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PREDICTING HOMEWORK COMPLETION AND ACADEMIC ACHIEVEMENT: THE ROLE OF MOTIVATIONAL BELIEFS AND SELF-REGULATORY PROCESSES

by

HÉFER BEMBENUTTY

A dissertation submitted to the Graduate Faculty in Educational Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

2005

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Abstract

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by

Héfer Bembenutty

Advisor: Professor Barry J. Zimmerman

This study sought to examine the roles of motivational beliefs and self-regulatory processes on predicting homework completion and academic achievement among college students enrolled in an urban technological college. This investigation was conceptualized under the umbrella of Zimmerman's (2000) cyclical model of self-regulation. Specifically, the aim of the present study was to find answers to the following questions: a) Are self-regulatory processes associated with the quality of students' homework completion? b) Is a willingness to delay gratification important in students' homework completion? c) What are the motivational sources of students' use of self-regulated learning strategies, delay of gratification, and homework completion? To answer these questions, participants responded to a questionnaire and maintained homework logs. A path analysis was conducted to test a self-regulated model of homework completion.

As it was hypothesized, highly self-efficacious students engaged in academic tasks for the sake of learning and mastering homework assignments. Students who reported completing their homework assignments indicated that they (a) used diverse and

effective self-regulatory learning strategies, (b) were willing to delay gratification for the sake of long-term academic goals, (c) were more motivated as indicated by their high self-efficacy, outcome expectancy, and intrinsic interest, and (d) obtained higher grades than students who did not successfully complete their homework assignments. These results provide support for Zimmerman's cyclical view of the role of self-regulatory processes in college students' homework practices and engagement. More specifically, these results indicate that high self-regulated learners with high self-efficacy beliefs and intrinsic interest in the course adopted a proactive approach to complete their homework.

Dedication

I dedicate this dissertation to my spiritual father, Padre Padre,

Man of God, Priest, Teacher, and Prophet

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This dissertation would not have been possible without the strong support and constant encouragement of Professor Barry J. Zimmerman, my mentor. My sincerest gratitude goes to Professor Zimmerman for services beyond the call of duty in helping me to complete this dissertation. I also offer my deepest gratitude to Professor Helen Johnson for helping me to do excellent work. I would like to express my gratitude also to Professor David D. Rindskopf for his great contribution to my personal, educational, and professional growth. A debt of gratitude goes out to Dr. John Hudesman and Dr. Dais Akiba for reading and offering helpful feedback to improve my dissertation.

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Chapter I

INTRODUCTION

Homework has been defined as a teacher-initiated method for directing students to study more effectively on their own outside of the school (Cooper, 1989, 2001). It is usually first assigned during the elementary school years and increases in depth and quantity during subsequent years. Current research indicates that homework generally has positive effects on students' academic outcomes (Cooper 1989, 2001; Cooper & Valentine, 2001; Epstein & Van Voorhis, 2001). Not only does homework serve to convey academic knowledge to students, but it should also prompt them to engage in self-initiated and self-directed studying (Zimmerman, 2002). However, little research has been done to investigate the latter topic, and this study attempts to fill in this gap, focusing specifically on population of at-risk college students.

In a historic article entitled, "An Invitation to an Educational Psychology of Studying," Rohwer (1984) called for greater research on the function, importance, and effects of studying on learners. To accomplish this, Zimmerman (1998) recommended investigating the role of self-regulatory processes in successful studying. He defined self-regulation as, "self-generated thoughts, feelings, and actions for attaining academic goals" (p. 73). Winne and Hadwin (1997) proposed four self-regulatory stages in homework completion: task definition (perception of the feature of the task); goal setting and planning (reframing goals); enacting study tactics and strategies (implementing, monitoring, and evaluating strategies); and metacognitively adapting studying (inspecting outcomes and making decisions and adjustments). However, this account does not

include motivational beliefs, such as delay of gratification, self-efficacy, and intrinsic interest. Students' use of self-regulatory processes (e.g., goal setting, self-monitoring, and strategy use) and their motivational beliefs (e.g., self-efficacy, intrinsic interest, and delay of gratification) during studying have been highly predictive of academic success (Schunk & Zimmerman, 1994, 1998).

Current theoretical accounts of homework have paid little attention to students' development and use of self-regulatory processes, but have focused instead on social environmental factors that influence students' engagement in homework. For example, researchers have examined the effects of parents and teachers on students' homework completion (Cooper & Valentine, 2001; Keith, 1986; Hoover-Dempsey & Sandler, 1995, 1997). Ironically, as Warton (2001) mentions, the voices of the students themselves tend to be overlooked in homework research.

Expectations and Obstacles Facing At-Risk Students

The problems associated with homework completion are exacerbated when the students are at-risk, which is defined as "subject to failure because of their characteristics and/or because of inadequate responses to their needs by school, family or community" (Slavin, 2003, p. 316). At-risk students often come from single-parent homes in low socioeconomic neighborhoods, have developmental delays, and display aggression. In addition, they often obtain low course grades, need to repeat classes, experience reading or math problems, and exhibit serious discipline problems in school, at home, and in the community (Slavin, 2003). Frequently, at-risk students fail to do their homework because they not only lack adequate resources but also the self-discipline necessary to

complete their homework. As these at-risk students matriculate through elementary and secondary school, they may receive early, compensatory, or remedial interventions designed to help them avoid failing. However, these programs often fail to develop academic proficiency because they do not provide the motivational beliefs and self-regulatory strategies that at-risk students need to become proactive learners. As a consequence, at-risk learners carry their academic deficiencies into college.

Although a formal acceptance letter from a college is often considered evidence of a student's readiness for higher education, many students enter college without having mastered the basic academic skills necessary to succeed. As the coursework grows more challenging and complex, these students quickly lose confidence in their capability to succeed and often drop out of college despite their sincere desire to graduate. This represents a tremendous loss for them, their families, and ultimately society itself.

The quantity and quality of the homework of at-risk college students is deficient in significant part because the college curriculum requires students to be personally responsible for completing not only assigned but implicit academic tasks, such as self-directed studying (Zimmerman, 2002). At-risk college students have seldom learned essential self-regulatory processes (e.g., goal-setting, strategy use, self-monitoring, and self-adjustment) that can insure academic success (Schunk & Zimmerman, 1998). To address the academic deficiencies of at-risk students, many colleges across America have offered remedial content area courses or tutoring. However, students also need to acquire more than content area knowledge. For example, teaching at-risk students basic mathematical skills will not prepare them to set daily goals and to manage their time

wisely. At-risk students may also need instruction in how to sustain motivation and self-confidence in the face of obstacles -- both academic and nonacademic.

It seems then that educators should ask more specific questions about the role of self-regulation in the completion of academic homework. Do at-risk college students know how to use effective learning strategies to complete their homework successfully? Do these students perceive themselves as sufficiently self-efficacious and intrinsically interested in the homework to motivate themselves to complete this important academic task? Do students who engage proactively and independently in their homework achieve greater academic success in college?

The Nature of College Homework

In college, homework assignments serve different purposes than in elementary, middle, and high school. In the pre-college years, homework is usually designed and monitored by teachers to help students complete or reinforce classroom learning tasks, but in college, homework is usually designed and monitored personally by students to enhance the effectiveness of their learning. Collegiate students are also expected to search for and absorb material that is not directly covered in class and are expected to demonstrate this knowledge in term papers, in oral reports, or on tests (Zimmerman, 2002). Thus, the quality and quantity of college students' homework depends heavily on their self-initiative and self-direction.

Achieving this high level of homework completion can be compromised by numerous competing alternatives in the college environment. This was clearly illustrated in the responses of 1,055 high school students to the annual survey investigating the

opinions of America's youth (Graves, 2003). According to this "State of Our Nation's Youth" report, 58% of America's high school students have their own televisions, 45% have their own cell phones, 39% have video game systems, 29% have DVD players, and 19% have MP3 players. Of this group of respondents, 80% stated that they planned to attend four-year colleges, and 75% were hopeful and optimistic about their future. These results suggested that first-year college students face innumerable distractions that could preclude them from regulating themselves and building self-confidence. If compounded by learning problems or lack of adequate study skills, these distractions can lead ultimately to college failure.

Current research on the nature of homework and students' success in completing it has focused on elementary, middle, and secondary school students. At this age level, parents and teachers are often instrumental in supervising its completion. Studies have examined the amount of time that parents dedicate to helping their children; attitudes of teachers, parents, and students toward homework; methods of parental supervision; types of homework; the impact of family characteristics (e.g., SES, mother's education, age of students) on homework completion. Although researchers (e.g., Cooper, 1989; Keith & Cool, 1992) have developed comprehensive models supporting these aspects of homework, they have offered little insight into students' cognition and motivation for homework. In recent research on pre-collegiate populations of students, several researchers (e.g., Xu & Corno, 1998, 2003; Walker, & Hoover-Dempsey, 2001) have included self-regulation constructs, such as self-monitoring, help-seeking, and emotional, attentional, and environmental controls. Researchers need to examine the relation

between homework and college students' use of self-regulatory strategies and motivational beliefs to explain why they are unable or unwilling to engage in self-initiated studying. The present study was specifically designed to focus on self-regulatory processes and motivational beliefs on homework completion among at-risk college students.

Overview of a Self-Regulation Model of Homework

A self-regulation model of homework completion offers an important alternative to previous models of homework completion. Although prior studies have measured student attitudes toward homework, they have usually focused on exogenous variables that are often not personally controllable, such as socio-economic status, gender, and race. A self-regulation approach focuses on specific controllable processes and beliefs before, during, and after homework completion, such as how students select, self-monitor, and self-evaluate their homework activities.

To explain the interdependence of task-specific motivational beliefs and self-regulated learning processes, Zimmerman (1998b, 2000) proposed a model of self-regulation involving three cyclical phases (see Figure 1). The *forethought phase* (pre-performance) includes self-regulation processes and motivational beliefs that set the stage for action. *Goal setting* refers to learners' specifying intended actions or outcomes of performance (Locke & Latham, 1991). During homework, learners set goals by making a list of tasks to be accomplished during the study time. For example, a college student could set a goal of completing 10 quadratic equation exercises from a book. *Strategic*

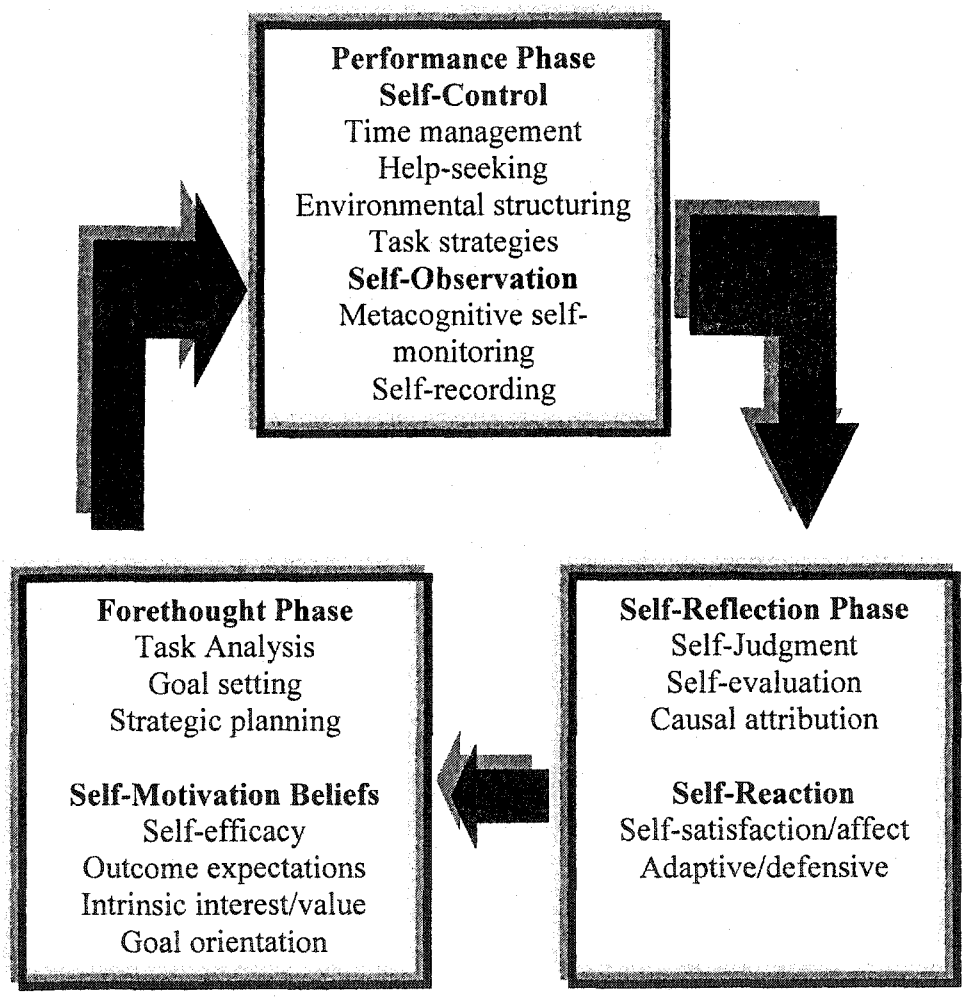
planning involves identifying an effective method for attaining one's homework goals, such a highlighting to improve one's reading comprehension (Zimmerman & Martinez-Pons, 1986).

In addition to goal setting and strategic planning processes, learners need to sustain their motivation to complete their homework assignments. Effective learners acquire beneficial motivational beliefs that enable them to sustain their effort over time and obstacles. Three key motivational beliefs associated with academic performance are self-efficacy, outcome expectancy, and intrinsic interest. *Self-efficacy* refers to individuals' beliefs in their capability to perform a specific task (Bandura, 1997). These beliefs are linked to different domains of functioning, such as math or English. For example, individuals might believe that they are capable of completing math homework problems (high math self-efficacy) but not capable of writing a coherent essay (low writing self-efficacy). In addition, self-efficacy beliefs are context-dependent because many non-ability influences can enhance or impede execution of skills, such as performance in poor lighting conditions. Self-efficacy is assessed before students are asked to perform. Thus, it can play a causal role in academic functioning, and influence effort, persistence, and choice of activities (Pajares, 1996; Pintrich & Schunk, 2002; Zimmerman, 2000).

Outcome expectancy refers to individuals' judgments about positive or negative outcomes that their behavior and actions will produce (Bandura, 1997). According to Bandura (1997), learners' outcome expectancies rather than their actual reception of

rewards determine action. If the students do not believe that the consequences of homework completion will be positive (e.g., improved test scores), they will not engage in

Figure 1. Zimmerman's Cyclical Model of Self-Regulation of Learning.



homework activities. However, Bandura (1997) cautioned that outcome expectancy is not sufficient to ensure task completion; self-efficacy is also necessary. If learners doubt their ability to complete the homework assignments effectively, even sizable rewards will not motivate them. In cyclical self-regulation terms, high self-efficacy beliefs are associated with goal setting, use of learning strategies, and persistence (Zimmerman, 2000).

Intrinsic interest refers to individuals' engagement in a task for the sake of the task itself (Deci, 1975; Hidi, 1990; Schiefele, 1991). Like self-efficacy, intrinsic interest is expected to affect students' use of learning strategies and performance: Students who value the intrinsic qualities of a task will persist longer over homework and eventually attain higher grades than students with low intrinsic interest in the task.

The *performance phase* includes the processes that affect attention and action during homework, such as strategy use and self-observation. The performance phase processes that affect attention and action include self-monitoring, time management, environmental structuring, and help-seeking. With regard to homework, *time management* refers to estimating and budgeting time for studying. Learners who use this strategy would schedule daily studying and homework time, organizing the day to ensure completion of key activities. For example, a learner would say to himself, "I will do my math homework for two hours before watching my favorite TV Program." Regarding homework, *self-monitoring* is defined as selective tracking of one's studying. Self-monitoring could take the form of keeping records of completed assignments, new words learned, or even creating a graph of grades or homework completed. With regard to homework, *environmental structuring* refers to selecting, organizing, and creating an

effective work setting, such as studying in a secluded place. A self-regulated learner, who wants to complete her homework, would say to herself, "I will disconnect the telephone while I am doing my homework." Finally, with regard to homework, *help seeking* represents a learning strategy in which learners choose social sources of knowledge and skill to secure successful task completion, such as seeking help from a study partner, a tutor, or a teacher. A self-regulated learner would tell himself, "If I have difficulty with my homework, I will call one of my classmates to discuss it with her."

The *self-reflection phase* (post-performance) includes learners' judgments and reactions to their performance efforts – namely their self-evaluations, attributions, self-satisfaction reactions, and adaptations. S*elf-evaluation* is defined as setting and using standards for assessing one's progress. For example, learners who engage in mathematics self-evaluation check their homework before handing it to the teacher and use as standards the math problems done in class by the teacher to examine the accuracy of their homework. As the learners engage in the task, they use self-regulatory strategies and during self-reflection phase they will evaluate their learning progress. *Attributions* refer to beliefs about the causes of one's homework outcomes, such as ability, task difficulty, or strategy use. Attributions to strategy use are particularly advantageous for sustaining motivation in the face of negative outcomes. Self-satisfaction or emotional reactions to one's homework outcomes determine whether the learners *adapt* their approach to future learning efforts or defensively avoid future efforts to learn.

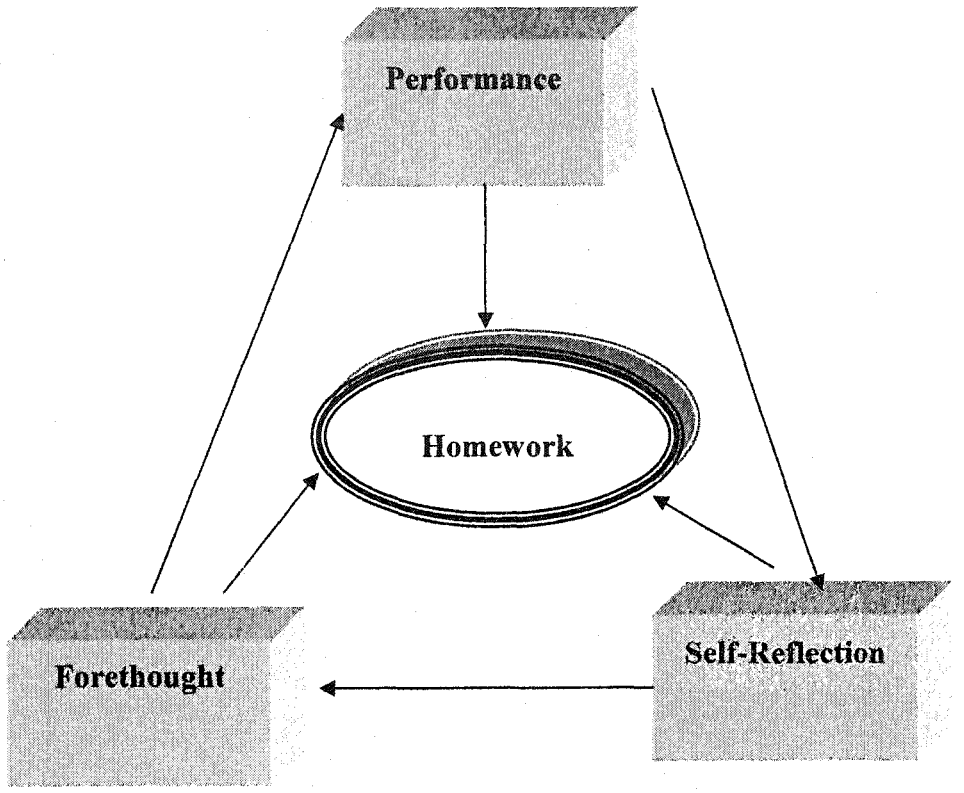
Zimmerman's (2000) cyclical phases correspond to key aspects of students' homework activities. For example, self-efficacy is an important forethought motivational

belief that prompts students to plan and initiate homework activity. During the performance phase, learners use study strategies to guide and monitor their completion of homework. Finally, in the self-reflection phase, they evaluate their learning progress and adapt their methods of homework completion.

Prior research has shown that students' motivational beliefs influence their use of learning strategies, and that these motivational beliefs and use of learning strategies are in turn related to students' academic achievement (Bandura, 1997, Schunk, 2001, 2002; Zimmerman, 2000). However, these self-regulatory studies have not focused on homework. From a social cognitive perspective, self-efficacy, intrinsic interest, and outcome expectancy are hypothesized to play a mediating role between students' homework and achievement (see Figure 2).

To assess and improve students' self-regulation of homework completion, Zimmerman, Bonner, and Kovach (1996) developed a self-monitoring form. In the form, the students reported the following information: a) what was the assignment, b) date of the assignment, c) at what time the assignment started, d) time spent on the assignment, e) where and with whom the assignment is completed, f) whether there are distractions during the homework completion, and g) their self-efficacy rating about the effectiveness of their learning process. This study time form can be used to judge their progress. Learners can monitor whether the time spent on task produces the expected outcomes, whether the place where and with whom the task is completed increased performance, and whether distractions influenced task completion. For instance, if learners find that studying by themselves is not conducive to satisfactory outcomes, they can select study

Figure 2. Cycle of Self-regulatory Phases and Homework.

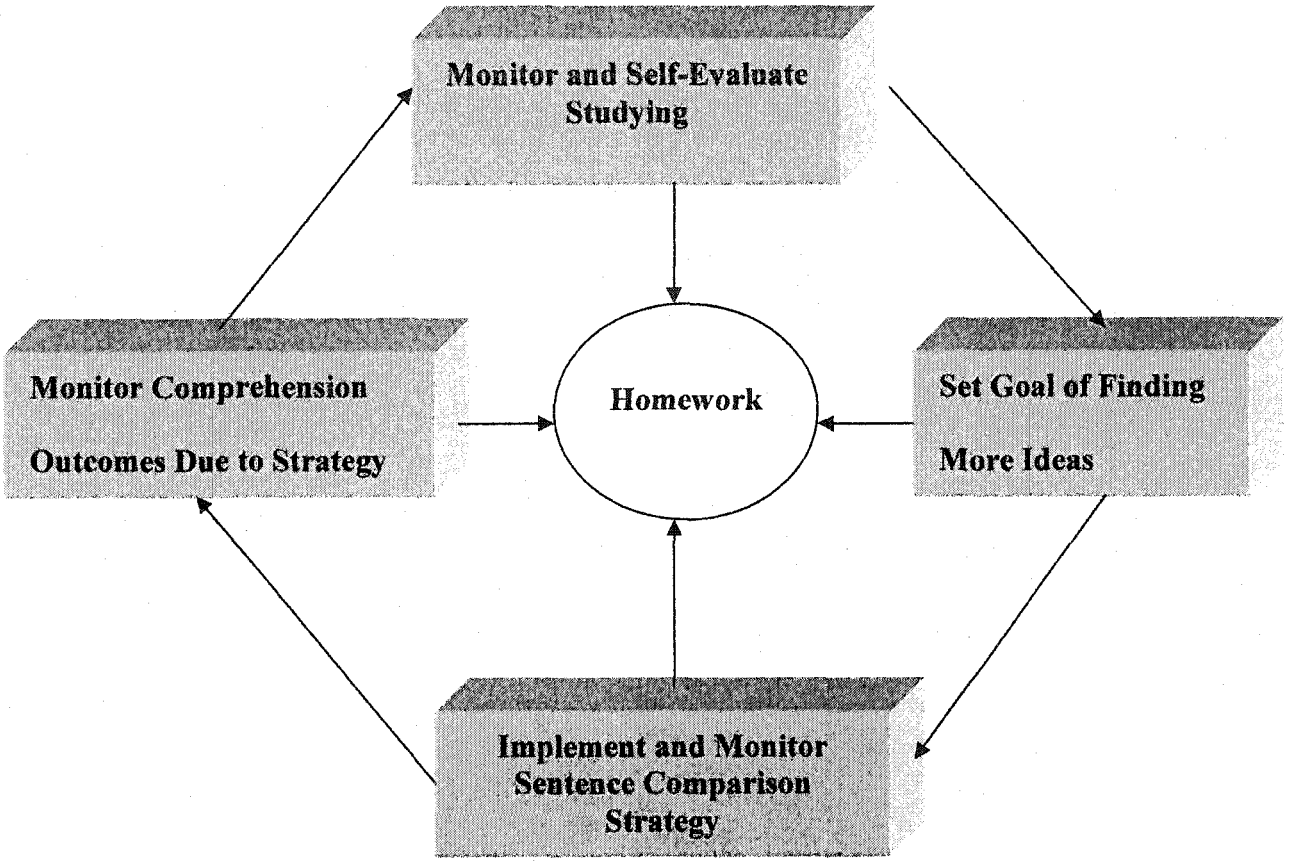


partners that can contribute to task completion. Further, if the students discover that while they do the homework, the telephone rings with calls from friends, they could decide to disconnect the telephone until the assignment is done. The proposed dissertation will use elements of Zimmerman's and colleagues' monitoring forms to assess at-risk college students' homework completion (see Figure 3).

Delay of Gratification

Delay of gratification has been conceptualized as a key index of a person's motivation to achieve (Ayduk et al., 2001; Mischel, 1996; Mischel, Canton, & Feldman,

Figure 3. Phases of Homework Self-regulation.



1996; Mischel, Shoda, & Rodríquez, 1989). Mischel and associates (Mischel, 1996; Mischel, Canton, & Feldman, 1996) developed a paradigm in which preschool children were asked to choose between a less valuable but immediately available reward and larger reward that is distant in time. These researchers found an association between the children's willingness to wait for such a reward and their intelligence level, ability to resist temptation, social responsibility, and achievement. Twelve years later in a longitudinal follow-up study, Mischel and colleagues found a positive relation between the preschool children's delay of gratification and their adolescent academic and social competence level (Mischel, 1996; Mischel, Shoda, & Rodríguez, 1989).

According to Mischel (1996), the ability to delay gratification is, in part, a function of a person's expectations of rewarding outcomes, self-efficacy beliefs, and valuing of the rewards. Mischel argued that for individuals to wait for delayed rewards, they must feel self-efficacious about their capability to obtain the later outcomes. In cyclical terms, without a firm belief in their goal outcome expectations, self-efficacy beliefs, and outcome valuing during forethought, individuals would not persist in goal-directed behavior and would not voluntarily postpone immediate gratification during the performance phase. To put it in causal terms, a student's ability to delay gratification mediates the relationship between self-efficacy level and goal-directed behavior toward future outcomes. Thus, delay of gratification would necessarily affect students' use of self-regulation and performance during homework completion.

As a motivational measure, delay of gratification has received very little attention in academic learning settings to date and has not been studied in the homework literature.

However, students' ability to delay non-academic sources of gratification until academic goals are attained is expected to influence their homework completion and academic achievement. To be successful, students need to focus on academic goals despite many attractive non-academic sources of gratification (Bembenutty & Karabenick, 1998).

Research Questions regarding Homework

Traditional models of homework view it as a reactive learning experience: Teachers assign students academic tasks to be completed at home. By contrast, self-regulatory models view homework as a *proactive* experience: Learners engage in teacher-assigned homework and self-initiated studying by setting goals for themselves, self-monitoring their academic progress, and self-reflecting upon their learning outcomes. Self-regulation models seek to explain students' need for self-discipline and delay of gratification in order to complete their homework. To date, little research has been conducted on self-regulatory components of students' homework completion and academic achievement.

From the preceding discussion, several basic questions can be raised:

1. Are self-regulatory processes associated with the quality of students' homework completion?
2. Is an ability to delay gratification important in students' homework completion?
3. What are the motivational sources of students' use of self-regulated learning strategies, and delay of gratification? Specifically, what is the role of

students' self-efficacy beliefs, outcome expectancy beliefs, and intrinsic interest?

Chapter II

Literature Review

This chapter consists of four sections. The first section provides an overview of literature associated with homework and academic achievement. Specific attention is given to the definition, purpose, and effects of homework on academic functioning. In addition, an overview of current models of homework, such as those of Cooper and Keith and their colleagues, is provided along with research on the relation between homework and academic performance, The second section will explore the role of self-regulatory processes in homework completion. Particular attention is given to describing the self-regulated learning models of Xu and Corno, Walker and Hoover-Dempsey, and Zimmerman, along with their implications and research outcomes regarding homework. The third section focuses on research on delay of gratification and homework completion. In addition, the relation between delay of gratification and self-regulation of learning is discussed along with motivational determinants of students' delay of gratification, such as self-efficacy beliefs, outcome expectancies, and intrinsic interest. In the fourth section, a justification for the present investigation is given along with the hypotheses.

Section One: Homework and Academic Achievement

Homework: Definition, Purpose, and Effects

Definition. An early definition of homework was provided by Good (1926) who defined it as, "school assignments to be completed out of regular school hours at the residence of a pupil" (p. 285). Bond and Smith (1966) broadened the definition of homework to include any school activities that teachers assign for the students to do in

their own time. Coulter (1979) acknowledged that assigned homework could be completed during study periods at school, home, or any other place. More recently Cooper (1989) has defined homework as, "tasks assigned to students by school teachers that are meant to be carried out during non-school hours" (p. 7) and pointed out that this definition excludes in-class work that the teacher assigns, extracurricular activities, or tutoring. Although there is considerable variability among these definitions of homework, they all exclude self-initiated studying activities that students employ to enhance understanding. This limitation leads to the issue of the purpose of homework activities.

Purpose. Historically, teachers have assigned homework for a variety of purposes. For instance, Strang (1968) recommends that homework should be given to meet students' needs and to extend their class work. Homework can also serve as a means of improving students' learning and achievement in schools (Cooper, 1989). LaConte (1981) suggests that the most frequent purposes that educators give for assigning homework are the following: a) to stimulate intellectual discipline, b) to cover more material in class, c) to increase independence and responsibility, d) to reinforce course material, and e) to cement the relationship between the schools and the parents. Enhancing intellectual discipline (a) and independence and responsibility (c) are linked conceptually to self-regulation. An alternative taxonomy of purposes for homework involved: practice, preparation, extension, and creative (Lee & Pruitt, 1979). *Practice* refers to those homework assignments designed to enhance skills and material covered in class. *Preparation* refers to homework designed to ready learners for future learning activities. *Extension* refers to those homework assignments designed to increase the transfer and

application of course materials to other aspects and situations. *Creative* refers to homework that requires critical thinking and cognitive engagement on the part of the learners.

Epstein (1988) developed the most comprehensive taxonomy of the purposes of homework: a) to practice skills, b) to increase the learning experience, c) to increase responsibility, self-confidence, and time management, d) to establish and maintain communication between schools and parents, e) to comply with districts' mandates about homework, f) to inform parents about activities going on in the school and the classroom, and g) to maintain classroom policies. Epstein's third purpose of homework (c) is also conceptually linked to self-regulation. In summary, enhancing students' self-regulation is widely perceived as an important purpose of homework assignments.

Effects. How well have the purposes of homework been realized? Cooper and Valentine (2001) reported that homework has had the following positive effects: a) enhancing retention, b) increasing understanding of course material, c) increasing study skills, d) increasing positive attitudes toward school, e) increasing the belief in learning outside of the classroom, f) increasing independence and responsibility, and g) facilitating parental involvement and appreciation of their children's school-related work. Knorr (1981) reported additional outcomes of homework, such as: a) it enhanced learning through reinforcement, assimilation, practice, and application, b) it allowed for completion of unfinished assignments and make-up work, c) it provided a preview of classroom work, d) it allowed teachers to adjust classroom instruction to individual

differences, and e) it provided supplemental home projects that supported school experience (see Knorr, 1981).

Not all effects of homework have been positive, however. Cooper and Valentine (2001) found that: a) too much homework bored the students; b) too much homework interfered with leisure time and community activities; c) too much parental involvement could result in interference and confusion; d) too demanding homework could result in cheating and other undesirable behavior; e) too much emphasis on homework could exacerbate socioeconomic differences among students. Similarly, Garman (1986) found that homework increased negative attitudes toward the school, promoted rote learning, diminished teachers' perception of individual differences among the students, resulted in negative outcomes for students who did not have the resources to complete the homework, and interfered with social and family activities. Clearly, in order to have its intended positive effects, homework cannot be assigned without careful monitoring.

An Overview of Current Models of Homework

The literature about homework is abundant, and many important variables surrounding it have been well investigated (Cooper, 1989), such as students' attitudes toward homework, frequency of homework completion, environmental conditions, and timing of homework. Current models of homework emphasize that students' engagement is a function of parental and teacher support. This research has focused on teachers, parents, and students' attitudes toward homework, parental supervision, family characteristics (e.g., socio-economic status, mother's education), and age of the students.

Cooper's model. Cooper and his associates (Cooper, Jackson, Nye, & Lindsay, 2001) developed a model of factors influencing the effect of homework, which include the following six components: exogenous variables (e.g., grade level, subject matter), assignment characteristics, initial classroom factors, home-community factors, classroom follow-up, and outcomes or effects. In a recent study, they investigated the factors that influence homework completion and its influences on academic outcomes among elementary school children (Cooper, Jackson, Nye, & Lindsay, 2001). Specifically, they wanted to assess the effect of family variables (e.g., students' ability levels, parent attitudes toward homework, and homework norms) on home and community processes (e.g., distractions at home, level of parental facilitation, and time children spent in after school activities), and the effect of these variables on students' classroom performance (e.g., homework completion, final grades, and attitudes). The investigators wanted to evaluate the magnitude of these associations and their mediating effects.

Participants in a key study by Cooper et al. (2001) comprised 570 students in Grade 2 and Grade 4, their parents, and 28 teachers. The study used the Homework Process Inventory to assess students, teachers, and parents' report about the students' behaviors, attitudes, and environmental structures related to homework. Factors related to student and family backgrounds included students' norms (e.g., "In general, how many of your students did you think actually finish their homework?"). The Tennessee Comprehensive Assessment Program was used to assess students' academic ability. Parental attitude included factors such as interest, skills, time, liking of homework, and help available. Homework environment included factors, such as whether the students

were alone while completing homework, whether the TV was on, and whether the children had quiet time to complete the homework. Parental facilitation included frequency of seeking help while doing the homework, or whether the children did it alone. The researchers used just one item to assess students' attitudes toward homework (i.e., Do you think homework helps you learn?) and students' homework completion (i.e., "How much of your homework did you finish?"). The teachers awarded the class grade. Using structural equation modeling, the investigators predicted multiple paths, and direct, and indirect effects among most of the variables.

Results showed that none of the variables had a direct effect on students' attitude toward homework with the exception of parental attitude. Specifically, homework environment, study ability, and parental facilitation did not predict students' attitude. However, homework completion, parent facilitation, and students' ability had a direct effect on final course grade. Further, students' norms and parental attitude had an indirect effect on final course mediated by parental facilitation. Cooper and his associates concluded that parents played an important role in their children's homework processes and successes. These researchers also concluded that students' attitude toward homework did not appear to have a significant role in the students' grade. However, homework completion did have a direct effect on academic success.

It is important to note that Cooper's et al.'s homework model emphasized parental factors associated with homework assignments rather than the children's self-regulatory factors. This emphasis is understandable since the children in this study were in elementary school, and they might be more under the control of their parents than

adolescents or college students. Furthermore, Cooper's et al.'s model was not a task-specific model in which students responded to specific academic homework tasks. More specifically, this model did not assess students' use of particular cognitive processes during homework completion, such as goal setting, planning, self-monitoring, record keeping, self-evaluation, self-instruction, and self-reaction during homework.

Keith's model. Keith and his associates (Anderson & Keith, 1997; Fehrmann, Keith, & Reimers, 1987; Keith & Benson, 1992; Keith & Cool, 1992) developed a model of factors influencing the effects of homework, which included the following components: exogenous variables (e.g., ethnicity, gender, family SES), students' ability, parental involvement, academic course work, quality of schooling, motivation for homework, and academic achievement. In a recent study, Fehrmann, Keith, and Reimers (1987) investigated the effects of parental involvement on their children's grades, time spent homework and time viewing TV. This longitudinal study targeted 28,052 high school students. Consistent with Cooper and his associates (Cooper, Jackson, Nye, & Lindsay, 2001), homework was assessed using a single item, "Approximately what is the average amount of time you spend on homework a week." Students responded on a scale ranging from zero (0, *No homework is ever assigned* or *I have homework but I don't do it)* to ten (10, *More than 10 hours a week).* Keith and his colleagues found that high parental involvement resulted in superior academic performance. Although parental involvement had a direct positive effect on homework completion, it did not have a direct effect on subsequent grades, but did affect them indirectly through time spent on homework. However, it is not possible from this study to determine specifically what the students did

during homework, such as which learning strategies they employed and which motivational beliefs influenced homework completion.

In conclusion, Cooper's and Keith's models offer limited information about the students' cognition and motivation during homework, especially their proactive self-regulatory processes and self-motivational beliefs.

Homework and Academic Performance

Paschal, Weinstein, and Walberg (1984) examined 15 studies of homework and academic achievement, and they found that: a) homework had positive impact on achievement; b) the effects of homework were greater in social studies than in other subject areas; c) frequent homework assignments had a greater effect than did intermittent homework; d) the effect of homework did not differ with socioeconomic status; and e) homework completion had a greater effect on academic achievement than did socioeconomic status. In a later review of experimental studies involving homework versus no homework groups, Cooper (1989, 2001) found that about 70% of the 17 studies reported that assigning homework had a positive effect on academic achievement (e.g., standardized tests, class tests, and final course grade) in the areas of mathematics, English, science, and social studies. Cooper found that the effect of homework on academic achievement varied with grade level. He concluded that the effect of homework on academic achievement was stronger among older students (i.e., junior high and high school students). Cooper noted that these effects were not a function of gender differences, but they were a function of the subject matter. For example, homework effects were small in mathematics, moderate in English, and large in social studies and

science. Cooper also discovered that the effects of homework were larger when the academic outcome in consideration was teacher-made tests or final course grades than when standardized tests were involved.

Cooper (1989, 2001) also investigated whether homework was more effective than in-school study on increasing academic achievement. Using 18 comparison groups, Cooper found that homework had a greater effect on academic achievement than in-school study. However, this finding depended on students' grade level. Homework had a strong positive effect on junior and senior high school students regardless of whether the outcomes involved standardized tests or grades. With elementary school children, the effect of homework was small -- perhaps because of the students' limited attention capabilities or good study skills. Furthermore, among 50 correlational studies, Cooper found a positive correlation between time spent on homework and academic achievement and attitude. However, these correlations varied depending on the grade level of the students. Specifically, among senior high school students, these correlations were higher (r = .25) than junior high students (r = .07) and significantly higher than elementary schools learners (r = .02). Time spent on homework had the highest correlation with academic achievement when the subject matter was mathematics and the lowest when the subject was social studies. Cooper (1989, 2001) observed that these results did not depend on whether the learners were high or low achievers, even though high achievers were expected to profit more from homework.

Similarly, Doane (1973) reported that the association between homework and academic achievement in mathematics was significant for skilled learners (i.e., students

who obtained high scores on math tests) but non-significant for less skilled learners (i.e., students who obtained low scores on math tests). However, he cautioned that a possible reason for the low associations among the less skilled learners was that they may not understand the class instruction, so they could not profit from the homework. There was evidence that homework completion enhanced learning regardless of students' original level of achievement. Polachek, Kniesner, and Harwood (1978) found that time and ability dedicated to academic work were the strongest predictors of college students' academic outcomes, and these researchers concluded that engaging in homework helped less skilled learners by compensating for their deficiencies. Standley (1980) also found that homework had a positive effect on all students, even highly-ability learners, and he concluded that homework completion was an important factor that distinguished successful learners from non-successful learners.

In a similar vein, Keith (1982), in a large longitudinal study with 20,364 senior high school students, found that the amount of time spent on homework had a significant effect on academic achievement -- even with less skilled learners. In another study, Keith and Page (1985), using data from another longitudinal and national study, found a positive effect of homework for all students regardless of their ethnic group. Indeed, Keith and Page reported that in comparison to the entire sample of learners, the effect of homework was greater among Hispanic and Black senior high school students. With regard to television effects on academic performance, Keith and his associates (Keith et al, 1986), in a national longitudinal study, found a small and negative association between viewing television and homework. Consistent with Cooper's (1989, 2001)

findings, in a longitudinal study with around 25, 875 high school students, Keith and Cool (1992) found an association between time spent on homework and academic achievement measures. In another national longitudinal study, Keith (1988) discovered a positive direct effect from of homework study on academic achievement outcomes. In another study, Keith and his associates (Keith et al., 1993) also found a direct effect of time spent in homework on academic achievement.

The United State Department of Education published a report (U.S. Department of Education, 1986) indicating that time spent on homework was positively correlated with academic performance. The U.S. Department of Education findings indicated that struggling learners who did homework achieved at similar levels to average learners who did not do homework and that average learners who did homework performed as well as highly skilled learners. However, these findings emerged only for high school students, mainly in mathematics (Cooper, 2001).

Trautwein and Koller (2003) cautioned that most studies used a single item index to assess homework: the amount of time learners spent on homework assignments. A single item index can be problematic for the following reasons: a) homework was not well defined, and the index could involve time spent on non-homework tasks; b) the actual time spent on homework may not be distinguished from the frequency or the size of the assignments, and a single item index doesn't differentiate these issues; and c) a single retrospective item index confounds the amount of homework assigned with what was actually completed (e.g., a student may be assigned 3 hours of homework but only did 30 minutes whereas for another student, 30 minutes may have been all the time that

was necessary to complete the assignment). To correct for these shortcomings when measuring the relationship between homework and academic achievement, Trautwein and his associates (Trautwin et al. 2002) used repeated measurement data among seventh grade German students enrolled in 125 classes. They found that frequency of homework assignments had a positive effect on academic achievement in the subject of mathematics. However, long homework assignments had a negative effect on mathematics achievement. The results imply that more comprehensive methods are needed when assessing time spent on homework.

Section Two: Self-regulation of Homework Completion

Xu and Corno's Model

Xu and Corno (1998, 2003) integrated self-regulation processes into their model of homework. These processes included constructs such as self-monitoring, help seeking, emotion, attention, and environmental control. They sought to link family involvement in homework to adolescents' responsibility for homework. In their model, exogenous variables include students' grade level, parents' educational level, students' prior achievement, and family support with homework. Their model includes the following five features of self-responsibility in homework: arranging the environment, managing time, focusing attention, monitoring motivation, and monitoring and controlling emotion. Arranging the environment refers to adolescents' efforts to change their environment in such a way that it would enhance homework completion. Managing time refers to learners' efforts to control and use time effectively to secure homework completion. Focusing attention refers to learners' efforts to avoid distractions from non-task

alternatives. Monitoring motivations refers to learners' efforts to manage and monitor goals to secure homework completion. Monitoring and controlling emotion refers to efforts to monitor and manage personal feelings and affect to achieve homework completion. These five features serve as the dependent variables of this model. Xu and Corno's work targeted elementary and junior high school learners.

In a recent study, Xu and Corno (2003) investigated the association between family involvement and adolescents' sense of responsibility for completing homework assignments. The participants consisted of 125 students attending a public school in New York City. These students, who varied greatly in ethnicity and socioeconomic status, responded to a survey assessing the aforementioned five features of students' responsibility associated with homework. After the students completed the survey, a sub-sample participated in a follow-up interview. The students' acceptance of responsibility for their homework completion depended on their families' arranging the home studying environment and on their personal monitoring and controlling of their emotions. Across grade levels, there were no significant differences in the students' reports of homework activities.

Walker and Hoover-Dempsey's Model

Walker and Hoover-Dempsey (2001) developed a model of parental involvement in their children's homework from a more general formulation by Hoover-Dempsey and Dandler (1995, 1997). The latter model involved five aspects of parent-child involvement: 1) parents' decision to become involved (which is influenced by a parent's sense of efficacy for helping children succeed in school), 2) parents' areas of involvement

(e.g., specific domains of parents' skills and knowledge), 3) parents' mechanisms for influencing child/student outcomes (e.g., modeling and reinforcement), 4) parents' response to mediating child variables (e.g., use of developmentally appropriate involvement strategies), and 5) child/student outcomes. In their model of homework, Walker and Hoover-Dempsey focused on parents' initial decision to become involved. This decision depends also on children's effort to seek help from their parents, which depends on two self-regulatory factors: a) affective (i.e., the students' press for independence, valuing of parental help, and explicit help-seeking), and b) cognitive (i.e., general level of academic performance and difficulty with day to day homework).

To examine the association between parents' involvement, children's use of self-regulated learning strategies and academic outcomes, Walker and Hoover-Dempsey (2001) conducted a cross-sectional study with 5th, 8th, and 11th graders. Parental involvement was measured with a 5-point Likert scale (e.g., "I appreciate my parents' help with my homework" and "My parents help me with my homework"). Academic achievement was measured by the report card grades in verbal and quantitative coursework for 5^{th} and 8^{th} grader students and with course grades for the 11^{th} grade students. Students' use of self-regulated learning strategies was assessed with a modified version of Zimmerman and Martinez-Pons' (1988) Rating Student Self-Regulated Learning Outcomes: A Teacher Scale (rephrased for students use); other items were included based on the work of Zimmerman and Martinez-Pons (1986) and Walker (1999). An example of an item (5-point Likert scale) assessing use of self-regulated learning

strategies is, "I stop from time to time when I am studying or completing homework to see how well I am doing."

Walker and Hoover-Dempsey (2001) reported the following results: a) parental homework involvement dropped across the three grade levels, and parental involvement was not associated with academic outcomes; b) 8th and 11th grade students' use of self-regulatory strategies in homework was positively related to verbal achievement, but not among 5th graders; and c) students' use of self-regulatory strategies in homework was not related to their achievement for any grade level. Despite the inclusion of several self-regulatory processes in this study, Walker and Hoover-Dempsey (2001) gave little attention to self-motivational beliefs that can explain the cyclical effects of self-regulation on homework completion. In addition, these studies did not include students' self-initiated studying activities that were not assigned by the teacher. To achieve academic excellence, learners must be motivated to self-initiate actions and remain committed to academic goals when they encounter a difficult task (Zimmerman, 1998; Zimmerman & Schunk, 2001).

Zimmerman's Cyclical Model of Self-Regulation of Learning

Because this model was described in detail in chapter one, this section will focus on research bearing on that model (see Figure 1).

Forethought phase. Regarding the importance of goal setting and strategic planning, there is evidence that academic goal setting and planning are predictive of achievement outcomes (Zimmerman, Bandura, & Martinez-Pons, 1992, Zimmerman & Martinez-Pons, 1986; 1988).

As was discussed in chapter 1, the forethought or pre-performance phase of Zimmerman's cyclical model of self-regulation identifies three motivational beliefs that are crucial for the development of self-regulation and homework completion: self-efficacy, outcome expectancy, and intrinsic interest. Zimmerman, Bandura, and Martinez-Pons (1992) conducted a study to assess the direct and indirect effects of self-efficacy beliefs on high school students' self-regulated studying. The researchers constructed two scales related to self-efficacy: self-efficacy for self-regulated learning (e.g., for using learning strategies) and self-efficacy for academic achievement (e.g., capability beliefs concerning math and science). The results indicated that self-efficacy for self-regulated learning was associated with self-efficacy for academic achievement and self-efficacy for academic achievement was predictive of students' grade goals and final grades. Self-efficacy for academic achievement was also indirectly predictive of the students' final grades through the goals they set for themselves. Finally, self-efficacy and the goals the students set for themselves greatly increased the prediction of the final grades. Similar findings were reported in research with college students regarding a course in writing (Zimmerman & Bandura, 1994).

With regard to research on outcome expectancies, Shell and his associates (Shell, Murphy, & Bruning, 1989; Shell, Colvin, & Bruning, 1995) have shown that they are positively associated with acquiring reading and writing skills. However, to my knowledge, there is no research examining the association between outcome expectancies and mathematical problem solving skills. This is important for homework completion because if the students do not believe their efforts to learn will produce desired outcomes,

they will not initiate action. These outcome expectancy beliefs are hypothesized to influence student' use of learning strategies and delay of gratification. Consequently, in the proposed study, I will examine these associations.

Regarding intrinsic or task interest, there is evidence that these beliefs are predictive of increased academic motivation and achievement (Krapp, Hidi, & Renninger, 1992; Schiefele, 1991). There is also evidence that student's intrinsic interest is predictive of learning with a non-academic task. Kitsantas, Zimmerman, and Cleary (2000) taught high school girls to throw darts and then assessed intrinsic interest in this activity in comparison to other athletic activities, such as soccer, and volleyball. They found that girls who learned from a coping model displayed higher intrinsic interest than girls who learned the skill from a mastery model or no model. In the proposed study, learners will be asked about their level of intrinsic interest when learning mathematical skills. It is expected that intrinsic interest will have a direct effect on students' use of learning strategies and performance. That is, students with high intrinsic interest will persist longer in homework and will obtain higher grades than students with low intrinsic interest.

The performance phase. Research on use of self-regulatory processes during homework is limited. Recall that Xu and Corno (2003) found that students' personal monitoring and controlling of their emotions was linked to their acceptance of responsibility for their homework completion, but that Walker and Hoover-Dempsey (2001) found that students' use of self-regulatory strategies in homework was unrelated to their achievement for any grade level. There is extensive research on academic

studying that indicates that use of self-regulatory strategies to learn including forms of self-monitoring, such as self-recording, area associated with greater motivation and achievement (Pintrich & DeGroot, 1991; Zimmerman & Kitsantas, 1999; Zimmerman & Martinez-Pons, 1986; 1988).

Self-reflection phase. There is extensive evidence of the importance of self-reflection processes in non-homework academic learning settings. Schunk (2001) has shown that students' engagement in self-evaluation improved the quality of their learning. Zimmerman and colleagues have shown that strategy use leads to greater strategy attributions, self-satisfaction (Zimmerman & Kitsantas, 1999), and strategy adjustments (Cleary & Zimmerman, 2001).

To date, Zimmerman's cyclical model of self-regulation has not been used to guide research on homework, but recently, Santrock (2004), in his textbook "Educational Psychology," described how Zimmerman, Bonner, and Kovach's (1996) self-regulation form could be used to assist students' in completing their homework (see Figure 2). Teachers were encouraged to provide guidelines regarding the form that students could follow to assess their studying progress. During an initial self-evaluation step, teachers gave daily assignments and weekly quizzes, and learners engaged in peer feedback on their own work. During the second step, goal setting and strategic planning, the students evaluated their progress after receiving initial grades from the teachers. Teachers and peers offered suggestions and recommended strategies to improve the quality of the work. During the third step, putting a plan into action and monitoring, the students monitored whether they were implementing the new strategies appropriately. In this step, the

teachers monitored the enactment of the new strategies. Finally, during the fourth step, monitoring outcomes and refining strategies, the teachers continued to monitor learners' use of the new strategies, assisted learners to refine their strategies where necessary, and checked their self-confidence. By applying the cycle model to homework, Santrock called attention to the important role of teachers and learners as active participants of students' learning processes (see Figure 3).

Section Three: Research on Delay of Gratification

There is evidence that delay of gratification is related to students' academic motivation and achievement. For example, Mischel, Shoda, and Peake (1988) found that preschoolers who opted to delay gratification were higher achievers and more orally fluent, academically oriented, and socially competent during high school than were preschoolers who preferred immediate gratification. Similarly, juveniles who delay gratification are more socially perceptive, responsible, intelligent, have higher achievement motivation, have greater insight into their own motives and behavior, and have higher level of productivity and aspirations (Funder & Block, 1989; Funder, Block, & Block, 1989; Shoda, Mischel, & Peake, 1990).

In efforts to improve students' delay of gratification, researchers have examined how children represent or attend to stimuli during the delay period. For example, having children imagine marshmallows reward as "clouds" resulted in greater delay of gratification than when the children focused on consummatory properties of the stimuli, such as imagining how the food would taste (Mischel, 1974; Mischel & Baker, 1975). Distracting children's attention from the rewards during the delay period by providing

them toys, or even having them imagine playing with toys, also increased their ability to delay (Mischel, Ebbesen & Zeiss, 1972).

Mischel's research on delay of gratification involved preschool children who decided between two magnitudes of tangible rewards. This age and task focus limits generalization of findings to older populations and other types of rewards. Wulfert and her associates (Wulfert et al., 2002) discussed the difficulty of finding rewards that have meaning for adolescents within Mischel's paradigm. The operational definition of delay of gratification, as a choice between small and large material rewards, does not fully capture the dilemma facing students in academic settings where the choice may involve different categories of rewards. For example, the temptation of the immediate reward may be negative and consummatory in nature (e.g., not going out for lengthy dinner) but the delayed reward may be positive and academic (e.g., performing well on a test the next day). In academic settings, delayed rewards are not necessarily supported by those same cognitive techniques, such as mentally transforming the image of the learning task. While retaining the general outlines of the delay of gratification paradigm, another approach, to which we now turn, would appear to be more suitable version for predicting academic outcomes.

Academic Delay of Gratification and Homework

Homework is an activity that often learners do alone, outside of the school, independently, and requiring long time periods to be completed. Often, learners are assigned homework tasks for which they have little motivation. These students could instead be having fun with their friends in the park, could be watching their favorite

movies or sporting events, or could be watching their favorite television show, or could be searching the internet. The academic delay of gratification task differs from earlier non-academic tasks in that mere waiting will not produce the delayed rewards. In academic tasks, the individual must engage in effective studying or other forms of learning to attain the delayed reward. This studying could involve assigned homework. Students who lack self-efficacy for homework skill, in for example math, would be less likely to delay immediate rewards. However, to date the concept of academic delay of gratification has not been fully integrated into the extensive literature related to students' homework completion.

To assess delay of gratification in academic setting with adults, Bembenutty and Karabenick (1998) developed the Academic Delay of Gratification Scale (ADOGS) that involves a series of scenarios that students are likely to encounter, each followed by response alternatives that represent short- versus long-term goal choices. An example of an immediate gratification option is "Going to a favorite concert, play, or sporting event, even though it may mean getting a lower grade on an exam in this class to be taken the next day" whereas an example of a delayed gratification option is "Staying home and studying to increase your chances of getting a higher grade." Bembenutty and Karabenick (1998) assessed the students' use of *cognitive strategies*, such as organization, rehearsal, and elaboration, and students' use of *resource management strategies*, which refers to students' self-management and regulation of their study time, environment, planning, scheduling, effort regulation, and help seeking (Pintrich et al., 1993). The hypothesized relations were verified between students' ADOG and their use of self-regulating

cognitive and resource management strategies (Bembenutty & Karabenick, 1998). Specifically, college students who were higher in ADOG also reported more frequent use of learning strategies as measured by the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, García, & McKeachie, 1993). These included cognitive strategies (elaboration, organization, and rehearsal) and resource management strategies (regulation of time and study environment, effort regulation, help seeking, and peer learning.). Similar relationships were obtained with both regularly admitted African American and Caucasian college students and conditionally admitted African American college students (Bembenutty & Karabenick, 1997).

Kim, Chung, Lee, and Kwon (2001), using the ADOGS, also found that junior high school Korean students with greater preference for delay of gratification reported greater use of learning strategies and volitional control strategies. These and other studies demonstrated links between ADOG and students' use of learning strategies; specifically, those learners more likely to delay gratification are those who employ cognitive and metacognitive strategies, such as planning, monitoring, and self-regulation (Pintrich & De Groot, 1990).

Delay of Gratification and Self-Regulated Learning

Mischel and his associates (Mischel, 1974; Mischel, Cantor, & Feldman, 1996) distinguish between the "goal choice" phase before engaging on delay of gratification and the "goal control" phases after an intention is established. During the goal choice phase, the decision to delay gratification is made based on the individual's outcome expectancy, intrinsic interest/values, and self-efficacy level. During the goal control phase,

individuals engage cognitively and behaviorally in actions to maintain goals. Mischel's goal choice phase parallels Zimmerman's forethought phase in which individuals set goals, engage in planning, and consider the self-efficacy level necessary for task completion. Similarly, Mischel's goal control phase parallels Zimmerman's performance phase in which individuals engage in behavioral action to secure goal completion. Unlike Zimmerman's model, Mischel's model does not include a self-reflection phase, which involves self-judgment and self-reaction after a performance regarding the successfulness of delaying gratification in attaining a goal, such as gaining good grades in school. Unlike Mischel's simple reward tasks, delay of gratification in natural settings does not guarantee success. Thus, it is important to study links between delay of gratification and immediate performance outcomes, such as students' homework completion. More specifically, does delay of gratification mediate the association between the students' motivational beliefs, such as self-efficacy, intrinsic interest, outcome expectancy and homework completion.

Highly self-regulated learners are characterized by a willingness to delay gratification and sustain effort despite distractions and long-term waiting periods. They learn to plan their actions and set specific academic goals in order to achieve them. In addition they can anticipate problems that could prevent them from achieving those goals. In contrast, poorly self-regulated learners are less efficient in identifying facts related to their tasks, have low self-efficacy, engage in ineffective self-evaluations and self-monitoring of their academic progress, and make detrimental attributions (e.g., failure due to lack of general ability). The cyclical model incorporates important self-regulatory

components necessary to turn less skilled into highly skilled learners (Zimmerman, 1998, 2000).

Research examining the association between delay of gratification and self-regulation of learning has started to emerge in the literature. For example, Bembenutty and Karabenick (1998) examined the association between students' choice to postpone immediate available opportunities to satisfy impulses (e.g., going to the movies and sport activities) in relation to favoring academic goals that were temporarily remote (e.g., high grade) among 369 college students enrolled in introductory psychology courses at a Midwestern university. The results indicated that students' delay of gratification preferences were associated with students' reports of using learning strategies known to facilitate academic success (e.g., time management, effort regulation, help seeking, peer learning, metacognition, elaboration, organization, and rehearsal). Further, delay of gratification was positively related to students' final course grade.

In a different study, Bembenutty and Karabenick (1998) once again examined the association between 113 undergraduate college students' delay of gratification and their use of self-regulation of learning strategies and final course grade. The results indicated that delay of gratification was positively related to students' use of cognitive strategies such as elaboration, critical thinking, metacognition, conditional knowledge, and rehearsal. Delay of gratification was also related to students' control of their environment, effort regulation, and time dedicated to study, as well as final course grade.

Bembenutty, Karabenick, McKeachie, and Lin (1998) examined the association between delay of gratification and students' use of self-regulatory learning strategies

among undergraduate college students. The results indicated that delay of gratification was associated with students' use of cognitive strategies (i.e., elaboration, rehearsal, metacognition, and conditional knowledge), self-regulatory strategies (i.e., effort regulation, control of study environment, and time management), and the final course grade. Given the aforementioned evidence, it is expected that a direct association exists between delay of gratification and self-regulation of learning. An examination of this relationship is warranted in particular when students' homework completion is considered a mediating factor.

Motivational Determinants of Academic Delay of Gratification

Mischel (1974) cautioned that, "it is necessary to consider the determinants of the individual's choice to delay for the sake of more preferred delayed outcomes" (p. 287). Delay of gratification involves a series of choices based on incentives, task, or activity interests. If the commitment to delay is made, then plans to pursue the delayed reward are established and distractors or competing alternatives are identified. The commitment to wait is then reconsidered in the light of the competing alternatives. Three important determinants of performance are self-efficacy, intrinsic interest, and outcome expectation. The direct association between these motivational determinants of delay of gratification, homework completion, self-regulation, and academic performance will be discussed next.

Delay of gratification and self-efficacy. Self-efficacy beliefs determine the individuals' preferences/choices, their persistence level, and their effort when pursuing academic tasks (Bandura, 1997; Pajares, 1996). Because higher self-efficacy has been linked to more successful academic motivation and performance (Bandura, 1997;

Zimmerman, 2002), it should influence students' choice of delayed outcomes. Current research supports this contention. For example, Bembenutty (2002) examined the direct and indirect effects of academic delay of gratification and self-efficacy on academic performance among minority college students enrolled in an introductory writing course as part of a summer immersion program. Results indicated that delay of gratification was a significant mediator between students' self-efficacy and their academic achievement (final course grade). Self-efficacy had a direct influence on achievement and an indirect effect through its association with students' willingness to delay of gratification, use of metacognition, and manage their time. Extrapolating from this study, it can be argued that students with limited self-regulatory skills should benefit from efforts to increase their self-efficacy, which should, in turn, help them to delay gratification.

The actual research examining the association between self-efficacy beliefs and delay of gratification is limited. However, a few studies have been conducted in non-academic setting that could enlighten our understanding of this association. For example, Rosenbaum and Ramat-Aviv (1986) examined the association between delay of gratification and self-efficacy beliefs among hemodialysis patients. The patients were placed in strict regime of fluid-intake in order to control their disease. The authors expected an association between the patients' past compliance with fluid-intake, the self-efficacy beliefs, and their ability to delay gratification. The results of the study indicate that self-efficacy beliefs were associated with fluid-intake (as indicated by body-weight increase), and their ability to remain compliant with the diet regime to achieve disease control (the delayed outcome).

Center (1995) conducted a study to examine relations between delay of gratification (a behavioral choice between an immediate available reward versus a temporarily distant reward), social behavior, intelligence test scores, and self-efficacy beliefs among 100 incarcerated juveniles. This researcher used a discriminant analysis procedure to identify the variables that distinguish immediate gratifiers from delayed gratifiers. The results indicated that self-efficacy was the only variable that significantly predicted preference for delay of gratification, which was assessed by a self-report instrument. Self-efficacy predicted the incarcerated juveniles' actual selection of a temporarily delayed reward rather than an immediately available reward. This indicated that self-report instruments were valid predictors of actual delay of gratification behavior.

Recently, Zollo, Lobo, and Vancouver, (2000) conducted a study to assess the psychometric properties of Rosenbaum' (1980) self-control schedule (SCS). Participants in the study were 84 undergraduate college students, who were paid $5.00 for their participation. Participants responded to the SCS and completed an encryption task. In addition, participants participated in a delayed monetary reward task, which is an indicator of delay of gratification. In this task, the students were instructed that if they could return to the experimenter two days later with the same $5.00 bill, they would receive an additional $1.50. The students were told that the bill have to be the same one that the experimenter gave to them as indicated on the recorded serial number of the bill. The results indicated that the self-efficacy was significantly related to the delayed monetary reward task as well as to the self-control measure. Although delay of

gratification and self-efficacy were significantly related, the correlations were modest in size.

Delay of gratification and outcome expectancy. Outcome expectancy refers to the belief that a particular method or strategy would produce certain outcome. The association between outcome expectancy and delay of gratification has not been studied to date. It is hypothesized that students who believe that patient waiting for a reward would produce desirable outcomes will be more likely to delay gratification.

Delay of gratification and intrinsic interest. It is hypothesized that students who were intrinsically interested in a task would be more willing to wait for delayed rewards. In the case of academic tasks, the positive properties of studying math make the need to delay rewards less pressing. Bembenutty and Karabenick (1998) found that college students with greater tendencies to delay gratification were more intrinsically motivated.

Summary of and Gaps in Homework Research

One of the hallmarks of students' self-regulation of learning is their ability to remain task-focused by protecting task specific intentions from non-task competing alternatives. Individuals with high preference for delay of gratification are more socially perceptive, responsible, intelligent, have higher achievement motivation, and higher productivity and aspirations (Funder & Block, 1989; Mischel, 1996; Shoda, Mischel, & Peake, 1990). However, to date, delay of gratification has not been fully integrated within the constellation of learners' repertoire of motivational indicators associated with academic success, self-regulations of learning, and homework completion. Recently, researchers have attempted to integrate the construct of delay of gratification within the

educational psychology literature, specifically, within the self-regulation and motivation literature (Bembenutty & Karabenick, 1998). Specifically, Bembenutty and Karabenick (1998, 2004; Bembenutty, 1999) found that delay of gratification is related to students' motivational tendencies such as self-efficacy, intrinsic interest, task value.

The preceding discussion has revealed that more research is needed on the association between delay of gratification and homework. It needs to be understood under what conditions delay of gratification is related to homework completion. It is important to examine individual differences in homework completion and time on tasks and to examine how delay of gratification modifies these individual differences. It is essential to consider what factors are associated with learners' completion of homework outside of school where in many instances no supervision exists nor a teacher present. As Trautwein and Koller (2003) have observed, schoolteachers regulate students' learning experience, time on task, selection of activities, and reinforcers. However, outside of the school, homework requires responsibility, self-monitoring, goal setting and planning, discipline, effort, and time management. These self-regulatory processes enable students to delay gratification in non-homework contexts (Bembenutty, 1999).

Section Four: Research Justification, Design, and Hypotheses

Research Justification

To date, very little research has focused on the role of self-regulatory processes and motivational beliefs in homework with college students despite historic interest in these processes. Another novel feature of the proposed research is the inclusion of academic delay of gratification measures in research on homework completion. A third

novel feature is the use of a cyclical model of self-regulation to guide research on academic homework. More specifically, do students' forethought phase self-efficacy beliefs, intrinsic interests, and outcome expectancies influence their motivation (as assessed by their delay of gratification) and use of self-regulation strategies (performance phase). Students' ability to delay nonacademic sources of gratification until academic goals are attained is expected to influence their homework completion and academic achievement.

Design

The research design model, depicted in Figure 4, illustrates that the students' motivational beliefs and tendencies (i.e., self-efficacy, outcome expectancy, and intrinsic interest) will have a direct effect on delay of gratification and self-regulation of learning. In turn, self-efficacy beliefs, and self-regulation will directly affect homework completion. The combination of homework completion, self-efficacy beliefs, and self-regulation will then have a direct effect on midterm grade exam, while the midterm grade exam and self-regulation of learning will directly affect the final grade exam. To examine the association between the variables and to determine the fit of the proposed model, the following hypotheses will be tested:

Hypotheses

Hypothesis 1. It is expected that students' frequency of homework completion, reported use of self-regulated learning strategies, self-efficacy and outcome expectancy beliefs, intrinsic interest, willingness to delay gratification, and course exam grades would be correlated. Specifically, it is expected that

students who reported higher frequency of homework completion would be more intrinsically interested in the course, have higher self-efficacy and outcome expectancy beliefs, show greater willingness to delay gratification, and obtain higher midterm and final exam grades than would students with lower frequency of homework completion.

Hypothesis 2. Students' motivational beliefs, use of learning strategies, and willingness to delay gratification would have an effect on students' frequency of homework completion, which in turn would directly affect academic performance. Specifically, it was hypothesized that:

H2a. Homework completion would have a direct effect on academic performance, as indicated by college students' midterm and final exam grades. Specifically, students who completed their homework more frequently would obtain higher midterm and final exam grades than students who completed their homework less frequently.

H2b: Students' self-regulation of learning would have a direct effect on homework completion as well as midterm and final exam grades. Specifically, students who used self-regulatory learning strategies more frequently would complete more homework and obtain higher midterm and final exam grades than students who used self-regulatory strategies less frequently.

H2c: Delay of gratification would have a direct effect on self-regulation but an indirect effect on homework mediated by self-regulation.

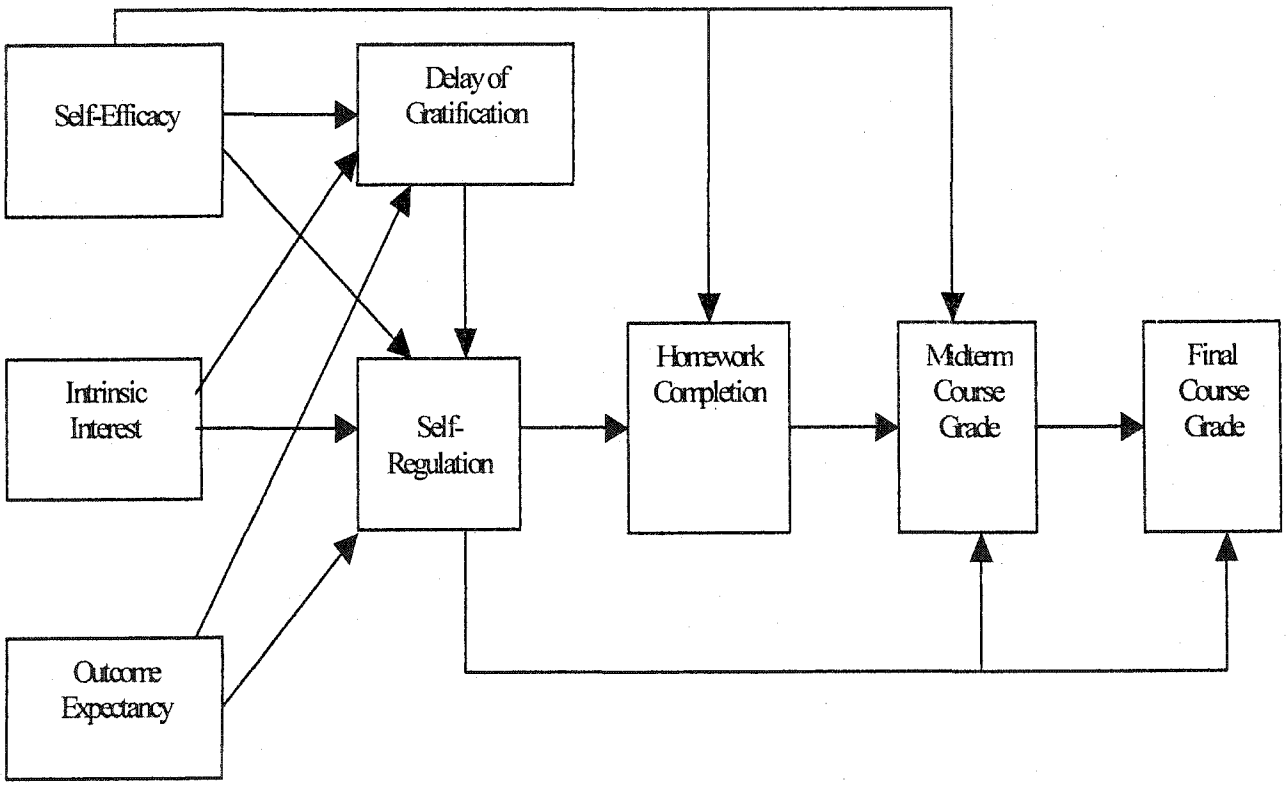
Specifically, students with greater willingness to delay gratification would also use self-regulatory learning strategies and this association would affect homework completion compared with students who were less willing to delay gratification.

H2d: Self-efficacy beliefs would have a direct effect on delay of gratification, self-regulation, homework completion, and midterm exam grade. Specifically, students with higher self-efficacy beliefs would display greater willingness to delay gratification, use self-regulatory learning strategies, and complete their homework more often than students with lower self-efficacy beliefs.

H2e: Intrinsic interest and outcome expectancy would have a direct effect on students' use of self-regulated learning strategies and delay of gratification. Specifically, students with higher intrinsic interest and outcome expectancy would also display greater willingness to delay gratification and use more self-regulatory learning strategies than classmates who have lower intrinsic interest and outcome expectancy.

Hypothesis 3. Students' homework activities, as reported in homework logs and surveys, would be significantly correlated to their reported use of self-regulated learning strategies, self-efficacy and outcome expectancy beliefs, intrinsic interest, willingness to delay gratification, and course exam grades.

Figure 4. Proposed Path Model



Chapter III

METHOD

Overview of the Study

The purpose of this study was investigated the role of motivational beliefs and self-regulatory processes on predicting homework completion and academic achievement among at risk college students participating in a self-regulated learning program at an urban technological college. A path analysis procedures designated to assess a model fit was used to examine these students' homework completion and achievement, based on their levels of self-efficacy and outcome expectancy beliefs, intrinsic interest, delay of gratification, and use of self-regulatory skills (see Figure 4). This research was conducted while the students participated in a program designed to enhance the self-regulatory study skills and motivation of at-risk students attending an urban technological college.

Overview of the Self-Regulation of Learning Project

The goal of the Self-Regulation of Learning Project (SRLP) is to help at-risk college students become self-regulated learners. This program helps students to become actively involved in their own learning process by acquiring skills to set goals, use strategies, self-monitor, self-adjust, and self-evaluate their academic progress. The SRLP follows a social-cognitive approach (Bandura, 1997; Zimmerman, 1998). Designed according to these underlying principles, the SRLP features three cyclical phases: forethought phase (planning, goal-setting, and strategy selection); performance phase

(strategy implementation and self-monitoring); and self-reflection (self-evaluation, attribution, and adaptation).

Students enrolled in the SRLP for one-year, starting in the summer when they participated in an intensive remedial program after failing to pass the college's entrance exam in math. If they successfully completed the summer training, the students were eligible to take college-level courses in the fall semester. In the fall, they took the first mathematics course (MAT 175). Simultaneously, the students took the Introduction to College Life course (AA 101), in which they continued to learn self-regulated study skills and strategies.

Participants

Participants were college freshman students ($N = 58$) enrolled in an introductory math course (Math 175) at a New York City College of Technology. The demographic characteristics of the participants are shown in Table 1. Forty-two of the students were males and 16 were females. Forty-four of the students reported that they were more comfortable speaking English, while the rest were more comfortable speaking other languages such as Spanish or Creole. Most of the students identified themselves as members of a minority ethnic group (e.g., African American, Hispanic, and Asian). They ranged in age from 17 to 26 years ($M = 18.67$, $SD = 1.69$). The students reported that 1 to 9 persons (including themselves) lived in their households, with 25.6% of them specifically indicating three persons and another 25.6% indicating 5 persons. As for marital status, 56 participants reported that never being married, one reported separated, and two did not respond. Thirty-four students reported having no children, three had

children, and 21 did not respond. Twenty-five percent of the students were employed either part-time (a few hours per week) or full-time. Participants were drawn from 12 different major areas of academic concentration (e.g., computer science, marketing, and accounting). Because of low frequencies of student in each major area, it is not possible to conduct statistical analyses of the role of this variable in the students' outcomes.

Table 1

Demographic Characteristics of the Participants

Characteristic	*N*	%
Gender		
Male	42	72.4
Female	16	27.6
Most comfortable language with		
English	44	75.9
Other	14	24.1
Ethnicity		
African-Americans	17	29.3
Caucasians	3	5.2
Asian-Americans	7	12.1
Hispanic/Latinos	18	31.0
Others	25	22.6
Marital Status		
Never Married	55	94.8
Separated	1	1.7
Missing	2	3.4

Instruments

Delay of gratification. A 10-item scale measuring students' delay of gratification was developed for this study (see Appendix A). This scale examined students' delay of gratification in relation to the mathematics course in which they were currently enrolled and how they prepared for their midterm exam. The students rated their preference for an attractive and immediately available option such as "Go to your favorite movies and then cram for the math midterm exam," versus a delayed alternative such as "Postpone going to the movies until after you have taken the math midterm exam." The work *cram* was used to convey the fact that when students put off doing their homework, they must compensate for their loss of regular study time. If the word *cram* was omitted, there would be no clear advantage for choosing to the delayed alternative. The word *cram* conveys the clear implication that the failure to delay requires personal sacrifice, such as the loss of sleep. Students responded on a 4-point scale: Definitely choose A, Probably choose A, Probably choose B, and Definitely choose B. Considered a continuous variable, responses were coded (1 to 4) and averaged. The mean for the items was 3.24 (*SD* = .58, *Range* = 1.80 to 4.00), indicating a general tendency to prefer delay of gratification, with a slight negative skewness (-.15). Evidence of acceptable internal consistency was suggested by Cronbach's $\alpha = .84$ (Nunnally, 1978).

Self-efficacy. Using the 4-item scale developed for this study, students rated their beliefs about their capability to perform on the mathematics course items by responding to such statements as "I am sure that I can learn all the material for the math midterm exam" (see Appendix B). Responses were coded (1 = low self-efficacy, 7 = high self-

efficacy) and averaged. The mean for the items was 5.49 (*SD* = 1.00, *Range* = 2.75 to 7.00), indicating a general tendency to have high self-efficacy beliefs, with a slight negative skewness (-.59). Evidence of acceptable internal consistency was suggested by Cronbach's α = .78 (Nunnally, 1978).

Outcome expectancy. Using the 3-item scale developed for this study, students rated their expectations of the outcomes of the math midterm grade exam on such items as "Doing well in the math midterm exam will help me to attain my future career goals." Responses were coded (1 to 7) and averaged. The mean for the items was 5.02 (*SD* = 1.29, *Range* = 1.33 to 7.00), indicating a general tendency to have high outcome expectancy beliefs, with a slight negative skewness (-.36). However, the evidence of acceptable internal consistency was moderate, as suggested by Cronbach's α = .59 (Nunnally, 1978). An examination of the alpha level when items were deleted suggested that deleting an item (i.e., "Doing well in the Math 175 midterm exam will help me socially with my friends and family") causes the alpha level to increase to .70. Thus, subsequent analyses presented total score by using two items (see Appendix B).

Intrinsic interest. On the 5-item scale developed for this study, students rated their interest in studying for and enjoying the math class on such items as "I enjoy solving challenging Math problems" and "I find studying math very motivating." Responses were coded (1 to 7) and averaged (see Appendix B). The mean for the items was 3.48 (*SD* = 1.46, *Range* = 1.00 to 6.60), indicating a moderate intrinsic interest, with a slight positive skewness (.27). Evidence of acceptable internal consistency was suggested by Cronbach's α = .84 (Nunnally, 1978).

Self-regulation of learning. An 11-item scale was developed for this study to assess students' degree of keeping records, estimation, goal-setting, self-rewarding, self-monitoring, selecting strategies, and environmental control. Examples of the items are "How often do you keep records on how well you are doing on practice problems in preparation for the math midterm exam?" and "How often do you set specific goals to guide your efforts while doing the practice problems for the math midterm exam?" (see Appendix C). Responses were coded (1 to 7) and averaged. The mean for the items was 4.42 (*SD* = .85, *Range* = 2.31 to 631), indicating a general tendency to use self-regulated learning strategies to study, with a slight negative skewness (-.33). Evidence of acceptable internal consistency was suggested by Cronbach's α = .78 (Nunnally, 1978).

Midterm and Final Exam Grades. Midterm and final exam grades were obtained from the instructors. The mean of the midterm exam grade had values ranging from 0 to 100 (*M* = 67.72; *SD* = 21.45). The final exam grades were also obtained from the instructors; these had values ranging from 0 to 100 (*M* = 66.45; *SD* = 21.25).

Measures of Homework

Frequency of math homework completion. Following Cooper and associates (Cooper, Jackson, Nye, & Lindsay, 2001; Cooper, Lindsay, Nye, & Greathouse, 1998; Cooper, Valentine, Nye, & Lindsay, 1999), math homework completion was assessed by students' responses to the following question: "How often do you complete your homework/assignments for the Math 175 course?" The response format consisted of a 7-point Likert scale (1 = "Never" to 7 = "Always"). A high score on the scale represented a high tendency toward completing homework assignments for the Math 175 class (*M* =

6.03; *SD* = 1.28). Cooper and associates used one item in their path analysis to test the model of the influence of homework on classroom performance (Cooper, Jackson, Nye, & Lindsay, 2001; Cooper, Lindsay, Nye, & Greathouse, 1998; Cooper, Valentine, Nye, & Lindsay, 1999).

Homework activities: Open-ended questions. In the present study, open-ended questions pertaining to social and environmental conditions associated with participants' homework activities were developed (see Appendix D). Two examples of open-ended questions are, "With whom do you usually study for MA175?" and "Where do you usually study for MA175?"

Homework activities: Likert types scales. Participants also responded to another series of questions pertaining to homework activities (see Appendix D). By using a Likert scale (1 = Never to 7 = Always), the students responded to questions such as "How often do you do your studying for the math midterm exam with the television on?"

Homework log. Students were given a homework log in which they reported their homework activities of the course (see Appendix E). In the homework log, students indicated their math homework goals for that day; where, when, and with whom they did their homework; whether there were distractions; and what their level of satisfaction was with the completed homework. The homework logs were given four times to the students during two weeks.

Procedure

The students were recruited while they were taking the course Math 175. The researcher told them that he was interested in assessing their motivation for learning

math, their use of learning strategies in introductory math courses, and their activities during homework completion. All students agreed to participate in the study and signed informed consents (see Appendix F). They received a questionnaire on which they indicated their motivation for learning math, their use of learning strategies and self-regulation, and their questions about homework. In addition, the researcher gave the students a homework log, which required about five minutes to fill in. On the log, students reported their homework activities. The researcher returned to the classroom three additional times to obtain further information on the students' homework activities through the homework logs. The students completed a total of four homework logs over two weeks.

Data Analysis

First, Pearson correlation coefficients were conducted to assess the direction and magnitude of the linear relations between primary variables of the study (e.g., self-regulation, self-efficacy). Second, using LISREL (Jöreskog & Sörbom, 2002), path analyses were conducted to test the goodness of fit of the hypothesized model. Third, Pearson correlation coefficients were conducted to assess the direction and magnitude of the linear relations between students' homework activities and the primary variables of the study (e.g., self-regulation, self-efficacy).

Although gender was not a primary variable of concern in the present study, gender differences among the primary variables in the present study were examined by using a multivariate analysis of variance (MANOVA) to compare means for the two groups. Gender was the independent variable and students' motivational beliefs, self-

regulation, and academic performance were the dependent variables. The results of the multivariate test of significant of the main effect of gender was not significant, Wilks' lambda = .83, F (1, N = 58) = .92, *ns*. Further, since there is prior evidence of gender differences on students' outcome expectancy, another MANOVA analyses was conducted including as the dependent variables the three original items used as an index of outcome expectancy. Studies examining outcome expectancy under the theoretical frame of future time perspective have found differences on gender role expectations (Greene & DeBacker (2004). In a recent literature review, Greene and DeBacker (2004) disclosed that gender differences were found in extension and density of future goals with men having further extension than women. The results of the multivariate test of significant of the main effect of gender was not significant, Wilks' lambda = .95, F (1, N = 58) = 1.02, *ns*. Therefore, gender is not considered in further analysis.

In addition, although ethnicity was not a primary variable of concern in the present study, ethnic differences among the primary variables in the present study were examined by several one-way analysis of variance (ANOVAs) to compare means of the different ethnic groups. For the purpose of this analysis, dummy variables were constructed (African American = 1, Hispanic = 2, and others (a mixture of different ethnic groups in which there were just little representation of students such as Asians, Native Americans) = 3). In these analyses, ethnicity was the independent variable and students' motivational beliefs, self-regulation, and academic performance were the dependent variables. The results of the ANOVA analyses revealed a non-significant main effect of ethnicity on the dependent variables, with the exception of delay of

gratification in which there was a significant main effect for ethnicity, F (2, N = 58) = 3.05. A Tukey B post-hoc analysis was used to determine group mean differences. African American students (M = 3.45; SD = .50) reported higher willingness to delay gratification than Hispanic (M = 2.96, SD = .51) and Other students (M = 3.30, SD = .62). Therefore, ethnicity will not be considered in further analysis.

Chapter IV

RESULTS

The results of the study are reported here following the order of the hypotheses.

Correlation between the Variables

Table 2 presents means, standard deviations, Cronbach alphas, and Pearson correlation coefficients among the variables of the study. Math homework completion was positively and significantly correlated with self-regulation ($r = .58, p < .05$), delay of gratification ($r = .44, p < .05$), self-efficacy ($r = .45, p < .05$), intrinsic interest ($r = .34, p < .05$), midterm exam grades ($r = .51, p < .05$), and final exam grades ($r = .59, p < .05$). However, math homework completion was not significantly correlated to outcome expectancy ($r = -.01, p > .05$). These results suggest that students who reported high frequency of homework completion used self-regulated learning strategies, had high willingness to delay gratification, were highly self-efficacious, had intrinsic interest in the course, and obtained high academic achievement in the course, as indicated by their scores on the midterm and final examinations.

It is also important to observe the moderate to high correlation between math homework completion and self-regulation ($r = .58, p < .05$). This association suggests that self-regulation of learning during task completion could be an essential element for successfully task completion. The strengths and directions of this association is evinced by the moderate correlation between homework completion, midterm exam grade ($r = .51, p < .05$), and final exam grade ($r = .59, p < .05$).

Delay of gratification was significantly and positively correlated with students' homework completion ($r = .44, p < .05$), self-regulation ($r = .48, p < .05$), self-efficacy ($r = .42, p < .05$), intrinsic interest ($r = .31, p < .05$), outcome expectancy ($r = .32, p < .05$), and midterm exam grade ($r = .28, p < .05$). As expected, the higher the students' willingness to delay gratification, the greater their self-efficacy beliefs for learning, their self-regulation of learning, their intrinsic interest, and their outcome expectancy beliefs. Surprisingly, however, delay of gratification was not related to academic performance in this study ($r = .19, p < .05$). This result is inconsistent with previous findings (Bembenutty & Karabenick, 1998).

Self-efficacy was also positively and significantly correlated to self-regulation ($r = .40, p < .05$), intrinsic interest ($r = .39, p < .05$), midterm exam grades ($r = .43, p < .05$), and final exam grades ($r = .41, p < .05$). However, self-efficacy was not significantly related to outcome expectancy ($r = .02, p > .05$).

The correlation between midterm and final exam grades was highly significant ($r = .83, p < .001$). It suggested a consistency in students' academic performance throughout the semester: students demonstrating high mid-semester performance also obtain high grades on the final examination at the end of the semester.

Path Analysis

The present researcher predicted that students' motivational beliefs, use of learning strategies, and willingness to delay gratification would have a direct effect on their frequency of homework completion, which would then affect academic performance. Specifically, homework completion would have a direct effect on academic performance,

as indicated by college students' midterm and final exam grades. Students' self-regulation of learning would have a direct effect on homework completion as well as midterm and final exam grades. Delay of gratification would directly affect self-regulation and indirectly affect homework mediated by self-regulation. Self-efficacy beliefs would have a direct effect on delay of gratification, self-regulation, homework completion, and midterm exam grades. Finally, intrinsic interest and outcome expectancy would have a direct effect on students' use of self-regulated learning strategies and delay of gratification (see Figure 3).

The proposed model was evaluated using LISREL-8.5 (Jöreskog & Sörbom, 2002). The following fit indexes were reported: Chi-square/*df*, Non-Normed Fit Index (NNFI), Root Mean Square Error of Approximation (RMSEA), Incremental Fit Index (IFI), Goodness of Fit Index (GFI), and Comparative Fit Index (CFI). A good of fit was indicated by a Chi-square/*df* equal or less than 25, an NNFI, IFI, GFI, and CGI greater than .90, and a low RMSEA (Bentler & Bonett, 1980; Byrne, 1998, 1992; Steiger, 1990)

Estimation of the proposed path model revealed significant χ^2 (15, N = 58) = 26.35, p = .03, NNFI = .88, IFI = .94, GFI = .90, RMSEA = .12, and CFI = .93. The indexes showed that the predicted model did not provide an optimal goodness of fit (see Table 3). Four of the paths were nonsignificant, namely, (a) from intrinsic interest to delay of gratification; (b) from outcome expectancy to self-regulation; (c) from self-regulation to midterm grade; and (d) from self-regulation to final exam grade. Removing

Table 2.

Means, Standard Deviations, and Cronbach Alphas, and Pearson Correlations among the Measures

	1	2	3	4	5	6	7	8
1. Math homework completion [a]	----							
2. Self-regulation [b]	.58***	----						
3. Delay of gratification [c]	.44**	.48**	----					
4. Self-efficacy [b]	.45***	.40**	.42**	----				
5. Intrinsic Interest [b]	.34**	.68***	.31*	.39**	----			
6. Outcome expectancy [b]	-.01	.31*	.32*	.02	.36**	----		
7. Midterm exam grade[d]	.51***	.23*	.28*	.43**	.35**	-.18	----	
8. Final exam grade [d]	.59***	.33*	.18	.41**	.39**	-.17	.83***	----
Mean	6.03	4.42	3.24	5.49	3.46	5.95	67.72	66.46
Standard Deviation	1.28	.85	.58	.99	1.46	1.25	21.45	21.25
Cronbach Alpha	----	.78	.84	.79	.84	.70	----	----

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

[a] The response format consisted of a 7-point Likert scale (1 = "Never" to 7 = "Always").

[b] The response format consisted of a 7-point Likert scale (1 = "Not at all true of me" to 7 = "Very true of me").

[c] Values are based on a 1 ("Definitely choose A") to 4 ("Definitely choose B"), cording responses with higher values indicating greater preference for academic delay of gratification.

[d] Values range from 0 to 100.

the nonsignificant paths produced a final model. However, given the substantial theoretical evidence of the causal effect of self-regulation on academic performance (Bandura, 1997; Zimmerman, 2000) and the estimated standardized path-coefficient (β = .15; t = 1.90, p < .10), the nonsignificant path at the p > .05

Table 3.

Goodness of Fit Indexes of the Proposed and Final Model (N = 58)

	Goodness of Fit Indexes						
Models	*df*	χ^2	NNFI	IFI	GFI	RMSEA	CFI
Predicted Model	15	26.35 (p = .03)	.88	.94	.90	.12	.93
Final Model	18	25.14 (p = .12)	.94	.96	.90	.09	.96

Note. NNFI, Non-Normed Fit Index; IFI, Incremental Fit Index; GFI, Goodness of Fit Index; CFI, Comparative Fit Index; RMSEA, Root Mean Square Error of Approximation.

between self-regulation and final exam grade was retained in the final model.

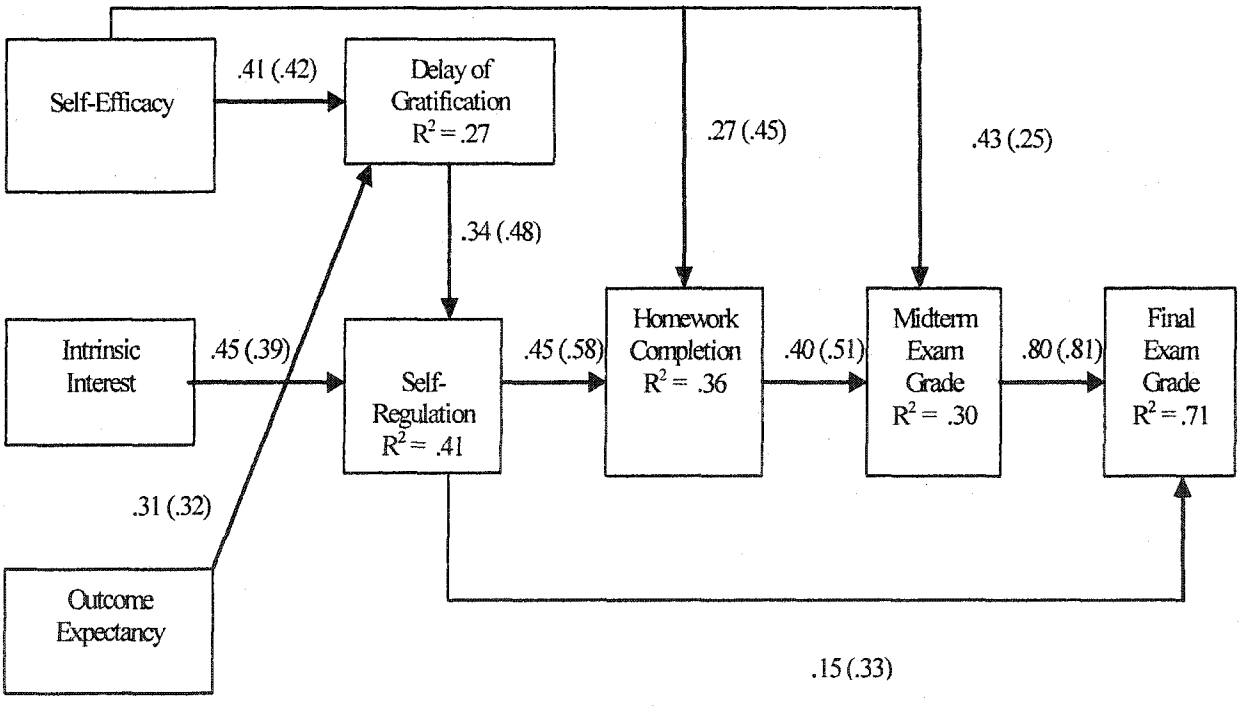
Figure 5 presents the significant paths (standardized coefficients with correlations in parentheses) resulting from the LISREL analysis. Omnibus fit indexes suggested the adequacy of this solution, indicating that the final model fit the data well: χ^2 (18, N = 58) = 25.14, p = .12 (NNFI = .94, IFI = .96, GFI = .90, CFI = .96, and a RMSEA = .09).

As expected, students' self-efficacy beliefs had a direct effect on homework completion (β = .27), willingness to delay gratification (β = .41), and midterm exam

grade (β = .25). Students' intrinsic interest had a direct effect on their self-regulation of learning (β = .45). Students' outcome expectancy had a direct effect on their willingness to delay gratification (β = .31), which in turn directly affected students' self-regulation (β = .34). Self-regulation had a direct effect on students' homework completion (β = .45), which similarly had a direct effect on midterm exam grade (β = .40). Both self-regulation

Figure 5

Final Reduced Path Model



(β = .15) and midterm exam grade (β = .80) had direct effects on students' final test grade.

As Figure 5 shows, self-regulation and self-efficacy accounted for 36% of the variance in homework completion. Delay of gratification and intrinsic interest accounted for 41% of the variance in self-regulation of learning. Similarly, self-efficacy and outcome expectancy accounted for 27% of the variance in delay of gratification, while self-regulation and midterm grade exam accounted for 71% of the variance in the students' final exam grade. Further, homework completion and self-efficacy beliefs accounted 30% of the variance in the students' midterm exam grade.

The final model differed from the proposed model by the absence of a significant path from outcome expectancy to self-regulation. However, self-efficacy had a direct effect on self-regulation and an indirect effect on self-regulation via delay of gratification. Intrinsic interest did not have a direct effect on delay of gratification. Finally, self-regulation had an indirect effect on midterm grade via homework completion. Table 4 displays the decomposition of direct, indirect, and total effects on the endogenous variables.

Students' Homework Activities

Students' homework activities reported on the survey were examined, followed by their homework activities as reported on the homework logs.

Homework Survey: Correlations. Pearson correlations between the students' homework activities reported in the questionnaires and their motivational beliefs, use of self-regulation, homework completion, and academic performance were examined. As Table 5 shows, the number of hours per week that students spent watching television was

negatively and nearly correlated to their willingness to delay gratification (r = -.24, p < .10) and their intrinsic interest in course content (r = -.25, p < .10).

The number of hours per week that the students usually spent studying for the math course was positively and nearly correlated to delay of gratification (r = .24, p < .10) and to intrinsic interest (r = .30, p < .05). Students' reports of how many hours per week they usually studied for all the classes was positively related to math homework completion (r = .28, p < .05), delay of gratification (r = .38, p < .05), midterm exam grade (r = .29, p < .05) and nearly correlated to self-efficacy beliefs (r = .24, p < .10).

Students' grade expectations for the midterm exam were positively and significantly related to math homework completion (r = -.35, p < .05), self-regulation (r = .43, p < .01), self-efficacy (r = .45, p < .01), intrinsic interest (r = .49, p < .01), midterm exam grade (r = .46, p < .05), and final exam grade (r = .44, p < .05). Surprisingly, their grade expectations were nearly significantly inversely related to outcome expectancy (r = -.26, p < .10).

Studying with the television on was not significantly related to students' reported motivational beliefs, self-regulation or academic performance. However, their reports of how often they studied for the math midterm exam with the radio or CD playing was significantly inversely related to self-efficacy (r = -.30, p < .05) and nearly significantly inversely related math homework completion (r = -.28, p < .10), delay of gratification (r = -.24, p < .10), and final course grade (r = -.26, p < .10).

Taken together, these findings suggest that students' homework activities and beliefs are associated with their reported homework activities. Specifically, their beliefs

Table 4

Decomposition of Direct, Indirect, and Total Effects on the Endogenous Variables

Effect	Direct Effect	Indirect Effect	Total Effect
On homework			
of delay of gratification	.00	.15	.15
of intrinsic interest	.00	.21	.21
of outcome expectancy	.00	.05 [a]	.05 [a]
of self-efficacy	.27	.06	.33
of self-regulation	.45	.00	.45
On self-regulation			
of delay of gratification	.34	.00	.34
of intrinsic interest	.45	.00	.45
of self-efficacy	.00	.14	.14
of outcome expectancy	.00	.11 [a]	.11 [a]
On delay of gratification			
of outcome expectancy	.31	.00	.31
of self-efficacy	.41	.00	.41
On midterm course grade			
of delay of gratification	.00	.06 [a]	.06 [a]
of homework completion	.40	.00	.40
of intrinsic motivation	.00	.08	.08
of outcome expectancy	.00	.02 [a]	.02 [a]
of self-efficacy	.25	.13	.38
of self-regulation	.00	.18	.18
On final course grade			
of delay of gratification	.00	.10	.10
of homework completion	.00	.32	.32
of intrinsic motivation	.00	.13	.13
of midterm grade exam	.80	.00	.80
of outcome expectancy	.00	.03 [a]	.03 [a]
of self-efficacy	.00	.32	.32
of self-regulation	.15	.14	.29

Note. [a] These effects are not statistically significant at the $p > .05$ level.

of self-efficacy to learn and master the course material were related to the grade they expected on the midterm exam and the number of hours spent on homework tasks. However, studying while listening to the radio or CD was not associated with their capability beliefs. Students' willingness and intention to delay gratification and their reported use of self-regulatory strategies were major factors associated with their reported homework activities.

Figure 6 displays the percent of the students' reporting places of studying while doing math homework assignments. Most students reported studying for their math course at home (33%) while others specified that they studied in their bedrooms (31%). The other 36% reported studying in such places such as the kitchen, library, school, at work, living room, with a tutor, or at a cousin's home. As Figure 7 displays, eighty-eight percent of the students reported that they usually studied for the math course alone, 11% studied with a friend, and 1% studied with a parent.

Homework Log: *Correlations*. The students reported their homework activities in Homework Logs administered four times during a two-week period. In each log, the students reported their homework goals, time of study, where and with whom they completed their assignments, the presence of distractions, and their satisfaction with homework completion (see Table 6). Across the four administrations of the math homework logs, the frequency with which the students reported that they did not study for the math course (i.e., 1 = "Did not study"; 2 = "Studied at least one time") was

Table 5
Means, Standard Deviations, and Pearson Correlation Coefficients between Homework Activities and Students' Motivational Beliefs, Self-regulation, and Performance

Question	*M*	*SD*	HWK COM	SELF-REG	DEL of GRAT	SELF-EFFIC	INT INTE	OUT EXP	MID EXAM	FINAL EXAM
How many hours per week are you spending watching television every day? [a]	3.11	2.25	-.05	-.19	-.24†	.06	-.25†	-.22	-.11	-.19
How many hours per week do you usually spend studying for MA175? [a]	4.22	4.00	.13	.20	.24†	.17	.30*	.18	.15	.11
How many hours per week do you usually spend studying for all your classes? [b]	10.07	7.67	.28*	.10	.38*	.24†	.09	.07	.29*	.19
What score are you most likely to get in the midterm in MA175?	82.13	9.14	.35*	.43**	.11	.45**	.49**	-.26†	.46*	.44*
How often do you study for the math midterm exam with the television on? [b]	3.76	1.94	.12	-.10	-.15	-.06	-.12	-.14	.13	-.13
How often do you study for the math midterm exam with the radio or compact disk (CD) on? [b]	3.59	2.06	-.28*	-.22	-.24†	-.30*	-.07	.07	-.22	-.26†

Note: [a]Open-ended questions. [b]Likert-type question with a range of 1 to 7. *p > .05; **p > .01; †p > .10. HWK COM = Homework completion, SELF-REG = Self-regulation, DEL of GRAT = Delay of gratification, SELF-EFFIC = Self-efficacy, INT INTE = Intrinsic interest, OUT EXP = Outcome expectancy, MID EXAM = Midterm exam grade, and FINAL EXAM = Final exam grade.

inversely related to their homework completion ($r = -.27, p < .05$). That is, the students who indicated that they did not do homework assignments also reported that they completed their assignments.

By examining students' homework Logs, it was possible to determine whether the students set general or specific goals. Across the four administrations of the homework log, the frequency with which the student indicated general goals (e.g., "Read from the book," "Go to the library," "To study") was significantly related to their self-efficacy beliefs ($r = .27, p < .05$). In other words, the students who established general goals and planning also reported having high efficacy beliefs about their competence to do well on the midterm examination. By contrast, the frequency with which the students reported specific goals across the four administration of the math homework logs was nearly significantly related to homework completion ($r = .25, p < .10$) and significantly related to the midterm exam grade ($r = .29, p < .05$). The frequency with which the students did not write a goal or wrote an irrelevant item was not significantly related to motivational beliefs, self-regulation of learning, or academic performance.

Figure 6

Percent of Students' Reporting Places to Study

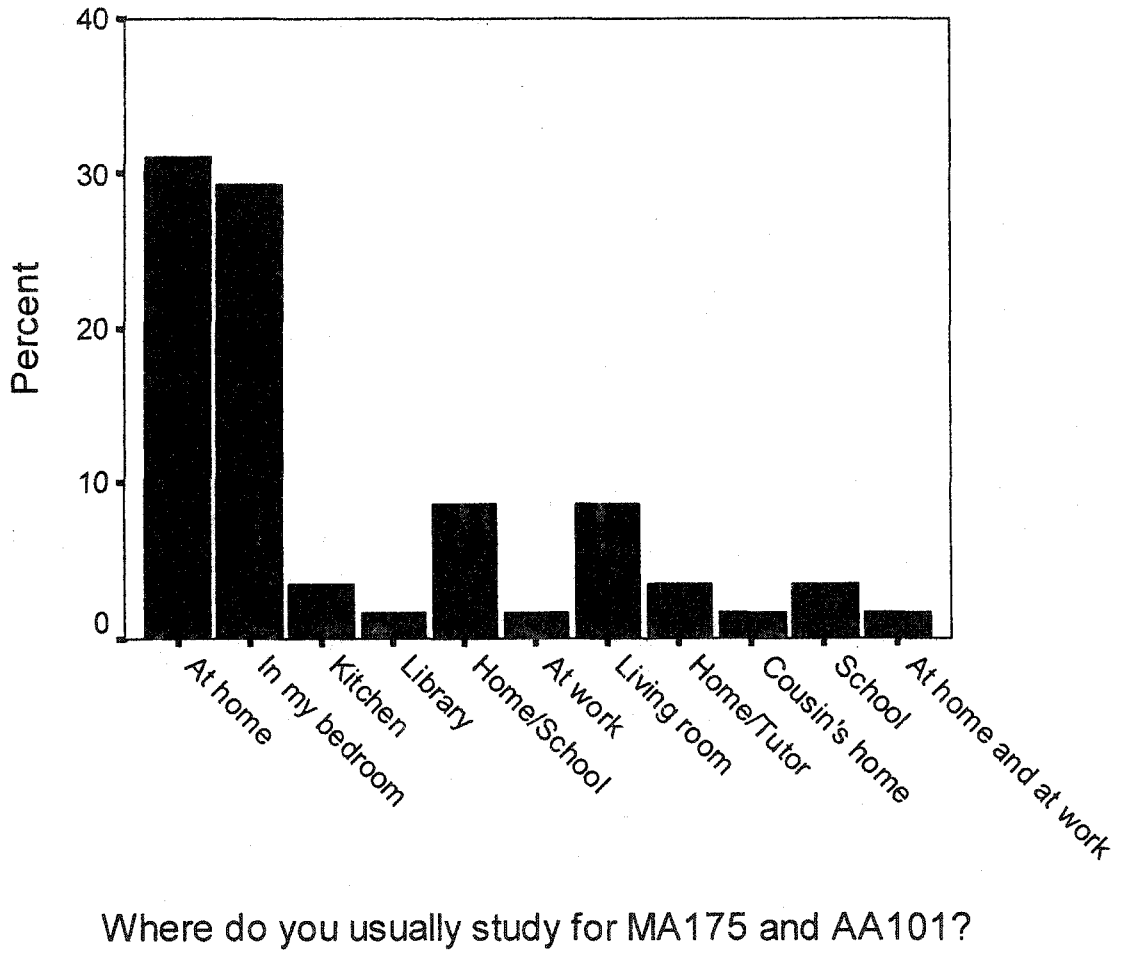
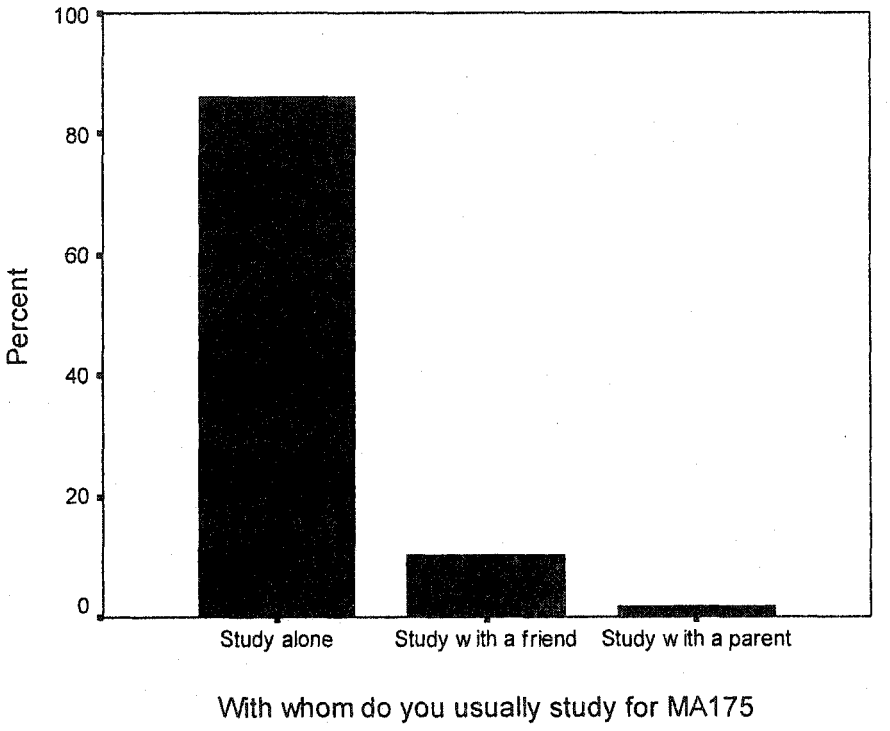


Figure 7

Percent of Students' reporting use of Study Partners (if any)



Time management accuracy (i.e., how much time they said they would spend studying minus their actual time studying) was positively related to homework completion ($r = .43, p < .01$) and midterm exam grade ($r = .28, p < .05$) and nearly significantly related to delay of gratification ($r = .29, p < .10$). In other words, students who spent the amount of time they set as a time goal were highly accurate; this accuracy is related to their motivational beliefs, self-regulation, and performance. From the Homework Log, it was also possible to infer the students' time management activities. The actual time that the student spent studying was significantly related to ratings of math

homework completion ($r = .32, p < .05$), intrinsic interest ($r = .27, p < .05$), to self-regulation ($r = .31, p < .05$), and nearly significantly related to delay of gratification ($r = .25, p < .10$) and outcome expectancy ($r = .24, p < .10$).

From the Homework Logs, it is also possible to assess whether the students studied in the same place everyday (i.e., 1 = "Did not study in the same place" and 2 = "Studied in the same place"). Surprisingly, studying in the same place everyday was inversely related to delay of gratification ($r = -.33, p < .05$). A possible explanation for this finding is that some students indeed studied in places with a significant number of distractions (e.g., Internet, CD, friends, and TV). Perhaps often changing the study venue was a strategy that helped to overcome obstacles and temptations. However, studying with the same partner everyday was negatively related to homework completion ($r = -.49, p < .10$), delay of gratification ($r = -.54, p < .10$), self-efficacy ($r = -.53, p < .10$), and outcome expectancy ($r = -.54, p < .10$). Again, it is possible to consider that changing partners could be an effective learning strategy if they prove not to be effective learners who do not contribute to the students' learning experience and development. Wesley (2004) reported that college students who study with a partner reported higher self-efficacy beliefs than students who study without a partner.

The frequency with which the students reported studying with another person (e.g., peers, friends, and tutors) was not significantly related to their motivational beliefs, self-regulation or academic performance. On the other hand, the frequency of studying alone was positively related to homework completion ($r = .34, p < .01$) and intrinsic interest in the course material ($r = .37, p < .01$). Further, the total amount of the different

distractions reported by the students across the four logs was not related to their motivational beliefs, self-regulation, and academic performance.

By inspecting the math homework logs, the students' level of satisfaction with their math homework activities was also examined. The students' level of satisfaction with the effectiveness of their study time was positively and significantly related to their final exam grade ($r = .40, p < .01$) and self-efficacy beliefs ($r = .27, p < .05$).

Table 6
Pearson Correlations between Students' Homework Activities Reported in the Homework Log and Their Motivational Beliefs, Self-regulation and Performance

	SCORING CODE	MID EXAM	FINAL EXAM	HWK COM	DEL of GRAT	SELF-EFFIC	INT INTE	OUT EXP	SELF-REG
Frequency of reporting "I did not study" for MA175?	Continuous Variable	.03	-.14	-.27*	-.17	.14	-.10	.02	-.19
Frequency of stating study goals (MA175-GENERAL)	Continuous Variable	-.06	.04	.091	.22	.27*	-.02	-.04	.06
Frequency of reporting study goals (MA175-SPECIFIC)	Continuous Variable	.29*	.17	.25†	.11	.04	.20	.01	.09
Frequency of non-writing a goal in the goal's column in MA175?	Continuous Variable	-.21	-.11	.00	.15	-.22	-.04	.02	.01
Time management	Continuous Variable	.28*	.21	.43**	.24	.10	.16	-.01	.19
Actual time spent on homework	Continuous Variable	-.05	.02	.32*	.25†	.01	.27*	.24†	.31*
Studying at the same place everyday	Categorical: No = 1; Yes =2	-.18	.02	-.23	-.33*	-.13	-.12	-.08	-.21
Studying with the same partner everyday [a]	Categorical: No = 1; Yes =2	-.32	.04	-.49†	-.54†	-.53†	-.16	-.54†	-.37
Studying with other person (teacher, peer, friend, or tutor)	Categorical: No = 1; Yes =2	-.12	-.01	.07	.21	.06	-.20	.15	.06
Studying alone	Categorical: No = 1; Yes =2	.21	.15	.34**	.15	.05	.37**	-.04	.15
Frequency of reporting distractions (each distraction count as one even if they are mentioned more than ones)	Continues Variable	.09	-.07	.03	-.07	-.08	-.04	.12	-.03
Level of satisfaction with homework completion	Continues Variable	.16	.40**	.18	.02	.27*	.12	-.22	.16

Note. † $p < .10$. * $p < .05$. ** $p < .01$. HWK COM = Homework completion, SELF-REG = Self-regulation, DEL of GRAT = Delay of gratification, SELF-EFFIC = Self-efficacy, INT INTE = Intrinsic interest, OUT EXP = Outcome expectancy, MID EXAM = Midterm exam grade, and FINAL EXAM = Final exam grade. [a] $N = 10$

Chapter V

DISCUSSION

This study was designed to examine the role of motivational beliefs and self-regulatory processes in predicting homework completion and academic achievement among college students enrolled in an urban technological college. The current investigation was conceived under the umbrella of Zimmerman's (2000) cyclical model of self-regulation. The discussion of the study is presented in the order of the hypotheses that were examined.

Hypothesis 1: Relationships between Math Homework Completion, Motivational Beliefs, and Use of Learning Strategies

The first hypothesis tested whether students' frequency of math homework completion, use of self-regulated learning strategies, self-efficacy and outcome expectancy beliefs, intrinsic interest, willingness to delay gratification, and midterm and final exam grades were correlated. Specifically, I hypothesized that students who reported higher frequency of math homework completion would be more intrinsically interested in the course, have higher self-efficacy and outcome expectancy beliefs, have greater willingness to delay gratification, and would obtain higher test grades than would students with a lower frequency of homework completion.

The results generally supported the first hypothesis. Students' math homework completion was related to their use of self-regulatory learning strategies and choice of temporarily distant rewards rather than immediately available ones.

Successful math homework completion was also associated with students' intrinsic interest in the course and their self-efficacy beliefs. Likewise, math homework completion was related to students' academic outcomes (i.e., midterm and final exam grades). In addition, students' motivational beliefs were associated with their use of self-regulatory strategies. More self-efficacious and intrinsically interested students tended to use such self-regulatory processes as setting goals, self-monitoring their study time, and self-evaluating their homework progress. These findings are consistent with Zimmerman' and Martinez-Pons, (1988, 1990) research which showed that students attending an academically gifted school displayed significantly higher mathematical self-efficacy and greater use of self-regulated learning strategies than students from regular schools. Specifically, academically gifted learners were more motivated to complete their homework assignments than were regular students.

Surprisingly, students' reported outcome expectancy was not correlated with their math homework completion, mid-term or final exam grades. Apparently, the students did not believe that doing well in their homework and exams would help them to attain their future career goals. It is possible that these students' career objectives did not require a high level of background in mathematics, and this led to the low predictive power of math homework completion and course grades in comparison to their self-efficacy beliefs.

Hypothesis 2: Direct and Indirect Effect of Motivational Beliefs and Use of Learning Strategies on Math Homework Completion and Academic Performance

The second hypothesis proposed that students' motivational beliefs, use of learning strategies, and willingness to delay gratification would have a direct effect on students' frequency of math homework completion, which in turn would have a direct effect on academic performance. Specifically, it was hypothesized that (H2a) college students' homework completion would have a direct effect on their midterm and a direct and indirect effect on their final exam grades; (H2b) students' self-regulation of learning would have a direct effect on their homework completion and midterm and final exam grades; (H2c) students' delay of gratification would have a direct effect on self-regulation and an indirect effect on their homework mediated by self-regulation; (H2d) students' self-efficacy beliefs would have a direct effect on their delay of gratification, self-regulation, math homework completion, and midterm and final exam grades; and (H2e) students' intrinsic interest and outcome expectancy would have a direct effect on their use of self-regulated learning strategies and delay of gratification.

In general, the present study provided substantial support for direct and indirect effects between students' motivational beliefs, use of self-regulated learning strategies, willingness to delay gratification, and frequency of homework completion on academic performance. Regarding hypothesis H2a, college students' math homework completion affected their midterm exam grades directly and their final exam grades indirectly via their midterm exam grades as was predicted. These

results suggest that students' completion of homework tasks contributed significantly to their successful academic performance.

In support of hypothesis H2b, the students' self-regulation of learning directly affected their homework completion and indirectly affected their midterm and final exam grades. As predicted, self-regulation of learning directly affected students' final course grade but not their midterm grade. The present results support the premise that self-regulation of learning impacts math homework completion. Compared to their less self-regulated peers, more self-regulated students performed better on the midterm and final exams.

In support of hypothesis H2c, the students' delay of gratification had a direct effect on self-regulation and an indirect effect on homework completion mediated by self-regulation. Students' willingness to postpone immediately available rewards and goals to pursue distant and valuable outcomes directly affected their use of self-regulatory learning strategies. Their willingness to expend academic effort, despite attractive and competing alternatives, was thus directly related to such self-regulatory processes as setting academic goals, planning, self-monitoring, estimating, self-recording, and self-evaluation. These results are consistent with Bembenutty's (2002) research in which he found an indirect and indirect effect of academic delay of gratification and self-efficacy on academic performance among minority college students who were participating in a summer immersion program. Similarly, these results are consistent with the work of Wulfert, Block, Ana, Rodriquez, and Colsman (2002), who found that middle and high school students

with high ability to delay gratification and who displayed high self-regulatory skills displayed higher academic performance than students with low ability to delay gratification and self-regulatory deficits.

An interesting finding of the present study is that delay of gratification does not directly affect homework; rather, this relationship is mediated via self-regulation. This suggests that delay of gratification alone is not a sufficient condition to secure students' homework completion. Rather, in addition to delaying gratification, students need to use appropriate self-regulatory strategies if they want to successfully complete their homework assignments, which in turn is conducive to high academic achievement. This finding is consistent with a model proposed by Opper (2003) that hypothesized that delay of gratification would have a direct effect on self-regulation and that self-regulation would have a direct effect on performance. Likewise and following Bembenutty's (1999) research, Conca, Powell, and Slyke (2004) proposed a model of learning in information systems education in which learners' motivation beliefs and strategies will have a direct effect on academic delay of gratification; academic delay of gratification will have a direct effect on self-regulation; and self-regulation will influence academic outcomes.

Students' willingness to delay gratification mediated the effect of two motivational beliefs (i.e., self-efficacy and outcome expectations) on their use of academic self-regulation, homework completion, and math exam performance. This is the first study that systematically incorporated delay of gratification in an

array of motivational beliefs and self-regulatory actions in an effort to predict math homework completion. Researchers (e.g., Bempechat, 2000, 2004; Corno & Xu, 2004; Kralovec & Buell, 2000) have often suggested the need for delay of gratification for successful completion of academic tasks, but until now had this premise not been tested with college students.

In partial support of hypothesis H2d, students' self-efficacy beliefs had a direct effect on their delay of gratification, math homework completion, and midterm exam grades. However, the effects of self-efficacy on self-regulation and the final examination grade proved to be indirect rather than direct. The present study sought to explain the ability of successful students to delay gratification and to use learning strategies effectively. They tended to be highly self-efficacious; That is, students felt confident about their abilities to master the academic tasks. These self-efficacy beliefs led them to delay gratification by taking appropriate actions, make wise decisions, and helped them persist against difficulty and temptations. Instead of delaying gratification, students with low self-efficacy beliefs reported a preference for attending a concert or sporting event, having fun with their friends, taking a trip, searching the internet, going shopping, talking on the phone or watching television rather than investing time in completing their homework assignments. These students with low self-efficacy beliefs also obtained low scores on both the midterm and final exams. Nevertheless, contrary to expectations, self-efficacy beliefs for successfully performing on the midterm exam only had a

significant indirect effect on final exam grades. This is not surprising in view of the proposed linkage of these constructs in the causal model depicted in Figure 4.

The lack of a direct path between self-efficacy and self-regulation, and its indirect mediation via delay of gratification, is notable. This suggests that students' motivational beliefs require a delay gratification if they are to use self-regulatory strategies successfully. If the students are unable or unwilling to postpone immediately available rewards to achieve long-term goals, they may not be successful in attaining them even if the have strong self-efficacy beliefs.

In partial support of hypothesis H2e, intrinsic interest had a direct effect on students' use of self-regulated learning strategies but did not influence their delay of gratification as expected, even though these two variables were significantly correlated. Because students with high interest in the course were more likely to use learning strategies, their academic performance was enhanced. In addition, outcome expectancy directly affected students' willingness to delay gratification, but contrary to predictions, outcome expectancy did not have a direct effect on students' use of self-regulated learning strategies, even though outcome expectancy was positively correlated with self-regulation. It is possible that, as Bandura (1997, 1999, 2001) cautioned, while outcome expectancies are widely recognized, students' self-efficacy belief may become the primary predictor of academic outcomes. A future study to examine this contention is needed.

In summary, the results of the path analysis led to several important conclusions. Self-efficacy—the students' own judgment of their capability to

successfully perform on the midterm exam—had a direct effect on their willingness to delay gratification and indirectly influenced self-regulated engagement in homework tasks. The students' level of intrinsic interest also influenced their use of self-regulatory strategies. These self-regulatory beliefs and behavior in turn had a direct impact on college students' homework completion and ultimately their academic performance.

Hypothesis 3: Students' Homework Activities

The initial analyses of the students' homework completion were based on the classic measure that has been used historically in research literature (Cooper, Jackson, Nye, & Lindsay, 2001; Cooper, Lindsay, Nye, & Greathouse, 1998; Cooper, Valentine, Nye, & Lindsay, 1999). When adapted to the math course in the present study, the question was: "How often do you complete your homework/assignments for the Math 175 course?" To broaden the scope of homework assessment in the present study, several additional homework measures were included. The third hypothesis proposed that math homework activities, as reported in the students' homework logs and a survey, would significantly correlate with their reported use of self-regulated learning strategies, self-efficacy and outcome expectancy beliefs, intrinsic interest, willingness to delay gratification, and midterm and final exam grades, as well as with the classic homework completion measure used in the initial analyses.

Homework activities. An examination of the math homework activity reports suggests that certain students' activities are positively correlated with their

homework completion, especially the number of hours of time spent during the week studying and the level of grade that they are likely to earn. By contrast, homework completion correlated negatively with listening to a radio or compact disk when studying. Among the homework measures that predicted performance on the midterm and final examination, the students' expected score on the midterm exam was most predictive. Interestingly, this same homework judgment was positively correlated with greatest number of motivational and skill measures, namely with self-regulation, self-efficacy beliefs, intrinsic interest, and with nearly significantly greater outcome expectations. The number of hours that the students spent in studying was positively correlated with their delay of gratification level as well as with their midterm exam grade. Viewing television during the week also led to nearly significantly poorer delay of gratification and lower intrinsic interest. This result is consistent with the finding of Pool, Koolstra, and Van Der Voort (2003, see also Pool, Koolstra, Cees, & Van Der Voort. 2003), who found that students in grade eight who were doing homework assignments while watching television performed worse and used more time than students in a control condition. These outcomes may have been due to the effect of dividing their attention between homework and television (see also Cool, & Yarbrough, 1994; Bowen & Bowen, 1998). Surprisingly, watching television when studying for the midterm exam did not seem to have any impact on the students' grades or intrinsic interest. These differences in findings suggest that future research should explore under what

conditions completing homework assignments while watching TV does or does not enhance homework completion.

Homework Log. An examination of the math homework logs of actual studying reveals that the students' homework behaviors are positively correlated with their homework completion, namely time management, actual time spent on homework, and studying alone. By contrast, the frequency of reporting not studying was negatively correlated with homework completion. The frequency of setting *general academic goals* for homework completion was positively related to the students' self-efficacy beliefs, but it was not correlated with the students' performance on either math exam. Setting *specific academic goals* was positively associated with significantly higher academic performance on the midterm exam. This result is consistent with the existing literature, which indicates that setting specific goals enhances students' academic performance by providing them with clear standards to regulate their actions (Schunk, 2004; Zimmerman, 2000).

The results of the present study suggest that greater time management was related to midterm exam performance, and the amount of time dedicated to study was related to significantly higher self-regulation of learning, intrinsic interest in math, and nearly significantly higher outcome expectations and delay of gratification. These findings are consistent with the literature. According to Pressley and McCormick (1995), time management refers to students' ability to orchestrate their schedule in order to take full advantage of their study time. Effective time management is related to degree of learning and achievement.

However, time management does not only influence the amount of time that students spend on task, but also the qualitative manner in which they spend that time (Pressley & McCormick, 1995). Further, according to Zimmerman (1994), time management is an essential component of self-regulation; he posits that teaching students to maintain detailed logs describing their use of study time can improve academic functioning. Zimmerman, Greenberg, and Weinstein (1994) discussed Weinstein's research at the University of Texas, where students, who were enrolled in a course entitled *Introduction to Educational Psychology: Individual Learning Skills*, were asked to keep a log of their activities for a week. The logs revealed to the students how much time they were wasting. The researchers concluded that students' use of logs could lead to higher academic achievement because students were required to estimate and monitor the time requirements of their study activities.

The results of the present study also suggest that high level of satisfaction with homework completion was related to final exam performance and high self-efficacy beliefs. Self-satisfaction refers to students' contentment with the outcomes of their study activities when compared with self-determined standards and goals. If the students are satisfied with their work, they remain motivated to continue their efforts to learn. According to Zimmerman and Kitsantas (1997), individual levels of self-satisfaction with prior performance are associated with optimistic self-efficacy beliefs regarding subsequent efforts. Similarly, Nuesell (2004) found a significant effect of self-efficacy on the level of satisfaction of college athletes trained to

combat choking during dart throwing. According to Zimmerman (2000), self-satisfaction is a key self-reaction.

The homework logs also indicated that studying with the same partner was inversely related to homework completion, ability to delay gratification, and motivational beliefs, although these correlations did not quite attain statistical significance ($p < .10$). These findings are inconsistent with the findings of Bryan, Burstein, and Bryan (2001), who observed that peer collaboration may improve homework completion. Likewise, these findings are not consistent with Wesley's (2003) study in which she found that students who use study partners reported higher self-efficacy beliefs, use self-regulatory strategies, and studying more than students who study alone. Clearly, further research on this issue is needed.

Educational Implications

Three major educational implications can be derived from this study. First, although the study did not directly and systematically assess the effectiveness of the instructional intervention, it did reveal that college students' self-regulatory processes and motivational beliefs played a causal role in their academic success. Learning about self-regulation and how to enhance and maintain high motivational beliefs should become an important component of educational programs for college students.

Second, teachers and counselors could use the questionnaires and the homework log employed in the present investigation diagnostically with students. These tools can serve to identify students who are struggling academically to

design an intervention plan to improve their studying and to follow their academic progress.

Third, teachers and instructors should be trained in using self-regulation learning strategies in the classroom so they may serve as social models for their students (Dembo, 2001). Students learn readily through social modeling (Bandura, 1997) and teachers should be trained to demonstrate various self-regulatory strategies. To be optimally motivated to teach self-regulation, teachers themselves need to possess high self-efficacy beliefs; in other words, teachers must believe they can positively influence their students' learning experience (Woolfolk & Hoy, 1990). While they need to model self-regulating behavior for their students, they also should set a positive example via their personal self-efficacy beliefs.

Limitations and Future Research

A significant limitation of this study was the sample size. The *power* of the statistical analyses (Cohen, 1992) could have been improved with a larger sample of students. However, the sample was of sufficient size to establish an adequate goodness of fit for the path model.

A second limitation of this study was that math homework was assessed only once right before the midterm examination, and the assessment questions specifically addressed educational principles related to their preparation for this exam. Thus, it is not known how the students' math homework activities might have changed when preparing for the final examination. On the other hand,

evidence does suggest that students' responses to the midterm assessments were directly related to their final exam grades, as indicated by the prediction of 71% of the variance on final exam grades. Nevertheless, future studies should consider examining students' motivational beliefs, use of self-regulatory strategies, and homework practices more frequently during the semester.

A third limitation involves the aggregation of the students' ethnicity in the statistical analyses. Prior evidence revealed that individuals from different cultures often respond differently to different psychological measures (Pajares, 2002). For example, African-American students tended to report greater delay of gratification than Caucasian students, but African-Americans earned lower course grades than Caucasians (Bembenutty & Karabenick, 1997). Future studies should examine the different self-regulatory processes and homework practices of different ethnic groups.

A fourth limitation involves the subject matter that was studied. It is important to assess these self-regulatory and motivational variables when students study in subject areas other than math (e.g., English, psychology, anthropology, biology) in order to determine whether this study's findings remain constant across subject areas.

The fifth limitation involves the background and aspirations of the students in the sample. The participants in the present study were enrolled in an associate degree program of a large urban community college. These students were disadvantaged socioeconomically and deficient in their academic

background and methods of studying. It is also important to assess the role of homework completion among students whose academic progress is not associated with socioeconomic disadvantage and among highly skilled learners. It is also important to extend the present research to regular college students in 4-year bachelor's degree programs.

Conclusion

The active involvement of at risk college students' during homework significantly improved their academic success. Students who were self-efficacious, and intrinsically interested, who had positive outcome expectations, and who could delay gratification were significantly more likely to adopt a proactive self-regulatory approach to the completion of homework tasks. These motivational and self-regulatory variables could explain a substantial amount of variance in these students' midterm and final examination grades in a difficult subject, such as math. Clearly, the results of the present study have important implications for helping at risk college students. Faculty, counselors, and parents should become aware that homework completion is not only important, it is significantly influenced by students' self-regulatory strategies and high motivational beliefs.

Appendix A

Delay of Gratification Scale

ACTIVITY PREFERENCES

This part of the survey concerns ten situations that students sometimes face when studying for the Math 175 midterm examination and engaging in other activities. Here are a series of choices between two alternative courses of action (A and B).

After you have read a pair of statements, indicate which course of action you would be more likely to choose and the strength of that choice. Do this by placing an ***X*** in front of the alternative that reflects your choice.

Please read each of the statements carefully, and relate each statement to the Math 175 course. It is important that your responses reflect your likely choice. That is, tell us what you really would do under the conditions described in the statements and your actual beliefs about those choices.

Which of the following would you choose to do?

1. A. Go to your favorite movies and then cram for the Math 175 midterm exam, ***OR***
   B. Postpone going to the movies until after you have taken the Math 175 midterm exam.

Choose One

___*Definitely choose A* ___*Probably choose A* ___*Probably choose B* ___*Definitely choose B*

Which of the following would you choose to do?

2. A. Hanging out with your friends and then cram for the Math 175 midterm exam. ***OR***
   B. Postpone hanging out with your friends until after you have taken the Math 175 midterm exam.

Choose One

___*Definitely choose A* ___*Probably choose A* ___*Probably choose B* ___*Definitely choose B*

Which of the following would you choose to do?

3. A. Go partying with your friends and then cram for the Math 175 midterm exam. ***OR***
   B. Postpone partying with friends until after you have taken the Math 175 midterm exam.

Choose One

___*Definitely choose A* ___*Probably choose A* ___*Probably choose B* ___*Definitely choose B*

Which of the following would you choose to do?

4. A. Study in a place with many pleasant distractions for the Math 175 midterm exam. ***OR***
   B. Study in an isolated place with no distractions until after you have taken the Math 175 midterm exam.

Choose One

___*Definitely choose A* ___*Probably choose A* ___*Probably choose B* ___*Definitely choose B*

Appendix A (continuation)

Which of the following would you choose to do?

5. A. Watch your favorite programs on television and then cram for the Math 175 midterm exam. OR
   B. Postpone television watching until after you have taken the Math 175 midterm exam.

Choose One

___*Definitely choose A* ___*Probably choose A* ___*Probably choose B* ___*Definitely choose B*

Which of the following would you choose to do?

6. A. Spend time surfing the internet and then cram for the Math 175 midterm exam. ***OR***
   B. Postpone surfing the internet until after you have taken the Math 175 midterm exam.

Choose One

___*Definitely choose A* ___*Probably choose A* ___*Probably choose B* ___*Definitely choose B*

Which of the following would you choose to do?

7. A. Spend time talking to friends on the telephone and then cram for the Math 175 midterm exam. ***OR***
   B. Postpone phone calls with friends until after you have taken the Math 175 midterm exam.

Choose One

___*Definitely choose A* ___*Probably choose A* ___*Probably choose B* ___*Definitely choose B*

Which of the following would you choose to do?

8 A. Spend time playing computer games and instead then cram for the Math 175 midterm exam. ***OR***
   B. Postpone playing computer games until after you have taken the Math 175 midterm exam.

Choose One

___*Definitely choose A* ___*Probably choose A* ___*Probably choose B* ___*Definitely choose B*

Which of the following would you choose to do?

9.A. Spend time playing recreational sports and then cram for the Math 175 midterm exam. ***OR***
   B. Postpone playing recreational sports until after you have taken the Math 175 midterm exam.

Choose One

___*Definitely choose A* ___*Probably choose A* ___*Probably choose B* ___*Definitely choose B*

Which of the following would you choose to do?

10. A. Spend time shopping for new things and then cram for the Math 175 midterm exam. ***OR***
    B. Postpone shopping until after you have taken the Math 175 midterm exam.

Choose One

___*Definitely choose A* ___*Probably choose A* ___*Probably choose B* ___*Definitely choose B*

Appendix B

Self-Efficacy, Outcome Expectancy, and Intrinsic Interest Scales [a]

Self-Efficacy Items

1. I am sure that I can learn all the material for the Math 175 midterm exam.
2. I am sure that I will pass the Math 175 midterm exam.
3. I am sure that I will obtain a high score on the Math 175 midterm exam.
4. I am sure that I can motivate myself to study the material for the Math 175 midterm exam.

Outcome Expectancy Items

5. Doing well in the Math 175 midterm exam will help me to attain my future career goals.
6. Doing well in the Math 175 midterm exam will help me to attain my future academic goals.
7. Doing well in the Math 175 midterm exam will help me socially with my friends and family.

Intrinsic Interest Items

8. I enjoy solving challenging math problems.
9. I enjoy studying math more than other subject.
10. I like to think about math when I have free time.
11. I find studying math very motivating.
12. I like to talk about math with my friends.

[a] Note. Participants responded to a 7-point Likert scale indicating whether they strongly agreed with the statement (circle 7) and strongly disagreed with the statement (circle 1). If the participants more or less agreed with the statement, they selected a number between 1 and 7 that best described them.

Appendix C
Self-Regulation of Learning Scale

LEARNING STRATEGIES

The following questions ask about your use of learning strategies and how you study for the **Math 175 midterm exam**. **There are no right or wrong answers, just answer as accurately as possible.** Use the scale below to answer the questions. If you think you use the strategies very often, circle 7; if you think that you never use the strategy, circle 1. If you sometimes use the strategy, find the number between 1 and 7 that best describes you.

		Never						Always
1.	How often do you keep records about how well you are doing your practice problems in preparation for the Math 175 midterm exam?	1	2	3	4	5	6	7
2.	How often do you estimate answers for the Math 175 problems before you actually solve them?	1	2	3	4	5	6	7
3.	How often do you set specific goals to guide your efforts while doing the practice problems in preparation for the Math 175 midterm exam?	1	2	3	4	5	6	7
4.	How often do you a set specific deadline (time) to study the material that could appear in the Math 175 midterm exam?	1	2	3	4	5	6	7
5	How often do you encourage yourself to continue studying math problems that could appear in the Math 175 midterm exam when you are having difficulties?	1	2	3	4	5	6	7
6.	How often do you check for computational errors in your practice problems in preparation for the Math 175 midterm exam?	1	2	3	4	5	6	7
7.	How often do you arrange a place (home, library) to complete studying for the Math 175 midterm exam?	1	2	3	4	5	6	7
8.	How often do you draw a picture and estimate the answer to the practice problems that could appear in the Math 175 midterm exam?	1	2	3	4	5	6	7
9.	How often do you go back to check whether your answers are reasonable after finishing problems that could appear in the Math 175 midterm exam?	1	2	3	4	5	6	7
10.	How often do you change a strategy when the one you are using is not working in problems that could appear in the Math 175 midterm exam?	1	2	3	4	5	6	7
11.	How often do you identify strategies that will help you to correct specific math errors in preparation for the Math 175 midterm exam?	1	2	3	4	5	6	7
12.	How often do you reward yourself for finding and correcting mistakes on the practice problems for the Math 175 midterm exam?	1	2	3	4	5	6	7

Appendix D

Homework Activities: Likert Type Scale

The following questions ask about the study environment where you study for the Math 175 midterm exam. **There are no right or wrong answers, just answer as accurately as possible.** For the next set of questions, circle a number that best represents how often do you engage in the activities described below.

	Never			Sometimes			Always
1. How many hours per week are you spending watching television every day?	1	2	3	4	5	6	7
2. How many hours per week do you usually spend studying for MA1175?	1	2	3	4	5	6	7
3. How many hours per week do you usually spend studying for all your classes?	1	2	3	4	5	6	7
4. What score are you most likely to get in the midterm in MA175?	1	2	3	4	5	6	7
5. How often do you study for the math midterm exam with the television on?	1	2	3	4	5	6	7
6. How often do you study for the math midterm exam with the radio or compact disk (CD) on?	1	2	3	4	5	6	7

Appendix E

Homework Log

STUDY TIME FORM

Student identification number _____ **Date** _____

1. Assignment or study goal	2. Estimation of Time Needed	3. Time Started	4. Time Completed	5. Where?	6. With whom it was completed?	7. Distractions	8. Assignment/ goal completion (from 1 to 100)
(for Math 175)							
(for AA101)							

Note. Please see next page for instruction about how to fill this Study Time Form.

How to Fill the Study Time Form

In this Study Time Form you should log all of the study activities you are doing out of the classroom. By study activities we mean any homework and any studying you choose to do. Use a row for Math 175 and another for AA101.

- In Column 1, write the specific material that you studied (for example, study problems 1 to 10 on how to multiply fractions).
- In Column 2, write how much time you estimate studying will require.
- In column 3, write the time you started studying.
- In column 4, write the time you finished studying.
- In column 5, write where you studied (for example, your bedroom).
- In column 6, write whether you studied alone, with a classmate, with a tutor, or with a friend, a parent..
- In column 7, describe the presence of any distraction during the study time (for example, your friend called you by telephone).
- In column 8, choose a number between 1 and 100 to indicate how well you have completed the assignment; 1 will indicate that you completed the assignment very badly and 100 will indicate that you completed the assignment very well.

If in one day you did not do any assignment or studying for Math 175 or AA101, indicate that in the rows by writing "None" or "I did not study."

Appendix F

Student Consent Form

Dear New Your City Technical College Student:

My name is Héfer Bembenutty, and I am a Ph.D. student in Educational Psychology at the City University of New York Graduate School. I am conducting a research project in which I would like you to participate.

The purpose of this investigation is to examine students' preparation for the Math 175 and AA101 midterm examinations. In particular, I am interested in how the students spend their time, the value they place on academic and non-academic activities, and the ways they learn the courses' material. A questionnaire will take about 35 minutes of your time to fill out. In addition, you will be given a Study Time Form to log your study activities outside of the classroom. The form will be completed in class during the next three class sections.

If you are interested in participating in this study, please initial the bottom of this page and sign on the back of this page. The information obtained in this study will be available to you if you request it. Be assured that your participation is completely voluntary. You can withdraw from the study at any time; it will not affect your class grades or your score on the midterm examinations.

Please provide your name and student identification number before completing the questionnaire. Your student identification number (ID) will be used to gather information from the instructor of Math 175 and AA101 about your grades and class participation. No individual information gathered in this research will be published.

Data for all participants will be kept in a confidential file at the office of my graduate adviser, Professor Barry J. Zimmerman, in the Educational Psychology Program at the Graduate School, City University of New York. Only my adviser and myself will have exclusive access to the file. Your instructors will not see your responses to the survey.

Thank you in advance for your cooperation. You can reach Professor Barry J. Zimmerman at (212) 817-8285, or Héfer Bembenutty at (646) 685-0011. Please contact either of us if you have any questions regarding this research. If you any questions regarding your rights as a participants in this study, you can contact Hilry Fisher, Sponsored Research, Graduate Center/City University of New York, (212) 817-7523, hfisher@gc.cuny.edu.

Initials _____

Appendix F (continuation)

CONSENT TO PARTICIPATE IN THIS RESEARCH

Title: Effects of Students' Motivational Beliefs and Study Practices on Academic Outcomes

I, _____, agree to participate in this research project. I have read the description of the study. I understand that my grade on the Math 175 and AA101 courses will not depend on my participation in this study. I also understand that my grades on the Math 175 and AA101 courses will be obtained from my instructors for analysis. I give permission to release this information by using only my student identification number. I understand that I can terminate my participation any time during this study without being penalized. I also understand that for the next three class meetings of Math 175 I will receive a very short Study Time Form to fill in.

Name (Print)	Students ID	(Signature)	(Date)

(Signature)

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