Differences in Motivation and Cognitive Learning Strategy Use from High School to College and Impact on First-Semester College Grade Point Average

by

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Abstract

The academic success of a college student is dependent upon many factors, among which are motivation and learning strategies. A substantial amount of research using these variables has been done; however, there is a lack of studies that address differences in motivation and learning strategy use from high school to college.

One purpose of this study was to determine if motivation and learning strategy use differs from high school to college. A second purpose was to determine if motivation and learning strategies used in college are significantly related to first-semester college grade point average. College students enrolled in an engineering orientation course responded to the Motivated Strategies for Learning Questionnaire (MSLQ), revised to elicit responses for high school and for college. Resulting data were analyzed using multivariate and univariate analyses of variance as well as multiple regression analyses.

Results from the multivariate and univariate analyses indicated that differences existed in motivation and learning strategy use in high school and in college. Means for the six MSLQ motivation scales were significantly different with those for college being higher than those for high school with the exception of the mean for self-efficacy which was higher in high school. Means for eight of the nine MSLQ learning strategy scales were significantly higher for college. No significant difference was found for help seeking.

The regression analyses yielded significant multiple correlations between first-semester college grade point average and the weighted combination of the MSLQ motivation variables

and learning strategy variables, respectively. From the univariate perspective, a significant relationship was found between first-semester grade point average and the motivation variables of task value and self-efficacy for learning and performance. As well, a significant relationship was found between first-semester college grade point average and the learning strategy variables of time and study environment, effort regulation, and help seeking.

These findings support the hypothesis that motivation and learning strategy use are more pronounced in college than in high school. Given the evidence that motivation and learning strategy variables were related to collegiate grades underscores their importance. However, relationships found were not of the magnitude to warrant making academic decisions based only on MSLQ variables.

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CHAPTER I. INTRODUCTION

In *Leaving College: Rethinking the Causes and Cures of Student Attrition* (1993), Tinto

found that 4 out of every 10 students leave 4-year postsecondary institutions without obtaining a

degree. Further, Tinto, a well-known researcher in student retention, indicated that the first year

is one of the most important in the student's collegiate career. Considering these statistics,

educators may have cause to be concerned with what students are learning in high school and

how they are being prepared for college. Students, as well, can no longer expect to use the same

passive strategies that may have worked in high school. As college students, they must take

responsibility for their learning and actively engage in the learning process if outcomes are to be

positive.

In Richard Light's *Making the Most of College: Students Speak Their Minds* (Harvard

University Press, 2001), students reported that most problematic for those who struggle

academically is that they "continue to organize their work in college the same way they did in

high school" (p. 37).   In recent years, however, there has been a focus on engaging students in

their learning process at the collegiate level. There has been a host of academic support and

retention programs and courses developed to address issues of retention and attrition (Hofer &

Yu, 2003; Newton, 1990; Petrie & Helmcamp, 1998; Pintrich, McKeachie, & Lin, 1987; Russell

& Petrie, 1992). In some programs goal orientation, social problem solving, and social

competence are incorporated into the program, while in others the focus is on a multimodal

counseling approach to address issues that promote academic success. In all, the emphasis

should be more than just content aimed at improved study methods or behavioral change, but must incorporate both motivation and cognitive aspects. Weinstein and Mayer (1986) wrote about learning strategies as

behaviors and thoughts that a learner engages in during learning and that are intended to influence the learner's encoding process. Thus, the goal of any particular learning strategy may be to affect the learner's motivational or affective state, or the way in which the learner selects, acquires, organizes, or integrates new knowledge. (p. 315)

In the *Social Construction of Learning,* Bredo (1997) described the psychology of learning from a behaviorist's perspective as a focus on behavior and the stimulus-response interaction. One learned through adaptation and habit, with little emphasis on thought. In the 1950s and 1960s, there was a shift in learning theory away from behaviorism to a cognitive perspective. From a cognitive view, the mind is more central in determining how individuals learned and organized knowledge (Quible, 2006; Weinstein & Mayer, 1986). Bredo asserted that learning was not dependent on an external locus but rather on an internal function; it was the process not the outcome that was important.

Cognitive factors indicate how the student processes and organizes information in memory for later retrieval. These strategies include elaboration, rehearsal, and organization and are often referred to as active learning strategies. Weinstein and Mayer (1986) pointed out that learners have control of how they encode information and what strategies to utilize based upon the outcome and performance desired. Learning tasks may require basic or complex learning strategies. A more complex cognitive learning strategy is metacognition. Metacognition is the ability to control and regulate cognition and is a critical component to self-regulation. Self-regulation is considered a defining attribute between successful and unsuccessful learners

(Pintrich, 2004; Pintrich, Smith, Garcia, & McKeachie, 1991; Watson, McSorley, Foxcroft, & Watson, 2004; Zimmerman, 1986, 1989).

In addition to the use of cognitive and metacognitive strategies, learners need to be motivated to achieve their desired outcomes. Motivation is widely thought to be a key factor in student learning and achievement (Eccles & Wigfield, 2002; Mealy, 1990; Pajares & Schunk, 2001; Schunk, Pintrich, & Meece, 2008; Wigfield & Eccles, 2002). Motivation and self-regulation are interrelated as noted in Schunk (1996); he infers that effective learning requires not only the regulation of cognitive factors but also the regulation of motivation. It is motivation that drives learning and the use of strategies. Weinstein and Mayer (1986) reported on the effectiveness of teaching of cognitive and metacognitive strategies that positively influence motivation, attention, memory, and comprehension.

Pintrich and Garcia (1991) used the social cognitive model that integrated motivational and cognitive variables. Cognition was viewed as knowledge, as in declarative (what do they know about the course) and procedural (how is the course organized), and learning and thinking strategies. They defined motivation in three general components: expectancy, value, and affect. Expectancy refers to beliefs about accomplishing a task as measured by self-efficacy (the expectancy for success and the ability and self-belief to accomplish a task) and control of learning beliefs (effort equals outcome). Value refers to the reason an individual engages in a task which may be intrinsic goal orientation, extrinsic goal orientation, and task value. Affect includes test anxiety which has a cognitive (worry) component and an emotional component (affective and physiological aspects). Worry deals with negative thoughts and has been found to have a negative impact on performance. Having an intrinsic orientation means doing the task because it is challenging and there is a curiosity and a desire to master the task. Extrinsic goal

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orientation is one where the student engages in the task for reasons that relate to grades, performance, evaluation by others, or competition. Task value is the emphasis placed on interest, importance, and usefulness of the task as considered by the student. This construct answers why the student is engaged in the course. A high task value implies more involvement in learning.

Weinstein and Mayer (1986) asserted the need for strategy development and the use of self-regulated learning strategies in strategic learning. Their learning model sought to explain learning as an interaction between ability, motivation, metacognition, and behavior that guided the learner toward a desired outcome. Their model consisted of three strategic elements which included cognition, metacognition, and motivation. Cognition is how information is acquired, processed, and retrieved. Cognitive strategies include rehearsal, elaboration, and organization. They are meant to assist the learner in taking in information and structuring it in a manner that assists in retrieval. These strategies impact the memory processes and help to actively engage the learner in the learning process. Metacognition is monitoring one's cognitive thoughts. Early research on metacognition came from John Flavell (1979). His concept of metacognition was what a learner knows about his or her cognitions. Not only did it include the knowledge about content but also the strategies to employ to master the content, which included use of prior knowledge. A major process, according to Flavell, was the ability to monitor one's thoughts in order to effectively use the knowledge and cognitive strategies. This concept is also known as self-regulation which is a directed process where learners use their cognitive abilities to guide, monitor, and change their academic skills (Zimmerman, 2002).

Pintrich et al. (1991) expanded on Weinstein and Mayer's (1986) model of learning as they believed other factors were also conducive to learning. These factors were defined as

resource management strategies and included time management, regulation of attention and effort, and collaboration with others. Along with cognitive strategy use and metacognitive self-regulation, resource management strategies could further enhance learning and performance. A motivated learner who possessed these traits and strategies would, Pintrich and his colleagues thought, have positive academic outcomes both in learning and in attitudes toward learning.

The Motivated Strategies for Learning Questionnaire (MSLQ) grew out of the need to assess motivational orientation and cognitive learning strategies in a Learning to Learn course in the early 1980s (Duncan & McKeachie, 2005; Pintrich et al., 1991). Through multiple studies the general model of college student motivation and self-regulation was borne. Essentially, the results indicated that students who use deep learning strategies and who think about their learning, allowing their behavior to be guided by metacognitive strategies and self-regulated learning, are more likely to perform better in their academic pursuits. From a motivational standpoint, these students tend to have a higher self-efficacy and a lower test anxiety and tend to engage in deep learning strategies more than those students with less adaptive motivational beliefs (Duncan & McKeachie, 2005; Garcia & Pintrich, 1995).

Problem Statement

Given that the first year is one of the most important and crucial times in college, it is important to understand what motivates students and what interventions can be put into place to help them develop strategies that promote academic success. There is an abundance of literature on motivation and learning at the primary, secondary, and higher education levels. However, lacking in the literature is an understanding of the motivation and cognitive learning strategy constructs in high school as compared to college. In order to understand better the learning needs of today's student, it would be advantageous to determine if differences exist in the

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motivation and cognitive learning strategies of high school students as compared to college students.

Since retention is a crucial concern in colleges and universities as a whole, it would also be important to know how motivation and cognitive variables relate to grades. There appears to be a lack of research regarding motivation and cognitive learning strategy factors, such as those measured by the MSLQ, that predict first-semester college grade point average.

Purpose of the Study

One purpose of the study was to examine the motivation orientation and learning strategies used by college freshmen as compared with their motivation orientation and learning strategies used in high school. A second purpose was to determine if the motivation and cognitive learning strategies assessed by the MSLQ are related to first-semester college grade point average.

Research Questions

The following research questions were investigated in the study.

1. Are there significant differences between the motivation orientation as measured by the MSLQ of college freshmen when comparing high school to college?

2. Are there significant differences between the cognitive learning strategies as measured by the MSLQ of college freshmen when comparing high school to college?

3. What is the relationship between the MSLQ motivation orientation and first-semester college grade point average?

4. What is the relationship between the MSLQ cognitive learning strategies and first-semester college grade point average?

Limitations of the Study

There are limitations to this study that impact generalizability. The sample was not randomly selected and was limited to a sub-sample of first-time entering freshmen in engineering and cannot be generalized to other majors, students, or groups at other institutions of higher learning. Students who were absent during administration of the instrument were not included in this study.

Precautions should be taken as the instrument is a self-reported questionnaire. Inherent in self-report questionnaires are issues related to validity and reliability. Duncan and McKeachie (2005) reported that there is difficulty in maintaining reliability when measuring constructs that are context specific. In addition, there may be certain limitations when recalling distant information as in high school motivational orientation and cognitive learning strategies. Further, when examining construct validity, social desirability issues should be closely examined. Individuals who desire to portray themselves in a positive light may be reluctant to make a negative self-report.

Finally, any differences found should be noted with caution, as "a difference to be a difference must make a difference" coined by Stein (as cited in Pedhazur & Schmelkin, 1991). In order to determine if differences are meaningful, further research would need to be conducted, perhaps measuring outcomes against the variables measured by the MSLQ within a given context. A qualitative inquiry or mixed-methodological investigation may also be helpful to obtain rich data in determining if differences exist from high school to college.

Significance of the Study

Institutions of higher learning are always concerned about attrition rates. As noted by Tinto (1993), 4 out of every 10 students leave 4-year postsecondary institutions without

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obtaining a degree. In specific areas such as engineering, Besterfield-Sacre, Atman, and Shuman (1997) reported that only 50% of the students who enter engineering actually graduate in engineering. The first year is crucial in a college student's academic career; therefore, any research that can help bolster academic success is important.

Utilizing the MSLQ to examine the motivational orientation and cognitive learning strategies of college freshmen provides a realistic approach in helping bridge the gap for both students and educators in identifying motivational and cognitive factors that contribute to or hinder success. Although the MSLQ has been used to measure motivational orientations and learning strategies on many college campuses, a significant portion of the research has been focused in specific courses or disciplines. The present study appears to be unique in its focus on measuring motivation and learning in the same population from high school to college.

CHAPTER II. LITERATURE REVIEW

There is an abundance of research on motivation and learning. It is logical to expect that motivation and learning are interrelated constructs that impact academic performance. This review follows the motivation and cognitive learning models presented by Pintrich et al. (1991). The discussion will begin with the construct of motivation and will then transition to the cognitive learning construct. Information is presented in the following sections: (a) Expectancy: Self-Efficacy and Control of Learning Beliefs; (b) Goal Orientation and Task Value; (c) Test Anxiety; (d) Cognitive Strategies: Rehearal, Elaboration, Organization, and Critical Thinking; (e) Metacognitive Self-Regulation; (f) Resource Management: Time and Study Environment, Effort Regulation, Peer Learning, and Help Seeking; and (g) Summary.

Motivation

Expectancy: Self-Efficacy and Control of Learning Beliefs

Self-efficacy is conceptually grounded in social cognitive theory which indicates that achievement is largely based on one's behaviors, cognitions, and social environment (Bandura, 1986). Bandura (1977) defined self-efficacy as a set of beliefs one has about his or her competence in carrying out a task or course of action. He indicated that self-efficacy is task specific, rather than an aspect of personality. In his research, he found that those with high self-efficacy tend to persist and have increased effort. Effort is guided by self-satisfactions or dissatisfactions. Performances or outcomes that fall below the goal lead to discouragement and

abandonment of the goal. Performances that somewhat meet the goal may cause dissatisfaction but lead to increased effort, whereas performances that surpass expectations create self-satisfaction that lead to additional goals and pursuits (Bandura & Cervone, 1983).

The model advanced by Pintrich and Schrauben (1992) further indicates that motivational beliefs are situation specific rather than traits of the individual. Efficacy is measured by one's expectancy for success regarding classroom tasks and the belief about the ability to accomplish such tasks (Pintrich et al., 1991). Self-efficacy beliefs contribute to motivation, learning, and achievement (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Pajares & Schunk, 2001; Schunk, 1995).

Causal research by Bandura et al. (1996) examined how psychosocial influences such as family, peer, self processes, and socioeconomic status affect academic achievement through self-efficacy. Socioeconomic status had a significant impact on academic efficacy. Academic and self-regulatory efficacy was found to be linked to academic achievement. The findings of this research support the varied ways in which self-efficacy beliefs contribute to academic achievement.

There is a wealth of research that links self-efficacy to self-regulated learning (Shell & Husman, 2008; Zimmerman, 1998; Zimmerman, Bandura, & Martinez-Pons, 1992; Zimmerman & Kitsantas, 2007). Zimmerman (1998) argued that self-efficacy is a key component that guides regulated behavior. He examined the implications of academic studying from a self-regulatory perspective and presented six dimensions that exemplary students and experts employ plus the role of these processes and self-efficacy in academic studying. He also discussed a cyclical self-regulatory model for study instruction.

Zimmerman (1998) pointed out that self-regulatory behaviors are context specific so as to assist the student in academic achievement. He proposed that motive or motivation provides the framework for the other five processes of academic studying. The psychological dimensions of motive, method, time, behavior, physical environment, and social aspects are explained by asking the why, how, when, what, where, and with whom questions, respectively. These questions prompt a specific process that relates to academic studying in a multidimensional and contextual manner. The components of self-regulatory processes are goal setting and self-efficacy; task strategies, imagery, and self-instruction; time management; self-monitoring, self-evaluation, self-consequences; environmental structuring; and selective help seeking. He reviewed research in self-regulated learning, incorporating learning strategies and techniques that address each of these self-regulatory processes for writers, athletes, musicians, and students. He emphasized that such strategies are used across diverse tasks and are maintained throughout life for daily living activities—not just in formal contexts.

Research by Schunk and Ertmer (1999) examined how goals influence self-efficacy, achievement, and self-regulation. There were two types of goals involved in their research: process goals and product goals. Process goals require the individual to learn a strategy that increases knowledge or skills such as, in this case, learning a computer application. Product goals focus on the outcome, which, in their research, was the computer application. With process goals, the students had the opportunity to judge their own competence and make changes as they learned. Being able to self-evaluate and note progress led to self-efficacy and self-regulation competence for learning the computer application.

Jackson (2002) examined the relationship between self-efficacy beliefs and test performance in an introductory psychology course. He found that self-efficacy beliefs predicted

exam performance. In a systematic intervention of encouragement through a note from the professor, some students were given a note designed to enhance efficacy and others were given a neutral note. With four strategies, the self-efficacy note emphasized past success in the class, both of the learner and classmates; provided encouragement and persuasion; and gave stress-reduction tips. Jackson's research seems to support the assertion by other researchers that self-efficacy is socially and situationally grounded (Bandura, 1986; Pintrich & Schrauben, 1992; Pintrich et al., 1991).

Control of learning beliefs indicates that outcomes are contingent on effort as opposed to outside sources such as teachers or luck (Duncan & McKeachie, 2005; Pintrich et al., 1991). If effort does indeed direct performance, then it might be said that one can effect change by varying effort. This notion assumes an internal locus of control as opposed to an external locus of control, which may be viewed as having little impact on learning.

Control of learning beliefs is closely aligned with Weiner's attribution theory (2000). He described two types of attribution processes: intrapersonal and interpersonal. Intrapersonal represents within-person factors such as thoughts, emotions, and effort that guide outcomes. Interpersonal are external factors such as the influence upon outcomes of others, luck, or the environment. Weiner indicated that those who believe outcomes are more closely related to internal causes such as effort and ability tend to experience a greater emotional response, whether it is success or failure. Pintrich and Schunk (2002) also support that those who feel in control of their learning have more success than those who believe they have no control, often labeled as learned helplessness. Those who link success to effort and ability tend to be more motivated and continue their efforts.

Schunk (1994, 1996) has shown that positive attributions of competence help sustain motivation to learn. He described the role of attributions on self-regulatory competence along three dimensions: internal or external, stable versus unstable, and controllable or uncontrollable. Ability was seen as internal, stable, and uncontrollable; effort was viewed as internal, unstable, and controllable. If success is attributed to high ability then there is a higher degree of self-efficacy than if it is attributed to unstable causes such as effort and luck. According to Schunk, the learner will tend to experience the emotions of pride or shame when outcomes are attributed to internal causes (ability) as opposed to external causes.

Control beliefs are thought to be interconnected with motivation theory (Pintrich, 2003) and self-determination theory (Ryan & Deci, 2000). Pintrich, however, indicates there is no one theory that relates control beliefs to motivation. Ryan and Deci have expanded the traditional goal orientation of intrinsic versus extrinsic motivation to a self-determination or autonomous model where learners operate from an extrinsic motivational pattern but self-determine their goals and values.

To determine if patterns of control beliefs would align themselves along traditional lines of goal orientation (extrinsic and intrinsic), Shell and Husman (2008) examined students' control beliefs for learning versus achievement outcomes in an undergraduate educational psychology course. Using canonical correlations, they found latent variables similar to Ryan and Deci's (2000) description of self-determination theory as an intrinsically, motivated, autonomous student who valued knowledge building as well as variables more closely labeled with a mastery goal orientation. Their hypothesis was partially supported in that the good strategy user or the motivated student did have high perceived control of learning beliefs; however, the results did not indicate a positive relationship for control of learning beliefs as it related to grade outcome

(achievement). This research supports earlier assertions by Vispoel and Austin (1995) who noted that there is no significant relationship between attribution constructs and achievement.

Goal Orientation and Task Value

Motivation is thought to be a significant factor in goal-directed behavior (Dweck & Leggett, 1988; Pintrich, 2004; Pintrich & Schunk, 2002; Wigfield & Eccles, 2000). Consequently, there has been a significant amount of research that focuses on why students pursue certain goals and tasks. This research commonly focuses on what is known as achievement goal theory, which indicates that goal orientation can be a strong predictor of student achievement (Dweck & Leggett, 1988; Elliiott & Harackiewicz, 1996; Pintrich, 2000a; Wolters, 2004).

Researchers have identified some basic constructs on which achievement goal theory is based. Earlier models in goal theory indicated there were essentially two approaches that explained goal orientation (Pintrich, 2000a; Wolters, 2004). One approach is defined as a mastery approach where the individual is focused on developing competence and mastering the task or material for the sake of learning (Pintrich, Conley, Kempler, 2003). The second and somewhat opposite goal structure is based on those who desire to outperform or demonstrate their competence in comparison with others, defined by Pintrich et al. (2003) as having a performance goal orientation. Using prior research, Dweck and Leggett (1988) examined a research-based model that focused on mastery-oriented and helpless patterns in terms of cognitive, affective, and behavior as they identified goal choices and motivational and personality processes. Two major patterns of cognition, affect, and behavior were identified: maladaptive or helpless responses and adaptive or mastery-oriented responses. The helpless pattern is characterized by the avoidance of challenging tasks and a deterioration of performance

when faced with a challenge. The mastery approach is defined as seeking challenges and persisting under difficult tasks. Dweck and Leggett further defined goals in terms of performance goals, where the focus is on extrinsic factors such as judgments by others, and learning goals, where the focus is on increasing competence. The response pattern depended on the different goal orientation, learning versus performance. They hypothesized that those with a performance orientation viewed intelligence as a fixed entity while those with a learning orientation viewed intelligence as malleable.

Similar to Dweck and Leggett (1988), other researchers (Harackiewicz, Barron, Pintrich, Elliott, & Thrash, 2002; Pintrich, 2000a) describe a normative model of goal theory that is in need of revision. They noted that mastery goals focus the student toward learning and mastery of the content or task. Adaptive outcomes of self-efficacy, task value, interest, positive affect, effort, and the use of metacognitive and cognitive strategies are related to a mastery orientation. In contrast, having a performance goal orients the students toward concern for their ability in comparison with others and avoidance of looking incompetent. Performance goals are seen as having less adaptive influence on motivation, affect, strategy, and performance. However, Pintrich (2000a) looked at research where performance goals may actually result in better performance and achievement and mastery goals are linked to intrinsic interest in the task. He called this a revised goal theory where approach performance goals and avoidance performance goals direct different outcomes from normative goal theory. Having an approach performance goal means one is driven to outperform others by demonstrating his or her ability and competence. An avoidance performance orientation focuses on not appearing incompetent, which leads to avoidance of the task. Maladaptive patterns tend to occur in the avoidance performance groups. Similar to Pintrich and others, research that encompasses approach and

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avoidance goals tend to have positive relationships in course achievement for college students (Church, Elliot, & Gable, 2001; Wolters, 2004).

Wolters (1998) examined the strategies used by college students to regulate their extrinsic and intrinsic motivation. Using the goal orientation and strategy use scales of the MSLQ, in addition to an open-ended questionnaire, the author determined that college students received higher grades when they promised themselves extrinsic rewards for earning higher grades. Rewards given might be to take a break after reading a certain number of pages and were not always tied to mastering the task or any level of deep processing, but rather just getting the task accomplished. These outcomes are somewhat contradictory but are believed to be effective when students can regulate and have control of the selection of the extrinsic reward (Deci & Ryan, 1990).

Pintrich (2000a) and Harackiewicz et al. (2002) suggested that there may be multiple pathways that lead to different patterns of motivation, affect, strategy use, and performance but which result in the same outcomes of achievement and performance. In general and according to prediction, Pintrich found that motivation, affect, and strategies became less adaptive over time regardless of goal orientation, with adaptive beliefs and strategies declining and other less positive variables increasing over time. In support of his revised goal theory, Pintrich did substantiate that students low in mastery but high in performance goals had higher initial levels of interest and value than the low mastery and low performance group.   The high performance goals group also reported more cognitive strategy use than those low in performance goals. Ryan and Pintrich (1997) described goal orientation in relation to help seeking in three ways: task-focused goals, which are those that guide the learner's desire for insight and understanding of a skill or task; extrinsic goals where the learner is guided toward some extrinsic reward or

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avoidance of punishment; and finally a relative ability goal, where the learner demonstrates high ability to garner favorable judgment in relation to others. Overall, their research demonstrated that having a task-focused approach led to adaptive help seeking, that is help seeking that focused on mastery and learning the task, whereas having an extrinsic and relative ability goal orientation resulted in a perception of help seeking as a threat to personal competence when asking for help from peers and teachers.

In similar research, Harackiewicz, Barron, Tauer, and Elliot (2002) sought to extend previous research on college freshmen regarding achievement goals as related to ability, high school performance, and achievement motivation. Their research included ability measures using admission data of the ACT and SAT tests, high school achievement outcomes (individual performance relative to their class), and an achievement motivation measure collected in the first semester. To gain a full academic picture of their college career, data were collected after 7 years. They found that ability and high school performance predicted academic performance in both the short-term and the long-term. However, goal effects for academic performance were seen in the short-term, but not in the long-term. Those students who had a performance approach had higher grades in the first term and those who adopted a work avoidance approach had lower grades their first semester. Contrary to what they predicted might happen, there were no long-term effects on academic performance for those students who had a mastery approach, leading the researchers to conclude that college students tend to operate with a performance approach attitude.

It appears that both revised goal theory and normative goal theory have influence over the development of motivation and achievement in a school context. Having a high approach performance goal, when paired with a high mastery goal, does not weaken the effect of a high

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mastery goal. With revised goal theory, it appears one who adopts a performance approach can develop adaptive patterns of motivation, affect, cognition, and achievement as readily as those with a mastery approach. In their examination of revised goal theory where learners can have both mastery and approach orientations that lead to positive outcomes, Harackiewicz et al. (2002a) asserted that learners also have different affective experiences that determine goal orientation and achievement.

While goal orientation prompts the learners to ask why they are engaging in a task, task value indicates the interest, importance, and usefulness of the task (Pintrich et al., 1991). Task value grew out of the expectancy-value theory. Wigfield and Eccles (2000), long-time researchers of children's achievement motivation, discussed expectancy-value theory of motivation. According to them, expectancy-value theorists argue that individuals' beliefs about their competence will guide their choice, persistence, and performance for a task or activity. It also determines the value and importance they place on the task or activity. This belief is also known as task value. Their discussion focuses on the nature of expectancy and value constructs, how they develop, and how they relate to children's and adolescents' performance and choice. Their model proposes that expectancies and values have a direct influence on achievement choices and also involve effort and persistence. Expectancies and values influence ability beliefs, perceptions of difficulty, and the individual's goals, self-schema, and affective memories. Ability beliefs tend to center on perception of competence toward an activity. In defining the constructs of motivation, Wigfield and Eccles posited that ability beliefs are different from expectancies for success. Ability beliefs are most often measured against a task, which indicates specificity, whereas ability beliefs and expectancies are more general and domain specific. Building on earlier work by Eccles, they examine subjective components of

achievement values such as interest, importance, intrinsic value, utility value, and cost. Each of these components has a specific value to the learner such as how the task fits into future plans, what one might have to give up to complete the task, or the effort required.

Bong (2001) discussed task instrumentality, which is the likelihood of reaching a goal through task completion. In this study, Bong operationalized task value as the usefulness, importance, and intrinsic interest students felt about a subject. Both concepts are closely related to achievement motivation in that the probability of success increases the task value. Similarly, Husman, Derryberry, Crowson, and Lomax (2004) studied instrumentality and task value. Instrumentality is said to be future focused, meaning a task is completed for a future reward or to reach a future goal, whereas task value has no time limit. The researchers further defined a concept known as endogenous instrumentality, where the task at hand is useful to satisfy a future goal, such as learning information from a course in the present that will benefit learning in a future course. Using the intrinsic motivation and task value scales of the MSLQ, the researchers sought to investigate the relationship among perceived endogenous instrumentality, intrinsic motivation, and task value, asking specifically, do these constructs exist and does endogenous instrumentality support intrinsic motivation and task value? From structural equation modeling, three unique variables emerged. Endogenous instrumentality and intrinsic motivation were separate but supportive constructs as were intrinsic motivation and task value; however, task value and endogenous instrumentality were weakly related. The weak relationship is proposed to exist because of the future orientation of instrumentality and the lack of time associated with task value. Essentially, there was no utility value for the task in future goals.

Test Anxiety

That test anxiety has a detrimental effect on academic performance is well documented (Klejin, van der Ploeg, & Topman, 1994; Schunk, Pintrich, & Meece, 2008; Zeidner & Matthews, 2005). Test anxiety can be defined as worry during a test, which can lead to a negative impact on test performance. Worry is believed to interfere with test performance by preventing the learner from retrieving information as opposed to being attentive and using effective information processing skills during the test (Bembenutty, 2008; McKeachie, Lin, & Middleton, 2004; Zeidner & Matthews, 2005).

Researchers have focused on two general models to explain the effects of test anxiety. One model explains test anxiety as having poor study or test-taking skills, known as a learning deficits model (Klejin et al., 1994; Tobias 1985). With a learning deficits model, the learner is anxious about the test, which prevents effective use of cognitive strategies such as elaboration, rehearsal, and organization. A second approach is referred to as the interference model, where the learner spends more time on negative thoughts during the test, preventing retrieval of information (Bembenutty, 2008; McKeachie et al., 2004).

Using a modified version of the MSLQ, Bembenutty (2008) assessed test anxiety and found a negative correlation with motivation, use of cognitive skills, and academic performance. Further, there were significant main effects for self-efficacy, perceived competence, and final grade; however, no significant effects were found for intrinsic motivation, task value, and expectancy for success. These findings suggest that worry does hinder the cognitive capacity for thinking and retrieval of information during a test.

In examining two types of high test-anxious students, Naveh-Benjamin, McKeachie, and Lin (1987) found evidence to support that worry prevented retrieval of information and poor

information processing skills contributed to poor performance. They could not distinguish between poor strategies causing anxiety or anxiety causing poor strategies. The research did indicate that one type of high-anxious students focused on rote memorization tactics, which they attributed to lack of cognitive capacity caused by worry and the inability to devote more time to deeper learning strategies.

In follow-up studies, McKeachie et al. (2004) looked at low-anxious students who highly resembled high-anxious students in a 1987 study where they used the MSLQ to assess test anxiety along with motivational constructs such as goal orientation, self-efficacy, and intrinsic and extrinsic motivation. They also looked at learning strategies such as organization, elaboration, and rehearsal. Their results indicated that the low-anxious students were low in organization and elaboration strategies, self-efficacy, task value, and intrinsic motivation, suggesting that they were high anxious and not low anxious as they had reported.

Tobias (1985) suggested when students have good study skills and test-taking strategies, less time is spent on worry and more time on using the necessary cognitive skills for the test. Those with good study habits who also experience high anxiety fall into a somewhat different group. These students have interruptive thought patterns during the test, which prevent them from retrieving the information previously learned. There is little room for thinking and using appropriate strategies because working memory is overcome with worry and negative thoughts.

More recent research has focused on test anxiety and self-regulation (Bembenutty, 2008; Schunk et al., 2008; Kitsantas, Winsler, & Huie, 2008). It is believed the strategies used by self-regulated learners may moderate the effects of test anxiety because the learners are able to recognize their learning patterns and employ the cognitive and behavioral skills that lessen the effects of test anxiety.

Cognitive Learning Strategies

Cognitive learning strategies are components of Weinstein's cognitive model of learning and information processing (Garcia & Pintrich, 1995; Weinstein & Mayer, 1986). There are three general cognitive constructs that comprise these learning strategies: cognitive, metacognitive, and resource management. Cognitive strategies include rehearsal, elaboration, and organization strategies. Rehearsal strategies are those that help the student recall information from a lecture or text. The more complex strategies of elaboration include summarizing and paraphrasing. Organization is seen when a student compiles information in outlines or tables. Critical thinking, which is the use of previous knowledge applied to new situations or the ability to critically evaluate new information, is also a cognitive strategy.

Metacognitive control strategies encompass one's ability to control and regulate his or her cognition. Included are planning such as goal setting, monitoring comprehension of information, and regulating behavior or cognition.

Resource management incorporates resource control such as time management, study environment, and effort (persistence when faced with a difficult or boring task). Peer learning and help-seeking also show the students' use of others in their learning process. These general strategies will be examined in more detail.

Cognitive Strategies: Rehearsal, Elaboration, Organization, and Critical Thinking

In recent literature, there has been much emphasis placed on learning strategies and the link to academic achievement. A study by Tuckman (2003) demonstrated that motivation and learning strategies could be taught. College students who were taught study strategies/skills were found to have higher grade point averages than their counterparts who were not given the same instruction. Their success in one domain led to success in other domains—success breeds

success. The supposed link between learning strategy courses and achievement is evident by the number of strategy and learning courses that have been put into practice across college campuses (Hofer & Yu, 2003; McKeachie, Pintrich, & Lin, 1985; Newton, 1990) in recent years. The early 1980s saw special attention to models that incorporated not just strategy teaching and use but an integration of cognitive models that focused on deep learning, use of prior knowledge, awareness of self and thinking, and critical evaluation (Bohr, 1983; Vermunt & Vermetten, 2004; Weinstein & Mayer, 1986).

Weinstein and Mayer (1986) indicated there was a shift away from a behaviorist perspective of S-R (stimulus-response) where learning is passive to a cognitive approach where learning is active and the focus is on how information is acquired, processed, and structured. They asserted that learning outcomes depend upon the prior knowledge of the student and the cognitive processes used during the learning process. This is not to assume, however, that content knowledge translated to knowledge about how to learn, but rather good instruction emphasized learning strategies not only in theory but also in actual practice within the classroom setting. They identified rehearsal, elaboration, and organizational strategies as important cognitive strategies related to academic performance in the classroom. These strategies range from rote memory tasks such as recall of information to deeper learning tasks that require comprehension and application of information.

Rehearsal strategies involve the recitation or memorization of information where the focus is a surface learning approach (Lynch, 2006; Pintrich, 1999; Zusho & Pintrich, 2003). Rehearsal strategies might involve highlighting, underlining, recitation, or copying of information. The goal here is to involve cognitions that encode information into working memory for later recall and to direct attention (Pintrich, 1999; Weinstein & Mayer, 1983).

Gardiner, Gawlik, and Richardson-Klavehn (1994) identified two types of rehearsal that differentiated the ability to retrieve information. They found that elaborative rehearsal allowed the individual to utilize episodic memory which promoted conceptual learning and retention of information, whereas maintenance rehearsal allowed for familiarity of the material but not deep learning. Weinstein and Mayer (1986) also distinguished two types of rehearsal: those strategies involved in learning basic concepts and those required for more complex tasks. Both aid in the selection and acquisition of information, but they do little to help integrate material or make connections with prior knowledge.

Garcia and Pintrich (1994) found that rehearsal strategies suffice in acquiring and maintaining information in working memory, but such strategies alone are not sufficient for mastering college-level material. Elaboration strategies are those that promote a deeper level of learning. Such strategies include paraphrasing or summarizing material, analogies, imagery, generative notetaking, and teaching others (Pintrich, 1999; Weinstein & Mayer, 1986; Zusho & Pintrich, 2003). Weinstein and Mayer (1986) stated that the goal of using such strategies is to integrate new knowledge with prior knowledge to create meaning. Such strategies enhance the ability to retrieve information from long-term memory to working memory. In light of the research by Garcia and Pintrich, it could be assumed that college requires higher level thinking strategies and as students reach such levels, their cognitive strategies are more sophisticated and developed.

Garcia and Pintrich (1994) examined memory performance as measured by group discussion using peer interaction and an elaboration strategy called elaborative interrogation in an introductory psychology class. Their study highlights the learning benefits of sharing strategic knowledge. Students are able to share their methods of learning as well as their

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knowledge of certain content to benefit others. As a result, many teaching methods today focus on interactive and cooperative learning.

One rehearsal strategy tool is called elaborative interrogation (Pressley et al., 1992). This strategy focuses on the use of the learner's existing knowledge. Connections made using the learner's already existing knowledge seem to be the key factor in the effectiveness of elaborative interrogation. This type strategy use utilizes *why* questions, which according to Pressley and his colleagues activates prior knowledge. In a study by Willoughby, Wood, McDermott, and McLaren (2002) students' memory was assessed by asking *why* questions to several statements regarding material that was judged to be familiar and unfamiliar to the participants. Participants were in two groups: those who were provided elaboration to *why* statements and those who were able to generate their own answer to the *why* statements. The results appear to indicate that the learners' activation and association of familiar material with new material were vital in memory performance. They were able to make distinctions about what they already knew and relate it to the new information, allowing it to be more memorable. Use of prior knowledge suggests that having limited existing knowledge of a subject limits the effectiveness of this particular elaboration strategy, supporting the use of prior knowledge as a learning strategy.

Paired-associate learning is an elaboration strategy where imagery is involved to help relate items or recall information (Weinstein & Mayer, 1986). An example might be "sidewalk-elephant," where the student may be asked to form an image and make associations such as a story, song, or riddle for later recall of the targeted words. In a study of fourth-grade students, Cubberly, Weinstein, and Cubberly (1986) used imagery and sentence elaboration to improve performance outcomes for test-anxious students. The students were given imagery strategy training and were asked to recall word pairs (e.g. dog-book) using imagery and sentence

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elaboration. Students who were given the strategy training showed a significant reduction in the levels of test anxiety in self-report measures over the control group who received no strategy training.

In an international study aimed to address high failure rates and low graduation rates, Watson et al. (2004) looked at the motivation and learning strategy constructs as they related to academic performance using a first-year psychology class. Of the cognitive strategies, rehearsal, elaboration, and critical thinking were significantly correlated to academic performance. Particularly, students indicated a high use of elaboration strategies to get through psychology.

Lynch (2008) extended MSLQ research by examining outcomes based on course difficulty. He examined, among other facts such as motivation and resource use, the use of learning strategies such as elaboration, rehearsal, and organization between freshmen and upper level students in difficult courses as determined by the students. Outcomes from the study indicated that freshmen increased their use of elaboration and organization strategies as course demands increased. His research seems to further support what is well known in the literature: college level learning requires more than rote learning strategies. This research also indicated that learners adjusted their learning strategy use as course content became more difficult and complex.

Like elaboration strategies, organizational strategies require deeper involvement and the use of complex strategies by the learner. Pintrich and his colleagues (1991) did not make a clear conceptual distinction between organization and elaboration, but there are specific behavioral tasks that delineate organization strategies such as outlining material, selecting main ideas, and using graphs, charts, and tables to organize material. Such tasks promote deep learning as opposed to surface learning. Schuell (1983) indicated that the use of organization strategies

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leads to effective use of other complex memory strategies such as elaboration and rehearsal. Effective use of these strategies helps the learner sort out what is important versus what is not important material. It allows the learner to perform complex tasks such as summarizing material in his or her own words or in outline form. Simple and practical use includes rewriting notes, organizing material into easy-to-understand charts and hierarchies, categorizing, using time periods and graphic organizers like concept maps, or skimming a chapter. Transforming such material helps the learner remember and retrieve information.

As seen with other cognitive strategy use, prior knowledge allows the learner to make connections and structure information that is already known to knowledge that is being acquired. Vermunt and Vermetten (2004), in a review of student-learning research, described organization as a deep learning skill that requires relating and structuring elements of information to each other and to prior knowledge. The use of prior knowledge is also evident when the learner engages in critical thinking. Critical thinking is believed to take place when the learner takes previous knowledge and applies it to new situations to solve a problem or make decisions and evaluations (Garcia & Pintrich, 1992; Pintrich et al., 1991). Halpern (1989) stated that critical thinking is a higher-order cognitive engagement process. It is "purposeful, reasoned and goal-directed" (p. 5). Critical thinking implores the why and how of learning. To think critically is to ask for evidence and to look beyond the truth of an idea. Indeed Santrock (2001) reported that critical thinking has received much recognition by educators over the past decade. They not only wanted their students to know the correct answers but also wanted them to challenge themselves with deeper intellectual thought and questions. To produce critical thinkers is what college instructors strive to achieve.

To understand critical thinking better, Lloyd and Bahr (2010) sought to define it and determine its usefulness from the perspective of students and faculty. While both groups had similar definitions and understandings of the concept of critical thinking, the academicians tended to view it as a state of mind using processes and techniques, whereas the students viewed critical thinking as an outcome. Some of the faculty tended to view the students' use of critical thinking in terms of a surface approach to learning, while others saw its usefulness to students beyond the classroom. Students tended to have a different view, with the majority seeing improvements in their critical thinking skills since beginning their academic programs.

Savich (2008) looked at ways to improve critical thinking in high school history courses. He asserted that students are apathetic and view history as boring. From a teaching and learning perspective, rote memorization skills are all that is needed "because all you do is memorize accepted, dry and dead facts" (p. 3). His research sought to identify teaching and learning strategies that would improve critical thinking skills and motivate students to learn history beyond regurgitation of mere facts. Two high school groups were chosen; one group was taught using the lecture method, and one was taught using the inquiry method. The inquiry method included role playing, simulation, re-enactments, use of multiple texts, use of visual and oral presentations, exposure to bias through various viewpoints, analyses of documents, and use of original and primary sources. The results indicated that those who were taught using the inquiry method that emphasized critical thinking skills scored higher on tests, quizzes, and assignments and gained an overall deeper and meaningful level of understanding of history. Savich noted that a deeper understanding of history occurred when the critical thinking strategies were integrated into the course content and when the students were motivated and had value for such learning skills. The lecture method proved valuable when introducing a topic.

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This research indicates there is an inherent aspect of motivation and classroom context involved in critical thinking. Research by Pintrich et al. (1991) and Elliot and Dweck (1988) suggested that those students who were intrinsically motivated tended to use deeper thinking processes. Likewise, those who were more extrinsically motivated focused on grades and comparing self to others and tended to use surface learning strategies. Such evidence suggests that those who want to master information are willing to utilize any and all resources to achieve success.

Garcia and Pintrich (1992) conducted research with college students that examined the correlates of critical thinking as related to motivation, use of cognitive learning strategies, and classroom experiences. This study, using 758 participants from three universities enrolled in three disciplines, was conducted over a school-year period. Using the MSLQ as a pre- and posttest measure, they found a positive relationship between motivation, deep learning, and critical thinking. Specifically, their research indicated that critical thinking, intrinsic goal orientation, rehearsal, elaboration, and metacognitive strategies were positively correlated. The weakest link among these five correlates was the relationship between critical thinking and rehearsal. This finding is not surprising, given that rehearsal strategies tend to require surface-level strategy use (Lynch, 2006; Pintrich, 1999; Zusho & Pintrich, 2003).

When Garcia and Pintrich (1992) examined the results by the disciplines of biology, English, and social science, post hoc tests indicated that biology students had higher levels of goal orientation, rehearsal, elaboration, and metacognitive self-regulatory strategies as compared with those students in English and social science. Metacognitive self-regulation proved to be the strongest predictor of critical thinking for students in English. Metacognitive self-regulation includes planning, self-monitoring, and regulating. Classroom experiences, although less

powerful predictors of critical thinking when compared to individual motivation and deep processing, were positively related to critical thinking in terms of peer collaboration and the type of tasks involved. According to Garcia and Pintrich, the data indicated that cognitive engagement "appears to beget further cognitive engagement that implies going beyond the material to think critically about it" (p. 15).

Metacognitive Self-Regulation

Learning from a social cognitive view requires that the learner be actively engaged in the process. Active engagement, by its nature, assumes that the student is involved in the learning process. Active engagement is more than just knowing about a strategy; it means knowing what strategy to use in which context; it means monitoring, controlling, and evaluating behavior and cognitions and knowing when to change such behavior and cognitions to bring about meaningful and desired outcomes. The ability to monitor, change, and control cognitions is referred to as self-regulated learning (Pintrich & DeGroot, 1990; Zimmerman, 1986, 1989).

Zimmerman (2000) refers to self-regulation as "self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals" (p. 14). From a social cognitive perspective, self-regulation is examined using three cyclical phases: forethought, performance/volitional control, and self-reflection. Forethought involves the processes of task analysis and self-motivation beliefs. Task analysis is setting goals and learning outcomes and deciding what methods and strategies will assist in achieving the goals. Self-motivation is self-efficacy and the belief about the ability to perform effectively. Self-motivation guides the learner in goal setting and strategy use. Performance and volitional control is about the learner's self-control in performing tasks, using imagery, and focusing attention. Performance and willfulness also means self-observation where the learner tracks his or her

performance and provides self-feedback, making changes and adjustments in thinking and learning behaviors as needed. The final phase according to Zimmerman is self-reflection. In this phase, the learner evaluates his or her performance, determining what contributed to performance. If the learner is adaptive, he or she develops new strategies and focuses on goals and is typically intrinsically motivated. If not adaptive, the learner tends to procrastinate, avoid tasks, and have cognitive disengagement.

Further studies related to the specific context of math and self-regulated learning have been done by Pape and Smith (2002) and Meyer and Turner (2002). The difference between what an individual cannot do but can accomplish with the facilitation of another is referred to as Vygotsky's concept known as the zone of proximal development or ZPD (McCaslin & Hickey, 2001). Operating within the learner's ZPD, scaffolding is an instructional process where the teacher supports the students cognitively, motivationally, and emotionally while learning (Meyer & Turner, 2002). Meyer and Turner qualitatively examined how scaffolded instruction in math helps to develop students' self-regulatory processes. The authors emphasize the inherent social processes of this type of instruction in providing cognitive, motivational, and emotional support to students in math instruction.

Demetriou (2000) broadly defined self-regulated learning as "those actions aimed at modifying a system's state of being after the system detects a need for a change because of previously set goals" (p. 209). In Demetriou's definition, the system must meet three conditions: (a) include a self-monitoring function that controls information related to the system's state, (b) include a system of self-representations that assist in the evaluation of the activities or cues, and (c) contain self-modification strategies that could be applied to the current state or direct change to another state.

Another general definition of self-regulated learning depicts students as metacognitively, motivationally, and behaviorally active participants in their learning (Zimmerman, 1986). Through metacognitive processes, the learner plans, organizes, self-instructs, self-monitors, and self-evaluates. Self-regulated learners perceive themselves as motivationally competent, self-efficacious, and autonomous. In the behavioral context, self-regulated learners select, structure, and create effective learning environments. Zimmerman (1990, 2001) stated that there are three basic components included in most definitions of self-regulated learning: students' awareness of the value of the self-regulation processes, a self-oriented feedback loop, and rationale for choosing a particular self-regulated strategy. The self-regulated processes and strategies are directed toward the outcome of goal attainment (Pintrich, 2000b). Similarly, Archer, Cantwell, and Bourke (1999) described self-regulated learners as those who use their knowledge of learning to plan, organize, and monitor their own learning. An example they provided is a student who, when completing an assignment, will review his or her work, making adjustments in strategies based upon progress.

Motivation is a concept that threads throughout the definitions of self-regulated learning. The importance of motivational beliefs as related to learning and cognition is well documented in the literature (Pintrich & Schrauben, 1992; Pintrich & Schunk, 2002). What learners believe about their motivation influences their judgment regarding their capability to accomplish a task, also known as self-efficacy. It influences their value and interest in the task as well. Zimmerman (1990) described learning and motivation as interdependent processes in self-regulation. Use of effective self-regulated strategies is hypothesized to develop awareness of self-control, which is the motivational foundation for self-regulation during learning (Zimmerman, 1986). Tuckman (2003), in a study on motivation and self-regulated learning in

college students, found that student achievement through grade point average was higher after receiving training on learning and motivation strategy use over time. VanderStoep, Pintrich, and Fagerlin (1996) identified that higher achieving college students in natural and social science courses used more self-regulated strategies than lower achievers and possessed adaptive motivational beliefs.

Social cognitive perspectives differ from theories that seek to define self-regulation as a singular internal state or stage that is genetically endowed or personally discovered. From a social cognitive view, self-regulation involves cyclical interdependence of forethought, performance/volitional control, and self-reflection. Similarly, Vygotsky is widely known for his perspective on meaningful language with social influence. As expected, the role of social environment is critical. Higher psychological processes first begin in the social world and are then internalized. Vygotsky viewed the development of thought as a progression from social interaction to egocentric speech to inner speech (McCaslin & Hickey, 2001). The internalization of speech, in Vygotsky's view, becomes self-directing, thereby contributing to a person's self-regulation process through self-control and self-direction (Crain, 2005; McCaslin & Hickey, 2001; Schunk & Zimmerman, 1997; Zimmerman, 1986, 2001; Zimmerman & Schunk, 2001). McCaslin and Hickey discussed the social context of self-regulated learning and Vygotsky's perspective in terms of co-regulated learning which involves the teacher, parent, student, and opportunities in the learning environment. The teacher or parent involvement in self-regulated learning, according to Vygotsky, is termed scaffolding (Meyer & Turner, 2002).

To augment the understanding of self-regulated learning, a dialogue regarding the array of self-regulated learning strategies and their use is imperative. A self-regulated learning strategy is defined as an "action directed at acquiring information or skill that involves agency,

purpose (goals), and instrumentality self-perceptions by a learner" (Zimmerman & Martinez-Pons, 1986, p. 615). Fourteen self-regulated learning strategy categories from social learning theory and research were identified: self-evaluation, organization and transformation, goal setting and planning, information seeking, record keeping, self-monitoring, environmental structuring, self-consequences, rehearsing and memorizing, seeking social assistance, and reviewing (Zimmerman, 1990; Zimmerman & Martinez-Pons, 1986). Zimmerman (1998) identified several specific strategies and described how they could be used in a variety of contexts such as professional writing, athletics, music, and academics. These strategies are goal setting, task strategies, imagery, self-instruction, time management, self-monitoring, self-evaluation, self-consequences, environmental structuring, and help seeking.

A discussion of specific learning strategies provides an additional aspect of the self-regulated learning. The use of goal setting as an identified self-regulated learning strategy has mixed outcomes. A study (Wolters, Yu, & Pintrich, 1996) on eighth grade students and goal orientation showed that students with a learning goal orientation where mastery was the focus demonstrated higher levels of self-regulation than those with extrinsic goal orientation focusing on grades and rewards. Extrinsic goal orientation was found in this study to be detrimental to self-regulation. Studies with college students resulted in a different outcome for goal setting. Schwartz and Gredler (1997) investigated the effect of goal setting instruction on self-efficacy. Results showed that the group who received goal-setting instruction scored significantly lower than the control group on the self-efficacy for self-regulation learning material. This finding revealed that goal setting instruction may not lead to self-efficacy. Limitations of this study as stated by the researchers imply that perceptions and previous use of goals by the participants could have influenced the results.

Archer, Cantwell, and Bourke (1999) studied two groups of college students and their goal orientations. One group consisted of mature-age adults returning to college via an enabling program. The second group contained younger students who entered college based on their academic achievement. Goal orientations were described as either motivational (mastery or performance) or academic alienation (work avoidance). Results of this study showed that there was no relationship between motivational goal orientation and use of self-regulated strategies.

Reflection as a self-regulated learning strategy encompasses record keeping and self-evaluation. Kuiper (2002) studied nursing graduates and their use of reflective journaling. The results showed that nursing graduates incorporated critical thinking skills within self-regulation strategy use. Ertmer and Newby (1996) said that reflection allows the learner to make a distinction when applying procedures, to recognize when strategies could be used, and to transfer knowledge and strategies to different tasks.

Academically, self-regulation improved learning and achievement (Zimmerman, 1998). Three instruments to measure academic achievement using self-regulated learning strategies are documented in the literature. The three instruments are the Self-Regulated Learning Interview Schedule (SLRIS), Motivated Strategies for Learning Questionnaire (MSLQ), and the Self-Efficacy for Self-Regulated Learning Scale (SESRL). Studies using the SLRIS have shown that use of self-regulated learning strategies have a positive effect on elementary and high school students' academic achievement (Zimmerman & Martinez-Pons, 1986, 1990). Studies using the MSLQ demonstrated that high academic achievers use self-regulated learning strategies more often than lower achievers among pre-college students (Pintrich & DeGroot, 1990; Wolters, Yu, & Pintrich, 1996), college students (Andrew, 1998; Garcia & Pintrich, 1995; VanderStoep, Pintrich, & Fagerlin, 1996; VanZile-Tamsen & Livingston, 1999), and post-graduate medical

students (Barker & Olson, n.d.). Additionally, the SESRL has been used to measure the use of self-regulated learning strategies and academic achievement in college students (Garavalia & Gredler, 2002; Schwartz & Gredler, 1997).

Talbot (1997) questioned if college students could be trained in self-regulated learning. His paper identified the characteristics of the self-regulated learner and provided strategies for using self-regulated learning. He finalized his paper by stating that college teachers have the responsibility to offer students tools to become educated and responsible citizens.

Zimmerman (1998) provided suggestions for how educators can assist students to optimize their study methods using specific self-regulated learning strategies. A cyclical model for self-regulated learning was described by Zimmerman using four steps. Step one consisted of self-evaluation and monitoring to determine the effectiveness of the current study strategies. Step two was goal setting and strategic planning where the student identified specific learning goals and strategies to meet those identified goals. Step three included strategy implementation and monitoring for use of a specific strategy and evaluation of its effectiveness. The final step used strategic outcome monitoring which consists of ongoing evaluation of the studying outcomes to identify and adopt the strategy that has the optimal effectiveness. Zimmerman concluded that teaching these strategies for studying could lead the student to attain the goal of life-long self-education. Garavalia and Gredler (2002) stated that educators could teach self-regulated learning strategies as a supplement to the subject matter.

Inherent in self-regulation is the ability to understand, process, evaluate, and modify one's thinking and behavior in relation to the environment or context. Flavell (1979) referred to this ability as metacognition. A well-known researcher of metacognition, he believed that the learner's knowledge about self and the task was used to control his or her own cognitive

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behaviors. Metacognitive knowledge, according to Flavell, consisted of knowledge and

experiences. Knowledge refers to one's understanding about how he or she learns or thinks. A

student may realize, for example, that he or she learns better with music in the background as

opposed to a quiet room. There is also task knowledge where the learner knows the nature of the

task and demands of the task as related to his or her abilities. For example, a student may

understand that he or she will need a tutor for math, whereas history will come easy. Finally,

there is metacognitive strategy knowledge, where the individual has an understanding of what

strategy to use based upon the task and monitors use of such strategy to ensure it meets his or her

goals. It is knowledge about the strategies to use, when to use them, and knowledge of their

effectiveness. Flavell (1979) distinguished between cognitive and metacognitive strategies

indicating that "cognitive strategies are invoked to make cognitive progress, metacognitive

strategies monitor it" (p. 909). He did allow for overlap of the two, indicating it is how the

strategy is used that determines if it is a cognitive or metacognitive action. For example, a

learner might use a certain note-taking method to better understand a subject, which would be

cognitive learning. He or she may use that same note-taking method to formulate questions or

quiz himself or herself to improve success on the test. The latter indicates a metacognitive

strategy.

Metacognition has been described as thinking about one's thinking or an awareness of

thinking (Zimmerman, 1990). According to Corno (1986), metacognition—or the metacognitive

process—refers to knowledge or awareness that certain cognitive strategies will be useful.

Metacognition develops over time and is often based on the idea that experience is the best

teacher. If one attempt to solve a problem does not work, then another strategy is implemented

until the problem is solved. The learner grows more efficient until metacognition appears to be automatic.

Zimmerman (1986) labeled metacognition as the way students plan, organize, and monitor the learning process. Corno (1986) and Pintrich (2000b) imply that using metacognitive strategies may be automatic; as we employ metacognitive strategies, we become more efficient and adaptive in our use of these strategies. Ertmer and Newby (1996) described two types of metacognitive processes: metacognitive knowledge and metacognitive control. Knowledge as described by Ertmer and Newby is knowledge about self as a learner, knowledge about what tasks to use in a given context, knowledge about appropriate cognitive strategies, and finally knowledge about content—the learner's knowledge about a specific subject. Metacognitive control is the ability to utilize self-regulated learning strategies such as planning, monitoring, and evaluation.

Metacognitive decision-making depends largely on planning according to Zimmerman (1989, 1990). Planning relates to setting goals. Zimmerman (1989) indicated that learners set proximal goals that include specificity and difficulty level that relate or lead to long-term goals. Having a specific goal such as "I will read three chapters and summarize each section" would be more effective than "I will study harder" according to Zimmerman. Planning also includes analyzing the task. It also activates prior knowledge to better understand the material. Monitoring refers to checking one's own comprehension of the material. Comprehension includes checking one's attention while reading and self-testing with the material to understand what is known and unknown. Regulating means adjusting cognitions to improve performance. A learner who engages in regulating activities will evaluate what is working and what needs improvement and make the necessary corrections to behavior.

In a recent qualitative study using college students, the use of metacognitive reading strategies as related to self-regulation was explored (Nash-Ditzel, 2010). Three types of metacognitive knowledge—declarative, procedural, and conditional—were discussed. Declarative knowledge is what learners know about a task or subject—they know what strategy to use for comprehending difficult material. Procedural knowledge is how to carry out that reading strategy. Conditional knowledge means knowing when to utilize the strategy to improve comprehension. In the Nash-Ditzel study, students were enrolled in a developmental reading course and were taught the strategies of connecting personal experiences with the text or using prior knowledge, understanding vocabulary, making inferences, asking questions of the text, making summaries, and defining what is important in the text. The instructor used a think-aloud method to describe the strategies and the benefit to each student. The strategies were modeled by the instructor and the students practiced them throughout the semester. Initially, all the students seemed to possess some level of declarative knowledge about what strategies to use, but through the instruction, modeling, and use of these strategies, they moved from a declarative base to a deeper understanding of procedural and conditional use of the strategies. As their strategy knowledge base increased, they became more self-regulated in their reading. They regularly executed critical thinking by using prior knowledge and were able to make stronger inferences from the reading, which aided in comprehension. Of importance in this study was the students' ability to determine when a strategy was appropriate and when to transfer strategy use from one task to another, not only in the reading class but also in other academic and non-academic settings such as reading a newspaper. Being able to monitor and control strategy use has positive implications for the transfer of such knowledge to other courses and learning situations.

Using the MSLQ, Paulsen and Feldman (2007) studied the cognitive strategy variables of elaboration, organization, and metacognition as well as the behavior resource strategies of time management, study environment, effort, peer learning, and help-seeking to measure college students' beliefs about learning and knowledge. Students who had naïve beliefs about learning and the structure of knowledge, that is, that learning and knowledge is fixed and cannot be gained or improved upon, were less likely to use deep cognitive strategies as well as metacognitive strategies.

Resource Management: Time and Study Environment, Effort Regulation, Peer Learning, and Help Seeking

Resource management and effort are an important part of self-regulated learning (Duncan & McKeachie, 2005; Garcia & Pintrich, 1994; Pintrich, 2000b). The MSLQ addresses how students regulate and use the resources of time and study environment, management of effort, and the use of others in seeking help and collaboration (Pintrich et al., 1991). Using these four subscales to measure resource management, Pintrich and his colleagues found that effective learners who regulated their thinking would also control and regulate their use of external sources. Zimmerman and Martinez-Pons (1986) and Weinstein, Palmer, and Schulte (1987) included behavioral aspects of regulation in their research, indicating the importance of resource and time management for effective learning.

Time management includes management of study time by planning, scheduling, and prioritizing activities (Pintrich, 2004; Garcia & Pintrich, 1995; Pintrich et al., 1991). The learner may develop a study schedule of the week, outlining study periods for reading, doing homework, or reviewing for a test. Included in time management is effective use of the time by setting realistic goals for that study time. A realistic goal may be to read or review notes daily. The

study environment questions of the MSLQ focus on the setting where study takes place. According to Pintrich and his colleagues, the study environment should be conducive to learning. It should be quiet, organized, and free from distractions. It seems logical that learners who effectively manage their time and study environment tend to be successful in their learning, with the opposite holding true for those who have poor time management skills.

In a qualitative study (Balduf, 2009) that examined underachievement in college students, time management emerged as a factor the participants attributed for their lack of success. They had few skills to deal with the abundant free time they encountered in college. Students reported they did not know how to pace themselves in preparation for an exam, electing to study right before a test. Their poor time management skills perpetuated other maladaptive behaviors such as procrastination and minimizing one course to focus on another. This research emphasizes that some students enter college unprepared, even if they earned high grades in high school. Many fail to realize that skills utilized in high school do not translate or work in the college environment.

To emphasize the structure of the study environment, Wolters (1998) found that college students used a variety of techniques to control their environment when motivation was low, including studying in a quiet room, eating or drinking, taking breaks, or listening to music. Not only did these students change their environment, but also they used strategies to focus attention. Likewise, Zimmerman (2002) posited that self-regulated learning not only encompasses knowledge but also behavioral issues such as changing the physical and social context so that goals can be reached.

Using the MSLQ to identify factors that predict course grades of freshmen and upper-level college students, Lynch (2006) found that time and study regulation were highly correlated

with grades ($r = .19$ for freshman; $r = .27$ for upper level; $r = .22$ for all). It seems that a self-regulated learner is likely to be motivated to manage time and make adjustments in study habits to be academically successful. A learner who is self-regulated is intentional in thinking and behavior. Part of being intentional is deciding how much effort to put into a task. Time management is an essential aspect of effort as the learner will determine how and when to use effort to accomplish a task.

Effort can be described as the ability to exercise control and attention in a distracting environment or when facing a difficult or uninteresting task (Pintrich, 2004; Pintrich et al., 1991; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). As Pintrich et al. (1991) noted, "Effort management is important to academic success because it not only signifies goal commitment, but also regulates the continued use of learning strategies" (p. 27). A self-regulated learner is able to manage and control effort. A large part of the effort extended is due to the task and what the learner thinks about his or her ability or self-efficacy as it relates to the task. Self-regulated learners tend to be motivated, persistent, and have high self-efficacy (Bandura, 1977; Pajares, 2002; Wolters, 1998, 2003). Sungur (2007) found a high motivational belief as related to effort regulation and metacognitive strategy use. In this study, which examined motivational beliefs, metacognitive strategy use, and effort regulation in science courses, the model showed that students with high self-efficacy used more metacognitive strategies which led to more effort regulation. This research points out that students with high motivation will make an effort to learn even with difficult material. Boekarts (1995) indicated that it is quality of time and effort, not quantity that leads to productive learning.

To study motivational profiles of high school and college students, Vansteenkiste et al. (2009) examined determination as measured by the effort scales of the MSLQ. Clustering

groups in four different profiles that focused on high/low quality motivation and high/low quantity motivation, the researchers determined that students who fit the profile labeled *good quality motivation*, meaning that they were autonomous in their study approach, had more effective learning patterns than those in the other groups. It should be noted that those students with a high quantity motivation profile (meaning high controlled motivation) were more prone to test anxiety, procrastination, and overall poor academic performance but used more cognitive strategies such as elaboration and rehearsal as compared with the students who fit other motivation profiles. Such research appears to endorse autonomy as a motivating factor.

Another aspect of environmental self-regulation is knowing when to seek help and utilize others in the learning process (Pintrich, 2004). However, much of the research on self-regulated learning focuses on the individual learner's ability to manage cognitive and metacognitive processes, as well as the effort, resource management, and motivation needed to be successful. Karabenick (1987) suggested that there is an almost over-emphasis on independent work, when there is a great deal of benefit in seeking help from others. He views help-seeking as a learning strategy, which is not a typical view of a learning strategy. According to his model of help seeking, the learner recognizes that a problem exists and seeks help to solve the problem. The learner factors in the perception of need and the related cost of seeking help. Karabenick extended the research on help seeking behaviors of college students in relation to academic activities, specifically the cognitive learning strategies of elaboration, metacognition, and resource management. He expected that students who used cognitive learning strategies would be more likely to seek help. The actual learning strategy used may determine how much or to what degree the student needs help, which could lead to a positive or negative use of help seeking. With college students at four institutions of higher learning, he examined strategy use

and help seeking using the MSLQ. In a pretest and posttest design, the study appeared to support

the hypothesis that the use of cognitive learning strategies was positively related to help seeking.

Those individuals who utilized elaboration strategies, which are those that promote a deeper

level of learning such as paraphrasing or summarizing material, analogies, imagery, generative

notetaking, and teaching others (Pintrich, 1999; Weinstein & Mayer, 1986; Zusho & Pintrich,

2003), had the highest correlation to help seeking. The lowest correlation occurred with the use

of rehearsal strategies, such as rote learning or memorization. Overall, this research emphasizes

that students who are willing to seek help tend to utilize the strategies that are most effective for

them. It is important to note that those who were less likely to use cognitive strategies were also

less likely to seek help. The author indicates that this may be a lack of knowing what skill is

needed or it may be a threat to self-esteem.

Karabenick (1987, 2003) and Karabenick and Knapp (1991) make distinctions in types of

help seeking. They discuss the difference in seeking help to avoid completing a task, also

referred to as executive help seeking, versus instrumental or adaptive help seeking which focuses

on mastering a task rather than avoiding the task, which fits the framework of achievement goal

theory (Dweck & Leggett, 1988). Research indicates the reason most students do not seek help

is the threat to self-esteem and social embarrassment (Karabenick, 1987; Newman & Schwager,

1993), although there are some inconsistencies when examining help seeking in relation to the

source. Corno (1986) indicated that environmental control is a very active way to learn and

involves metacognitive awareness that using such strategies will improve learning. In a very

active fashion, the learner knows when to ask questions of the teacher and when to seek help

from others. Corno goes on to report that there are aspects of self-monitoring involved when

students ask for help in that they are able to gauge their comprehension level and know when and who to ask for help.

Karabenick (2003) used the MSLQ to help understand students' help-seeking attitudes in large college classes by looking at indicators and their relation to course-related motivation, self-regulation, and performance. The researcher examined levels of help-seeking threat, intentions to seek help, help-seeking goals (executive versus instrumental), preferred helping resources (teachers or peers), class-related motivation, and use of learning strategies. Four homogenous groups emerged: strategic or adaptive help seekers, formal help-seekers, help seeking avoidant, and expedient help seekers. Those who were strategic with their help-seeking were more motivated, had a mastery approach goal orientation, used rehearsal techniques more, and had higher course grades. Those who were help-seeking avoidant were more anxious, performed poorly, and used organization learning strategies. Their goal orientation focused on mastery avoid, performance approach, and performance avoid achievement goal orientations. Those who felt threatened to seek help were more likely to avoid it altogether and had an executive goal rather than an instrumental goal. For those who had an executive goal, there was no difference in whom they sought for help or whom they avoided for help, indicating they would seek or avoid their teacher or peers at the same rate. Students with an instrumental goal tended to seek help from their teachers rather than their peers.

Ryan and Pintrich (1997) discussed competence and attitude as related to help seeking. In their study of adolescents, they found that students with high cognitive competence did not attribute their need for help to lack of ability and sought help when needed. Students who were not confident in their competence were more likely to feel threatened and, therefore, avoided help from their peers. Again, Ryan and Pintrich's research underscores the motivational factors

involved when deciding to use others for help. The research also emphasizes that learning is a social interaction and it is important to consider the social nature of learning (Pintrich, 2004).

One aspect of social learning is peer learning. The literature suggests that peer learning promotes self-regulated learning (Topping, 2005; Zimmerman, 1998) and motivation (Ryan, 2000, 2001). Bandura (1986) indicated that peer associations have powerful influences regarding behavioral and cognitive actions. Inherent in peer associations is that selection occurs based on similarity of values, beliefs, ideas, or attitudes (Ryan, 2000). Jones, Alexander, and Estell (2010) refer to this similarity as homophily.

In a 2010 study, Jones, Alexander, and Estell examined homophily as related to peers' self-regulated learning use and asked if group member perception about ability influences individual academic performance. They used five subscales of the MSLQ that focused on metacognition, environment, effort, help-seeking, and peer learning pertaining to math. There was little similarity between the individual and group members' self-regulated learning ability with the exception of effort regulation. In addition, regulative ability had little to do with academic performance. Peer learning had a negative relationship on math performance, suggesting that the students did not seek their peers for help. This research indicates that while similarities existed among group members and similarity may draw individuals together, self-regulation abilities may tend to be more individual in nature.

In a similar study using the MSLQ on Turkish high school students, Yumasak, Sungur, and Cakiroglu (2007) found that peer learning and achievement had a negative relationship. Possible reasons they cited were that Turkish biology courses do not emphasize group goals and objectives and perhaps the context of the class does not support the level of thinking needed for reliance on peers.

Summary

This literature review examined the motivation constructs of expectancy, value, and affect, as well as test anxiety. Expectancy refers to self-efficacy and control of learning beliefs. Self-efficacy was found to be important particularly as it related to self-regulated learning. This relationship indicates that learners are confident in their beliefs that they are able to monitor, change, and control their cognitions in order to affect positive learning outcomes (Pintrich & DeGroot, 1990; Zimmerman, 1998).

Value refers to goal orientation which encompasses intrinsic and extrinsic motivation. Goal orientation is commonly referred to as achievement goal theory in the literature, which underscores the link between goal theory and student achievement. Intuitively, it seems natural that intrinsic motivation is related to academic success; however, both intrinsic and extrinsic motivation were shown to be related to academic success (Harackiewicz et al., 2002a; Pintrich 2000a). While there was limited research that negatively linked test anxiety to motivation, the literature did bear out that test anxiety has a negative impact on academic performance due to worry and the reflection of poor learning strategies as test anxiety.

In keeping with the learning model put forth by Pintrich et al. (1991), the literature review examined the cognitive learning constructs of rehearsal, elaboration, organization, and critical thinking. It was well documented in the literature that the cognitive strategies that promote deep and active learning are those that are needed in college. The ability to think critically is what educators wish for their students. Critical thinking was especially important because it is believed to signify deep, thoughtful, and evaluative thought processes (Santrock, 2001). Critical thinking was also found to activate prior knowledge when acquiring new knowledge in problem-solving situations (Garcia & Pintrich, 1992; Pintrich et al., 1991).

There is a wealth of literature that documents the relationship of metacognitive self-regulation and academic achievement. There are also a number of definitions, but Zimmerman's (1986) definition appears to capture its meaning best by describing self-regulated learners as being metacognitively, motivationally, and behaviorally active participants in their learning. Zimmerman's definition suggests a strong link between motivation and self-regulation. This was well noted in the literature, with the two concepts being described as interdependent processes (Zimmerman, 1990). It appears that students who are metacognitively self-regulated are also academically successful.

Although there was an abundance of research that pointed to the relationship of motivation and cognitive learning constructs as they related to academic achievement at many academic levels, there was little or no prior research that examined high school and college differences as they relate to these same constructs. Similarly, lacking in the research is how these constructs are related to first-semester college grade point average. Therefore, this study will focus on examining the differences between college and high school motivation and cognitive strategy use and the relationship of these constructs to first-semester college grade point average.

CHAPTER III. METHOD

This is an ex post facto study that examined motivation and learning strategy use in high

school versus college. Those same constructs were related to first-semester grade point average

of college freshmen. The Motivated Strategies for Learning Questionnaire (MSLQ) was used to

measure the motivation and cognitive learning strategy variables in this study. The relevant

sections of this chapter include: (a) Review of the Problem, (b) Participants, (c) Instrument, (d)

Procedures, (e) Sources of Data, (f) Data Analysis, and (g) Statistical Treatment of the Data.

Review of the Problem

The MSLQ was the theoretical response designed to assess college students' motivational

orientations and their use of different learning strategies for a college course (Garcia & Pintrich,

1995). The instrument was developed from a social-cognitive view, which indicates that

motivation and learning strategies are not characteristics of the learner, but rather contextually

bound and something that can be learned and applied when needed, as in a course or subject

(Duncan & McKeachie, 2005; Garcia & Pintrich; 1995; Pintrich, 1989).

The MSLQ has been used extensively with college students. Lacking, however, is

research using the MSLQ to determine how motivation and learning strategies differ in high

school and in college. As Tinto (1993) noted, 4 out of 10 students don't graduate from college.

Are students not academically prepared to deal with the rigor and demand of higher education?

Are they using strategies that proved successful in high school to prepare themselves for college?

The purpose of this study was to use the MSLQ to examine the motivation orientation and cognitive learning strategies used by college freshmen as compared with the motivation orientation and cognitive learning strategies they used in high school. A further purpose was to determine if the motivation and cognitive learning strategies assessed by the MSLQ are significantly related to first-semester college grade point average. The goal is to identify learning and motivation factors that may contribute to or hinder academic success from high school to college.

Participants

Participants of the study were 418 students, primarily freshmen, enrolled in two sections of an engineering orientation course at a major southeastern, public university in the fall of 2006. It should be noted that all pre-engineering students must enroll in the engineering orientation course their freshman year before matriculating into an engineering major. Of the participants, 57 were female and 361 were male.

Instrument

Data were gathered using an adapted version of the MSLQ. The MSLQ is an 81-item, self-report questionnaire containing 15 scales designed to measure motivation and cognitive learning strategy use as related to a course. Pintrich et al. (1991) measured the motivational aspects using 31 items across six scales: Intrinsic Goal Orientation, Extrinsic Goal Orientation, Task Value, Control of Learning Beliefs, Self-Efficacy for Learning and Performance, and Test Anxiety. Cognitive learning strategies were measured using 50 items across nine scales: Rehearsal, Elaboration, Organization, Critical Thinking, Metacognitive Self-Regulation, Time and Study Environment, Effort, Peer Learning, and Help Seeking.

In this study, the instrument was modified to reflect both the overall motivation and strategy use in high school and college, resulting in 162 items. For example, the value component of intrinsic motivation for college and high school was measured using the following two statements, respectively:

College: In my classes, I prefer course material that really challenges me so I can learn new things.

High School: In my classes, I preferred course material that really challenged me so that I could learn new things.

In addition, the following statements reflect the cognitive and metacognitive strategies as measured by a metacognitive self-regulation item:

College: When studying for my courses, I try to determine which concepts I don't understand well.

High School: When studying for my courses, I tried to determine which concepts I didn't understand well.

In responding to these items, participants were instructed as to the nature of the instrument and to answer each question differentiating their high school experiences from their college experiences. Further, when responding to high school experiences, they were asked to consider all classes taken in Grades 9 through 12, and when responding to college experiences, they were asked to consider all the classes they were taking for the term. In addition, the numerical scale of 1 (*not at all true of me*) to 7 (*very true of me*) was explained, and they were asked to answer each question and told that there were no wrong answers.

Pintrich set the stage for development of the MSLQ by examining the relationships between motivation and cognitive learning strategies among college students (1989). The

MSLQ was the theoretical response designed to assess college students' motivational orientations and their use of different learning strategies for a college course (Garcia & Pintrich, 1995). The MSLQ was developed using a social-cognitive model of motivation and learning, which indicates that the motivation and learning strategies employed by students are fluid and may vary depending on context and instruction (Duncan & McKeachie, 2005; Pintrich, Smith, Garcia, & McKeachie, 1993). Motivation and learning strategies are not characteristic of the learner, but rather contextually bound and something that can be learned and applied when needed, as in a course or subject (Duncan & McKeachie, 2005; Garcia & Pintrich, 1995; Pintrich, 1989). This general cognitive framework implies that the student is active in the learning process. It also distinguishes the MSLQ from other study skills instruments (Pintrich et al., 1993). The MSLQ has been used extensively with college students as well as with other populations; it has been translated into multiple languages and has been adapted to fit the needs of researchers and instructors across many different contexts.

The psychometric properties of the original MSLQ are described in the MSLQ Manual (Pintrich et al., 1991) and also in Pintrich et al. (1993). With 31 items, the motivation scales tap into three broad areas: expectancy, value, and affect. Expectancy components speak to a student's perceptions of self-efficacy and his or her control beliefs for learning. Self-efficacy is the expectancy for success and the ability and self-belief that a task can be accomplished. Control beliefs are those thoughts where effort equals outcome. The value components assess why a student engages in a task and contains three scales. They are intrinsic goal orientation, extrinsic goal orientation, and task value. Intrinsic goal orientation focuses on learning and mastering a task. Extrinsic goal orientation is a focus on grades and approval from others. Task

value is the student's belief about how valuable, important, or useful the task or course is. Affect is measured by the anxiety and worry experienced when taking exams.

There are 50 questions that pertain to cognitive learning strategies. The cognitive learning strategy scales are based on a social-cognitive model of learning and information processing (Pintrich et al., 1993; Weinstein & Mayer, 1986). The information processing model examines how information is taken in, processed, and structured by the individual. The cognitive learning strategies portion covers three scales: cognitive, metacognitive, and resource management.

Cognitive strategy use reflects how a learner uses basic and complex strategies to process information from lectures or text material. A basic task involves rehearsal strategies, which may also be referred to as rote memorization, surface learning, or simple recall of information (Lynch, 2006; Zusho & Pintrich, 2003). More complex cognitive strategies include elaboration and organization, where the student utilizes strategies which promote a deeper level of learning. Elaboration strategies include paraphrasing or summarizing material, analogies, imagery, generative notetaking, and teaching others (Pintrich, 1999; Weinstein & Mayer, 1986; Zusho & Pintrich, 2003). Organization strategies include outlining and using charts and graphs to organize material (Pintrich et al., 1991; Pintrich et al., 1993). Another cognitive measure includes critical thinking, which assesses use of strategies that involve connecting prior knowledge to new information or critically evaluating ideas and thinking (Pintrich et al., 1993).

Metacognitive strategies are those that involve the student's thinking and regulation of his or her own cognitions and behavior. This scale includes planning, as in goal setting; monitoring, where the individual examines his or her comprehension of the course material; and

regulating, where the individual will make adjustments in learning to meet the demands of the course or task.

The third learning strategy is resource management. Included are assessments of the student's management of time and study environment, as well as how he or she will regulate effort when faced with difficult or boring tasks. The last two resource scales examine how effectively one uses the help of others by examining peer learning, as in using study groups or friends, and help-seeking behaviors, such as asking peers and instructors for assistance.

The MSLQ requires the respondent to answer items based upon a 7-point Likert scale of 1 to 7, with 1 being *not at all true of me* and 7 being *very true of me*. Scale scores are derived by taking the mean of the items comprising the scale. For example, the task value scale is composed of six items; the scores would be summed for these six items and the mean calculated for a task value score. Some items are reverse coded due to the negative wording of the item, meaning a rating of 1 would become a 7, a rating of 2 would become a 6, a 3 becomes 5, a 4 remains a 4, a 5 becomes a 3, a 6 is reversed to 2, and a 7 becomes a 1. According to the manual, the simplest way to score a negatively worded item is to subtract the original score from 8 (Pintrich et al., 1991). After reverse coding, all items then reflect positive wording, indicating a higher score, and reflects a greater level of the construct being measured (Duncan & McKeachie, 2005).

The MSLQ has been in use informally since the early 1980s where it began as a questionnaire to evaluate the effectiveness of a Learning to Learn course (Duncan & McKeachie, 2005; Pintrich et al., 1993; Pintrich et al., 1991). Formal development of the instrument began in 1986 from a grant awarded through the Office of Educational Research and Improvement to establish the National Center for Research to Improve Postsecondary Teaching and Learning.

The instrument was administered at three institutions including a public 4-year university, a small liberal arts college, and a community college. Data were gathered over three waves in 1986, 1987, and 1988 where the researchers tested the theoretical constructs represented by the 15 scales that relate to motivation and cognitive learning strategies. The final validation sample included 380 participants where internal consistency analyses include coefficient alphas and confirmatory factor analyses. Predictive validity was examined using correlations of the scales with course academic outcomes (Pintrich et al., 1993).

The theoretical model of the MSLQ was tested using two confirmatory factor analyses: one for the motivation scales and one for the cognitive and metacognitive components (Pintrich et al., 1993). The researchers used the LISREL structural modeling program to determine which items loaded onto which latent factor. For example, they tested the 31 motivation items to see how well they fit the six latent factors of intrinsic goal orientation, extrinsic goal orientation, task value, control beliefs about learning, self-efficacy for learning and performance, and test anxiety. Likewise, the 50 items that represent the cognitive and metacognitive factors were tested to see how well they fit the nine latent factors of rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment management, effort regulation, peer learning, and help seeking.

Factor loadings of .8 or higher indicate a well-defined construct (Pintrich et al., 1993). Lambda-ski estimates for the motivation items ranged from .38 to .89, with the greatest variability occurring on the control of learning beliefs variable with a range of .38 to .84 as well as on the extrinsic goal orientation variable, with a range of .44 to .71. Lambda-ski estimates for the cognitive items range from .17 to .90 for help-seeking and .42 to .74 for organization. Goodness of fit estimates (GFI) resulted in a .77 for the motivation model and a .78 for the

learning strategies. Chi-square to degrees of freedom ratio (χ^2/df) resulted in 3.49 for the six

latent factors of the motivation scales and 2.26 for the nine latent factors of the cognitive scales.

Pintrich et al. (1993) found this to be a good fitting model, using Hayduk's (1987) range of 1.0 to

5.0 as a close fit.

Reliability estimates, using Cronbach's alpha, were calculated for each of the 15 latent

constructs of the MSLQ. Internal consistency was considered good, with coefficient alphas for

the six motivation scales considered to be robust. Coefficient alphas ranged from the lowest at

.62 for Extrinsic Goal Orientation to a high of .93 for Self-Efficacy for Learning and

Performance. Internal consistency was considered reasonable as it related to the nine latent

factors of the learning strategies scales. Alphas ranged from .52 for Help Seeking to .80 for

Critical Thinking.

Using two confirmatory factor analyses to validate the theoretical constructs of the

instrument and the relatively high coefficient alpha results, the researchers suggested that the

model, as measured by the six motivational scales and the nine cognitive scales, has relatively

good internal consistency and is representative of student motivation and learning strategy use in

a college classroom (Pintrich et al., 1993).

Procedures

As part of an ongoing assessment in the College of Engineering, data were collected on

pre-engineering students, who were in attendance in two sections of an engineering orientation

course. A faculty member from the Educational Foundations, Leadership, and Technology

(EFLT) Department, administrative staff from the College of Engineering, and other staff

distributed and monitored the administration of this instrument. All participants were given a

copy of the adapted MSLQ, a scantron to record their answers, and writing utensils. The

instructions for taking the instrument were read to them. Students were given the opportunity to

ask questions and/or to opt out of taking the questionnaire. All students present took the

questionnaire. It took approximately 50 minutes for the participants to respond to the 162-item,

Likert-scale questionnaire. Upon completion of the questionnaire, the instrument and scantron

were collected from each student, and university staff members reviewed the scantron for

appropriate completion of all data. Participants who provided incomplete information were

asked to supply the missing data.

Sources of Data

Pre-existent data from an ongoing project within the College of Engineering were used

for this study. The MSLQ used in this study, as well as all resulting data, was managed and

secured by faculty members in the College of Education's EFLT Department. Student

information was gathered using the Banner System to determine student grade point averages

and first-semester grade point average.

Data Analysis

The data were checked for missing information. Cases containing missing information

were not utilized in the data analysis. The data were analyzed using PASW, Version 18.

Statistical Treatment of Data

Initially the data were analyzed to test the strength of the reliability estimates of the 15

MSLQ variables. Reliability was set at .50, with all the variables exceeding this preset

measurement. Following the reliability analysis, multivariate and univariate analyses were

conducted to determine if differences existed between motivation and cognitive learning

strategies employed in high school and college. In the multivariate and univariate analyses, the

independent variables were high school and college. Dependent variables were identified as the

MSLQ motivation constructs: intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety. Additional dependent variables were cognitive and resource management variables: rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment, effort regulation, peer learning, and help seeking.

Last, a multiple regression was conducted to determine if the MSLQ variables predicted first-semester grade point average. The independent and dependent variables used in the multiple regression analysis were the motivation and cognitive variables of the MSLQ and first-semester grade point average, respectively.

CHAPTER IV. RESULTS

Chapter 4 describes the results of the statistical analysis. Response rate and reliability estimates are presented, followed by the results of the multivariate analysis used to determine if student motivation orientation and cognitive learning strategies used differ for college and high school. A multiple regression analysis was conducted to determine if student motivation and cognitive learning strategies employed in college are related to first-semester grade point average.

Selection of Variables

The MSLQ contains two over-arching constructs: motivation and cognitive learning strategies (Pintrich et al., 1993; Pintrich et al., 1991). These two constructs are measured using 15 scales with the motivation items assessing the value component of intrinsic and extrinsic motivation and task value, the expectancy components of control of learning beliefs and self-efficacy for learning and performance, and finally the affective component of test anxiety. The cognitive and learning strategies items assessed rehearsal, elaboration, organization, critical thinking, and metacognitive self-regulation, while the resource variables were time and study environment, effort, peer learning, and help seeking. The number of items for each scale range from 4 to 12. There were 418 participants and the response rate for each item was considered high for all 15 scales. For example, the lowest response rate was for Time and Study Environment for college with 411 out of 418 responding to this item. There were several items

that received responses by all participants, including those comprising the Control of Learning Beliefs scale for college, Elaboration scale for college, and Peer Learning scale for college and high school.

Reliability

Initial reliability estimates were computed using Cronbach's coefficient alpha for all of the variables represented in the 15 scales. Cronbach's alpha is a measure of internal consistency and is typically used for Likert-type scales such as the MSLQ. Reliability estimates indicated that all of the scales met the established level of reliability (.50), with the exception of one, Control of Learning Beliefs for high school, with a .49 level of reliability (see Table 1). High reliability estimates are significant and indicate good internal consistency as well as homogeneity of the items.

Table 1

Reliability of the Motivated Strategies for Learning Questionnaire

MSLQ scale	*N*	Number of items	α
Motivation scales			
Intrinsic Goal Orientation			
College	412	4	.69
High School	417	4	.66
Extrinsic Goal Orientation			
College	414	4	.69
High School	415	4	.66

(table continues)

Table 1 (continued)

MSLQ scale	*N*	Number of items	α
Task Value			
College	417	6	.77
High School	417	6	.80
Control of Learning Beliefs			
College	418	4	.66
High School	417	4	.49
Self-Efficacy for Learning and Performance			
College	414	8	.87
High School	416	8	.86
Test Anxiety			
College	417	5	.78
High School	414	5	.73
Learning scales			
Rehearsal			
College	413	4	.66
High School	414	4	.69
Elaboration			
College	418	6	.72
High School	416	6	.76
Organization			
College	417	4	.69
High School	416	4	.71

(table continues)

Table 1 (continued)

MSLQ scale	*N*	Number of items	α
Critical Thinking			
College	415	5	.81
High School	414	5	.80
Metacognitive Self-Regulation			
College	417	12	.75
High School	416	12	.80
Time and Study Environment			
College	411	8	.70
High School	413	8	.69
Effort			
College	415	4	.61
High School	414	4	.63
Peer Learning			
College	418	3	.63
High School	418	3	.60
Help Seeking			
College	415	4	.53
High School	416	4	.62

Reliability of an instrument is typically judged by the instrument's stability over time and context as well as internal consistency (Duncan & McKeachie, 2005). In this study, the motivation scales contained internal consistency reliability estimates ranging from .49 for Control of Learning Beliefs for high school to .87 for Self-Efficacy for Learning and

Performance for college, with the average being .72. A comparison of these reliability outcomes for this study to those of the theoretical model developed by Pintrich and his colleagues (1993, 1991) where the motivation coefficient alphas ranged from .62 for Extrinsic Goal Orientation to .93 for Self-Efficacy for Learning and Performance, with the average being .78, shows that the average coefficient alphas obtained in the present sample were only slightly lower.

Reliability estimates for the cognitive learning scales ranged from a high of .81 for Critical Thinking for college to a low of .53 for Help Seeking for college. Pintrich and his colleagues (1993, 1991) obtained coefficient alphas on the learning strategies scales that ranged from a low of .52 for Help Seeking to a high of .80 for Critical Thinking. Alpha averages for both the current study and the theoretical model are consistent at .69 and .71, respectively.

The coefficient alphas are robust for both the motivation and cognitive learning strategies variables for the current study as well as the previous research by Pintrich and his colleagues (1993, 1991). Therefore, we can conclude that both studies indicate strong internal consistency for the MSLQ scales.

Multivariate Tests for Motivation Variables

A MANOVA was conducted to determine if significant differences existed between high school and college motivation variables defined as intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety. The results of the multivariate analysis, using Wilks' Lambda, were significant for motivation differences between high school and college, $F(6, 412) = 90.72$, $p < .000$, η^2 =.569, large effect size. The null hypothesis that there are no significant differences in motivation orientation as measured by the MSLQ when comparing high school to college can be rejected.

Univariate Tests for Motivation Variables

Univariate analyses were used to examine within-subjects differences for the six

motivation variables. All were found to be statistically significant ($p < .01$), with the exception

of control of learning beliefs ($p = .54$). Table 2 presents results for the univariate tests for

motivation.

Table 2

Univariate Tests of Significance for MSLQ Motivation Scales: College and High School

Motivation scale	df	F	η^2	Sig.
Intrinsic Goal Orientation	417	51.63	.11	.00
Extrinsic Goal Orientation	417	45.36	.10	.00
Task Value	417	282.40	.40	.00
Control of Learning Beliefs	417	.37	.00	.54
Self-Efficacy for Learning and Performance	417	263.34	.39	.00
Test Anxiety	417	153.76	.27	.00

Means and standard deviations were also computed in order to compare the motivation

variables for high school and college. As shown in Table 3, the mean for each scale was higher

for college with the exception of Self-Efficacy for Learning and Performance, where the high

school had a mean of 5.93 as compared to college at 5.21. The means for Control of Learning

Beliefs were not significantly different, being 5.56 and 5.54 for college and high school,

respectively. The scores also followed a somewhat skewed distribution on all the college

motivation variables, with the exception of test anxiety, which was normally distributed. The

high school variables of extrinsic goal orientation, control of learning beliefs, and self-efficacy

for learning and performance were also somewhat skewed, whereas intrinsic goal orientation,

task value, and test anxiety scores were normally distributed. Following Table 3 is a definition

and explanation of the mean scores (Pintrich et al., 1991).

Table 3

Means and Standard Deviations for MSLQ Motivation Scales: College and High School

Motivation scale	College		High School	
	M	*SD*	*M*	*SD*
Intrinsic Goal Orientation	5.03	.99	4.75	1.09
Extrinsic Goal Orientation	5.72	1.0	5.45	1.12
Task Value	5.66	.85	4.86	1.01
Control of Learning Beliefs	5.56	.94	5.54	.92
Self-Efficacy for Learning and Performance	5.21	.89	5.93	.84
Test Anxiety	4.17	1.39	3.59	1.29

Intrinsic Goal Orientation

The scale refers to why the individual is engaging in the learning task. Intrinsic means

that the task is a challenge and the student wishes to master the task. A higher college mean

would indicate a greater value or intrinsic motivation for college tasks as opposed to high school

tasks.

Extrinsic Goal Orientation

Extrinsic goal orientation is the antithesis of intrinsic goal orientation. The student engages in the task for reasons such as achieving a grade or reward or views himself or herself in comparison with others. The learning task is a means to an end (e.g., grade). A higher college mean would indicate that the students were more motivated to achieve through extrinsic measures than intrinsic measures.

Task Value

Task value is measured by how interesting, important, or useful the student finds the task to be. Task value differs from goal orientation as the latter refers to why an individual engages in a task. A mean higher for college indicates a greater value for the tasks required in college as opposed to those in high school.

Control of Learning Beliefs

This scale examines the students' beliefs about the relationship of their efforts and positive learning outcomes. The learners feel they have control of their academic performance. There was no significant difference in high school and college means for this scale.

Self-Efficacy for Learning and Performance

This scale assesses two expectancy aspects: the expectancy for success related to performance and self-efficacy, which is one's belief about the ability and skill to master a task. The high school mean was higher than the college mean, indicating a more positive belief toward the expectation of success and confidence in one's ability and skill level in high school than college.

Test Anxiety

This scale contains two components: worry and emotion. Worry refers to the negative thoughts the learner has relating to tests. Emotion is the affective and physiological aspects of anxiety that related to test taking. The means indicate higher test anxiety for college than for high school.

Multivariate Tests for Cognitive Learning Strategies Variables

A MANOVA was conducted to determine if significant differences existed between high school and college learning strategies variables measured by rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment, effort regulation, peering learning, and help seeking. The results of the multivariate analysis, using Wilks' Lambda, were significant for cognitive learning strategy use between high school and college, $F(9, 408) = 31.55$, $p < .000$, $\eta^2 = .410$, large effect size. The null hypothesis that there are no significant differences in learning strategies as measured by the MSLQ when comparing high school to college can be rejected.

Univariate Tests for Cognitive Learning Strategies Variables

Univariate analyses were used to examine within-subjects differences for the nine cognitive learning strategy variables. All were found to be statistically significant ($p < .01$), with the exception of help seeking ($p = .22$). Table 4 presents results for the univariate tests for cognitive learning strategies.

Table 4

Univariate Tests of Significance for MSLQ Cognitive Learning Strategies Scales: College and

High School

Cognitive Learning Strategies Scale	df	F	η^2	Sig.
Rehearsal	416	78.22	.16	.00
Elaboration	416	156.17	.27	.00
Organization	416	216.82	.34	.00
Critical Thinking	416	83.90	.17	.00
Metacognitve Self-Regulation	416	227.63	.35	.00
Time Management	416	157.34	.27	.00
Effort	416	123.78	.23	.00
Peer Learning	416	10.80	.03	.00
Help Seeking	416	1.50	.00	.22

Means and standard deviations were also computed to compare the nine cognitive learning strategies variables for high school and college. As shown in Table 5, the mean for each scale was higher for college. The mean scores followed a normal distribution for both college and high school. Following Table 5 is a definition and explanation of the mean scores (Pintrich et al., 1991)

Table 5

Means and Standard Deviations for MSLQ Cognitive Learning Strategies Scales: College and

High School

Cognitive Learning Strategies Scale	College		High School	
	M	*SD*	*M*	*SD*
Rehearsal	4.82	1.16	4.43	1.28
Elaboration	4.91	.99	4.42	1.12
Organization	4.31	1.23	3.66	1.31
Critical Thinking	4.44	1.22	4.10	1.29
Metacognitive Self-Regulation	4.58	.82	4.06	.95
Time and Study Environment	4.88	.90	4.30	.97
Effort Regulation	4.94	1.04	4.38	1.22
Peer Learning	4.06	1.32	3.89	1.37
Help Seeking	4.21	1.10	4.15	1.24

Rehearsal

This strategy involves repeating or rehearsing information with the goal of getting it into memory for later recall. A higher college mean indicates that the learners endorsed this strategy more for college tasks than high school tasks.

Elaboration

Elaboration is a strategy to help store information in long-term memory. It involves building connections using skills such as summarizing or creating analogies, which helps the learner to connect new information with prior knowledge. The mean for college was higher than

high school, indicating that the participants endorsed this strategy use more in college than in high school.

Organization

This strategy involves the learner in tasks such as outlining, clustering, or selecting main ideas from a reading passage. Like elaboration strategies, the goal is to connect information that is to be learned. The college mean was significant for endorsement of such strategies.

Critical Thinking

The critical thinking mean was higher for college as compared with high school. A higher mean indicates greater use of such strategies as applying previous knowledge to solve problems or make critical evaluations of information.

Metacognitive Self-Regulation

Metacognitive self-regulation involves three areas of self-regulatory processing: planning, monitoring, and regulating. Planning involves goal setting and task analysis; monitoring requires the learner to focus attention and self-test through questioning; regulating is adjusting the thought processes through feedback and checking as one moves through the learning process. The learners favored these strategies more for college tasks than high school.

Time and Study Environment

A significant college mean indicates that the learners subscribe more to the resource management strategies of scheduling, planning, and management of time and study environment for optimal learning in college than high school.

Effort Regulation

This self-management strategy requires the students to control and monitor their attention and effort in order to accomplish academic goals, particularly when faced with distractions or uninteresting tasks. These items were endorsed more for college than high school.

Peer Learning

Collaborating with or using peers on college course material was supported more in college than in high school as evidenced by the higher college mean.

Help Seeking

Although not significant, the mean for college was higher for this learning strategy. This outcome is an indication that the learners support the use of others, such as instructors and peers, in their learning process more in college than high school. Help seeking also implies that the student knows when to seek help from others.

<div align="center">

Regression Results for Motivation Variables

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The null hypothesis stated there was no significant relationship between the MSLQ motivation variables and the first-semester college grade point average. The full model of the regression analysis of the six independent motivation variables achieved an R of .20. This model accounted for 4% of the variance in the dependent variable of the first-semester college grade point average. The overall $F_{6, 410}$ was 3.03 ($p < .01$), which was statistically significant. The null hypothesis can be rejected.

Further analysis of the model suggested that there was no significance in the overall relationship between the dependent variable, first-semester college grade point average, and the four motivation variables of intrinsic goal orientation, extrinsic goal orientation, control of learning beliefs, and test anxiety. There was a significant relationship between the dependent

variable, first-semester college grade point average, and the two motivation variables of task value and self-efficacy for learning and performance (see Table 6).

Table 6

Regression Analysis for Motivation Variables Related to First-Semester College Grade Point Average

Motivation scale	Pearson *r*	sig	partial *r*	sig
Intrinsic Goal Orientation	.072	.144	-.052	.292
Extrinsic Goal Orientation	.079	.108	.040	.417
Task Value	.143	.004	.087	.079
Control of Learning Beliefs	.068	.162	-.052	.291
Self-Efficacy for Learning and Performance	.171	.000	.103	.036
Test Anxiety	-.070	.154	-.056	.260

Regression Results for Cognitive Learning Strategies Variables

The null hypothesis stated there was no significant relationship between the MSLQ cognitive learning strategies variables and the first-semester college grade point average. The full model of the regression analysis of the nine independent cognitive learning strategies variables achieved an *R* of .30. This model accounted for 9% of the variance in the dependent variable of the first-semester college grade point average. The overall $F_{9, 407}$ was 4.46 ($p < .001$), which was statistically significant. The null hypothesis can be rejected.

Further analysis of the model suggested that there was no significance in the overall relationship between the dependent variable, first-semester college grade point average, and six of the cognitive learning strategies variables of rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, and peer learning. There was a significant relationship between the dependent variable, first-semester college grade point average, and the three learning strategies variables: time and study environment, effort regulation, and help seeking (see Table 7).

Table 7

Regression Analysis for Cognitive Learning Strategies Variables Related to First-Semester College Grade Point Average

Cognitive learning strategies scale	Pearson r	sig	partial r	sig
Rehearsal	-.037	.456	-.065	.187
Elaboration	.070	.154	.058	.241
Organization	-.037	.454	-.055	.265
Critical Thinking	-.008	.876	-.036	.462
Metacognitive Self-Regulation	.091	.064	.031	.533
Time and Study Environment	.216	.000	.118	.017
Effort Regulation	.214	.000	.091	.067
Peer Learning	-.094	.054	-.028	.566
Help Seeking	-.099	.042	-.081	.104

Summary

This study sought to determine if there were significant differences in motivation orientation of college freshmen as measured by the MSLQ when comparing high school and college. The null suggested that no differences would exist; however, the null was rejected as significant differences in their reported motivation orientation were found to exist between high school and college based upon the multivariate analysis. The univariate analysis that addressed within-subjects differences as related to this question showed that statistical significance existed for all the motivation variables with the exception of one, control of learning beliefs.

A second multivariate analysis examined the question: Are there differences in cognitive learning strategies of college freshmen as measured by the MSLQ when comparing high school to college. The null hypothesis predicted differences would not exist. The null was rejected as significant differences did exist for cognitive learning strategy use between high school and college as reported by the participants. A univariate analysis addressing within-subjects differences related to this question found statistical significance for all the cognitive learning strategy variables with the exception of help seeking.

A regression analysis was conducted to answer the question: What is the relationship between the MSLQ motivation orientation and first-semester college grade point average? The null hypothesis stated there was no significant relationship between the MSLQ motivation variables and first-semester college grade point average. The null was rejected. A regression analysis was also done to address the question: What is the relationship between the MSLQ cognitive learning strategies and first-semester college grade point average. The null predicted that no significant relationship would be found; however, the null was rejected.

It must be noted here that although statistically significant differences were found, these differences may not be meaningful. With the large sample size represented in this study, results may be significant but not meaningful. For the findings to have meaningfulness, they must be so within the context for which they are intended (Pedhazur & Schmelkin, 1991).

CHAPTER V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter contains three sections. The first section is a summary of the study. Section 2 contains conclusions of the study, followed by Section 3 which focuses on recommendations for further research.

Summary

The purpose of this study was to examine the differences in motivation and cognitive and metacognitive strategy use from high school to college as measured by the Motivated Strategies for Learning Questionnaire (MSLQ). The research focused on the motivation and learning strategies used in high school as compared with those motivation and learning strategies used in college. The study also examined the relationship between motivation and learning strategies and first-semester grade point average. The study was guided by the following questions:

1.   Are there significant differences in the motivation orientation as measured by the MSLQ of college freshmen when comparing high school to college?

2.   Are there significant differences in the cognitive learning strategies as measured by the MSLQ of college freshmen when comparing high school to college?

3.   What is the relationship between the MSLQ motivation orientation and first-semester college grade point average?

4.   What is the relationship between the MSLQ cognitive learning strategies and first-semester college grade point average?

Four null hypotheses were posed by this study. The first and second null hypotheses stated that no significant differences existed in high school and college motivation orientation and cognitive learning strategies use. The second and third null hypotheses stated that no significant relationships existed between motivation orientation/cognitive learning strategies and first-semester college grade point average.

The MSLQ has been used extensively with college students; however, research examining motivation and learning strategies from high school to college appears to be lacking. This research was an ex post facto study that examined motivation and cognitive learning strategy use as measured by the MSLQ as related to first-semester college grade point average as well.

The participants in the study were students enrolled in two sections of an engineering orientation course at a major southeastern, public university in the fall of 2006. They completed the MSLQ, a self-report instrument containing 81 items that measure the constructs of motivation and learning strategy use. In this study, the instrument was revised, using 162 items to measure these same constructs related to high school and college for this particular population.

Multivariate analyses were used to determine if differences existed in an optimally weighted combination of MSLQ motivation and cognitive learning strategies variables between high school and college. Univariate analyses were employed to examine within-subject differences for the 15 dependent motivation and learning strategy variables. Finally, a multiple regression was used to determine if a relationship existed between the MSLQ variables and first-semester college grade point average.

The MANOVA results for the motivation constructs revealed that significant differences existed between high school and college. Eta squared was used to determine the proportion of

variance in the weighted combination of the dependent variables that could be accounted for by the independent variables. The large effect size ($\eta^2 = .569$) indicates that 57% of the difference in motivation as measured by the MSLQ was accounted for by high school and college. Consistent with prior research, this study emphasizes the importance of motivation in learning and achievement.

Results of the ANOVA test of within-subjects effects revealed significant differences on five of the six motivation variables, including intrinsic and extrinsic goal orientation, task value, self-efficacy for learning beliefs, and test anxiety. With the exception of self-efficacy, means were higher for college. Control of learning beliefs was not significant.

The literature on motivation is clear that this construct is a key factor in learning and achievement at many levels. Pintrich and his colleagues (1993, 1991) described motivation as three interacting constructs: expectancy, value, and affect. Expectancy is the belief the individual has about his or her learning and the ability to accomplish a task. Value refers to the reason an individual engages in a task, and affect is the worry or concern regarding tests. Consistent with prior research, the participants of this study are both extrinsically and intrinsically motivated. More so than in high school, in college they like challenging material but also feel earning high grades is important. This finding is consistent with prior research in that having both a mastery and performance goal orientation contributes to success. The participants value what they learn and find the material useful, but they also have some anxiety when taking tests and consider the consequences of poor tests grades, which also supports prior findings. In contrast, self-efficacy was significantly higher in high school than college, meaning the students had higher expectations regarding their skill and ability to learn complex material in

high school than they did in college. Control of learning beliefs, which indicates effort as it relates to performance, was not significantly different between high school and college.

The MANOVA results for the cognitive and metacognitive learning strategies revealed significant differences between high school and college. Eta squared was used to determine the proportion of variance in the weighted combination of the dependent variables that could be accounted for by the independent variables. The large effect size ($\eta^2 = .410$) indicates that 41% of the difference in the learning strategy variables as measured by the MSLQ was accounted for by high school and college.

The ANOVA tests of within-subjects effects revealed significant differences on eight learning strategy variables, including rehearsal, elaboration, organization, critical thinking, self-regulation for learning, time management, effort, and peer learning. Help seeking showed no significance. All means were higher for college.

As we see in the literature, there has been much emphasis placed on the use of cognitive and metacognitive strategies as related to academic success, particularly in courses where such strategies are taught. Generally, the research posits that students who employ such strategies as elaboration and organization, along with metacognitive strategies of self-regulation and monitoring and the appropriate use of time and others will perform better in their academic pursuits. While prior research supports rehearsal, elaboration, and organization strategy use as well as the use of critical thinking skills in college, rehearsal tends to be the one strategy that is not sufficient by itself to promote a deep understanding and long-term retrieval of information. Rehearsal had the smallest effect size, $\eta^2 .16$, of the four cognitive strategies.

The metacognitive strategies are measured by metacognitive self-regulation, which is the planning, monitoring, and regulating of cognitions and behaviors. The effect size of this variable

accounted for the most difference among all of the learning strategy variables, meaning the participants endorsed their use of strategies such as changing their course when one strategy does not work, setting class goals, or organizing material before studying. A plethora of research on self-regulated learning indicates students with metacognitive skills have knowledge about themselves and are able to use that knowledge to control their cognitive behavior.

The beliefs concerning the resource management variables of time and study environment, effort regulation, peering learning, and help seeking were significantly different between high school and college. The individuals in this study subscribed to using strategies such as planning, management of time, and choosing an optimal study environment for college more than high school. They also felt they could control their effort in strategic ways in order to accomplish their goals and avoid distractions. Finally, they endorsed the use of their peers and would seek help from peers and instructors during the learning process.

The multiple regression analysis examined the variables of the MSLQ and their relationship with first-semester college grade point average. The motivation model accounted for 20% of the variance in the dependent variable, first-semester grade point average. When examining the relationship between each of the independent variables of the MSLQ and first-semester college grade point average, only task value and self-efficacy for learning and performance were significantly related to first-semester grade point average. The literature shows that students who are motivated tend to have high self-efficacy. They tend to do better and persist academically. Task value is measured by the learner in interest, importance, and usefulness of the task. The research shows that the probability of success based on self-competence will lead to increased task value. Pintrich and his colleagues operationalized the MSLQ at the course level (1993, 1991). Further, this particular population may be unique and

different from those whose motivation aspects were measured against a course. In this particular study, the MSLQ was used to predict first-semester college grade point average. The lack of significance in predicting first-semester grade point average may be due to the population studied. Participants in this study were from a larger demographic group with an average ACT of 26; thus, they may already be a highly motivated group of students with high ability.

Similar results were found in the multiple regression analysis of the cognitive learning strategies variables. The full model with the nine independent variables accounted for 30% of the first-semester grade point average. However, when examining each independent variable as it related to the first-semester grade point average, only time and study environment, effort regulation, and help seeking had a significant relationship. Prior research indicates that time management and regulated study behavior are highly related to course grades. There is awareness by the learner that controlling the environment is a way to learn. Again, these traits point to a motivated and self-regulated population, which is a reasonable assumption regarding this particular sample of students based upon entry demographics.

Conclusions

With reports indicating high attrition during the first year of college, it is important for college freshmen to be academically prepared when they come to college (Besterfield-Sacre et al., 1997; Tinto, 1993). They cannot expect to use the same thinking and learning behaviors that worked in high school to achieve the same results in college. College is challenging, and students must take responsibility for their learning by engaging in the process and utilizing the resources available. Given the rigors of college and the aforementioned research, one would instinctively think that differences do exist. If such differences can be identified, college

educators can be better prepared to target specific learning and retention programs that assist students during that initial year.

Motivated, self-regulated learners typically have high self-efficacy, are intrinsically motivated, and take responsibility for their learning. They are aware of their own behaviors and cognitions and how they impact outcomes, using the appropriate strategies to achieve their goals. Schunk (1995) described a self-regulated learner as one who can focus his or her thinking, motivation, and behavior toward a desired goal. Bandura (1977) described this interaction between thoughts and behaviors as reciprocal determinism.

Paul Pintrich was a well-known researcher in motivation and learning. He set the stage for the development of the MSLQ by examining the relationships between motivation and cognitive learning strategies among college students (1989). The MSLQ was the theoretical response designed to assess college students' motivational orientations and their use of different learning strategies for a college course (Garcia & Pintrich, 1995). The instrument was developed from a social-cognitive perspective, indicating that motivation and cognitive strategy use is contextually bound and something that can be learned and applied when needed, as in a course or subject area (Duncan & McKeachie, 2005; Garcia & Pintrich; 1995; Pintrich, 1989). There have been numerous studies using the MSLQ (Lynch, 2006; McKeachie et al., 2004; Pintrich & DeGroot, 1990; Pintrich & Garcia, 1991; Pintrich, McKeachie, & Smith, 1989; Pintrich et al., 1991); however, the research seems to lack areas of study using the MSLQ as a baseline for comparing motivation and learning strategy constructs from high school to college. This study was an effort to examine these constructs using participants who reported their motivation and cognitive strategy use both in high school and college.   The goal was to determine if significant

differences exist and how the data may be utilized in the future to promote learning and motivation in the first year of college and beyond.

There is an abundance of literature that discusses learning and retention programs that have recently come about to address issues of retention and attrition (Hofer & Yu, 2003; Newton, 1990; Petrie & Helmcamp, 1998; Pintrich, McKeachie, & Lin, 1987; Russell & Petrie, 1992). These programs address learning issues, typically by addressing learning styles, learning strategies, or problem solving, while others use a social or counseling approach to address academic issues. The emphasis should be more than just content aimed at improved study methods or behavioral change, but must incorporate both motivation and cognitive aspects. The literature supports improving collegiate academic performance by addressing motivation, cognition, and metacognition issues (Duncan & McKeachie, 2005; Garcia & Pintrich; 1995; Pintrich, 1989; Schunk 1996; Weinstein & Mayer, 1986).

Pintrich et al. (1991, 1993) examined the reliability and validity of the MSLQ with different populations and the present research appears to support their claims that the MSLQ is a good measure in predicting differences between high school and college motivation and cognitive strategy use. However, the present study provided little support for the MSLQ as a predictor of first-semester college grade point average.

Recommendations

This study was conducted to gain a better understanding of whether or not learners use different motivation and cognitive and metacognitive learning strategies from high school to college. Much like the studies done by Pintrich et al. (1991, 1993), the present research was conducted using a non-random sample of pre-engineering students enrolled in an orientation course. Consequently, generalizability of the results is limited. To address generalizability, it

would be advantageous to continue validation of the MSLQ on different populations, disciplines, and classifications (freshman, sophomore, junior, senior).

Neither gender nor race was factored into the questions that guided this research. These two variables might be considered an important area of study when validating the MSLQ. It is well known that most engineering colleges are male dominated, presenting a limited scope in view of the natural demographic makeup of a typical college classroom.

The relationship between the MSLQ and first-semester college grade point average can only hold true for the population sampled. This population is a sub-sample of a population whose entry attributes includes an average of a 26 ACT, which may indicate an already motivated, self-regulated group of students. The MSLQ's usefulness in predicting first-semester grade point average may be different with other populations. Of particular interest may be the usefulness of the MSLQ in predicting retention of an at- risk population. Since many universities have developed classes that target these populations, it would seem logical that predicting their success as measured by the MSLQ would be beneficial retention data.

Finally, this study was conducted for dissertation purposes. The ultimate use of these results would be to incorporate what we have learned from this research into practical applications that include recruitment, course design, study skills preparation, and academic counseling. The results could also be used to foster meaningful collaboration between secondary educators and higher education personnel so that high school students are realistically prepared for college.

REFERENCES

Andrew, S. (1998). Self-efficacy as a predictor of academic performance in science. *Journal of Advanced Nursing, 27*(3), 1-10.

Archer, J., Cantwell, R., & Bourke, S. (1999). University study via an enabling program: Achievement, motivation, and self-regulation. *Higher Education Research and Development*, *18*(1), 31–54.

Balduf, M. (2009). Underachievement among college students. *Journal of Advanced Academics*, *20*(2), 274–294.

Bandura, A. (1986). *Social foundation of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215.

Bandura, A., Barbaranelli, C., Caprara, G., & Pastorelli, C. (1996). Multifaceted impact on self-efficacy beliefs on academic functioning. *Child Development*, *67*, 1206–1222.

Bandura, A., & Cervone, D. (1983) Self-evaluative and self-efficacy mechanisms governing the motivational effects of goal systems. *Journal of Personality and Social Psychology*, *45*(5), 1017–1028.

Barker, J., & Olson, J. (n.d.). *Medical students' learning strategies: Evaluation of first year changes*. Retrieved October 2, 2010, from http://www.msstate.edu/org/MAS/ejour2.html.

Bembenutty, H. (2008). Self-regulation of learning and test anxiety. *Psychology Journal*, *5*(3), 122–139.

Besterfield-Sacre, M., Atman, C., & Shuman, L. (1997). Characteristics of freshmen engineering students: Models for determining student attrition in engineering. *Journal of Engineering Education*, *86*(2), 139–149.

Boekaerts, M. (1995). Self-regulated learning: Bridging the gap between metacognitive and metamotivation theories. *Educational Psychologist*, *4*(30), 195–200.

Bohr, D. (1983). Project HELP: Instruction for high-risk, non-traditional students. (ERIC Document Reproduction Service No. ED 258615)

Bong, M. (2001). Between- and within-domain relations of academic motivation among middle and high school students: Self-efficacy, task-value, and achievement goals. *Journal of Educational Psychology*, *93*, 23–34.

Bredo, E. (1997). The social construction of learning. In G. D. Phye (Ed.), *Handbook of academic learning: Construction of knowledge* (pp. 3–45). San Diego, CA: Academic Press.

Church, M., Elliot, A., & Gable, S. (2001). Perceptions of classroom environment, achievement goals, and achievement outcomes. *Journal of Educational Psychology*, *93*(1), 43–54.

Corno, L. (1986). The metacognitive control components of self-regulated learning. *Contemporary Educational Psychology*, *11*, 333–346.

Crain, W. (2005). *Theories of development: Concepts and applications* (5th ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Cubberly, W., Weinstein, C., & Cubberly, R. (1986). The interactive effects of cognitive

  learning strategy training and test anxiety on paired-associate learning. *Journal of*

  Educational Research, *79*(3), 163–168.

Deci, E., & Ryan, R. (1990). A motivational approach to self-integration in personality. In R.

  Dienstbier (Ed.), *Current theory and research in motivation* (pp. 237–288), Lincoln, NE:

  University of Nebraska Press.

Demetriou, A. (2000). Organization and development of self-understanding and self-regulation:

  Toward a general theory. In M. Boekaerts, P. R. Pintrich & M. Zeidner (Eds.),

  Handbook of self-regulation (pp. 209–251). San Diego, CA: Academic Press.

Duncan, T., & McKeachie, W. (2005). The making of the motivated strategies for learning

  questionnaire. *Educational Psychologist*, *40*(2), 117–128.

Dweck, C., & Leggett, E. (1988). A social-cognitive approach to motivation and personality.

  Psychological Review, *95*(2), 256–273.

Eccles, J., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of*

  Psychology, *53*, 109–132.

Elliott, E., & Dweck, C. (1988). Goals: An approach to motivation and achievement. *Journal*

  of Personality and Social Psychology, *54*(1), 5-12.

Elliot, A., & Harackiewicz, J. (1996). Approach and avoidance achievement goals and intrinsic

  motivation: A meditational analysis. *Journal of Personality and Social Psychological*,

  70(3), 461–475.

Ertmer, P., & Newby, T. (1996). The expert learner: strategic, self-regulated, and reflective.

  Instructional Science, 24, 1–24.

Flavell, J. (1979). Metacognition and cognitive monitoring. *American Psychologist, 34*(1), 906–911.

Garavalia, L., & Gredler, M. (2002). Prior achievement, aptitude, and use of learning strategies as predictors of college student achievement. *College Student Journal, 36*(4), 616–626.

Garcia, T., & Pintrich, P. (1995). *Assessing students' motivation and learning strategies: The motivated strategies for learning questionnaire*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA. (ERIC Document Reproduction Service No ED 383770)

Garcia, T., & Pintrich, P. (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-regulated learning: Issues and applications* (pp. 127–153). Hillsdale, NJ: Lawrence Erlbaum Associates.

Garcia, T., & Pintrich, P. (1992). *Critical thinking and its relationship to motivation, learning strategies, and classroom experiences*. Paper presented at the Annual Meeting of the American Psychological Association, Washington, DC. (ERIC Document Reproduction Service No ED 351643)

Gardiner, J., Gawlik, B., & Richardson-Klavehn, A. (1994). Maintenance rehearsal affects knowing, not remembering; elaborative rehearsal affects remembering, not knowing. *Psychonomic Bulletin and Review, 1*(1), 107–110.

Halpern, D. (1989). *Thought and knowledge: An introduction to critical thinking* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Harackiewicz, J., Barron, K., Pintrich, P., Elliot, A., Thrash, T. (2002). Revision of

    achievement goal theory: Necessary and illuminating. *Journal of Educational*

    Psychology, *94*(3), 638–645.

Harackiewicz, J., Barron, K., Tauer, J., & Elliot, A., (2002). Predicting success in college: A

    longitudinal study of achievement goals and ability measures as predictors of interest and

    performance. *Journal of Educational Psychology*, *94*(3), 562–575.

Hayduk, L. A. (1987). *Structural equation modeling with LISREL: Essentials and advances*.

    Baltimore: Johns Hopkins University.

Hofer, B., & Yu, S. (2003). Teaching self-regulated learning through a "learning to learn"

    course. *Teaching of Psychology*, *30*(1), 30–33.

Husman, J., Derryberry, W., Crowson, H., & Lomax, R. (2004) Instrumentality, task value, and

    intrinsic motivation: Making sense of their independent interdependence. *Contemporary*

    Educational Psychology, *29*, 63–76.

Jackson, J. (2002). Enhancing self-efficacy and learning performance. *The Journal of*

    Experimental Education, *70*(3), 243–254.

Jones, M., Alexander, J., & Estell, D. (2010). Homophily among peer groups members'

    perceived self-regulated learning. *The Journal of Experimental Education*, *78*, 378–394.

Karabenick, S. (2003). Seeking help in large college classes: A person-centered approach.

    Contemporary Educational Psychology, *28*(1), 37–58.

Karabenick, S. (1987). *Cognitive learning strategies: Their relation to perceived need and*

    help-seeking behavior. Paper presented at the Annual Convention of the American

    Psychological Association, New York, NY. (ERIC Document Reproduction Service No

    ED 292 010)

Karabenick, S., & Knapp, J. (1991). Relationship of academic help seeking to the use of learning strategies and other instrumental achievement behavior in college students. *Journal of Educational Psychology*, *83*, 221–230.

Kitsantas, A., Winsler, A. & Huie, F. (2008). Self-regulation and ability predictors of academic success during college: A predictive validity study. *Journal of Advanced Academics, 20*(1), 42-68.

Kleijn, W., van der Ploeg, H., & Topman, R. (1994). Cognition, study habits, test anxiety, and academic performance. *Psychological Reports*, *75*, 1219–1226.

Kuiper, R. (2002). Enhancing metacognition through the reflective use of self-regulated learning strategies. *The Journal of Continuing Education in Nursing, 33*(2), 78–87.

Light, R. J. (2001). *Making the most of college: Students speak their minds* (pp. 37). Cambridge, MA: Harvard University Press.

Lloyd, M., & Bahr, N. (2010). Thinking critically about critical thinking in higher education. *International Journal for the Scholarship of Teaching and Learning*, *4*(2), 1-16.

Lynch, D. (2008). Confronting challenges: Motivational beliefs and learning strategies in difficult college courses. *College Student Journal*, *42*(2), 416–421.

Lynch, D. (2006). Motivational factors, learning strategies and resource management as predictors of course grades. *College Student Journal*, *40*(2), 423–428.

McCaslin, M., & Hickey, D. (2001). Self-regulated learning and academic achievement: A Vygotskian view. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (pp. 289–307). Mahwah, NJ: Lawrence Erlbaum Associates.

McKeachie, W., Lin, Y., & Middleton, M. (2004). Two types of low test-anxious (low-worry) students. *Counseling and Clinical Psychology Journal*, *1*(3), 141–152.

Mckeachie, W., Pintrich, P., & Lin, Y. (1985). Teaching learning strategies. *Educational Psychologist*, *20*, 153–160.

Mealy, D. (1990). Understanding the motivation problems of at-risk college students. *Journal of Reading, 33*, 598–601.

Meyer, D., & Turner, J. (2002). Using instructional discourse analysis to study the scaffolding of student self-regulation. *Educational Psychologist, 37*, 17–25.

Nash-Ditzel, S. (2010). Metacognitive reading strategies can improve self-regulation. *Journal of College Reading and Learning*, *40*(2), 45–63.

Naveh-Benjamin, M., McKeachie, W., & Lin, Y. (1987). Two types of test-anxious students: Support for an information processing model. *Journal of Educational Psychology, 79*(2), 131–136.

Newman, R., & Schwager, M. (1993). Students' perceptions of the teacher and classmates in relation to reported help seeking in math class. *Elementary School Journal*, *94*, 3–17.

Newton, F. (1990) Academic support seminars: A program to assist students experiencing academic difficulty. *Journal of College Student Development, 31*, 183–186.

Pajares, F. (2002). Gender and perceived self-efficacy in self-regulated learning. *Theory Into Practice*, *41*(2), 116–125.

Pajares, F., & Schunk, D. (2001). Self-beliefs and school success: Self-efficacy, self-concept, and school achievement. In R. Riding & S. Rayner (Eds.), *International perspectives on international differences* (pp. 239–265). Westport, CT: Ablex.

Pape, S., & Smith, C. (2002). Self-regulating mathematics skills. *Theory Into Practice*, *41*(2), 93–101.

Paulsen, M., & Feldman, K. (2007). The conditional and interaction effects of epistemological beliefs on the self-regulated learning of college students: Cognitive and behavioral strategies. *Research in Higher Education*, *48*(3), 353–401.

Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, design, and analysis*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Petrie, T., & Helmcamp, A. (1998). Evaluation of an academic study skills course. *Journal of College Student Development, 39*, 112–116.

Pintrich, P. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology*, *16*(4), 385–407.

Pintrich, P. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, *95*(3), 667–686.

Pintrich, P. (2000a). Multiple goals, multiple pathways: The role of goal orientation in learning and achievement. *Journal of Educational Psychology*, *92*(3), 544-555.

Pintrich, P. (2000b). 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, CA: Academic Press.

Pintrich, P. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research*, *31*(6), 459–470.

Pintrich, P. (1989). The dynamic interplay of student motivation and cognition in the college classroom. In C. Ames & M. Maehr (Eds.), *Advances in motivation and achievement: Motivation enhancing environments* (pp. 117-160). Greenwich, CT: JAI Press.

Pintrich, P., Conley, A., Kempler, T. (2003). Current issues in achievement goal theory and

    research. *International Journal of Educational Research*, *39*, 319-337.

Pintrich, P., & DeGroot, E. (1990). Motivational and self-regulated learning components of

    classroom academic performance. *Journal of Educational Psychology*, *82*, 33–40.

Pintrich, P., & Garcia, T. (1991). Student goal orientation and self-regulation in the college

    classroom. In M. L. Maehr & P. R. Pintrich (Eds.), *Advances in motivation and*

    achievement: Goals and self-regulatory processes (pp. 371–402). Greenwich, CT: JAI.

Pintrich, P., McKeachie, W., & Lin, Y. (1987). Teaching a course in learning to learn.

    Teaching Psychology, *14*(2), 81–85.

Pintrich, P., McKeachie, W., & Smith, D. (1989). *The motivated strategies for learning*

    questionnaire. Ann Arbor: National Center for Research to Improve Postsecondary

    Teaching and Learning, University of Michigan.

Pintrich, P., & Schrauben, B. (1992). Students' motivational beliefs and their cognitive

    engagement in classroom academic tasks. In D. H. Schunk & J. L. Meece (Eds.), *Student*

    perceptions in the classroom (pp. 149–183). Hillsdale, NJ: Lawrence Erlbaum

    Associates.

Pintrich, P., & Schunk, D. (2002). *Motivation in education: Theory, research, and applications*

    (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

Pintrich, P., Smith, D., Garcia, T., & McKeachie, W. (1993). Reliability and predictive validity

    of the motivated strategies for learning questionnaire (MSLQ). *Educational and*

    Psychological Measurement, *53*, 801–813.

Pintrich, P., Smith, D., Garcia, T., & McKeachie, W. (1991). *A manual for the use of the*

    motivated strategies for learning questionnaire (MSLQ). Ann Arbor, MI: University of

Michigan, National Center for Research to Improve Postsecondary Teaching and Learning.

Pressley, M., Wood, E., Woloshyn, V., Martin, V., King, A., & Menke, D. (1992). Encouraging mindful use of prior knowledge: Attempting to construct explanatory answers facilitates learning. *Educational Psychologist*, *27*(1), 91–109.

Quible, Z. (2006). Analysis of the motivational orientation of and learning strategies used by students in a written business communication course. *The Delta Pi Epsilon Journal*, *48*(3), 168–190.

Russell, R., & Petrie, T. (1992). Academic adjustment of college students: Assessment and counseling. In. S. Brown & R. Lent (Eds.), *Handbook of counseling psychology* (pp. 485–511). New York: John Wiley & Sons.

Ryan, M. (2001). The peer group as a context for the development of young adolescents' motivation and achievement. *Child Development*, *72*, 1135–1150.

Ryan, M. (2000). Peer groups as a context for the socialization of adolescents' motivation, engagement, and achievement in school. *Educational Psychologist*, *35*, 101–111.

Ryan, R., & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78.

Ryan, A., & Pintrich, P. (1997). "Should I ask for help?" The role of motivation and attitudes in adolescents' help seeking in math class. *Journal of Educational Psychology*, *89*, 329–341.

Sungur, S. (2007). Modeling the relationships among students' motivational beliefs, metacognitive strategy use, and effort regulation. *Scandinavian Journal of Educational Research*, *51*(3), 315–326.

Santrock, J. W. (2001). *Educational psychology*. New York: McGraw-Hill.

Savich, C. (2008). Improving critical thinking skills in history. Online submission. (ERIC Document Reproduction Service No. ED 501 311)

Schuell, T. (1983). The effect of instructions to organize for good and poor learners. *Intelligence, 7*, 271-286.

Schunk, D. (1994). Self-regulation of self-efficacy and attributions in academic settings. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulation of learning and performance: Issues and educational applications* (pp. 75–99). Hillsdale, NJ: Lawrence Erlbaum Associates.

Schunk, D. (1996). *Attributions and the development of self-regulatory competence.* Paper presented at the annual conference of the American Educational Research Association, New York, NY.

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

Schunk, D., & Ertmer, P. (1999). Self-regulatory processes during computer skill acquisition: Goal and self-evaluative influences. *Journal of Educational Psychology*, *91*(2), 251–260.

Schunk, D. H, Pintrich, P. R., & Meece, J. L. (2008). *Motivation in education: Theory, research, and applications* (3rd ed.). Upper Saddle River, NJ: Pearson/Merrill Prentice Hall.

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

Schwartz, L., & Gredler, M. (1997). *The effects of goal-setting instruction on self-efficacy for self-regulated learning (SESRL) in undergraduate classrooms.* Paper presented at the annual meeting of American Educational Research Association, Chicago, IL.

Shell, D., & Husman, J. (2008). Control, motivation, affect, and strategic self-regulation in the college classroom: A multidimensional phenomenon. *Journal of Educational Psychology*, *100*(2), 443–459.

Talbot, G. (1997). *Can self-regulated learning be taught to college students?* Quebec, Canada. (ERIC Document Reproduction Services No. ED 409 289)

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition*. Chicago: University of Chicago Press.

Tobias, S. (1985). Test anxiety: Interference, deficit, skills, and cognitive capacity. *Journal of Educational Psychology*, *71*, 573–582.

Topping, K. (2005). Trends in peer learning. *Educational Psychology, 25*(6), 631-645.

Tuckman, B. W. (2003). The effect of learning and motivation strategies training on college students' achievement. *Journal of College Student Development, 44*(3), 430–437.

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

Vansteenkiste M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology*, *101*(3), 671–688.

VanZile-Tamsen, C., & Livingston, J. A. (1999). The differential impact of motivation on the self-regulated strategy use of high- and low-achieving college students. *Journal of College Student Development*, *40*, 54–59.

Vermunt, J., & Vermetten, Y. (2004). Patterns in student learning: Relationships between learning strategies, conceptions of learning, and learning orientations. *Educational Psychology Review*, *16*(4), 359–384.

Vispoel, W., & Austin, J. (1995). Success and failure in junior high school: A critical incident approach to understanding students' attributional beliefs. *American Educational Research Journal*, *32*, 377–412.

Watson, M, McSorley, M., Foxcroft, C., & Watson, A. (2004). Exploring the motivation orientation and learning strategies of first year university learners. *Tertiary Education and Management*, *10*, 193–207.

Weiner, B. (2000). Intrapersonal and interpersonal theories of motivation from an attributional perspective. *Educational Psychology Review*, *12*(1), 1–14.

Weinstein, C., & Mayer, R. (1986). The teaching of learning strategies. In M. Wittrock (Ed.), *Handbook of research on teaching and learning* (pp. 315–317). New York: MacMillan.

Weinstein, C., & Mayer, R. (1983). The teaching of learning strategies. *Innovation Abstracts*, *5*(32), 315-327.

Weinstein, C., Palmer, D., & Schulte, A. (1987). *The Learning and Study Strategies Inventory*. Clearwater, FL: H and H Publishing.

Wigfield, A., & Eccles, J. (2002). Defining motivation and its development. In A. Wigfield & J. S. Eccles (Eds.)., *Development of achievement motivation* (p. 1). San Diego: Academic Press, Inc.

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

Willoughby, T., Wood, E., McDermott, C., & McLaren, J. (2002). Enhancing learning through strategy instruction and group interaction: Is active generation of elaborations critical? *Applied Cognitive Psychology*, *14*, 19–30.

Wolters, C. (2004). Advancing goal theory: Using goal structures and goal orientations to predict students' motivation, cognition, and achievement. *Journal of Educational Psychology, 96*(2), 236–250.

Wolters, C. (2003). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. *Educational Psychologist*, *38*(4), 189–205.

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

Wolters, C., Yu, S., & Pintrich, P. (1996). The relation between goal orientation and students' motivational beliefs and self-regulated learning. *Learning and Individual Differences*, *8*(3), 211–238.

Yumusak, N., Sungur, S., & Cakiroglu J. (2007). Turkish high school students' biology achievement in relation to academic self-regulation. *Educational Research and Evaluation*, *13*(1), 53-69.

Zeidner, M., & Matthews, G. (2005). Evaluation anxiety: Current theory and research. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 141–163). New York, NY: Guilford Press.

Zimmerman, B. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice*, *41*(2), 64–70.

Zimmerman, B. (2001). Theories of self-regulated learning and academic achievement: An overview and analysis. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated*

learning and academic achievement: Theoretical perspectives (pp. 1–37). Mahwah, NJ: Lawrence Erlbaum Associates.

Zimmerman, B. (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. (1998). Academic studying and the development of personal skill: A self-regulatory perspective. *Educational Psychologist*, *33*, 73–86.

Zimmerman, B. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist*, *25*, 3–17.

Zimmerman, B. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, *81*(3), 329–339.

Zimmerman, B. (1986). Becoming a self-regulated learner: Which are the key subprocesses? *Contemporary Educational Psychology*, *11*, 307–313.

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

Zimmerman, B., & Kitsantas, A. (2007). Reliability and validity of self-efficacy for learning form (SELF) scores of college students. *Journal of Psychology*, *215*(3), 157–163.

Zimmerman, B., & Martinez-Pons, M. (1990). Student differences in self-regulated learning relating grade, sex, and giftedness to self-efficacy and strategy use. *Journal of Educational Psychology*, *82*, 51–59.

Zimmerman, B., & 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., & Schunk, D. (2001). Reflections on theories of self-regulated learning and

 academic achievement. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated*

 learning and academic achievement: *Theoretical perspectives* (pp. 289–307). Mahwah,

 NJ: Lawrence Erlbaum Associates.

Zusho, A., & Pintrich, P. (2003). Skill and will: The role of motivation and cognition in the

 learning of college chemistry. *International Journal of Science Education*, *25*(9), 1081–

 1094.