixed in that students take both courses to satisfy a requirement. Contextual variables include proportion of friends from high school who are now in college.

A great deal of research has examined the relations between personal variables, particularly sex, and levels of motivational variables, cognitive processes and academic achievement. The SRL model says that motivational and cognitive variables mediate the relations between personal and contextual variables and academic outcomes. For example, the model suggests that the sex difference frequently found in math (e.g., Lubinski & Benbow, 1992) is really due to differences between males and females in their motivation to learn or excel in math. This dissertation will examine the traditional personal variables of age and sex in the context of two required courses and will explore the value of including identity status as a relevant variable in the model. The SRL model suggests that the personal contextual variables examined here will be significantly correlated at the bivariate level with the outcome measures, but will become nonsignificant once motivational and/or cognitive variables are entered into the equation, although some of the available research calls this into question.

Pintrich, Roeser, and DeGroot (1994) examined the interrelations of motivation, cognition, and classroom context variables in middle school students. Contextual information obtained in this study included perceptions of teacher effectiveness, interest in schoolwork, perceptions of classroom productivity, and the presence of opportunities to work with other students. Through intercorrelations and a series of multiple regressions, the researchers found that when students view their teacher as effective and their classwork to be productive, they have higher intrinsic value and self-efficacy for that subject and they use more cognitive strategies and more self-regulation than students who have more negative views of their teacher and classroom. When students are able to work with other students in the classroom, they have higher self-efficacy for the

classroom, use more cognitive and self-regulatory strategies, and also experience lower test anxiety than students who do not have the opportunity to work with peers. Anxiety led to poor processing of the material, and cognitive strategy use early in the school year led to higher intrinsic motivation later in the school year. This study showed that contextual variables are related to motivational and cognitive processes.

One study based on the SRL model compared motivation variables and cognitive strategy use by seventh and eighth graders across three different courses: Social Studies, English, and Mathematics (Wolters & Pintrich, 1998). This study found that these middle school students use cognitive (but not self-regulatory) strategies differentially across the domains studied, but that the relations between motivation variables and cognitive strategy use are similar across domains. For example, cognitive strategy use (measured as one scale) was associated with higher grades across all courses, but students reported more cognitive strategy use in social studies courses than in English or Mathematics courses (Wolters & Pintrich, 1998). This information indicates that participant levels of SRL variables are domain specific, but that consistent relations can be expected among the SRL variables and course outcomes. Regression analyses only included sex, task value, self-efficacy, and test anxiety to predict performance (excluding the strategy variables, which were considered as outcomes). These regressions were significant, but only accounted for 18% to 20% of the variability in course grades, with sex, self-efficacy and test anxiety as the significant predictors. Females had higher grades, as did those with greater self-efficacy and lower test anxiety. These results are not consistent with the SRL model in that the effect of sex on the academic achievement variable was direct and not mediated by motivational processes.

According to SRL theory, sex and culture are related to motivational and cognitive constructs. One way that both an individual's sex and culture can influence self-regulated learning is through gender schemas. Grabill, Lasane, Povitsky, Saxe, Munro, Phelps, and Straub (2005) investigated the relation between gender schemas and perceptions of study behaviors. Gender schema theory contends that individuals process information based on their ideas of masculinity and femininity. Culture influences the development and description of gender schemas. Self-esteem is tied into how well an individual's actions line up with their choice of gender identity. According to Grabill and colleagues, self-regulated learning behaviors are associated more with femininity than masculinity. This may be problematic for men who wish to be good students. Grabill and colleagues also reported that college students associate both studying and academic success with femininity. However, students rated a hypothetical student who puts forth low effort but performs well as masculine.

Eccles and colleagues examined sex differences in achievement-related outcomes, such as course choice. Eccles claims that sex related STV differences are mediators of sex differences in academic-related choices. For example, one study (Eccles et al., 1984) found that females were less likely to enroll in math courses because they found math to be less important (attainment value), useful (utility value) and enjoyable (intrinsic value) than males did. In other words, task value mediated the relation between sex and course choice, just as SRL predicts these variables to relate.

Ego Identity Status

Students bring much more than age, sex, and ethnicity when they approach college work. Ego identity status is a personal trait that has been linked to study strategies and

behaviors as well as motivational variables (Cross & Allen, 1970; Marcia, 1966; Waterman & Waterman, 1972). Because of the importance of identity development in students in early college, Marcia's (1966) identity status is included in this study as a personal variable.

Marcia's research showed that achieved students persist longer on a difficult task, adjust expectations according to feedback (i.e., self-regulate), have robust self-esteem, and have low endorsement of authoritarian values – all considered adaptive traits. Students in Foreclosure have a high endorsement of authoritarian values, have self-esteems that are susceptible to negative feedback, and fail to adjust expectations and goals after receiving feedback (Marcia, 1966).

Dunkel (2000) proposed that the creation of possible selves is the way that individuals explore their possible identities. He produced a short line of studies exploring the link between Marcia's identity status and variables related to possible selves. He first used the Extended version of the Objective Measure of Ego Identity Status (EOM-EIS-2) questionnaire to classify participants into one of Marcia's identity statuses and compared status to the number of positive and negative possible selves the participant endorsed. Moratorium and Foreclosure students endorsed more positive possible selves than the other identity status groups. Moratorium students also endorsed more neutral and negative possible selves than all other groups. These findings about participants in Moratorium are consistent with the hypothesis that possible selves are the way that adolescents explore possible identities. Moratorium individuals are actively exploring options for their future and have not ruled out any possibilities by committing to a select few. Dunkel and Anthis (2001) repeated these results using the Ego Identity Process

Questionnaire (EIPQ).

Research Questions

The MSLQ is not equivalent to the SRL model, but was designed under a self-regulated learning framework (Pintrich, 1995; Pintrich, 2004; Pintrich et al., 1993). This dissertation was designed to identify variables that, when added to the MSLQ, would more completely assess the SRL model. The first question under study is whether or not students mention study strategies not included in the MSLQ, and do these strategies improve the predictive power of the MSLQ variables on expected course grade and test grade?

The major question investigated by this study is "How can the SRL model (and its measurement) be improved for predicting expected course grade and test grade?" This question is addressed by several supporting and more specific questions. Does the Achievement Goal Questionnaire (Elliot & McGregor, 2001) improve upon the current SRL model, which includes only intrinsic and extrinsic goal orientations? Do academic possible selves variables (number of possible selves and number of related strategies) increase the predictive power of the SRL? Is identity development status a useful construct for the SRL model? In other words, this study is designed to test the hypothesis that the addition of measures of goal orientation framework, academic possible selves, and ego identity status will test the SRL model more completely than does the MSLQ alone.

I hypothesize that students who indicate that they hold approach-oriented goal orientations will perform better than students who hold avoidance-oriented goal orientations. Performance-approach goal orientation is expected to be a better predictor

of test grade than mastery-approach goal orientation. Students who are able to articulate several academic possible selves and strategies to attain them are expected to perform better than students who do not articulate academic possible selves or are unable to elaborate on how they plan to attain the possible selves they do hold. The fit of ego identity status into SRL theory has not been evaluated in research to date, and so the evaluation of this question will be exploratory in nature, although it is reasonable to expect that students who are identity achieved would be better able to self-regulate than would those who are in the diffused status.

The third question under study asks whether students adjust their use of cognitive and metacognitive strategies over the course of a semester in effective ways, as evidenced by time two outcomes that are better predicted by time two constructs than by time one constructs.. SRL theory has stated that self-awareness and feedback should lead to an adjustment of cognitive, metacognitive, and regulatory strategies in future effort (Pintrich, 2000, 2004; Zimmerman, 2000). Test scores from early in the semester are presumably feedback for students who engage in self-regulation.

Conclusion

Past research on SRL and the variables included in the SRL model has untangled some of the relations between personal and contextual, cognitive, and metacognitive variables. Research has also examined the links between these groups of variables and a number of academic outcomes. One major tool in SRL research is the MSLQ, which has not been modified since 1993. Research on goal orientations, in particular, has advanced a great deal since the MSLQ was finalized. Pintrich, a principal in the development of the MSLQ, was also involved in goal orientation research, and called for the investigation

of how the 2x2 Framework of achievement goals fits with the SRL model. This study proposes to do just that.

College student goals research has also investigated future time orientation, attainment value, and instrumental value. These constructs all include how the student sees the future and long-term goals. Future-oriented constructs are not included in SRL research to date, but perhaps understanding the long-term goals that a student holds will help explain variance in academic outcomes. This study proposes to include possible selves in SRL research.

Personal variables included in the SRL model are limited, in general, to sex, ethnicity, age, and prior knowledge and it is not clear that the relations between these variables and academic outcomes are mediated by motivational and/or cognitive variables. Therefore, this study will examine the nature of these relations and includes the additional personal/contextual variable of identity status. College is a time of exploration of possible identities and the pursuit of one or more possibilities, or in other words, college is a time of identity development. Perhaps a student's identity development status affects the meaning ascribed to coursework or the cognitive resources the student brings to achievement related work. This study proposes the inclusion of ego identity status as a personal variable in SRL research.

The following chapter will describe the sample, the methods, and the measures used to address the research questions. Chapter 4 will describe the results of statistical analyses, and chapter 5 will discuss the implication of these results.

CHAPTER III

METHODS

Introduction

Self-regulated learning is important in academic achievement literature, and

appears to be important for succeeding in college. Past research has shown that the

variables included in the MSLQ are linked to better academic outcomes, but the original

measures of the constructs included in the model may need to be updated. Specifically,

the Achievement Goal Orientation (AGO) may be a better measure of achievement goals

than the conceptually similar subscales in the MSLQ. Also, the constructs of identity

development status, as a personal variable and possible selves, as a motivational variable

can be inserted into the SLR model theoretically. They may prove useful. The

methodology of this study expands on previous tests of the SRL model by including the

full MSLQ as well as measures of constructs that are clearly relevant to the concerns of

the model (i.e. identity status), as well as alternatives to measures in the model (i.e.,

Achievement Goal Questionnaire).

This led to the development of several research questions. The first question

under study is whether or not students mention using study strategies not included in the

MSLQ, and do these strategies improve the predictive power of the MSLQ variables?

The second question investigated in this study is whether expansion of the constructs in

the model would enhance the predictive value of the SRL model. More specifically, does

the inclusion of the Achievement Goal Questionnaire, academic possible selves variables

(both considered within the motivation component of the model), and identity

development status (within the personal/contextual component) improve the predictive power of the SRL model? Finally, this study asks whether students adjust their use of cognitive and metacognitive strategies over the course of a semester to maximize test and course grade outcomes?

Participants

Data were collected at the University of New Hampshire's Psychology department. The participants were students in Statistics in Psychology and Research Methods classes who are required to participate in three hours of lab experience during the semester. The majority of participants were freshmen and sophomores. Statistics and Research Methods are usually taken to satisfy a Psychology major requirement, in order to move onto higher-level Psychology courses Students may also take statistics to satisfy a major requirement in a number of other departments or to satisfy a general education requirement.

Data collection was open for nine weeks and resulted in a total of 368 participants, 276 in Statistics, 91 in Research Methods and one non-responder. In the first three weeks, the study was open for students willing to participate in two waves of data collection, early and late in the semester. This sample is referred to as the longitudinal sample. For the remaining weeks of the semester, participation required only one assessment. This group of participants is in addition to the longitudinal sample and is referred to as the single wave sample.

The longitudinal sample consisted of 102 participants, 92 Caucasian, 84 female and 18 male; 83 in Statistics and 19 in Research Methods. On average, students were 19.33 years old (sd = .708, range = 18 - 21) and most (79) were sophomores. The single

wave sample consisted of 266 participants, 202 female and 64 male, predominantly

Caucasian (251) and sophomore (176); 193 in Statistics and 72 in Research Methods. On

average, students were 19.58 years old (sd = 1.07, range = 18 - 26). Due to relatively

small class sizes and other demographic information provided by the students, the

university IRB was concerned that it would be possible to identify participants if

instructor information was gathered as well. Therefore, students could not identify the

section of statistics or research methods in which they were enrolled.

Method

First, data collection was opened to participants as a two-hour study to take place at

two points in the semester. Upon signing up for the study using the Sona Systems

website, students completed a consent form. The researcher then assigned each

participant a code, which was kept with names of participants in an Excel file. The code

allowed responses to be matched across the two waves of data collection, and the

separate file matching names to codes allows proper credit to be given to each

participant. After three weeks, this option was closed and a one-credit study was opened

and remained for the rest of the semester. During the last two weeks of the semester,

participants in the two-credit (longitudinal) study were invited to complete the second

half of the study via an email from Sona. Questionnaires were hosted on the Survey

Monkey website. When data collection was complete, responses were downloaded from

Survey Monkey. Date of survey completion was automatically recorded by Survey

Monkey.

Measures

Pintrich's Self Regulated Learning (SRL) model states that personal, contextual,

motivational, cognitive, and metacognitive variables interact to influence academic outcomes. In this section, study measures will be described and grouped according to the SRL model. The complete survey is presented in Appendix B.

Personal/Contextual Variables

Demographic Questions. This section of the questionnaire included open-ended items about such variables as ethnicity, age, gender (1=Female, 0=Male), major (0=Other, 1=Non-Declared Liberal Arts, 2=Psychology), SAT scores, number of siblings, family income, and parents' education. A question in this section asked participants to indicate what percentage of their friends from high school are now in college. This question is thought to measure how normative college enrollment is in the students' home community, and is considered a contextual variable. These items fit into the personal/contextual box of the SRL model. In the longitudinal sample, these questions were only included in the first wave of data collection.

Identity Development. Identity Development was measured using the Ego Identity Process Questionnaire (EIPQ; (Balistreri, Busch-Rossnagel, & Geisinger, 1995). This questionnaire has 32 items administered in a Likert-type format with six possible responses ranging from "Strongly Disagree" to "Strongly Agree," which form two scales, commitment and exploration. Balistreri and colleagues report alpha coefficients of .80 and .86, respectively (1995). Alpha coefficients in the present study were .75 and .72, respectively. Items were averaged to obtain a commitment score and an exploration score. A median split was performed on each of the scales in order to classify students into one of four identity categories. Individuals who scored high on the exploration scale and low on the commitment scale were classified as moratorium; those low on

exploration but high on commitment were classified as foreclosed. Individuals high on both scales were classified as identity achieved, and those low on both scales were classified as diffused. The variable was then dummy coded into separate items such that one item indicated achieved status, another indicated foreclosed status, and so on. In the longitudinal sample, this questionnaire was included in both waves of data collection.

Motivation and Cognitive Strategies

Academic Motivation Questions. This section of the questionnaire included open-ended items about how and why the student chose to go to college, why the student chose UNH for his or her college education, how much parents participated in that decision, how and why the student chose to take the Statistics in Psychology or Research Methods course, and what respondents hope to gain from their college education. These open-ended questions were developed for this research project. The MSLQ asks about a certain set of motivational variables that are useful in SRL theory. Under the assumption that the MSLQ does not include the full universe of possible motivational variables salient to college students, these questions were included in the questionnaire. Questions are phrased in the least leading way possible to allow students to phrase their motivations in their own words.

Students were also asked to list, in order of importance, their reasons for attending college at all. Responses to these items were coded into categories that were influenced by Phinney, Dennis, and Osorio (2006). This process resulted in nine categories: (1) Learning (reasons related to academics) and degrees (e.g., "get a degree"), (2) Career (long-term job or career goals, e.g., "get a decent job"), (3) Social (making friends, partying, and the Greek System), (4) Financial (higher salary earned by college

graduates), (5) Culture (gaining a new perspective, learning about other cultures, and gaining a different experience), (6) Athletics (those who came to college for a particular sport, or to continue training), (7) Independence (those who came to college for experience living on their own or to explore themselves), and (8) the Default category is for students who indicated that college attendance is expected by their families, high schools, friends or social norms (e.g., "was not an option not to go," "everyone from my high school goes to college"); and an Other category for responses that did not fit into any of the previous eight categories. For example, one student listed her top five reasons for attending college as: "to get a degree," "to meet new people," "to have new experiences," "to build my resume," and "I have to." This participant's responses were coded, respectively, as Learning, Social, Culture, Career, and Default. The number of reasons a student generated was counted and considered a variable as well. That is, although there were 5 lines for the students to use, some gave only one reason and others provided up to 5 reasons. The open-ended motivation questions were included in both waves of data collection for the longitudinal sample. The second wave data were not included in this study's analyses, but were included in the questionnaire for possible future examinations of the results.

Study Skills Questions. This section asks students to describe how they prepared for their last exam in the course for which they are receiving credit and was developed for this study. This question was worded to be as open-ended as possible so as to not lead responses to a particular type of study strategy. Responses were examined for the categories of cognitive and metacognitive strategies included in the MSLQ, and for any strategies that do not easily fit into those categories. For example, one student described

her test preparation like this: "I take notes on the reading. Then if I have a question, I'll address the teacher. Next I will review the study guide and rewrite the notes that pertain. Lastly, I will study these until I feel comfortable, or run out of time. Unfortunately, the latter occurs often." This student indicates that she uses organization ("taking notes"), help-seeking/works with students ("address the teacher"), metacognitive self-regulation ("if I have a question" and "until I feel comfortable"), rehearsal ("review" and "rewrite"), and effort regulation ("study until I...run out of time").

Also included in this section are questions about grades (on the last exam, and expected final), and time spent studying. Expected Final Grade was coded so that a higher number indicates a better letter grade (1=F to 12=A). Pintrich's model states that cognitive study strategies are important determinants of college outcomes. This section was included to allow students to describe their study habits in their own words. The MSLQ includes items on four cognitive strategies and five metacognitive strategies, which may not capture the full range of behaviors used by students in preparing for exams. By allowing the students to list their own study and regulatory behaviors, it was hoped that these open-ended questions would uncover other categories of cognitive strategies that should be included in the MSLQ, and that may help explain course outcomes. This section was included in both waves of data collection for the longitudinal sample.

Possible Selves. The possible selves measure asks students to write down what they would like and not like to be like in one year (Oyserman, 2004). Students are also asked to describe in detail what actions, if any, they are taking to meet or avoid each possibility. Possible selves can be in any domain of life, but this research is only

interested in possible selves related to academic achievement, interaction with instructors,

and academic activities, not possible selves related to college life or personal

development in general. Possible selves were coded for number of both positive and

negative possibilities, balance, and the number of strategies listed for each academic

possible self. Students were able to list both positive and negative possible selves for

themselves, and often included one or more strategies to attain or avoid those

possibilities. This section was included only in the first wave of data collection for the

longitudinal sample.

Motivated Strategies for Learning Questionnaire (MSLQ). The MSLQ (Pintrich et

al., 1993) consists of 81 7-point Likert-type items ("not at all like me" to "very much like

me"), and is divided into two scales: Motivation and Learning Strategies. Each scale is

divided into several subscales. The Motivation scale is made up of the following

subscales (with example items, alphas from the validation study [Pintrich et al., 1993],

and alphas from the present study in brackets): intrinsic goal orientation ("The most

satisfying thing for me in this course is trying to understand the content as thoroughly as

possible." alpha = .74, [.73]), extrinsic goal orientation ("Getting a good grade in this

class is the most satisfying thing for me right now." alpha = .62, [.57]), task value (" I

think I will be able to use what I learn in this course in other courses." alpha = .90, [.85]),

control of learning beliefs ("If I study in appropriate ways, then I will be able to learn the

material in this course." alpha = .68, [.75]), self-efficacy for learning and performance

("I'm confident I can learn the basic concepts taught in this course." alpha = .93, [.95]),

and test anxiety ("When I take a test I think about how poorly I am doing compared with

other students." alpha = .80, [.83]). The learning strategies scale is made up of the

rehearsal ("When I study for this course, I practice saying the material to myself over and over." alpha = .69, [.76]), elaboration (" When I study for this class, I pull together information from different sources, such as lectures, readings and discussions." alpha = .75, [.73]), organization (" When I study the readings for this course, I outline the material to help me organize my thoughts." alpha = .64, [.78]), critical thinking ("I often find myself questioning things I hear or read in this course to decide if I find them convincing." alpha = .80, [.81]), metacognitive self-regulation ("When reading for this course, I make up questions to help focus my reading." alpha = .79, [.78]), time and study environment management ("I usually study in a place where I can concentrate on my course work." alpha = .76, [.77]), effort regulation ("I work hard to do well in this class even if I don't like what we are doing." alpha = .69, [.73]), peer learning ("When studying for this course, I often try to explain the material to a classmate or friend." alpha = .76, [.81]), and help-seeking ("When I can't understand the material in this course, I ask another student in this class for help." alpha = .52, [.54]) subscales. Pintrich and colleagues designed the scale to be administered with a specific course in the students' minds (Pintrich et al., 1993); students were asked to consider the course for which they are receiving credit. Pilot testing had indicated that the alpha levels for the peer learning and help-seeking subscales were unacceptable, so a new scale that combined questions from those subscales was created. This subscale reflects collaborative learning and help-seeking from classmates and has been titled works with students (alpha = .85). The longitudinal sample completed this questionnaire in both waves of data collection.

Achievement Goal Questionnaire. The Achievement Goal Questionnaire (Elliot & McGregor, 2001) consists of 12 Likert-type items with seven possible answers ranging

from "Not at all true of me" to "Very true of me", and is divided into four subscales: Mastery-approach ("I desire to completely master the material presented in this class." alpha = .87), mastery-avoidance ("Sometimes I'm afraid that I may not understand the content of this class as thoroughly as I'd like." alpha = .89), performance-approach ("It is important for me to do better than other students." alpha = .92), and performance-avoidance ("My goal in this class is to avoid performing poorly." alpha = .83). Alphas from the present sample are essentially equivalent to those reported by Elliot and McGregor (mastery-approach (alpha = .84), mastery-avoidance (alpha = .87), performance-approach (alpha = .91), and performance-avoidance (alpha = .81)). This questionnaire was included in both waves of data collection for the longitudinal sample. This questionnaire reflects current research into goal orientations, and was included in the hopes that it would be a useful addition to the intrinsic and extrinsic goal orientations included in the MSLQ.

The dependent variables are test grade(s) and expected final grade. Students reported their most recent exam grade and the grade they expected for the course in the first section of the questionnaire.

In order to address these data, a series of multiple regressions were run. However, due to the limitations of the data, in the form of a limited number of participants and a great number of variables), preliminary analyses were run first to cull the number of variables.

Summary

Statistics and Research Methods college students completed questionnaires on the variables included in the SRL model. These variables include personal variables,

motivational constructs, cognitive strategies and two outcome measures of recent test

grade and expected final course grade. The next chapter will discuss the findings of data

collection and the statistical analyses performed on them. Chapter five will discuss the

implications of the findings for research and classroom application.

CHAPTER IV

RESULTS

This chapter will describe the statistical analyses performed on the data and the results found. First, the results of the open-ended study strategies question will be examined to address the first research question. Next, preliminary analysis of the data will be described and the results outlined. The number of participants and the number of variables are not in the desired ratio for adequate analyses. The results of the preliminary analysis will be used to reduce the number of variables included in the regression analyses used to examine the second and third research questions.

Question One

The first question this research was designed to answer was whether or not students mention study strategies not included in the MSLQ when they are asked in open-ended questions rather than the more limited Likert-type format of the MSLQ. Coding of the strategies students offered revealed that those regularly mentioned by students were already included in the MSLQ. Among those not included in the MSLQ, the most frequently mentioned preparation strategy was attending class. This strategy was mentioned by 21 participants. Seven participants mentioned getting enough sleep the night before an exam, 6 participants mention eating a good breakfast or drinking caffeinated beverages before the exam. Two students each mentioned relaxing and focusing. One student each mentioned prayer, using music to help study, and taking Adderall as preparatory strategies. Many students mentioned practices already covered by the MSLQ such as rehearsal, organization, elaboration, study environment

management, metacognitive self-regulation, help seeking, and peer learning. The results

provided by participants to the open-ended study question were either repetitive with the

multiple-choice questionnaire already included in the study, or mentioned very

infrequently. For this reason, variables coded from the open-ended questions will not be

included in the remainder of the analyses.

Preliminary Analyses

The primary analytic technique for this study is hierarchical regression. However,

the number of variables included in the study is large and needed to be culled to at least

approximate the 10:1 subject-to-variable ratio recommended by Nunnally (1982).

Therefore, a series of preliminary analyses was conducted.

Differences Between Longitudinal and Single Wave Samples. The first of these

preliminary analyses included a comparison of the two groups of participants on all of the

wave one variables. Previous research (e.g., Harber, Zimbardo, & Boyd, 2003; Stevens

& Ash, 2001) has revealed differences in personality characteristics between students

who choose to participate in required research earlier vs. later in the semester. In the

process of these comparisons, data were also examined for outliers and other

irregularities, none of which was found.

Means and standard deviations for both groups on all variables as well as t values

from the between-group comparisons of the means, are in Table 1. Examination of the

means suggests that the longitudinal sample contains better, more highly motivated

students than does the single wave sample. Because of the differences found in 7 of 14

MSLQ variables, one of the four achievement goal variables and one of the outcome

measures, subsequent analyses will be performed separately for the longitudinal and the

single wave groups. Table 2 has the means and standard deviations of the Wave 2 variables.

Correlations Between Predictors and Outcomes. Correlations between all potential predictor and outcome variables (test grade and final grade for both samples, plus test 2 grade and second estimate of final grade for the longitudinal sample) were calculated. Variables that were significantly correlated with at least one outcome variable for either group are in Table 3. Given the differences found between the two groups, an additional variable, when in the semester participation occurred (date) was added. This is considered a personal/contextual variable. In the single wave sample many of the MSLQ variables are significantly correlated with test grade and expected final grade in the hypothesized direction. That is, higher levels of goal orientations, value, control and self-efficacy beliefs, metacognition, and lower levels of anxiety are correlated with higher test grades and expected final grades. The Achievement Goal Questionnaire (AGQ) subscales with approach valence were positively correlated with outcome measures and mastery-avoidance goal orientation was negatively correlated with outcome measures. These correlations are consistent with self-efficacy theory. Date of participation was negatively correlated with both outcome measures in the single wave sample, indicating that those who participated earlier earned higher test grades and expected higher final grades. This relation was unexpected.

In the longitudinal sample, expected final grade at the end of the semester (i.e., wave 2) had the largest number of correlates. These correlations were also in the expected direction for the MSLQ variables. The AGQ scales, however, did not correlate with expected final grade in the hypothesized directions. Mastery-approach goal

orientation at time 2 was negatively related to final grade and mastery-avoidance goal orientation at time 2 was positively related to expected final grade. According to the literature on goal orientations, approach goals should be related to better outcomes and avoidance goals should be related to lower outcomes. These correlations could be artifacts of the smaller sample size or restricted range of the participants. The standard deviations of the goal orientations variables, however, are not different from one another, so restricted range does not seem to be the reason for this difference.

Although there were some considerable differences between the groups in the magnitude, and in some cases, direction of these correlations (e.g., Mastery-approach goal orientation is negatively related to outcome measures in the longitudinal sample but positively related to outcomes in the single wave sample), it is worth noting that for both, two of the three variables proposed as additions to the SRL model (identity status and achievement goals) are significantly related to the outcomes. Although the number of negative academic possible selves was significantly related to test grade in the single wave group ($r = -.12$, $p < .05$), because it is the only significant correlation in a total constellation of 24 correlations involving the possible selves variables, that construct will not be considered further. Variables that were not significantly related to outcomes will not be included in subsequent regression analyses.

Intercorrelations of Wave 1 Motivation Variables. Next, correlations between all wave one motivation variables that were significantly related to the outcomes were calculated in order to determine if some variables could be eliminated from the primary analyses because of redundancy. Those results are in Table 4 and indicate that the MSLQ subscales Task Value (TV) and Intrinsic Goal Orientation (IGO) are substantially related.

Although these are theoretically distinct constructs, the magnitude of the correlation between them would lead to a problem in regression analyses and so TV will not be included in subsequent single-wave sample analyses.

In Table 5 are the intercorrelations for the Wave 1 MSLQ learning strategies subscales that were significantly related to the outcomes. For both single wave and longitudinal groups it appears that Time and Study Environment Management (TSEM) and Effort Regulation (ER) are redundant (rs = .69 and .72, respectively), as are Metacognitive Self-Regulation (MSR) and Elaboration (Elab; rs = .69 and .62, respectively). ER and MSR will be kept due to their stronger correlations with the outcome variables.

Finally, correlations were computed for all of the wave 2 variables that were significantly related to the outcomes. These are shown in Table 6. As was the case in the Wave 1 data, task value and intrinsic goal orientation are highly correlated (r = .77) in Wave 2, as are TSEM and ER (.75). TV is also highly correlated with performance-approach (PAP; r = .71), one of the variables under consideration as an addition to the SRL model. That association was evident in Wave 1, but at a lower magnitude (r = .18 for single-wave, .30 for longitudinal).

Decisions on removal of variables were based upon zero-order correlations. This may not be the best approach, however the sample was smaller than anticipated and several predictor variables were highly correlated. Small samples, relative to the number of variables included in a study, present problems for degrees of freedom and power of statistical tests. Since sample size could not be increased in this case, the number of predictor variables had to be culled. High colinearity of variables can lead to problems

with regression equations, the primary method of analysis in this research. In order to have valid regressions, the high colinearity of predictor variables must be addressed. In this case, eliminating some predictor variables from inclusion in analyses met the needs of both problems.

Question Two

The second research question was whether or not the additional measures given to participants could improve the predictive ability of the variables included in the MSLQ. Separate regression analyses for the single wave and longitudinal groups were conducted to address this question. For the single wave group, the criterion variables were test grade and final grade. For the longitudinal sample, criterion variables were wave 2 test and final grades. The general format for regression equations was as follows: personal and contextual variables were entered on step 1, motivational and cognitive strategies were entered on step 2, and step 3 added alternate measures of the MSLQ variables. The reasoning of these steps follows the pattern of self-regulation laid out in figure 1 (i.e., personal and contextual variables come before motivational and cognitive variables which then influence outcomes) and allows examination of additional variables not included in the MSLQ. Only variables significantly related to the outcomes were included in these analyses.

Single Wave Sample Test Grade Regression. The first step of the regression included three personal/contextual variables: fathers' education, date of participation and the moratorium ego identity status. The second step included the MSLQ variables: intrinsic goal orientation, extrinsic goal orientation, control of learning beliefs, self-efficacy of learning beliefs, metacognitive self-regulation and effort regulation. The final

step included mastery-approach, mastery-avoidance and performance-avoidance, and did not enter the equation. The final equation was significant ($F[13, 184] = 6.86, p < .001$) and accounted for 33% of the variance in test grades. Significant predictors in the final model were date of participation, ego identity status and self-efficacy of learning beliefs. These results are in Table 7. Because only 199 of the single wave participants provided their fathers' education level, this regression was re-run without that variable. The results were the same. The contextual variable of date of participation was a significant predictor of test grade, indicating that students who participated earlier in the semester scored higher on exams. This regression supports the inclusion of ego identity status in the SRL model and indicates that two of the three personal contextual variables were directly related to outcomes, only partially mediated by motivational variables. The third personal/contextual variable, father's education, was rendered nonsignificant with the inclusion of the motivational variables. Moratorium identity status was predictive of reported test grade even when additional variables were added to the equation. Presence of moratorium identity status predicted higher test grades than the other identity statuses. Self-efficacy was also predictive of test outcomes, which was unsurprising. Self-efficacy is a very robust construct that has been shown to relate to a variety of outcomes. Students who believe that they can learn the material and skills necessary to do well in a course usually do. Students who believe that they can do well on tests typically do.

Single Wave Sample Final Grade Regression. The regression predicting final grade included SAT-M, SAT-V, date of participation and moratorium ego identity status in step one. Step 2 included intrinsic goal orientation, extrinsic goal orientation, control of learning beliefs, self-efficacy of learning beliefs, test anxiety, metacognitive self-

regulation and effort regulation. Mastery-approach and avoidance and performance-approach were in Step 3. The final equation was significant and accounted for 52% of the variance ($F[14,189] = 14.82, p < .001$). The significant predictors were time of participation, moratorium, SAT-V, control of learning beliefs, and self-efficacy of learning beliefs. The additional motivation variables (mastery and performance) did not enter the equation. Results are presented in Table 8. Identity status remained significant throughout; moratorium status was directly related to final grade, with students in moratorium achieving higher grades than those in other identity statuses. Interestingly, SAT-V became a significant contributor to the regression with the inclusion of motivation variables. The contextual variable of date of participation was a significant predictor of expected final grade, indicating that students who participated earlier in the semester expected higher final grades; this remained significant with the inclusion of motivational variables. This finding is the same in direction and reason as the finding of the regression to predict test grade. Thus, there is no evidence that personal/contextual variables included here are mediated by motivational variables. The MSLQ variables of control and self-efficacy were significantly predictive of outcomes. Those with higher self-efficacy and lower control beliefs expected higher final grades. Self-efficacy relates to expected higher grade in the expected direction, but control beliefs do not. In theory, those who believe that they have more control over their learning should exercise that control and see higher outcomes as a result. That this regression beta coefficient was negative is also surprising because the zero order correlation is positive. The regression results also support the inclusion of ego identity status in the SRL model as moratorium identity status was predictive of final grade even when additional variables were added to

the equation.

Longitudinal Sample Test Grade Regression. The regression predicting test grade
with the longitudinal sample participants included test grade from wave 1, sex, and
foreclosure ego identity status in step one. Step 2 added self-efficacy of learning beliefs,
test anxiety, and effort regulation. The third step added only how often the student
reviews. The final equation was significant and accounted for 36% of the variance in test
grade ($F[7,76] = 5.97, p < .001$). The additional cognitive process variable (review) did
not enter the equation. Results are presented in Table 9. In the first step of the equation,
test grade is a significant predictor, as are sex and foreclosure identity status, but in the
second step, earlier test grade is no longer significant. Significant predictors include sex,
foreclosure, and self-efficacy. Because test grade is no longer a significant predictor
when self-efficacy is included in the equation, it appears that students use feedback
during the semester to inform their self-efficacy beliefs. A meditational analysis
following Baron and Kenny's protocols (Baron & Kenny, 1986) reveals that self-efficacy
mediates between feedback and course grade and this mediation is significant when
tested with the Sobel test ($p < .01$). While the additional measure of cognitive processes
(review) did not add to prediction of the outcome measure under study, the ego identity
status was predictive and does support the inclusion of identity status with the SRL model
as a personal variable. Foreclosed status was predictive of higher test grades than other
statuses. The mediation analysis also revealed relations between a contextual variable, a
motivational variable, and an outcome measure as predicted by the SRL model.

Longitudinal Sample Final Grade Regression. The regression analysis predicting
expected final grade with the longitudinal sample included percent of high school

classmates now in college, parents' income, and test grade. MSLQ variables extrinsic

goal orientation, task value, control of learning beliefs, self-efficacy of learning beliefs,

elaboration, and effort regulation were entered in the second step. The third step included

achievement goal orientation subscales mastery-approach, mastery-avoidance, and

performance-approach. The fourth step of the regression added in the time students

reported studying and how often they review course material. The final equation

accounted for 67% of the variance and was significant ($F[14,78] = 11.096, p < .001$), but

the additional motivational and cognitive process variables did not enter the equation.

Results are presented in Table 10. Significant predictors of expected final grade include

test grade, parents' income, percent of high school friends in college, and self-efficacy of

learning beliefs. This regression revealed interesting relations between family income

and final grade. In the first step of the equation, which only included personal and

contextual variables, income was not a significant predictor. When the MSLQ variables

were added, self-efficacy alone was significant, but income became significant as well.

Lower family income levels predicted higher expected final grades. The β - values for all

three personal/contextual variables decrease when the MSLQ variables are added to the

regression. The MSLQ variables must account for some of the variance of these

personal/contextual variables, thus freeing up Income to account for a significant portion

of variance.

Question Three

In order to assess the final research question of this study, a final set of regression

analyses was run to determine if students change their study strategies after receiving

feedback. In the first step of the analysis wave 1 versions of the cognitive process

variables that were included in the regression to predict test grade were included. In step 2, feedback, in the form of the students' first reported test grade was added. In the final step, the wave 2 versions of the cognitive process variables were added.

Regression to Examine Change in Test Grade Correlates. The regression predicting test grade 2 with both time 1 and time 2 variables accounts for 16% of the variance and is significant ($F[3,80] = 4.91, p < .01$). Results of the regression are presented in Table 11. The first step of the analysis includes only time 1 effort regulation and is not significant. The second step of the analysis added test grade at time one and did significantly increase predictive ability of the regression. At this point only test grade was significantly predictive of test grade at the end of the semester. In the final step, effort regulation from time 2 was added. The third step adds significantly to the regression. Both the feedback students receive (in the form of test grades during the semester) and their effort regulation at the end of the semester were significant predictors of test grade at the end of the semester.

Regression to Examine Change in Expected Final Grade Correlates. The regression to examine expected final grade with both time 1 and time 2 predictors is significant and accounts for 43% of the variance ($F[9,75] = 6.22, p < .01$). Regression results are presented in Table 12. Step one of the regression includes elaboration, effort regulation, time studied, and frequency of review from time 1 data. The second step included feedback (test grade from time 1). Step three adds the time 2 versions of the step one predictors. Each step added significantly to the prediction of expected final grade. Significant predictors in step 1 are effort regulation and time studied. When the feedback variable is added, those two variables are no longer significant. In the final model, both

feedback and frequency of review are significant predictors of expected final grade. The beta coefficient of review at time one is negative, but the beta coefficient at time two is positive. It seems that students begin to review more often each week in response to test grade feedback during the semester, and this new frequency of review is predictive of expected final grade.

Summary

This chapter described the data collected from Statistics in Psychology and Research Methods students. Analyses sought to address the three research questions described previously. Qualitative analysis of student responses revealed that students do not mention using study strategies that are not included in the MSLQ's cognitive section with great regularity. Multiple regressions were performed to address the second and third research questions. Possible selves were eliminated as a useful construct in SRL research through preliminary data analysis. The subscales of the Achievement Goal Questionnaire did not significantly add to prediction of academic outcomes over the traditional goal orientations of intrinsic and extrinsic goal orientation. Identity status, however, was a useful predictor of course outcomes in both the longitudinal and single-wave samples. Multiple regressions were also performed to investigate how change in study strategies relates to final course grade and final test score. The feedback the student receives, in the form of earlier test grade, was a significant predictor of both outcomes. Effort regulation and frequency of review were also significant predictors of course outcomes. In the following chapter, the implications of these results will be discussed.

CHAPTER V

DISCUSSION

Self-regulation is a critical component of successful college study, and has been the subject of a good deal of research using college student participants. The model of SRL is general and the details of which variables are included in the research have changed over the years. This dissertation proposed a number of changes in the hopes of providing a better overall measure of self-regulation for predicting test grade and expected final grade. These changes included the use of the AGQ, possible selves, and identity development status in addition to the MSLQ to measure self-regulated learning constructs.

Data were collected from students in Statistics in Psychology and Research Methods classes in two ways. First, the longitudinal sample participants completed questionnaires early in the semester and then again at the end of the semester. Second, the single-wave sample participants completed the questionnaires once during the semester. The single-wave sample was open to students for six weeks.

Question One

The first question addressed by this study was whether or not students use study strategies not included in the MSLQ. They did not. Students did, however, mention engaging activities that coincided with most of the MSLQ cognitive subscales, including the metacognitive and regulatory strategies. Students did not mention engaging in any critical thinking as they prepared for Statistics or Research Methods tests, but that result may be a reflection of the nature of the courses and evidence of some self-regulation.

Critical thinking during study is expected to be more adaptive in a theory driven course than in these two courses. The results of the open-ended study strategies question provide support for the cognitive processes subscales included in the MSLQ (Pintrich et al., 1993) and only those subscales.

Question Two

The second question under study was whether the SRL model would be improved by the inclusion of two additional measures of motivation (the AGQ and possible selves) and a measure of identity status, in addition to the MSLQ. This question was evaluated through a series of multiple regressions in which the personal and contextual variables, including identity status, were entered first, the MSLQ variables were entered in the second step, and the new motivation variables were entered in the third step. Two regressions were calculated for each sample, one for each outcome measure.

In each equation, the step that added the MSLQ variables significantly increased R^2 over the personal and contextual variables alone. This consistent finding reveals that the MSLQ variables are useful for predicting the course outcome of grade. By far, the most useful construct for predicting outcomes was self-efficacy of learning beliefs. Self-Efficacy was a significant predictor in every regression equation calculated. This was unsurprising since self-efficacy has been repeatedly proven to be an important correlate for academic and other achievement-related outcomes (Chemers, Hu, & Garcia, 2001; House, 1995; Williams & Clark, 2004). Indeed, a meta-analysis of research on psychosocial and study skills factors found that self-efficacy was the best predictor of college GPA. Instructors and teachers should apply this consistent finding by helping students realize what they have the ability to do. Being able to perform a certain task, or

have knowledge on a certain subject is important for performance and so is knowing that one can perform that task or realizing that one does know the material.

In most regressions, self-efficacy was the only MSLQ subscale that significantly predicted outcome measures. The exception to this was the regression predicting expected final grade in the single wave sample (Table 8). Intrinsic goal orientation and control of learning beliefs were negatively related to expected final grade. Neither of these variables predicted final grade in the hypothesized direction, and only control of learning beliefs remained significant once the achievement goals entered the equation. Both intrinsic goal orientation and control beliefs are expected to be positively related to outcomes. As a student has more internal value for the subject, effort and results would be expected to increase. For control beliefs, students who believe they have no control over outcomes would be expected to decrease efforts and show lower test and course grades. This finding is unexpected to say the least, especially given that the zero-order correlations were in the expected direction, that is, higher control beliefs associated with higher grades. This curious finding does suggest that meta-teaching should be focused on self-efficacy instead of encouraging intrinsic goals or that the student take control of his own learning.

Examination of Table 10 reveals that in the final grade regression for the longitudinal sample, the relation between control beliefs and criterion was also negative, although nonsignificant. The personal/contextual variables in the two equations were different, but both had a measure of something akin to prior knowledge and perhaps it was that variable that affected the direction of the relation between control beliefs and

expected final grade. It is also possible, of course, that these results are simply statistical artifacts, but they are curious.

It is worth noting that the single wave sample was significantly different from the longitudinal sample on a number of measures, suggesting the students who signed up for the study later in the semester and for only one session were less academically oriented than were those in the longitudinal sample. For example, the single wave sample scored lower on average than the longitudinal sample on the self-efficacy subscale, higher on test anxiety and they expected lower final grades. These findings, coupled with the personality differences that have been reported for students who participate in research later in a semester (e.g., more present than future oriented [Harber, Zimbardo, & Boyd, 2003]; less conscientious [Stevens & Ash, 2001]) suggest that researchers who rely on college student participants for their research would be well advised to keep track of when in the semester the students participate.

Possible Selves

As was previously discussed, the possible selves variables were not correlated with the criterion variables and thus, were not included in the regression analyses. This finding was rather disappointing because of the relations between possible selves and outcome variables in other samples and the straightforward nature of interventions to increase possible selves. In this sample, only the number of strategies to attain negative academic possible selves was significantly correlated with test grade in the single wave sample ($r = -.12, p < .05$). Past possible selves research has led to significant outcomes with samples of middle school students, high school students, and even one college athlete sample that went through an intervention to develop possible selves (Hock et al.,

2006). It may be that the general college student population, as represented by the participants of this study, does not have the same relationship between possible selves and academic outcomes as younger students, or students who have gone through an explicit process to develop detailed possible selves. Consideration of possible selves may still be a useful way to encourage positive academic outcomes in college students when introduced and actively developed as part of an intervention (Oyserman et al., 2002). Without an intervention at the college level, however, the possible selves that students report do not appear to be significant predictors of the academic outcomes examined here. Future research should focus on the way that possible selves can be developed in all college students, but the value of this construct for prediction in students who have not had guidance in developing their possible selves remains questionable.

Ego Identity Status

Moratorium status was significantly predictive of both test grade and expected final grade in the single wave sample and foreclosure was significantly predictive of test grade in the longitudinal sample. This was a surprising finding because previous research (Cross & Allen, 1970) had indicated that moratorium identity status students had grades that were significantly lower than achieved students but similar to foreclosed and diffused identity status students. Waterman and Waterman (1972) studied college students' persistence in pursuing an engineering degree and found that students who withdrew from the program who were foreclosed or diffused were required to do so because of poor grades. Achieved withdrawers left the program in good standing. Moratorium student withdrawers had GPAs that were between that of the achieved students and the other two groups. In the current study moratorium students in the single wave sample

reported significantly higher test scores (t(260)=2.38, p = .018) and expected final grades (t(263) = 2.50, p = .013) than students in the other three categories combined. In the longitudinal sample, foreclosed students reported higher test and final grades than did students in the other three categories combined, but this difference was only significant for initially reported expected final grade (t(100) = 2.31, p = .023) and wave 2 test score (t(98) = 2.36, p = .02). It may be that the students in the longitudinal sample who are in the foreclosure status (45%) have more time to devote to their studies than do students in the other statuses because, by definition, they are not and have not engaged in much exploration. On the other hand, students in the single wave sample who are in the moratorium status may score higher than their non-moratorium peers because they are still exploring. Since these students have not yet committed to an identity and are still exploring possibilities, they may feel the need to keep their grades up to keep their options open. Both of the courses under study are prerequisites for further study in Psychology. If a student still sees "Psychology major" as a possible identity, it would be crucial to keep grades up in these two classes so that that possibility remains open. This logic also explains why diffused status was unrelated to outcome measures. Diffused students are not committed to a particular identity, nor are they exploring possibilities. Since these students likely are not considering "Psychology major" as a possible identity, it would not be as crucial for them to earn high grades in Statistics or Research Methods as it would be for other students. The non-declared liberal arts majors had proportionately more diffused students (χ^2(6) = 25.10, p < .01) than students with a declared major (Psychology or other). Neither of these explanations, however, accounts for the lack of relation between the achieved status and outcome measures.

Achievement Goal Orientations

The Achievement Goal Questionnaire (AGO) does not appear to be a useful addition to the MSLQ as a measure of SRL theory. The entry step for AGQ variables in each regression was non-significant. There were several significant zero-order correlations between the AGQ goal orientations and the outcome measures, indicating there is some form of relation between these variables. The new goal orientations do have significant correlations with the goal orientations in the MSLQ, but not at such a level that the subscales were considered redundant, except for task value and performance-approach in wave 2 of the longitudinal sample. The AGQ contains only three very similar questions in each subscale. The conciseness of the AGQ was appealing in the design phase of this experiment because this measure was added to an already lengthy survey, but perhaps a different measure of the 2x2 framework would reveal different outcomes. The temporal stability of only mastery-approach orientation (measured by Pearson's r) was significant.

Question Three

The results of the regressions examining change in cognitive strategies over the course of the semester indicate that students do change their study behaviors in response to feedback over the course of the semester. Regressions using only cognitive processes and feedback were significant predictors of outcome variables, and only the time two variables were significant predictors of outcomes in the final models. These analyses could only be performed with the longitudinal data, and as previously discussed, these students score higher on outcome variables and predictor variables in ways that indicate that the longitudinal students are better self-regulators. The results of these regressions

support that claim. Self-regulation is thought to work through a series of feedback loops where the results of goal attainment efforts influence the preparation and behaviors in later efforts. This process appears to be active in these longitudinal students. It would be interesting to know whether the single wave sample, who do not seem to be as active in their self-regulation, are able to adjust their cognitive processes in response to feedback as well. This finding is easily applicable to the classroom. Professors and instructors should provide timely and informative feedback to their students so that they can employ self-regulatory processes. In addition to feedback, brief meta-teaching segments could be added to lectures in which students think about how they studied for a previous test, evaluate the effectiveness of those strategies, and then brainstorm additional or better ways of studying. Teachers, as the more experienced learners, should guide the discussion to effective forms of study for their domain.

Correlations

Although not central to this dissertation, the results of preliminary analyses did reveal some interesting relations among the variables under study and some unexpected relations to the criterion variables. For example, the high correlation of elaboration and metacognitive self-regulation was interpreted as redundancy of those two subscales. On first consideration, this was surprising as elaboration questions dealt specifically with students' handling of the material by making connections to other information in their possession (i.e., "I try to understand the material in this class by making connections between the readings and the concepts from the lectures.") and metacognitive self-regulation questions dealt with actions the student takes to check comprehension (e.g., "I ask myself questions to make sure I understand the material I have been studying in this

class."), monitor attention levels (e.g., "During class time I often miss important points because I'm thinking of other things;" reverse-scored), and ways of approaching the material for a specific course (e.g., "When I study for this class, I set goals for myself in order to direct my activities in each study period."). While these two subscales do seem theoretically separate, elaboration is not necessarily an automatic cognitive process in which students engage as they read textbooks or study for tests. Students must make an active decision to engage in elaboration, much as they must decide to check their comprehension as they study (as opposed to merely reading through the required pages), continuously bring their attention back to course material, and set goals and strategies before engaging in study. In effect, students who elaborate are engaging in self-regulation.

Another set of MSLQ subscales that were highly correlated is effort regulation and time and study environment management. Effort regulation dealt with questions that measure persistence at study or work in the course even in the face of difficulty or low interest (e.g., "Even when course materials are dull and uninteresting, I manage to keep working until I finish."). Time and study environment management measures the student's ability to stick to a regular study schedule despite other interests and activities, and the student's preference for studying in a quiet location. While effort regulation seems to ask about a student's behavior in a single study session, and time management questions ask about a student's persistence over the course of a semester, they do seem quite similar. Perhaps there is enough overlap in these concepts for students that the subscales combined into one scale measuring management of study efforts and locations.

Among the relations of the predictor variables to the criterion variables, there were some interesting differences between the single wave and the longitudinal samples. For example, intrinsic and extrinsic goal orientation were each significantly correlated to both criterion variables in the single wave sample, but there were limited correlations between the goal orientations and the criterion variables in the longitudinal sample. Similar patterns were found with task value, control of learning beliefs, and test anxiety. Even more interesting were the relations among the achievement goal orientations and criterion variables. In the single wave sample, the hypothesized relation between goal orientations and outcomes was seen. Approach forms of both orientations were positively related to outcomes, while mastery-avoidance was negatively related to outcomes. In the longitudinal sample, however, mastery-approach goal orientation at the end of the semester was negatively related to test grade and expected final grade. Mastery-avoidance goal orientation at the end of the semester was positively related to both criterion measures. Performance-approach goal orientation was related to expected final grade in the hypothesized direction. Literature on the 2x2 framework of achievement goals presents evidence that performance-approach is a better predictor of test grades and mastery goals are better predictors of more global measures of achievement such as GPA (Young, 2007).

Finally, although not a major focus of this study, the contention (Pintrich, 2004) that in the SRL model the relation between personal and contextual variables and academic outcomes is mediated by motivational and cognitive variables was not fully supported here. One mediational relation was found in which self-efficacy mediates the relation between feedback and expected course grade. This finding does support

Pintrich's claim of a general mediational model, but other results contradict the mediational claim. Identity status, measures of prior knowledge, family income, college attendance rate among peers and sex were found, in one or more regression analyses, to continue to contribute unique variance even after motivational and cognitive variables were included in the equation. Further exploration of how these variables contribute to test performance and final grades could shed valuable light on the problem that opened this dissertation: Why have college graduation rates not kept pace with enrollment rates?

Limitations and Future Directions

One limitation of the design of the study is that one outcome measure was dependent upon the way different instructors construct their courses. Participants came from several Statistics in Psychology and Research Methods classes organized and graded by different instructors who have differing goals for their courses. Also, final grades in both courses are partially dependent upon participation in studies such as this one as well as other assignments that do not necessarily reflect statistical or research methods knowledge. These extra requirements may inflate expected final grade so that it is not truly reflective of academic achievement. Perhaps future research could include a proficiency exam in data collection that will allow a more objective measure of achievement than expected final grade. Still, finding that approximately 67% of the variability in expected final grade can be explained by the variables included in this study is important. The overall picture indicates that students are sensitive to the feedback they receive in the form of test scores and, from an intervention perspective, the substantial contribution made by self-efficacy of learning beliefs suggests that students could benefit

from a program designed to link the feedback they are already receiving to their self-efficacy beliefs.

Another limitation of this study is the overlap in one of the criterion measures, expected final grade, and one of the predictor variables, self-efficacy. The self-efficacy scale in the MSLQ includes questions that assess expected course outcome of the course as well as ability beliefs. Self-efficacy may be such a strong predictor of course outcomes, in this study and a variety of others, because of the overlap in the way the two are measured. The fact that ability beliefs and outcome beliefs are both included in the self-efficacy subscale (Pintrich et al., 1993) could confound the regression results.

Because of the differences in the variables under study, the entire sample was divided into two according to whether only one or two waves of the study were completed. This resulted in a much smaller longitudinal sample than expected at the outset of this research. The low N reduces the power of each test and also limits the number of constructs that can be examined within the available degrees of freedom.

Future research can expand on this study in several ways. First, ego identity should be examined in relation to SRL and outcome variables in greater detail. At present, moratorium (low commitment and high exploration) and foreclosure (high commitment and low exploration) statuses are related to course outcomes in the single-wave and longitudinal samples, respectively. That these two completely opposite statuses would be predictive of final grade in the two samples and the other strategies that share a component with them is surprising. The longitudinal sample appears to be more academically oriented. However, the predictive value of the foreclosure identity status suggests that settling on (or accepting) an identity (possibly including college major)

without exploration is important to success in college courses among more academically oriented students. From the perspective of identity theory (Erikson, 1968; Marcia, 1966), this finding is problematic. Future research with more participants and the ability to look at identity status in relation to major, stability of major and career goals may help explain these seemingly paradoxical findings.

Future research could also benefit from a more detailed investigation of possible selves in a general college population. The current study only coded for the presence of any academic possible self, which may have been too general. Perhaps a more specific coding strategy (i.e., identifying possible goals specific to the course under study) would reveal relations among the possible selves variables and outcome variables.

Pintrich (2000) has also called for research to investigate approach and avoidance forms of both mastery and performance goals. Had the sample in this research been large enough, it would have been interesting to take the motivation questions from the MSLQ and the AGQ and factor analyzed them together. It is conceivable that such an analysis would have yielded a different, and possibly more informative, configuration of motivation variables than currently exists in the two separate scales. Further study with a larger sample might profitable address these four goal orientations in relation to SRL theory.

It would also be interesting to further investigate the mediation of test scores as feedback and course grade by self-efficacy beliefs. It may be that individual differences in test score perception affect how students incorporate that feedback in their self-regulation. Students who perceive the instructor's grading as unfair or biased are unlikely to take their grades seriously and alter their study behaviors accordingly.

Attribution Theory could help illuminate the relations between feedback, self-efficacy, and self-regulation.

Conclusions

This study evaluated three measures for their inclusion in self-regulated learning theory and research. A possible selves measure and the Achievement Goal Questionnaire did not contribute significantly to regressions predicting the outcomes of test grade and expected final grade, and their inclusion in SRL research as measured here is not recommended. Identity status, however, did significantly predict achievement outcomes, and should be investigated for its place in the personal variables of SRL theory.

References

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

Ames, C., & Archer, J. (1987). Mothers' beliefs about the role fo ability and effort in school learning. *Journal of Educational Psychology, 79*, 409-414.

Anderman, E. M., Anderman, L. H., & Griesinger, T. (1999). The Relation of present and possible academic selves during early adolescence to grade point average and achievement goals. *The Elementary School Journal, 100*, 3-17.

Balistreri, E., Busch-Rossnagel, N. A., & Geisinger, K. F. (1995). Development and preliminary validation of the Ego Identity Process Questionnaire. *Journal of Adolescence, 18*, 179-192.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215.

Baron, R. M., & Kenny, D. A. (1986). The Moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical consideration. *Journal of personality and Social Psychology, 51*, 1173-1182.

Bembenutty, H. (2009). Three essential components of college teaching: Achievement calibration, self efficiacy, and self-regulation. *College Student Journal, 43*, 562-570.

Chemers, M. M., Hu, L.-t., & Garcia, B. F. (2001). Academic self-efficacy and first-year college student performance and adjustment. *Journal of Educational Psychology, 93*, 55-64.

Collins, J. (1982, March). *Self-efficacy and ability in achievement behavior.* Paper presented at the American Educational Research Association, New York.

Covington, M. V., & Mueller, K. J. (2001). Intrinsic versus extrinsic motivation: An approach/avoidance reformulation. *Educational Psychology Review, 13*, 157-176.

Credé, M., & Kuncel, N. R. (2008). Study habits, skills, and attitudes: The Third pillar supporting collegiate academic performance. *Perspectives on Psychological Science, 3*, 425-453.

Cross, H. J., & Allen, J. G. (1970). Ego identity status, adjustment, and academic achievement. *Journal of Consulting and Clinical Psychology, 34*, 288.

Dahl, T. I., Bals, M., & Turi, A. L. (2005). Are students' beliefs about knowledge and learning associated with their reported use of learning strategies? *British Journal of Educational Psychology, 75*, 257-273.

Davis, K. D., Winsler, A., & Middleton, M. (2006). Students' perceptions of rewards for academic performance by parents and teachers: Relations with achievement and motivation in college. *The Journal of Genetic Psychology, 167*, 211-220.

Dunkel, C., & Anthis, K. S. (2001). The Role of possible selves in identity formation: A Short-term longitudinal study. *Journal of Adolescence, 24*, 765-776.

Dunkel, C. (2000). Possible selves as a mechanism for identity exploration. *Journal of Adolescence, 23*, 519-529.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*, 1040-1048.

Eccles, J. S. (2005). Subjective task value and the Eccles et al. model of achievement-related choices. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of Competence and Motivation* (pp. 105-121). New York: Guilford Press.

Eccles, J. S., Adler, T. F., Futterman, R., Goff, S. B., MKaczala, C. M., Meece, J. L., et al. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and Achievement Motivation* (pp. 75-146). San Francisco, CA: W. H. Freeman.

Eccles, J. S., Adler, T. F., & Meece, J. L. (1984). Sex differences in achievement: A test of alternate theories. *Journal of Personality and Social Psychology, 46*, 26-43.

Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist, 34*, 169-189.

Elliot, A. J., & McGregor, H. A. (1999). Test anxiety and the hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 76*, 628-644.

Elliot, A. J., & McGregor, H. A. (2001). A 2 X 2 achievement goal framework. *Journal of personality and Social Psychology, 80*, 501-519.

Elliot, A. J., McGregor, H. A., & Gable, S. (1999). Achievement goals, study strategies, exam performance: A Mediational analysis. *Journal of Educational Psychology, 91*, 549-563.

Erikson, E. H. (1968). Eight Ages of Man. *International Journal of Psychiatry, 2*, 281-300.

Faye, C., & Sharpe, D. (2008). Academic motivation in university: The Role of basic psychological needs and identity formation. *Canadian Journal of Behavioural Science, 40*, 189-199.

Garcia, T., & Pintrich, P. R. (1994). Regulating motivation and cognition in the classroom: The Role of self-schemas and self-regulatory strategies. In D. H. Schunk, & B. J. Zimmerman, (Eds.), *Self-Regulation of Learning and Performance: Issues and Educational Applications* (pp. 127 - 153). Hillsdale, NJ: Lawrence Erlbaum.

Grabill, K. M., Lasane, T. P., Povitsky, W. T., Saxe, P., Munro, G. D., Phelps, L. M., et al. (2005). Gender and study behavior: How social perception, social norm adherence, and structured academic behavior are predicted by gender. *North American Journal of Psychology, 2005*, 7-24.

Grant, H., & Dweck, C. S. (2003). Clarifying achievement goals and their impact. *Journal of Personality and Social Psychology, 85*, 541-553.

Harber, K. D., Zimbardo, P. G., & Boyd, J. N. (2003). Participant self-selection biases as a function of individual difference in time perspective. *Basic and Applied Social Psychology, 25*, 255-264.

Harter, S. (1981). A New self-report scale of intrinsic versus extrinsic orientation in the classroom: Motivational and informational components. *Developmental Psychology, 17*, 300-312.

Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Review of Educational Research, 58*, 47-77.

Hock, M., F., Deshler, D. D., & Schumaker, J. B. (2006). Enhancing student motivation through the pursuit of possible selves. In C. Dunkel & J. Kerpelman (Eds.), *Possible Selves: Theory, Research and Applications* (pp. 205-221). New York: Nova Science Publishers.

House, J. D. (1995). Noncognitive predictors of achievement in introductory college mathematics. *Journal of College Student Development, 36*, 171-181.

Howell, A. J., & Watson, D. C. (2007). Procrastination: Associations with achievement goal orientation and learning strategies. *Personality and Individual Differences, 43*, 167-178.

Karabenick, S. A. (2003). Seeking help in large college classes: A Person-centered approach. *Contemporary Educational Psychology, 28*, 37-58.

Leondari, A., Syngollitou, E., & Kiosseoglou, G. (1998). Academic achievement, motivation and possible selves. *Journal of Adolescence, 21*, 219-222.

Lips, H. M. (2004). The Gender gap in possible selves: Divergence of academic self-views among high school and university students. *Sex Roles, 50*, 357-371.

Lynch, D. J. (2006). Motvational factors, learning strategies and resource management as predictors of course grades. *College Student Journal, 40*(2).

Lubinski, D., & Benbow, C. (1992). Gender differences in abilities and preferences among the gifted: Implications for the math-science pipeline. *Current Directions in Psychological Science, 1*(2), 61-66.

Malka, A., & Covington, M. V. (2005). Perceiving school performance as instrumental to future goal attainment: Effects on graded performance. *Contemporary Educational Psychology, 30*, 60-80.

Marcia, J. E. (1966). Development and validation of ego-identity status. *Journal of personality and Social Psychology, 3*, 551-558.

Markus, H. R., & Nurius, P. (1986). Possible Selves. *American Psychologist, 41*, 954-969.

McKeachie, W. J., Pintrich, P. R., & Lin, Y.-G. (1985). Teaching learning strategies. *Educational Psychologist, 20*, 153-160.

Miller, R. B., DeBacker, T. K., & Greene, B. A. (1999). Perceived instrumentality and academics: The Link to task valuing. *Journal of Instructional Psychology, 26*, 250-260.

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review, 91*, 328-246.

Nunnally, J. C. (1982). The study of human change: Measurement, research strategies, and methods of analysis. In B. Wolman (Ed.), Handbook of developmental psychology (pp. 133-148). Englewood Cliffs, NJ: Prentice-Hall.

Oyserman, D. (2004). Possible selves citations, measure, and coding instructions. Unpublished instrument. Institute for Social Research, University of Michigan.

Oyserman, D., Bybee, D., & Terry, K. (2006). Possible selves and academic outcomes: How and when possible selves impel action. *Journal of Personality and Social Psychology, 91*, 188-204.

Oyserman, D., Bybee, D., Terry, K., & Hart-Johnson, T. (2004). Possible selves as roadmaps. *Journal of Research in Personality, 38*, 130-149.

Oyserman, D., & Fryberg, S. (2006). The Possible selves of diverse adolescents: Context and function across gender, race and national origin. In C. Dunkel & J. Kerpelman (Eds.), *Possible Selves: Theory, Research, and Applications* (pp. 17-39). New York: Nova Science Publishers.

Oyserman, D., Gant, L., & Ager, J. (1995). A Socially contextualized model of African American identity: Possible selves and school persistence. *Journal of Personality and Social Psychology, 69,* 1216-1232.

Oyserman, D., & Markus, H. R. (1990). Possible selves and delinquency. *Journal of Personality and Social Psychology, 59,* 112-125.

Oyserman, D., Terry, K., & Bybee, D. (2002). A possible selves intervention to enhance school involvement. *Journal of Adolescence, 25,* 313-326.

Palmer, D. J., & Goetz, E. T. (1988). Selection and use of study strategies: The Role of the studier's beliefs about self and strategies. In C. E. Weinstein, E. T. Goetz & P. A. Alexander (Eds.), *Learning and Study Strategies: Issues in Assessment, Instruction, and Evaluation* (pp. 41-61). San Diego, CA: Academic Press, Inc.

Patrick, H., Ryan, A. M., & Pintrich, P. R. (1999). The Diffrential impact of extrinsic and mastery goal orientations on males' and females' self-regulated learning. *Learning and Individual Differences, 11*(2).

Pekrun, R., Elliot, A. J., & Maier, M. A. (2006). Achievement goals and discrete achievement emotions: A Theoretical model and prospective test. *Journal of Educational Psychology, 98,* 583-597.

Phinney, J. S., Dennis, J., & Osorio, S. (2006). Reasons to attend college among ethnically diverse college students. *Cultural Diversity and Ethnic Minority Psychology, 12,* 347-366.

Pintrich, P. R. (1989). The Dynamic interplay of student motivation and cognition in the college classroom. In M. L. Maehr & C. Ames (Eds.), *Advances in Motivation and Achievement* (Vol. 6, pp. 117-160). Greenwich, CT: JAI Press Inc.

Pintrich, P. R. (1995). Understanding self-regulated learning. *New Directions for Teaching and Learning, 63,* 3-12.

Pintrich, P. R. (2000). The Role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich & M. Zeidner (Eds.), *Handbook of Self-Regulation* (pp. 451-502). San Diego: Academic Press.

Pintrich, P. R. (2004). A Conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review, 16,* 385-407.

Pintrich, P. R., Conley, A. M., & Kempler, T. M. (2004). Current issues in achievement goal theory and research. *International Journal of Educational Research, 39*, 319-337.

Pintrich, P. R., & De Groot, E. A. M. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*, 33-40.

Pintrich, P. R., Roeser, R. W., & De Groot, E. A. M. (1994). Classroom and individual differences in early adolescents' motivation and self-regulated learning. *Journal of Early Adolescence, 14*, 139-161.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the motivated strategies for learning questionnaire (MSLQ). *Educational and Psychological Measurement, 53*, 801-813.

Pizzolato, J. E. (2006). Achieving college student possible selves: Navigating the space between commitment and achievement of long-term identity goals. *Cultural Diversity and Ethnic Minority Psychology, 12*, 57-69.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A Meta-analysis. *Psychological Bulliten, 130*, 261-288.

Ruvolo, A. P., & Markus, H. R. (1992). Possible selves and performance: The Power of self-relevant imagery. *Social Cognition, 10*, 95-124.

Schunk, D. E. (1985). Self-Efficacy and classroom learning. *Psychology in the Schools, 22*, 208-223.

Schunk, D. H. (1990). Introduction to the special section on motivation and efficacy. *Journal of Educational Psychology, 82*, 3-6.

Spellings, M. (2006). *A Test of Leadership: Charting the Future of U.S. Higher Education.*

Sperling, R. A., Howard, B. C., Staley, R., & DuBois, N. (2004). Metacognition and self-regulated learning constructs. *Educational Research and Evaluation, 10*, 117-139.

Stavrianopoulos, K. (2007). Adolescents' metacognitive knowledge monitoring and academic help seeking: The Role of motivation orientation. *College Student Journal, 41*, 444-453.

Stevens, C. D., & Ash, R. A. (2001). The Conscientiousness of students in subject pools: Implications for "laboratory" research. *Journal of Research in Personality, 35*, 91-97.

Unemori, P., Omoregie, H., & Markus, H. R. (2004). Self-Portraits: Possible selves in European-American, Chilean, Japanese and Japanese-American cultural contexts. *Self and Identity, 3*, 321-338.

Universities, A. o. A. C. a. (2002). *Greater expectations: A New vision for learning as a nation goes to college.*

Vancouver, J. B., & Kendall, L. N. (2006). When self-efficacy negatively relates to motivation and performance in a learning context. *Jounal of Applied Psychology, 91*, 1146-1153.

VanderStoep, S. W., Pintrich, P. R., & Fagerlin, A. (1996). Disciplinary differences in self-regulated learning in college students. *Contemporary Educational Psychology, 21*, 345-362.

Waterman, A. S., & Waterman, C. K. (1972). Relationship between freshman ego identity status and subsequent academic behavior: A Test of the predictive validity of Marcia's categorization system for identity status. *Developmental Psychology, 6*, 179.

Weinstein, C. E., & Underwood, V. L. (1985). Learning strategies: The How of learning. In J. W. Segal, S. F. Chipman & R. Glasser (Eds.), *Thinking and Learning Skills* (Vol. 1, pp. 241-258). Hillsdale, NJ: Lawrence Erlbaum.

Wigfield, A., & Eccles, J. S. (1989). Test anxiety in elementary and secondary school students. *Educational Psychologist, 24*, 159-183.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-Value theory of achievement motivation. *Contemporary Educational Psychology, 25*, 68-81.

Williams, R. L., & Clark, L. (2004). College students' ratings of student effort, student ability and teacher input as correlates of student performance on multiple-choice exams. *Educational Research, 46*, 229-239.

Wolters, C. A. (1998). Self-Regulated learning and college students' regulation of motivation. *Journal of Educational Psychology, 90*, 224-235.

Wolters, C. A., & Pintrich, P. R. (1998). Contextual differences in student motivation and self-regulated learning in mathematics, English, and social studies classrooms. *Instructional Science, 26*, 27-47.

Young, J. W. (2007). Predicting college grades: The Value of achievement goals in supplementing ability measures. *Assessment in Education, 14*, 233-249.

Zimmerman, B. J. (1989). A Social cognitive view of self-regulated academic learning. *Journal of Educational Psychology, 81*, 329-339.

Zimmerman, B. J. (2000). Attaining self-regulation: A Social cognitive perspective. In M. Boekaerts, P. R. Pintrich & M. Zeidner (Eds.), *Handbook of Self-Regulation* (pp. 13-39). San Diego, CA: Academic Press.

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal, 45*, 166-183.

Zimmerman, B. J., & Martinez-Pons, M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. *American Educational Research Journal, 23*, 614-628.

Zimmerman, B. J., & Martinez-Pons, M. (1988). Construct validation of a strategy model of student self-regulated learning. *Journal of Educational Psychology, 80*, 284-290.

Zusho, A., & Pintrich, P. R. (2003). Skill and will: The Role of motivation and cognition in the learning of college chemistry. *International Journal of Science Education, 25*, 1081-1094.

APPENDICIES

APPENDIX A

COPIES OF APPROVAL LETTERS FOR RESEARCH INVOLVING HUMAN

SUBJECTS

From: Andrew Leber <andrew.leber@unh.edu>
Subject: Re: IRB/Subject Pool Request
Date: August 30, 2009 9:57:46 AM EDT
To: Rachel Rogers <raj3@unh.edu>

Hi Rachel --

I've looked over your IRB submission and I have a few questions.

- I noticed that this is a modification of a previously approved protocol, but I don't remember it. Do you remember when this was last approved and who approved it?
- This study is unique in that you won't be using the general subject pool but rather only students in your section. Because the system of crediting students is carried out online, are you planning to use this online system for record keeping? As an alternative, you could post this study to Sona systems, requesting that students must be registered for a section in stats, thus greatly increasing your potential sample size.
- Do you plan to administer the surveys during class time?
- Some students could be easily identified using the combination of mother's maiden name, birthday, race (some sections few minority students), and other demographic information collected. Is there a way you could prevent the identification of some students?

Andy
--
Andrew B. Leber, Ph.D.
Assistant Professor of Psychology
University of New Hampshire
http://pubpages.unh.edu/~abr36

From: Andrew Leber <andrew.leber@unh.edu>
Subject: Re: IRB update

Date: September 4, 2009 6:09:27 PM EDT
To: Rachel Rogers raj3@cisunix.unh.edu

Hi Rachel --

I've looked over your revised IRB, and I realized there would be some logistical issues
with getting your study to work well on survey monkey, which could require some
tweaking. Because you have people participating on 3 separate occasions, it could be
tricky for Sona to handle. Upon thinking about this at length, here is what I suggest:

- Post a 3-credit Online External study
- When people click, it will take them to a consent form in which they enter their names
and email addresses. They will agree that they are signing up for 3 separate studies and
they will acknowledge that they understand credit for each stage of the survey can only
be earned if they complete it within the specified time. Though they can withdraw at any
time, without penalty, and they will get prorated credits.
- After they fill out the online consent form, explain that instructions will be emailed to
them. Here, you will generate a random code (on your own, not through the system), and
you will email it to them, along with the link to the first survey. Explain that the use of
the code will help ensure that researchers don't see their names when analyzing the data.
 You'll keep an xls file separately that has a list of all names and codes.
- Each time the next stage of the study needs to be carried out, you can send a mass email
to all participants with the link to the next study. Remind them that they must use their
unique codes and that they can contact you if they've lost them.
- To assign credit, at the end of the study, you should make a new list of codes indicating
how many sessions each unique code completed. Then, that list can be matched up to the
original xls file. What you *shouldn't* do is take out the original file with names and
codes and match it up to each survey. This makes it too easy to associate survey
responses to individuals.

Does all of this make sense? If so, let me know that you will make this modification to
your protocol (just requires an email acknowledgment), and I'll approve the study. In the
meantime, I've set up a Sona account for you so that you can go into the system and get
an idea as to how things work. Make sure to read the online guide, which can be found
here: http://pubpages.unh.edu/~abr36/sona/

-andy

--
Andrew B. Leber, Ph.D.
Assistant Professor of Psychology
University of New Hampshire
http://pubpages.unh.edu/~abr36

From: Andrew Leber <andrew.leber@unh.edu>
Subject: Re: IRB update
Date: September 24, 2009 6:08:47 PM EDT
To: Rachel Rogers raj3@unh.edu

Hi Rachel --

I was going through SONA and I noticed you don't have your IRB code posted. It seems that I never emailed you one, probably because of the back and forth over the approval. Please update your study info with this code: 09F-13.

Thanks!

Andy
--
Andrew B. Leber, Ph.D.
Assistant Professor of Psychology
University of New Hampshire
http://pubpages.unh.edu/~abr36

APPENDIX B

SURVEY

DEMOGRAPHIC QUESTIONS		
What is your user code?		[open ended]
Sex:		[open ended]
Age:		[open ended]
Major:		[open ended]
Ethnicity:		White/Caucasian
		African American/Black
		American Indian/Alaska Native
		Mexican American/Chicano
		Other Latino
		Other
Year in School:		[open ended]
What were your scores on the SAT?	Math	[open ended]
	Verbal	[open ended]
	Writing	[open ended]
How many older siblings do you have?		[open ended]
How many younger siblings do you have?		[open ended]
What is your best estimate of your parents combined income?		Less than $25,000
		$25,000 - $49,999
		$50,000 - $74,999
		$75,000 - $99,999
		$100,000 - $124,999
		$125,000 - $149,999
		$150,000 - $174,999
		$175,000 - $199,999

		$200,000 or more
Who else in your family, besides you, has attended, or is attending, college? Please list for each person whether or not they graduated		[open ended]
What is the highest level of formal education obtained by your family members?	Answer for:	Elementary School Only
	Father	Some High School
	Mother	High School Graduate
		Postsecondary School other than college
		Some College
		College Degree
		Some Graduate School
		Graduate Degree
OPEN-ENDED MOTIVATION QUESTIONS		
Please list the top 5 reasons for why you're going to college at all, in order of importance.		[open ended]
		[open ended]
		[open ended]
		[open ended]
		[open ended]
When did you decide to go to college?		[open ended]
How involved were your parents or guardians in this decision?	Answer for:	1. Not involved at all
	Father	2.
	Mother	3.
		4. Somewhat Involved
		5.
		6.
		7. Extremely Involved
Why did you decide to go to UNH?		[open ended]
How involved were your parents	Answer for:	1. Not involved at all

or guardians in this decision?	Father	2.
	Mother	3.
		4. Somewhat Involved
		5.
		6.
		7. Extremely Involved
What do you hope to gain from your college education?		[open ended]
What do you hope to gain from your specific degree?		[open ended]
Why did you register for Statistics in Psychology/Research Methods in Psychology?		[open ended]
Are you receiving:	(check all that apply):	Financial Aid
		Academic Scholarship
		Athletic Scholarship
		College fund established by parents or other relative
Are you paying a portion of your college costs through your own earnings?		Yes
		No
If yes, what portion of:	Books and supplies?	[open ended]
	Room and board?	[open ended]
	Tuition and fees?	[open ended]
What percent of your friends from high school are now in college?		[open ended]
How important is it to you to make a contribution to your field of study?		1. Not at all
		2.
		3.
		4.
		5.
		6.

		7. Essential
How important is it to you to obtain recognition for your contributions to your field?		1. Not at all
		2.
		3.
		4.
		5.
		6.
		7. Essential
Where in your acquisition of the knowledge you'll need to meet your professional goals do you see yourself in 5 years?		1. Just beginning
		2.
		3.
		4.
		5.
		6.
		7. Done
STUDY SKILLS AND OUTCOME MEASURES QUESTIONS		
Please list all the things you do to prepare for an exam in the course for which you are receiving credit.		[open ended]
What grade did you earn on your last exam in the course for which you are receiving credit?		[open ended]
How much time did you spend studying for your last exam in the course for which you are receiving credit?		[open ended]
How often do you review course material?		Daily
		After every class
		About once a week
		Only just before an exam
Are you able to use your textbook, notes, and/or other materials during exams?		Yes
		No

What do you expect your final grade to be in the course for which you are receiving credit to be?		A
		A-
		B+
		B
		B-
		C+
		C
		C-
		D+
		D
		D-
		F

POSSIBLE SELVES QUESTIONNAIRE

Who will you be next year? Each of us has some image or picture of what we will be like and what we want to avoid being like in the future. Think about next year – imagine what you'll be like, and what you'll be doing next year.

Type one thing about what you expect you will be like and what you expect to be doing next year.

Mark NO if you are not currently working on that goal or doing something about that expectation, and mark YES if you are currently doing something to get to that expectation or goal.

If you answered YES in the previous question, enter what you are doing this year to attain that goal. Please be as detailed as possible.

Then repeat this process for up to four goals.

[Goal One] Next year, I expect to be…		[open ended]
[Goal One] Am I doing something to be that way?		No
		Yes
[Goal One] If yes, what I am doing to be that way next year:		[open ended]
[Goal Two] Next year, I expect to be…		[open ended]
[Goal Two] Am I doing something to be that way?		No
		Yes

[Goal Two] If yes, what I am doing to be that way next year:		[open ended]
[Goal Three] Next year, I expect to be…		[open ended]
[Goal Three] Am I doing something to be that way?		No
		Yes
[Goal Three] If yes, what I am doing to be that way next year:		[open ended]
[Goal Four] Next year, I expect to be…		[open ended]
[Goal Four] Am I doing something to be that way?		No
		Yes
[Goal Four] If yes, what I am doing to be that way next year:		[open ended]

In addition to expectations and expected goals, we all have images or pictures of what we don't want to be like; what we don't want to do or want to avoid being. First, think a minute about ways you would not like to be next year – things you are concerned about or want to avoid being like.

Type one concern or self-to-be-avoided in the space below

Mark NO if you are not currently working on avoiding that concern or to-be-avoided self, and mark YES if you are currently doing something so this will not happen next year.

If you answered YES, enter what you are doing this year to reduce the chances that this will describe you next year. Please be as detailed as possible.

Then repeat this process for up to four concerns or selves-to-be-avoided.

[Concern One] Next year, I want to avoid…		[open ended]
[Concern One] Am I doing something to avoid this?		No
		Yes
[Concern One] If yes, what I am doing now to avoid being that way next year:		[open ended]
[Concern Two] Next year, I want to avoid…		[open ended]
[Concern Two] Am I doing something to avoid this?		No
		Yes
[Concern Two] If yes, what I am doing now to avoid being that		[open ended]

way next year:		
[Concern Three] Next year, I want to avoid...		[open ended]
[Concern Three] Am I doing something to avoid this?		No
		Yes
[Concern Three] If yes, what I am doing now to avoid being that way next year:		[open ended]
[Concern Four] Next year, I want to avoid...		[open ended]
[Concern Four] Am I doing something to avoid this?		No
		Yes
[Concern Four] If yes, what I am doing now to avoid being that way next year:		[open ended]

MOTIVATED STRATEGIES FOR LEARNING QUESTIONNAIRE

Please answer the following questions with the course for which you are receiving credit (i.e., Statistics and Psychology or Research Methods in Psychology) in mind.

	1. Not at all like me	2.	3.	4.	5.	6.	7. Very much like me.
1. In a class like this, I prefer course material that really challenges me so I can learn new things.							
2. If I study in appropriate ways, then I will be able to learn the material in this course.							
3. When I take a test I think about how poorly I am doing compared with other students.							
4. I think I will be able to use what I learn in this course in other courses.							
5. I believe I will receive an excellent grade in this class.							
6. I'm certain I can understand the most difficult material presented in the readings for this course.							
7. Getting a good grade in this class is the most satisfying thing for me right now.							

8. When I take a test I think about items on other parts of the test I can't answer.						
9. It is my own fault if I don't learn the material in this course.						
10. It is important for me to learn the course material in this class.						
11. The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.						
12. I'm confident I can learn the basic concepts taught in this course.						
13. If I can, I want to get better grades in this class than most of the other students.						
14. When I take tests I think of the consequences of failing.						
15. I'm confident I can understand the most complex material presented by the instructor in this course.						
16. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.						
17. I am very interested in the content area of this course.						
18. If I try hard enough, then I will understand the course material.						
19. I have an uneasy, upset feeling when I take an exam.						
20. I'm confident I can do an excellent job on the assignments and tests in this course.						
21. I expect to do well in this class.						
22. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.						
23. I think the course material in this class is useful for me to learn.						
24. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good						

grade.							
25. If I don't understand the course material, it is because I didn't try hard enough.							
26. I like the subject matter of this course.							
27. Understanding the subject matter of this course is very important to me.							
28. I feel my heart beating fast when I take an exam.							
29. I'm certain I can master the skills being taught in this class.							
30. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.							
31. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.							
32. When I study the readings for this course, I outline the material to help me organize my thoughts.							
33. During class time I often miss important points because I'm thinking of other things.							
34. When studying for this course, I often try to explain the material to a classmate or friend.							
35. I usually study in a place where I can concentrate on my course work.							
36. When reading for this course, I make up questions to help focus my reading.							
37. I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do.							
38. I often find myself questioning things I hear or read in this course to decide if I find them convincing.							
39. When I study for this class, I practice saying the material to myself over and over.							
40. Even if I have trouble learning the material in this class, I try to do the work on my own, without help from anyone.							

41. When I become confused about something I'm reading for this class, I go back and try to figure it out.						
42. When I study for this course, I go through the readings and my class notes and try to find the most important ideas.						
43. I make good use of my study time for this course.						
44. If course readings are difficult to understand, I change the way I read the material.						
45. I try to work with other students from this class to complete the course assignments.						
46. When studying for this course, I read my class notes and the course readings over and over again.						
47. When a theory, interpretation, or conclusion is presented in class or in the readings, I try to decide if there is good supporting evidence.						
48. I work hard to do well in this class even if I don't like what we are doing.						
49. I make simple charts, diagrams, or tables to help me organize course material.						
50. When studying for this course, I often set aside time to discuss course material with a group of students from the class.						
51. I treat the course material as a starting point and try to develop my own ideas about it.						
52. I find it hard to stick to a study schedule.						
53. When I study for this class, I pull together information from different sources, such as lectures, readings, and discussions.						
54. Before I study new course material thoroughly, I often skim it to see how it is organized.						
55. I ask myself questions to make sure I understand the material I have been studying in this class.						

56. I try to change the way I study in order to fit the course requirements and the instructor's teaching style.							
57. I often find that I have been reading for this class but don't know what it was all about.							
58. I ask the instructor to clarify concepts I don't understand well.							
59. I memorize key words to remind me of important concepts in this class.							
60. When course work is difficult, I either give up or only study the easy parts.							
61. I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying for this course.							
62. I try to relate ideas in this subject to those in other courses whenever possible.							
63. When I study for this course, I go over my class notes and make an outline of important concepts.							
64. When reading for this class, I try to relate the material to what I already know.							
65. I have a regular place set aside for studying.							
66. I try to play around with ideas of my own related to what I am learning in this course.							
67. When I study for this course, I write brief summaries of the main ideas from the readings and my class notes.							
68. When I can't understand the material in this course, I ask another student in this class for help.							
69. I try to understand the material in this class by making connections between the readings and the concepts from the lectures.							
70. I make sure that I keep up with the weekly readings and assignments for this course.							
71. Whenever I read or hear an assertion or conclusion in this class, I think about possible alternatives.							

72. I make lists of important items for this course and memorize the lists.							
73. I attend this class regularly.							
74. Even when course materials are dull and uninteresting, I manage to keep working until I finish.							
75. I try to identify students in this class whom I can ask for help if necessary.							
76. When studying for this course I try to determine which concepts I don't understand well.							
77. I often find that I don't spend very much time on this course because of other activities.							
78. When I study for this class, I set goals for myself in order to direct my activities in each study period.							
79. If I get confused taking notes in class, I make sure I sort it out afterwards.							
80. I rarely find time to review my notes or readings before an exam.							
81. I try to apply ideas from course readings in other class activities such as lecture and discussion.							

ACHIEVEMENT GOALS QUESTIONNAIRE

Please rate yourself on each item while thinking about the course for which you are receiving credit.

	1. Not at all true of me	2.	3.	4.	5.	6.	7. Very true of me
1. My goal in this class is to avoid performing poorly.							
2. I worry that I may not learn all that I possibly could learn in this class.							
3. I want to learn as much as possible from this class.							
4. My fear of performing poorly in this class is often what motivates me.							
5. Sometimes I'm afraid that I may not understand the content of this class as							

thoroughly as I'd like.								
6. I just want to avoid doing poorly in this class.								
7. I desire to completely master the material presented in this class.								
8. It is important for me to do well compared to others in this class.								
9. It is important for me to understand the content of this course as thoroughly as possible.								
10. It is important for me to do better than other students.								
11. I am often concerned that I may not learn all that there is to learn in this class.								
12. My goal in this class is to get a better grade than most of the other students.								

EGO IDENTITY PROCESS QUESTIONNAIRE

Please rate how strongly you agree or disagree with each statement.

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. I have definitely decided on the occupation I want to pursue.						
2. I don't expect to change my political principles and ideals.						
3. I have considered adopting different kinds of religious beliefs.						
4. There has never been a need to question my values.						
5. I am very confident about what kinds of friends are best for me.						
6. My ideas about men's and women's roles have never changed as I						

became older.					
7. I will always vote for the same political party.					
8. I have firmly held views concerning my role in my family.					
9. I have engaged in several discussions concerning behaviors involved in dating relationships.					
10. I have considered different political views thoughtfully.					
11. I have never questioned my views concerning what kinds of friend is best for me.					
12. My values are likely to change in the future.					
13. When I talk to people about religion, I make sure to voice my opinion.					
14. I am not sure about what type of dating relationship is best for me.					
15. I have not felt the need to reflect upon the importance I place on my family.					
16. Regarding religion, my beliefs are likely to change in the near future.					
17. I have definite views regarding the ways in which men and women should behave.					
18. I have tried to learn about different occupational fields to find					

the best one for me.						
19. I have undergone several experiences that made me change my views on men's and women's roles.						
20. I have consistently re-examined many different values in order to find the ones which are best for me.						
21. I think what I look for in a friend could change in the future.						
22. I have questioned what kind of date is right for me.						
23. I am unlikely to alter my vocational goals.						
24. I have evaluated many ways in which I fit into my family's structure.						
25. My ideas about men's and women's roles will never change.						
26. I have never questioned my political beliefs.						
27. I have had many experiences that led me to review the qualities that I would like my friends to have.						
28. I have discussed religious matters with a number of people who believe differently than I do.						
29. I am not sure that the values I hold are right for me.						

30. I have never questioned my occupational aspirations.						
31. The extent to which I value my family is likely to change in the future.						
32. My beliefs about dating are firmly held.						

APPENDIX C

SURVEY QUESTIONS THAT MAKE UP EACH SUBSCALE

MOTIVATED STRATEGIES FOR LEARNING QUESTIONNAIRE	
Subscale	Included Items
Intrinsic Goal Orientation	1, 16, 22, 24
Extrinsic Goal Orientation	7, 11, 13, 30
Task Value	4, 10, 17, 23, 26, 27
Control of Learning Beliefs	2, 9, 18, 25
Self-Efficacy of Learning Beliefs	5, 6, 12, 15, 20, 21, 29, 31
Test Anxiety	3, 8, 14, 19, 28
Rehearsal	39, 46, 59, 72
Elaboration	53, 62, 64, 67, 69, 81
Organization	32, 42, 49, 63
Critical Thinking	38, 47, 51, 66, 71
Metacognitive Self-Regulation	33*, 36, 41, 44, 54, 55, 56, 57*, 61, 76, 78, 79
Time and Study Environment Management	35, 43, 52*, 65, 70, 73, 77*, 80*
Effort Regulation	37*, 48, 60*, 74
Works With Students	34, 45, 50, 68, 75
ACHIEVEMENT GOALS QUESTIONNAIRE	
Subscale	Included Items
Mastery-Approach	3, 7, 9
Mastery-Avoidance	2, 5, 11
Performance-Approach	8, 10, 12
Performance-Avoidance	1, 4, 6
EGO IDENTITY PROCESS QUESTIONNAIRE	
Subscale	Included Items
Commitment	1, 2, 5, 7, 8, 12*, 13, 14*, 16*, 17, 21*, 23, 25, 29*, 31*, 32
Exploration	3, 4*, 6*, 9, 10, 11*, 15*, 18, 19, 20, 22, 24, 26*, 27, 28, 30*

A * indicates that the item is reverse coded before subscale formation.

Table 1

Means and Standard Deviations for Wave 1 Predictor and Criterion Variables for Single Wave and Longitudinal Participants

Variable	Single Wave N = 206-266		Longitudinal N = 85-102		
	M	SD	M	SD	t
Criterion Variables					
Final Grade	9.61	1.83	10.24	1.46	-3.10
Test Grade	84.29	11.5	84.41	14.57	-.08
Personal/Contextual Variables					
Age	19.58	1.07	19.33	0.71	2.14
Sex	75.6% F		82.4% F		χ^2 ns
Major	36.5% Ψ		26.5% Ψ		χ^2 ns
SAT-M	562.99	114.71	581.48	143.05	-1.44
SAT-V	573.77	102.44	585.06	132.66	-0.77
Father Education	5.69	1.83	5.56	1.92	0.51
Mother Education	5.77	1.65	5.54	1.59	1.12
Family Income	4.86	2.27	4.74	2.03	0.48
Number of Siblings	1.68	1.10	1.68	1.00	0.00
Ego Identity – Commitment	3.83	0.57	3.95	0.59	-1.69
Ego Identity – Exploration	3.87	0.59	3.75	0.55	1.71
Academic Motivation Variables					
Number of Reasons for College	4.77	.73	4.68	.69	1.19
Parents Involved in College	5.58	1.49	5.72	1.46	-0.84
Parents Involved in Choice	4.90	1.62	4.87	1.71	0.13
% of Friends in College	87.96	17.48	86.91	19.80	0.49
Contribution to Field	5.42	1.42	5.67	1.31	-1.52
Recognition in Field	4.76	1.53	4.92	1.58	-0.90
Professional Goals in 5 years	4.25	1.51	4.04	1.59	1.18
Study Skills Questions					
Time Studying (hrs)	4.57	4.43	3.79	3.88	1.53
Frequency of Review	1.89	.81	1.96	.76	-0.76
Possible Selves (PS)					
Number of Positive PS	1.65	.86	1.73	.82	-0.83
Number of Positive PS Strat.	1.75	1.08	1.71	1.19	0.25
Number of Negative PS	1.24	.83	1.25	.92	-0.12
Number of Negative PS Strat.	1.03	.94	.97	.94	0.58
MSLQ Motivation Subscales					
Intrinsic Goal Orientation	3.87	1.21	4.08	1.02	-1.53
Extrinsic Goal Orientation	5.15	1.12	5.20	1.07	-0.36
Task Value	3.93	1.25	4.19	1.08	1.87
Control of Learning Beliefs	4.98	1.09	5.06	.94	-0.58
Self-Efficacy-Learning Beliefs	4.75	1.28	5.09	1.05	-2.42
Test Anxiety	4.14	1.34	3.67	1.35	3.02

Variable	Single Wave N = 206-266		Longitudinal N = 85-102		
	M	SD	M	SD	t
MSLQ Learning Strategies					
Rehearsal	4.26	1.19	4.50	1.15	1.74
Elaboration	4.17	1.17	4.45	1.03	-2.10
Organization	4.36	1.19	4.70	1.19	-2.40
Critical Thinking	3.25	1.19	3.39	1.08	-0.97
Metacognitive Self-Regulation	4.21	0.92	4.43	0.88	-2.07
Time and Study Environment Management	4.82	0.91	5.04	0.93	-2.13
Effort Regulation	5.09	1.12	5.36	1.12	-2.13
Works with Students	3.63	1.45	3.57	1.50	0.37
Achievement Goals					
Mastery-Approach	4.42	1.40	4.79	1.30	-2.31
Mastery-Avoidance	3.80	1.61	3.51	1.54	1.53
Performance-Approach	4.29	1.64	4.58	1.54	1.54
Performance-Avoidance	5.59	1.31	5.54	1.35	.27

Table 2

Means and Standard Deviations for Wave 2 Predictor and Criterion Variables for the Longitudinal Sample, as well as t-values and Temporal Stability Correlations

Variable	M	SD	t	r
Criterion Variables				
Final Grade	9.76	1.94	3.43	.70*
Test Grade	83.81	12.16	.76	.31*
Personal/Contextual Variables				
Ego Identity – Commitment	3.95	.62	-.29	.76*
Ego Identity – Exploration	3.77	.61	-.90	.75*
MSLQ Motivation Subscales				
Intrinsic Goal Orientation	3.86	1.18	1.99*	.53*
Extrinsic Goal Orientation	4.98	1.15	2.14*	.58*
Task Value	3.94	1.19	2.45*	.57*
Control of Learning Beliefs	4.98	1.08	.77	.57*
Self-Efficacy-Learning Beliefs	4.94	1.19	1.56	.61*
Test Anxiety	3.75	1.38	-.76	.70*
MSLQ Learning Strategies				
Rehearsal	4.16	1.19	3.15*	.56*
Elaboration	4.21	1.15	2.42*	.57*
Organization	4.02	1.15	6.70*	.76*
Critical Thinking	3.25	1.19	1.68	.64*
Metacognitive Self-Regulation	4.11	0.85	4.68*	.70*
Time and Study Environment Management	4.87	0.90	2.48*	.34*
Effort Regulation	5.09	0.97	2.86*	.71*
Works with Students	3.45	1.37	1.12	.73*
Achievement Goals				
Mastery-Approach	3.80	1.64	5.75*	.32*
Mastery-Avoidance	4.60	1.59	-5.50	.19
Performance-Approach	4.62	1.46	-.23	.19
Performance-Avoidance	4.21	1.26	7.56*	.07

* indicates p < .05

Table 3

Correlations Between All Predictor and Criterion Variables for Single Wave and Longitudinal Samples

Predictor	Single Wave (N = 203-265)		Longitudinal (N = 63-102)			
	Test 1	Final	Test 1	Test 2	Final	Final 2
Age	-.03	-.06	-.11	-.15	**-.21**	**-.28**
Sex (1=female, 2=male)	-.09	-.02	.09	**-.26**	-.13	-.18
SAT-M	.10	**.20**	-.03	-.05	-.05	.05
SAT-V	.11	**.16**	-.10	.00	-.01	.01
Father Education	**.14**	.09	.06	.02	.12	.12
Income	.00	-.02	-.10	-.08	-.08	**-.21**
# Reasons for going to college	-.01	-.01	-.05	-.15	-.06	**-.20**
% of Friends in college	.04	-.01	.12	.03	.18	**.20**
Amount of time studying	-.04	-.03	-.10	-.20	-.18	**-.20**
Reviewing (wave 2)			.14	.20	.22	**.24**
Negative possible selves	**-.12**	-.09	.13	.10	.00	.01
Intrinsic Goal Orientation	**.18**	**.25**	.01	-.04	.17	.11
IGO wave 2			.05	.06	.09	**.24**
Extrinsic Goal Orientation	**.13**	**.27**	**.22**	.11	.18	.18
EGO wave 2			**.10**	.20	.18	**.29**
Task Value	**.18**	**.22**	.06	-.01	.18	**.20**
TV wave 2			.06	.16	.12	**.28**
Control of Learning Beliefs	**.25**	**.25**	.12	-.01	.13	.13
CLB wave 2			.12	.14	**.22**	**.28**
Self Efficacy for Learning	**.45**	**.63**	**.39**	**.27**	**.60**	**.50**
SEL wave 2			**.41**	**.45**	**.49**	**.69**
Test Anxiety	**-.22**	**-.25**	-.05	-.16	-.02	-.16
TA wave 2			-.16	**-.21**	-.12	-.18
Elaboration	.09	**.13**	-.01	.09	.12	.15
Elaboration wave 2			.00	.14	.12	**.23**
Metacognitive Self-regulation	**.19**	**.20**	.13	-.03	.07	.10
Time and study environment Management	**.29**	**.22**	**.22**	.11	.18	**.21**
TSEM wave 2			**.09**	.17	.15	**.25**
Effort Regulation	**.30**	**.31**	.11	.11	.17	**.23**
ER wave 2			.17	**.27**	**.20**	**.34**
Mastery-Approach	**.15**	**.20**	.07	.12	.14	**.21**
Mastery-Approach wave 2			**-.23**	-.17	**-.22**	**-.16**
Mastery-Avoidance	**-.13**	**-.12**	-.19	-.01	**-.22**	-.08
Mastery-Avoidance wave 2			.14	.13	**.14**	**.20**
Performance-Approach	**.14**	**.32**	**.27**	.18	**.23**	**.21**
Performance-Approach wave 2			.02	.16	.13	**.27**

Predictor	Single Wave (N = 203-265)		Longitudinal (N = 63-102)			
	Test 1	Final	Test 1	Test 2	Final	Final2
Moratorium	**.14**	**.15**	-.13	-.18	.04	-.01
Foreclosed	-.04	-.02	.11	**.22**	.15	.13
Diffused	-.09	-.12	-.04	.01	**-.23**	-.15
Test grade		**.68**		**.31**	**.58**	**.52**
Expected Final Grade				**.44**		**.70**
Date of participation	**-.20**	**-.19**	-.02	-.05	-.13	-.13

Significant Correlations are in bold.

Table 4

Correlations of All Wave 1 Motivation Variables

Variable	Reason	Percent	IGO	EGO	TV	CLB	SELB	TA	MAP	MAV	PAP
Reasons		**.20**	-.08	-.08	-.01	.03	.05	-.02	-.11	-.03	**-.08**
Percent	.01		-.02	**-.21**	**-.15**	**-.16**	-.05	**-.15**	-.06	-.10	**-.07**
IGO	-.15	-.01		**.27**	**.71**	**.35**	**.55**	.02	**.59**	**.26**	**.20**
EGO	-.14	-.03	**.24**		**.37**	**.33**	**.44**	**.20**	**.40**	**.22**	**.58**
TV	-.16	.07	**.65**	**.30**		**.44**	**.53**	.01	**.59**	**.27**	**.18**
CLB	**-.25**	.07	**.28**	**.36**	**.23**		**.58**	-.11	**.19**	.05	.13
SELB	**-.25**	.05	**.52**	**.38**	**.43**	**.54**		**-.26**	**.39**	-.06	**.34**
TA	.08	-.05	.08	**.29**	.09	.05	-.19		.09	**.40**	.17
MAP	-.07	.08	**.39**	**.45**	**.59**	.09	**.27**	.17		**.43**	**.33**
MAV	.04	.18	.07	**.21**	.16	-.01	**-.30**	**.40**	**.27**		**.29**
PAP	-.08	.09	**.25**	**.64**	**.30**	**.24**	**.20**	**.23**	**.35**	**.27**	

Note. Single wave group is above the diagonal, longitudinal is below. Bold-face indicates p < .05

Table 5

Correlations of Wave 1 MSLQ Learning Strategies Variables

Variable	Time	Elab	MSR	TSEM	ER
Time		.09	.11	.21	-.02
Elab	.10		.69	.30	.31
MSR	.22	.62		.50	.47
TSEM	.28	.30	.52		.69
ER	.09	.29	.52	.72	

Note. Single wave group is above the diagonal, longitudinal is below.
Time = Time spent studying for exam, Elab= Elaboration, MSR = Metacognitive study strategies, TSEM=Time and Study Environment Management, ER = Effort Regulation.

Table 6

Correlations of All Wave 2 Variables Significantly Correlated With Outcomes

Variable	IGO	EGO	TV	CLB	SELB	TA	E	TSEM	ER	MAP	MAV	PAP
Review	-.07	-.07	-.02	.07	.11	-.10	-.03	-.33	-.15	-.18	-.16	-.03
IGO		.31	.77	.31	.47	.12	.53	.31	.31	.24	.17	.64
EGO			.37	.37	.46	.37	.56	.43	.36	.22	.64	.45
TV				.35	.53	.15	.63	.36	.35	.27	.25	.71
CLB					.58	.01	.24	.24	.20	-.05	.12	.17
SELB						-.16	.35	.46	.56	-.13	.27	.48
TA							.35	-.02	-.23	.51	.34	.17
E								.36	.24	.44	.37	.56
TSEM									.75	-.05	.23	.53
ER										-.13	.18	.41
MAP											.30	.25
MAV												.30

Bold-face indicates p < .01

Table 7

Regression Predicting Test Grade in the Single Wave Sample

Step and Variable	Step 1 β	t	ΔR²	Step 2 β	t	ΔR²	Step 3 β	t	ΔR²
Step 1			.11*						
Date	-.24	-3.55*		-.18	2.88*		-.18	-2.74*	
Moratorium	.20	2.92*		.17	2.70*		.17	2.69	
Father's Education	.15	2.27*		.06	.93		.07	1.03	
Step 2						.21*			
IGO				-.09	-1.17		-.06	- .69	
EGO				-.08	-1.06		-.17	1.33	
CLB				.02	.19		.05	.61	
SELB				.42	3.95*		.33	2.96*	
TA				-.08	-1.10		-.07	- .91	
MSR				.03	.36		.05	.67	
ER				.14	1.82		.15	1.82	
Step 3									.01
MAP							.00	.05	
MAV							-.12	-1.56	
PAP							.12	1.44	

$F (13,184) = 6.96, p < .01$; * indicates $p < .05$

Table 8

Regression Predicting Expected Final Grade in the Single Wave Sample

Step and Variable	Step 1 β	Step 1 t	ΔR^2	Step 2 β	Step 2 t	ΔR^2	Step 3 β	Step 3 t	ΔR^2
Step 1			.12						
Date	-.23	-3.51*		-.18	-3.35*		-.18	-3.34	
Moratorium	.17	2.52*		.16	2.97*		.15	2.86	
SAT-M	.11	1.18		-.01	- .07		-.01	- .18	
SAT-V	.11	1.10		.18	2.38*		.18	2.40*	
Step 2						.39*			
IGO				-.13	-1.96*		-.09	-1.25	
EGO				.00	.02		-.04	- .58	
CLB				-.21	-2.99*		-.18	-2.48*	
SELB				.78	9.19*		.72	7.90*	
TA				-.02	- .25		-.00	- .01	
MSR				.02	.35		.03	.48	
ER				-.00	- .03		.00	.04	
Step 3									.01
MAP							-.01	- .17	
MAV							-.09	-1.33	
PAP							.13	1.92	

F(14, 189) = 14.82, p < .01; * indicates p < .05

Table 9

Regression Predicting Test Grade in the Longitudinal Sample

Step and Variable	Step 1 β	Step 1 t	ΔR²	Step 2 β	Step 2 t	ΔR²	Step 3 β	Step 3 t	ΔR²
Step 1			.22*						
Test Grade	.31	3.12*		.15	1.43		.13	1.28	
Sex	-.27	-2.71*		-.22	-2.27*		-.20	-2.03*	
Foreclosure	.22	2.25*		.19	2.01*		.20	2.01*	
Step 2						.12*			
SELB				.38	3.02*		.37	2.96*	
TA				-.13	-1.34		-.11	-1.14	
ER				-.08			-.04	-.35	
Step 3									.01
Review							.11	1.09	

$F(7,76) = 5.97$, $p < .01$; * indicates $p < .05$

Table 10

Regression to Predict Expected Final Grade in the Longitudinal Sample

Step and Variable	Step 1 β	t	ΔR²	Step 2 β	t	ΔR²	Step 3 β	t	ΔR²	Step 4 β	t	ΔR²
Step 1			.46*									
Test Grade	.56	7.63*		.38	5.11*		.38	5.00*		.35	4.61*	
Income	-.15	-1.95		-.14	-2.16*		-.15	-2.16*		-.15	-2.17*	
Percent	.22	2.86*		.17	2.45*		.17	2.35*		.15	2.04*	
Step 2						.19*						
EGO				.00	.03		-.03	-.29		-.03	-.30	
TV				-.03	-.33		-.04	-.37		-.03	-.25	
CLB				-.11	-1.27		-.10	-1.11		-.10	-1.14	
SELB				.62	5.49*		.63	5.24*		.62	5.20*	
E				-.01	-.15		-.03	-.24		-.04	-.37	
ER				-.11	-1.31		-.10	-1.22		-.08	-.92	
Step 3									.00			
MAP							.02	.25		.04	.53	
MAV							.05	.50		.04	.46	
PAP							.00	.04		.00	.01	
Step 4												.01
Review										.07	.88	
Time Studied										-.07	-.95	

$F_{(14, 78)} = 11.10$, $p < .01$; * indicates $p < .05$

Table 11

Regression to Examine Change in Test Grade Correlates

Step and Variable	Step 1 β	t	ΔR²	Step 2 β	t	ΔR²	Step 3 β	t	ΔR²
Step 1			.01						
ER 1	.12	1.08		.09	.80		-.08	- .65	
Step 2						.09*			
Test Grade				.30	2.85*		.27	2.62*	
Step 3									.05*
ER 2							.28	2.21*	

$F(3,80) = 4.91$, $p < .01$, * indicates $p < .05$

Table 12

Regression to Examine Change in Expected Final Grade Correlates

Step and Variable	Step 1			Step 2			Step 3		
	β	t	ΔR^2	β	t	ΔR^2	β	t	ΔR^2
Step 1			.12*						
E 1	.08	.70		.09	.06		.00	.04	
ER 1	.24	2.21*		.18	1.89		.11	.99	
Time Study	-.26	-2.26*		-.19	-1.93		-.17	-1.39	
Review	-.02	- .18		.02	.22		-.05	- .42	
Step 2						.22*			
Test Grade				.48	5.19*		.43	4.77*	
Step 3									.08*
E 2							.16	1.46	
ER 2							.20	1.73	
Time Study 2							.09	.77	
Review 2							.24	2.06*	

F(9,75) = 6.22, p < .01; * indicates p < .05

Figure 1

A general model of Self Regulated Learning Theory as seen in Zusho and Pintrich, 2003