The relationship between self-regulated learning behaviors and academic performance in web-based courses

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(ABSTRACT)

This study investigated self-regulated learning behaviors and their relationships with academic performance in web-based courses. The participants (n = 106) were distance learners taking humanities and technical coursed offered by a community college in Virginia. Data was collected using 28 items from the Motivated Strategies for Learning Questionnaire and 5 demographically related items. Data analysis included factor analyses, multivariate analysis of variance, and regression analyses. The employment of self-regulated learning behaviors differed between humanities and technical courses (p = .0138). Time and study environment management (p = .0009) and intrinsic goal orientation (p = .0373) categories reported significant findings in their relationship to academic performance. The factors affiliated with time and study environment management and intrinsic goal orientation were used as predictors in the development of a mathematical formula used to predict academic success in a web-based course. These predictors explain 21 percent of the variance in the academic success rating calculated using the mathematical formula developed from this study.

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I dedicate this to my wife, April,
and my daughters T. Alexia and Olivia.
Thank you for what you have done for my life

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CHAPTER ONE: INTRODUCTION AND NEED FOR THE STUDY

During the instructional process, students are given the instructional goals and objectives, which address the skills they should be able to perform. They are given information that is necessary to perform these skills. Opportunities are provided for this knowledge to be exercised in a controlled environment with accessibility to resources and assistance, if needed. The learners are given the opportunity to model the appropriate behaviors in an isolated and independent setting to accomplish their instructional goals and objectives through the administering of homework. The teacher provides feedback on their accomplishments and provides insight on strategies that could be used to increase performance on academic tasks. Once the student has mastered the skills, they are able to transfer and apply them to other situations that may differ from the one in which the skill was learned.

From elementary school through high school, the teacher controls the process of learning. Instructors establish the goals and objectives; and apply a strategy toward how the student will be taught the information. Activities and assessments are developed to monitor and evaluate progress toward their accomplishment of tasks. They are developed based on the criteria of the goals and objectives. At this academic level, goals and objectives are instituted by external sources (e. g., teachers and administrators). In order to place a value on what is being learned, a numerical grade is usually issued. Grades and test scores have come to determine the academic merit of students and schools' efforts in educating students. The importance of grading and test scores has influenced teachers to focus more on the content of what is to be learned. Through the strategies they employ in

delivering instruction, teachers have taken ownership in how the students learn the information.

Instructors also take responsibility for regulating the learning process. They set the goals, employ the strategic plan, monitor goal progress, and evaluate the level of success according to criteria they [the teachers] have set. Instructors take it upon themselves to structure the learning environment and motivate students through extrinsic rewards or verbal gratification. The student perceives his or her ability from the evaluation of the teacher. The importance of grades is transferred from the teacher to the student and grading becomes the motivation for students to learn and accomplish tasks. This reliance on grades may cause the student to compare their progress to others in the class. Based on those comparisons, they may attribute their success or failure incorrectly. This may lead them to make negative attributions and incorrectly perceive their ability. With varying experiences encountered with different teachers within changing learning domains, this incorrect perception may transfer across these domains.

The diligence and attention educators take in regulating their students learning provides evidence of the importance of this ability. However, the student is given minimal opportunities to practice regulating his or her own learning. The opportunity to do so occurs when the student is given independent class work or homework. The student is more concerned about the content and end product of a learning situation. Less attention is paid to the process and how learning takes place. The skills necessary to self-regulate learning are not formally taught to "regular" students. The student may vicariously acquire these skills through observations of strategies that the instructor uses to teach the material or behaviors of their peers around them. It is the intention of formal

education to produce independent, self-regulated learners. Evidence of such is in the transition from high external involvement with elementary school students to complete autonomy of learning experienced by undergraduate, graduate, and adult learners. In order to understand what self-regulated learning is, the learner must be aware of the phases, processes, subprocesses, and factors responsible for self-regulation. There are necessary constructs that need to be recognized and the employment of appropriate actions and behaviors to facilitate this process. They are important to the development and assessment of self-regulated learning. The value of the constructs, phases, processes, and strategies of self-regulated learning have been derived and formulated according to a variety of theoretical frameworks and established practically through empirical findings. Information in the following pages addresses the empirical findings of research in the area of self-regulated learning in traditional educational environments and how these behaviors are hypothesized to effect learning and academic achievement in nontraditional situations.

Need for the Study

Self-regulated learning has been related to high academic performance (Zimmerman & Martinez-Pons, 1992). Goal, motivation, and self-efficacy have been found as influential factors according to the phases, processes, and subprocesses of self-regulated learning. Goals are the standards by which learners compare and evaluate their progression. Learners orientate their goals as either intrinsic or extrinsic. Intrinsic goal orientation has been related to greater self-regulated learning strategy use and skill acquisition (Schunk & Swartz, 1993a). The belief that one is making progress toward goals, along with anticipated satisfaction of goal attainment, enhances self-efficacy and sustains motivation (Schunk, 1996). Stone (2000) summarizes the relationship between goals, motivation, self-efficacy and self-regulated learning behaviors. Self-efficacy reflects the confidence in one's ability to complete tasks, influencing the type of goal orientation. A positive concept, specifically high self-efficacy, should invoke more self-regulation. Learners who are confident they can learn the material are more likely to implement self-regulated learning strategies resulting in academic achievement.

According to social cognitive theory, self-regulated learning includes personal (cognitive), behavioral, and environmental variables (Bandura, 1986). These three constructs produce a triadic reciprocity with one another meaning they are interdependent. The catalyst that sustains this relationship, according to Bandura (1977), is self-efficacy. In this triadic relationship, the environment prompts the learner to incorporate strategies to structure it for optimal learning to take place. The learner has to perceive the strategies as being effective in the environment in which they are to be used. Observing and emulating the behavior within the environment establish this perception. It

is necessary the environment provide social assistance to guide the process of implementation of the behavior. According to social cognitive theory, the goal orientation, motivation, and behaviors employed are affected by the self-efficacy of the learner according to different domains or environments in which they learn. The most adaptive, self-regulated learners modify and change their beliefs as a function of the task or context (Garcia & Pintrich, 1994). The environment impacts the self-regulated behaviors a learner employs.

Distance education technologies deliver instruction in an environment where student and instructor are separated by time and space. It is an environment that has promoted a feeling of transactional distance in older distance learners giving them a feeling of isolation from the instructor (McIsaac & Gunawardena, 1996). Styles and Zariski (2000) did not perceive web-based environments as optimal in providing feedback or explanation due to the lack of interaction. Interaction between content, student, and teacher are immediate and proximal in traditional settings. In web-based instruction, the interaction between students and instructor is minimized. This type of isolation requires the learner to self-regulate their motivation, confidence, and cognitive abilities in an isolated environment. Wilson (1997) hypothesized the use of self-regulatory behaviors are more critical when distance learning is the primary method of instruction than in traditional classrooms. He also pointed out modeled behavior is lacking in distance education environments, especially in web-based instruction. The isolation minimizes the students' observation of self-regulation. This lack of observation hinders emulation and self-controlled opportunities to become self-regulated. This is necessary in order for a learner to be efficacious about the impact the use of these

strategies has on academic performance. The self-regulated learner has to be behaviorally, motivationally, and metagcognitively aware.

The relationship between self-regulated learning and academic performance has been empirically established including high school students in traditional settings (Zimmerman & Martinez-Pons, 1986). Evidence suggests the combination of personal, environmental, and social factors must be taken into account when predicting academic success in distance programs (McIsaac & Gunawardena, 1996). The environment or social variables will influence the learners' goals, motivation, and self-efficacy. This will influence self-regulated learning behavior and ultimately academic performance. Social cognitive theory proclaims self-regulation is context specific. Given this, the contextually different learning environment, promoted by distance education, requires the relationship between self-regulated learning and academic performance to be investigated.

Purpose of Study

This study will address the relationship between self-regulated learning behaviors and academic performance in web-based courses. Institutions responsible for delivering web-based instruction currently provide their constituents with information concerning technical requirements necessary to participate in the distance learning experience (Hardy & Boaz, 1997). They communicate general, non-technical characteristics such as self-motivated, self-disciplined, self-controlled, and assertiveness. These have been found to be evident in older distance learners.

Gibson and Graff (1992) recommend learners be informed of different learning strategies. They contested acquiring information about learning allows students to select strategies best suited for the situation and context. Information about the success of the strategies' use could provide structure and direction toward learning. Self-efficacy and continued employment of self-regulated learning behaviors are a result of observed success by others who are similar to them. This study will provide researchers, institutions, teachers, parents, and students with possible evidence of the relationship between self-regulated learning behaviors and grades issued upon course completion. From this information, these beneficiaries may be able to predict the academic success of potential distance learners in web-based courses by assessing the self-regulated learning behaviors they employ.

The results of this research will be used in the development of a mathematical formula. The formula will be a function of the responses made to 28 items of the Motivated Strategies for Learning Questionnaire (MSLQ). The MSLQ, driven by the formula, will assess a potential students'goal orientation, metacognitive self-regulation,

and time and study environment management before participating in a web-based course. Results from responses using the MSLQ will provide students with information on how they rate their goal orientation, metacognitive self-regulation, and management of time and study environment. It will serve as a possible predictor of the learners' academic success in a web-based course. This feedback will be relevant to the student in providing concrete information addressing the relationship between appropriate behaviors and the resulting academic performance in a web-based environment. The development of this formula will be based upon the model that is created from information attained through this research. It would serve as a valuable tool for institutions, teachers, parents, and students.

The institution providing web-based courses will be equipped to provide specific information on the relationship between goal orientation, time and study environment management, and metacognitive self-regulation on academic performance. They would be able to assess potential students on their reported self-regulated learning behaviors and inform the student how they may perform in a web-based course. The result of this study could be included in training teachers to design and develop web-based instruction. Instructors would be advised to include prompts for the students to employ appropriate behaviors as the students engage in the instructional experience. These prompts will help in the students progress in learning and development of appropriate self-regulatory behaviors. Collaboration between the institutions, designers, developers, and instructors could implement interventions to include explicit strategy instruction to potential students before they partake of the web-based instructional experience. One of the most valuable pieces of this inventory is students will be involved in the continued development. The

structure of the model on which the inventory is based will be obtained from students' self-report of self-regulated learning behaviors and academic performance.

Research Questions

This study will focus on specific self-regulated learning behaviors (i. e. goal orientation, metacognitive self-regulation, and time and study environment management) and how they are independently related to a distance learner's academic performance in a web-based course. It will also investigate if a relationship exists between the employment of self-regulated learning behaviors and the domain of learning in which instruction is taking place. The study will answer the following questions:

1) Is there a relationship between the employment of self-regulated learning behaviors and the domain (i. e., humanities or technical courses) in which learning occurs?
2) Is there a significant relationship between a student's management of time and study environment and their academic performance in web-based courses?
3) Is there a significant relationship between a student's intrinsic goal orientation and their academic performance in a web-based course?
4) Is there a significant relationship between a student's metacognitive self-regulation and academic performance in a web-based course?
5) Is there a significant relationship between a student's extrinsic goal orientation and their academic performance in a web-based course?

CHAPTER TWO: LITERATURE REVIEW

This review of literature is divided into two main sections. The major section of this review focuses on self-regulated learning. This section discusses the phases, processes, and subprocesses of self-regulation from a social cognitive theoretical perspective. Three factors influencing self-regulated learning strategy use are acknowledged. Common self-regulated learning strategies, how they are developed, and how they are measured concludes this section. The second section addresses general information regarding distance education. The reader will have a thorough understanding of the relationship between these two distinct areas.

Self-Regulated Learning

Self control, self-disciplined, and self-directed are a few words synonymous with self-regulation. Just as self-regulation has several words with which it can be identified, it also has several definitions. These definitions are the results of different theoretical perspectives on self-regulated learning. "Self-regulated learning is the ability to be metacognitively, motivationally, and behaviorally active participants in the learning process" (Zimmerman, 1986; Zimmerman, 1989, p. 4). Metacognitively, self-regulated learners plan, organize, self-instruct, self-monitor, and self-evaluate at different stages as they learn. Motivationally, they perceive themselves as competent, self-efficacious, and autonomous. Behaviorally, they select, structure, and create their environments for optimal learning.

Self-regulated learners approach educational tasks with confidence, diligence, and resourcefulness. They are aware when they have mastered a particular skill or set of skills and use appropriate strategies for attainment of goals they have yet to accomplish. Butler

and Winne (1995) said self-regulated learners begin with a given task; evaluate the task and set goals according to the information from the evaluation; use strategies to meet the goal; monitor their progress toward the goal and evaluate the use of the strategy; and reinterpretation of the task takes place regarding information attained from internal and external feedback. All theories of self-regulated learning treat motivational processes used by students interdependent to their learning processes. This definition is one of generality concerning self-regulation. Each definition, regardless of theoretical perspective, possesses common characteristics. Theorists and researchers interested in self-regulation believe it to be a cyclical process. Zimmerman (1998) identified three phases present in the process of self-regulation: forethought, volitional or performance control, and self-reflection.

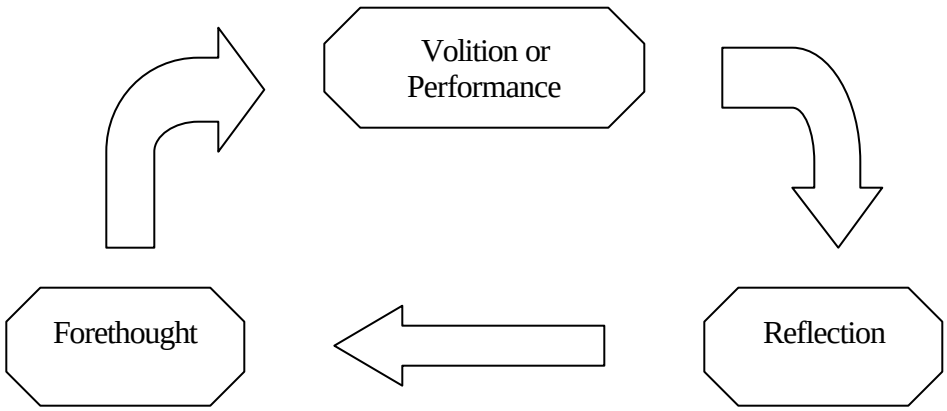

Figure 1. Phases of Self-Regulation

Forethought. The learner, when engaged in a learning task, begins in the forethought phase. Forethought is the initial phase that embodies processes influencing beliefs and efforts to learn and sets the stage for learning. Goal setting and strategic

planning are two processes that are utilized in the forethought phase of self-regulation. Goals can be set in accordance to the instructional goal and/or objectives of the lesson or unit to be covered. Using the goals, learners can establish a strategic plan to assure their completion of activities or projects. Schunk (1985) conducted a study with learning disabled students. Some of the students set performance goals; some were assigned goals to attain; and others were not given nor did they set goals for themselves. The learners who set their own goals displayed greater achievement than the group who had goals assigned for them and the group who was assigned no goals. Other processes that present themselves in the forethought phase are goal orientation, intrinsic interest, and self-efficacy. After the task has been identified in the forethought phase, the learner moves to the volitional or performance control phase.

Volitional or performance control. The performance control phase processes occur during efforts of learning and affect concentration and performance. These processes include attention focusing, self-instruction or verbalization, and self-monitoring. While in the learning environment, the learner must take it upon his or herself to make decisions that will lead them to obtain the goal. One of these decisions is to minimize the distractions that may present themselves and impede the learning process. Theorists of volitional control (e. g.,, Kuhl, 1985; Heckhausen, 1991; Corno, 1993) emphasized the need for learners to protect themselves from distractions and from competing intensions. Teachers have been charged with this task in their efforts of classroom management or physical arrangement of the classroom. It is up to the learner to internally make adjustments to focus attention where the external properties of the environment may fail to do so.

Another group of processes in performance control is self-instruction. Self-instruction is the learners' way of guiding themselves through a learning task. Guided self-instruction could serve as a means of concentrating attention, establishing sequential steps, or praising oneself to enhance motivation to continue learning. Vygotsky (1978) pointed out that bringing behavior under verbal control vastly increases human's power to plan, by drawing on past experiences and anticipate new situations. Berk (1992) and Diaz (1992) concluded that observed levels of private speech, while working on a task, solicits higher gains in achievement over time. Bivens and Berk (1990) reported those using more private speech, while solving math problems, showed larger gains in achievement from first to third grade.

A third group of processes present in the performance control phase of learning is self-monitoring. Self-monitoring is the process learners use to gain information on the progress toward their goal attainment. Skillful self-monitors can distinguish between when they are performing well and when they are not. Social or external feedback is not necessary to formulate this distinction in progress and the information is used to alter their performance. As learners experience success in attaining skills and strategies, these skills and strategies tend to become automatic or routine. Carver and Scheier (1981) suggested when this happens the learner pays attention to the use of these skills as they relate to changing contexts. Self-monitoring changes focus from the skill to the environment where the skill is being used. The variety and changes in and between domains and contexts makes the self-monitoring process difficult but necessary. It could have an influence on the strategic planning (forethought phase).

Self-reflection. The third self-regulatory phase involves processes that occur after learner efforts have been exercised. Self-reflection includes the following actions: self-evaluation, attributions, self-reactions, and adaptively. Self-evaluation is the comparison of information attained from self-monitoring to some standard whether set by the instructor or the learners. Immediately following the comparison of these two pieces of information, attributions are made in response to the results. Self-regulated learners tend to attribute failure to correctable causes and success to personal competence. Zimmerman and Kitsantas (1997) found that personal attribution of success and failure to strategy use are directly related to positive self-reactions, but the attributions of these outcomes to ability are related to negative self-reactions. Attributional processes are critical in the self-reflection phase of learning because the results of the information attained when comparing self-monitoring information to self-evaluative information is what effects the motivation of learners to continue the learning process and attainment of the desired goal. Attributions of strategy use also reinforce variations in approach until the learner discovers the strategy that works best for them in the environment. These variations in approach are evident in the adaptation of a learners academic learning method. Several repeated trials are needed for eventual mastery. They [attributions] assist in identifying the source of learning errors to strategy use, learning methods, or insufficient practice and adapt the learners' performance to more successful learning situations (Zimmerman & Martinez-Pons, 1992). Adaptation is a function of goals, accurate monitoring, and appropriate self-evaluation.

The phases of self-regulatory processes are self-sustaining in the fact that each phase (i. e., forethought, volition or performance control, and self-reaction) creates inertia

for the next phase. The forethought phase prepares the learner for and influences the actions and strategies the learner employs in the volitional or performance control phase. Information gathered during the performance control phase is used in a comparative basis in the self-reflection phase. The self-reflective phase of self-regulation influences the forethought phase through self-efficacy of mastering the skill, learning goal orientation (Dweck, 1988), and intrinsic interest in task (Zimmerman & Kitsantas, 1997). The self-reflection phase also influences goal setting and strategic planning in the forethought process. Information from the self-reflection processes of attribution and adaptation will effect the learner's motivation to implement a plan that will result in success of goal attainment. The success of the strategy used, attributed to something correctable, will motivate the learner to modify the strategy and implement it again. Otherwise, the learner will attribute the failure of the strategy to ability and may change the goal or set an easy or difficult goal based on erroneous attribution of failure.

The three phases depicted by Zimmerman (1998) embodied the processes, terminology, and components of several theoretical perspectives that have been used to define self-regulated learning. Zimmerman and Schunk (2001) pointed out several commonalities in the definition of self-regulated learning. The definitions involve the use of specific processes, strategies, or responses for student to improve academic achievement. Self-regulation is defined as a cyclical process for monitoring progress in learning. Definitions of self-regulated learning provide an explanation of what motivates learners to use particular processes, strategies, or responses. Specifically, more precise definitions of self-regulation vary depending on the theoretical basis. How the different processes of self-regulated learning are described and hypothesized to interact vary from

theory to theory. Zimmerman and Schunk (2001) illustrated the distinction between theories of self-regulated learning according to five categories: 1) what motivates students to self-regulate, 2) what processes or procedures use to become self-reactive or self-aware, 3) what key processes are used, 4) what are the social and environmental affects, and 5) how does a learner acquire the capacity to self-regulate.

Social Cognitive Theory

According to Bandura's (1977) social cognitive theory, individuals posses a self-system that enables them to exercise a measure of control over their thoughts, feelings, motivation and actions. This self-system encompasses one's cognitive and affective structures and provides reference mechanisms and a set of sub functions for perceiving, regulating and evaluating behavior. It results from interplay between the self and environmental sources of influences. Human functioning involves reciprocal interactions between behaviors, environmental variables, and personal factors (cognitions). Cognitive processes are influenced by the development of intellect that informs behaviors. Cognitively, the development of intellect moves the student from a state of "other-regulation" to internal, self-regulation. Environmentally, the social climate provides components (e. g., teachers and peers) from whom students can seek assistance (Bandura, 1986). The capacity for students to self-regulate increases as the student develops the capacity to self-motivate and sustains appropriate cognition and motivation until the goal is attained. Behaviorally, the gradual acquisition of appropriate study strategies and attitudes provide the structure for self-regulatory behavior. The student must actively participate in evaluating the effectiveness of his or her use of behaviors and strategies, and be willing to make necessary changes. Bandura's theory communicates the

importance of self-efficacy (a cognitive determinant) and the environment in the development and use of self-regulation.

Subprocesses of Self-Regulated Learning

Learners are actively involved in their learning. Regardless of whether the instruction is teacher-centered or student-centered, the learner takes it upon himself or herself to become involved in learning. Self-regulation refers to the processes whereby students activate and sustain behaviors, cognitions, and affects that are systematically oriented toward the attainment of learning goals (Zimmerman, 1989, 1990, 1994). Social cognitive theory views self-regulation as comprising of three subprocesses: self-observation, self-judgment, and self-reaction (Bandura, 1986; Kanfer & Gaelick, 1986). These subprocesses are not mutually exclusive events; they interact with and influence each other. Students observe their behaviors while engaged in learning tasks. The purpose of observing their behavior is to judge their behavior against the goals or standards that have been set by the student, the instructor, or the other students through social modeling. Information obtained from the judgment will conjure a positive or negative reaction (Zimmerman, 1989). If the student views their progress as positive, they will eventually internalize the strategies and context that promoted this success; otherwise, modifications will be made. Negative or positive reactions will be in accordance with the standards set forth during self-observation.

Self-observation. Self-regulatory processes include attending to and concentrating on instruction (Schunk, 1997). Self-observation is the attention the learner gives to his or her behavior while learning (Bandura, 1986). This information gained is a determinant of the progress toward goal attainment validating a necessary program of

change. This subprocess of self-regulated learning is evident in the performance and volitional control phase of self-regulation. It is here where attention is focused and strategic planning is developed. This component of the subprocesses of self-regulated learning establishes standards and goals to which progress will be compared and evaluations will be made. Bandura's (1989) theory of human agency implied observation of one's own progress instills learners with the belief that goals are attainable. Self-recording is an activity that assists in the self-observation process where instances of behaviors are recorded along with the time, place (environmental variables), and duration of behavior (Karoly, 1982; Mace, Belfiore, & Shea, 1989). Recording those instances allows the learner to instantaneously gather information about the effectiveness of the behavior instead of relying on memory.

Schunk (1983) provided third grade students with modeled instruction and practice over sessions to improve subtraction skills. One group of students self-monitored by recording the number of problems they completed in a session. An adult monitored problem completion for a second group of students. A third group of students did not monitor their completed number of problems. Results of the study showed that self- and external monitoring lead to higher self-efficacy, persistence, and achievement than the group who did not monitor their progress. Although in this case, self- and external monitoring were equally effective, self-monitoring is preferable over longer periods of time because it requires less teacher assistance and provides students with a sense of control over their learning outcomes.

Self-monitoring can promote long-term maintenance of strategy use. Research involving strategy use says that learners practice strategies that benefit their performance

but discontinue strategy use when it is no longer required (Pressley et al., 1990). Students who continue to record strategy use will find it useful in improving their performance; therefore, minimizing the chances of discontinued use. Self-monitoring is necessary in self-regulated learning, but is insufficient for sustaining it.

Self-judgment. Self-judgment is the comparison of present performance with one's goals. Bandura (1991) provided two important factors in the judgmental component of self-regulation: self-comparison and referential comparison with others. The decision to compare one's progress to social standards or internal standards is dependent upon the properties of the goals (i. e., absolute versus normative). Both absolute or personal (internal) goals and normative (external) goals contribute valuable information to self or internal comparison. Comparing one's performance with standards informs one of goal progress. Marsh (1990) reported that students use both absolute and normative comparisons. Williams-Miller (1998) found that students gave more weight to peer-group comparisons (normative) than to self or internal (absolute) comparisons. Self-judgments can be affected by goal attainment. When individuals care little about how they perform, they may not assess their performance or expend effort to improve (Bandura, 1986). Judgments of goal progress are more likely to be made for goals one personally values.

According to self-regulated learning theories, students model their behavior and perceive their ability in comparison to those who are similar to them. This can be attributed to the competitive environment that is created due to the use of grades to assess mastery of concepts. After the learner has made judgments about the progress toward goal attainment, they may attribute their success or failure to strategy use, luck, ability, or effort. With development, ability attributions become increasingly important. Younger

children tend to attribute success with increased effort on a given task, whereas older children's attributions become a function of ability. According to Zimmerman and Martinez-Pons (1992), attributions are a vital self-judgment process that link strategy monitoring and use. It has been shown that students who report failure attributions to ineffective strategy use (i. e., something they can control), report high levels of self-efficacy and remain motivated. Conversely, students who attribute failure to ability, effort, or luck hold low levels of self-efficacy and hold beliefs they cannot succeed on their own (Zimmerman & Kitsantas, 1997).

Self-reaction. The ability to self-reflect is considered the most unique human function of the subprocesses of self-regulation. This form of self-referent thought allows for one to evaluate and alter their thinking and behavior (Pajares, 1995). Self-reactions to goal progress initiate behaviors. The belief that one's progress is acceptable, along with the anticipation of satisfactory goal accomplishment, enhances self-efficacy and motivation. Negative evaluations will not decrease if one believes they have the ability to improve. Conversely, the learner's motivation will not increase if they lack the belief they have the ability to succeed and increased effort will not negate the lack of motivation. Assuming that people believe they are capable of improving, higher goals will be set leading to greater effort and persistence to attain those goals. Social cognitive theory postulates that the anticipation of consequences for goal attainment enhances motivation. Motivation will persist in the absence of external rewards such as grades, which are not given until the end of the course. The learner must sustain his or her motivation by setting tangible goals for accomplishing their work. They reward or punish themselves according to those goals that are established.

At the start of a learning activity, students have such goals as acquiring skills and knowledge, finishing work, and making good grades. As they work, students monitor, judge, and react to perceptions of their goal progress. These self-regulatory processes interact with one another. As students monitor their progress they judge it against their goals and react positively or negatively, which sets the stage for further observations. These processes also interact with the environment (Zimmerman, 1989). Students who judge their learning progress as inadequate may react by asking the teacher for assistance. In turn, the teacher can suggest or teach students to use a better strategy to foster better learning. The value of the self-observation or self-monitor process is to address the learning conditions. These environmental conditions can be altered to improve performance (e. g., ineffective learning conditions can be altered to promote better environmental features).

The use of these self-regulatory subprocesses will prompt students to attribute negative outcomes strategically, preserve their self-efficacy beliefs, sustain their motivation, and improve their potential to learn and their intrinsic interest in mastering the task (Kitsantas, 1997). These subprocesses are intergrated in the forethought, volitional or performance control, and reflection phases of self-regulation (Zimmerman, 1998). The functionality of the subprocesses work similar to the phases in that self-observation establishes the goals to be attained. Self-judgment provides information on goal progress while the task is being completed. Self-reaction compares the goal progress to the goals that were set in order to provide information that will either change the goal or change the strategies used to attain the goal if they are not sufficient. If the present progress is favorable, the learner rewards himself or herself accordingly.

Throughout the execution of the phases, processes, and subprocesses of self-regulation, there are key components involved: standards (goals), motivation, self-efficacy, and strategy use. The belief that one is making progress, along with anticipated satisfaction of goal attainment, enhances self-efficacy and sustains motivation (Schunk, 1996). Self-regulation is considered a process rather than an end result to learning. Goals, motivation, and self-efficacy are the necessary components of the phases, processes, and subprocesses responsible for the sustenance of self-regulated learning.

Factors in Self-Regulated Learning

Self-Efficacy. Self-efficacy refers to personal beliefs about one's capabilities to learn or perform skills at designated levels (Bandura, 1986). It is the catalyst to the triadic reciprocity of personal, behavioral, and environmental interaction. Self-efficacy causality regulates motivation and actions (Bandura, 1997). It is the central mechanism of intentional human action. It is relative to one's confidence to learn or accomplish a task. Self-efficacy dictates the choice of activities, effort, persistence, and achievement (Schunk, 1990). Learners weigh and combine factors such as perceived ability, task difficulty, amount of effort, amount and type of assistance received from others, perceived similarity to models, and persuader credibility.

Bandura (1986) stated performance accomplishments, observational experiences, persuasion, and physiological reactions supply information that influence self-efficacy. Successful academic performances are responsible for enhancing self-efficacy where failure may reduce efficacy if the development of it [self-efficacy] was not strong. Learners who observe others similar to them being successful in accomplishing a task believe they too can accomplish the same task in the same context. Teachers and parents

providing persuasive feedback (e. g., "You can do this") have been proven to increase self-efficacy in the learner. These factors validate the environmental variables in the phases of self-regulated learning and the value of social modeling and comparison to successfully self-regulate.

Schunk (1985) argued a reciprocal relationship exists between students' goal setting and their perceptions of self-efficacy. When students set intermediate goals that are specific and proximal in time, they can perceive their learning progress more readily, and this, in turn, enhances their self-efficacy. Increased self-efficacy can lead students reciprocally to set even more challenging ultimate goals for themselves (Zimmerman, 1990). As students work on tasks, they constantly compare their progress to the goals that have been set. Students who compare their progress toward learning goals are more apt to experience a sense of self-efficacy for skill improvement and engage in activities they believe to enhance learning. There has been inquiry regarding the mediating power that a student's perception in his or her ability has any relationship between the goals the student's choose and their achievement. Elliott and Dweck (1988) provided evidence that self-efficacy is a mediating factor between goal orientation and achievement. Children were assessed and grouped according to their perceived low or high ability. They were given learning goals as well as performance goals. Children, who perceived their ability as low, selected easier tasks to avoid being judged as incompetent. In 1993, Schunk and Swartz conducted three experiments that explored the effects of goal orientation and feedback on self-efficacy. There were four conditions: 1) process learning, 2) process learning and progress feedback, 3) product (performance) goals, and 4) general goal. In the three experiments, it was found that process (learning) goals and progress feedback

lead to higher self-efficacy than process learning, product goals, or general goals. As the student works and perceives improvement, self-efficacy is sustained thus motivation for learning is sustained.

Self-efficacy is relative to self-regulation in regards to motivation. A student's self-efficacy is related to whether the student will work on a given task. Kinzie (1990) found individuals who demonstrated high levels of self-efficacy tended to sustain their motivation to learn. Bandura (1993) posited self-efficacy beliefs contribute to motivation in a number of ways. Self-efficacy determines the goals people set for themselves, how much effort they expend, how long they persevere in the face of difficulty, and their resilience to failures. Students who were rated by teachers as being less academically oriented displayed lower levels of self-efficacy than did students who were considered high in self-efficacy. Self-efficacy does not necessarily have to be extremely high for self-regulation to exist and high academic achievement to occur. Salmon (1984) found that students who reported low self-efficacy put forth greater mental effort to compensate for their lack of confidence in their ability to complete the task. There is an evident relationship between self-efficacy and motivation. Schunk (1994) discovered that if learners' self-efficacy is not too low, it could serve as a motivator in the increase of a students' persistence toward completing tasks. As long as the leaner is efficacious enough to surmount difficulties they encounter, having some concern about their ability to be successful in a learning situation will sustain effort and use of strategies to negate the effects of perceptions of low self-efficacy. This supports the claim by Bandura (1986) that the stronger a students' self-efficacy, the more persistent students are in their learning.

Individuals with high self-efficacy reported increased use of cognitive and self-regulatory strategies (Pintrich & Schrauben, 1992). Self-efficacy develops as students notice progress in their learning and as they attain their goals. Schunk and Cox (1986) provided subtraction instruction to students with learning disabilities. The children either received effort feedback during the first half of instruction, the second half of instruction, or received no effort feedback. The results showed that effort feedback enhanced self-efficacy, skill, and problem solving during independent practice time. Evidence of problem solving during independent practice time required application of self-regulatory strategies.

Self-evaluation is a strategy that self-regulated learners use during the self-judgment and self-reaction subprocesses when learners compare and evaluate their performance. The feedback the learner obtains from self-evaluation supplies information concerning attributions made about their progress during and after task completion. Attributional feedback has been proven to influence self-efficacy (Schunk, 1983). Children lacking subtraction skills were assigned to four feedback conditions: ability, effort, ability and effort, and no feedback. The students received ability feedback (e. g., "You are good at this"), effort feedback (e. g., "You've been working hard"), ability plus effort feedback, or no feedback. Children who attribute their academic success to hard work and effective strategy use tended to experience higher self-efficacy. Self-efficacy and subtraction skills were assessed. Students who received ability feedback promoted self-efficacy and skill more than those students who received effort feedback, ability plus effort feedback, and no feedback. As a result, students who attribute success to a combination of ability, effort, and strategy use, should feel efficacious about learning and

remain motivated to work diligently. Self-efficacy is a strong predictor of academic performance and mediates the influence of other determinants (Pajares, 1994). Social cognitive approaches to self-regulated learning have focused on perceptions of self-efficacy as the ultimate source of student motivation (Bandura, 1986; Schunk, 1989; Zimmerman, 1989b).

Motivation. According to Bandura (1986), motivation is a goal directed behavior instigated by expectations concerning the anticipated outcomes of actions and self-efficacy for performing those actions. It influences how and why people learn as well, it influences their performance (Pintrich & Schunk, 1996). According to self-regulated learning theories, goal attainment is the primary end result of the learning process. Motivation is evident in the tendency for students to set higher learning goals for themselves as they complete earlier goals. Student learning and motivation are treated as interdependent processes. Student proactive involvement in learning is evident of their motivation through the self-initiated activities designed to promote self-observation, self-evaluation, and self-improvement.

Research conducted in self-regulated learning during the past decade has focused on the relationships between single motivational variables, such as goal orientation and interest, and their individual effects on students' use of self-regulated learning strategies. It has been shown that students who have high interest in a topic use more self-regulated learning strategies than students with low topic interest (Pintrich, 1989; Pokay & Blumenfeld, 1990; Schiefele, 1992). However, students probably learn with different levels of interest, which may combine with goal orientation to affect their use of learning strategies.

McWraw and Abrami (2001) conducted a study that focused on the causal relationships between goal orientation and motivation on the use of self-regulated learning strategies. The model used as a theoretical basis for this study was the "skill and will" model (Pintrich & Garcia, 1991; Pintrich & Schrauben, 1992). The "skill" component of the model consists of cognitive (e. g., rehearsal, collaboration, and organization) and metacognitive (e. g., planning, monitoring, and regulating cognition) strategies. The "will" component of the model involves the reasons students engage in learning tasks (goal orientation) and student's feelings about the task to be completed (task value). The study reported the motivational construct influencing the use of metacognitive strategies was interest. Provisions for interesting material will facilitate the use of strategies such as selecting the main idea and metacognitive strategies.

The learning environment requires students to exercise their acquisition of knowledge through instruction. The presence of tests in the learning environment has been associated with positive and negative affects related to learning. In the instructional design process, assessment items are created in conjunction with learning objectives. It has been found that high school students have depended on external sources (e. g., performance on test) to motivate themselves more than using learning for the sake of learning to motivate them to learn. Tests have been used as a motivator to learn material because of the importance the grade on the test has in relation to proving mastery of the objectives and attainment of the instructional goals. Assessment tools have also created test anxiety in some students, which has adversely affected performance by reducing student's motivation for learning. High test anxious students may decrease their level of

expectancy for success and lead the student to defensively devalue important learning outcome (Bembenutty et al., 1998).

Brackney and Karabenick (1995) provided evidence suggesting test anxiety interferes with students' ability to use learning strategies while it reduces motivation. These findings acknowledge the relationship existing between motivation and self-regulated learning is influenced by the amount of test anxiety that is present. Williams-Miller (1998) conducted a study on 208 high school students who perceived themselves as self-regulated learners reported high levels of competence and autonomy (motivation). These findings support Pintrinch, Roeser, and DeGroot's (1995) theory that motivation is linked to self-regulation. In a 1998 publication, Bembenutty, McKeachie, Karabenick, and Lin found anxiety effected intrinsic and extrinsic motivation, self-efficacy, control beliefs, social desirability, competence, and expectancy for success. It also effects learning strategies such as rehearsal, organization, help-seeking, and final course grades.

Williams-Miller (1998) and Bembenutty et al. (1998) confirmed the reciprocal nature of self-regulated learning to motivation association proposed by social cognitive theorists (Bandura, 1997). It is evident when students are highly motivated to achieve and employ metacognitive and cognitive strategies, the effects of test anxiety are negated. Anxiety may not have detectable mediating effects between self-regulated learning and motivation because high levels of motivation encouraged self-regulated learning strategy use. These two components increased self-efficacy and reduced the effects of anxiety.

As a means to protect one's self-worth, Paris and Newman (1990) said learners resort to using self-handicapping or learned helplessness tactics. In this instance, the emotional and cognitive components are minimal. It is used to prevent them from

investing effort resulting in low expectations for success. Frequent defense of one's self-worth can lead to passiveness and apathy in the learning situation. Using such tactics, the learner relinquishes their responsibility for their own learning. Students' perceptions of their responsibility for their learning are intertwined with their beliefs about effort. Academic interventions have been studied that can enhance a students' self-perceptions of their own ability, agency, control, or efficacy (e. g., Schunk & Rice, 1987).

Motivation plays an important role in a student's academic performance (Garcia & Pintrich, 1994; Deci & Ryan, 1985; Pintrich & Schunk, 1996), thus students' motivational tendencies are positively related to students' self-regulation of learning. Motivation is needed for the learner to implement strategies that will influence learning processes. Several researchers (e. g., Pintrich, 1995; Pintrich & Schunk, 1996; Garcia, 1995) believe that students may use different motivational strategies in different learning situations. The attitude that a learner has about learning and completing tasks is reflective in the goals he or she sets to attain.

Goals. Self-efficacy beliefs and self-regulatory processes work together in an interdependent manner and are mediated by goals. Achieving one's goals can enhance an individual's self-efficacy in completing tasks that include ambiguous or novel elements (Bandura, 1995). Standards or goals are the criteria students use to monitor their progress in learning. At the start of a learning task, students have such goals as acquiring skills and knowledge, finishing work, and making good grades. Goals exercise two key functions in self-regulated learning. Goals guide the learner to monitor and regulate one's efforts in a specific direction. They also serve as the criteria by which learners evaluate their

performance. The results of this evaluation will modify efforts toward attaining the goal or it will provide information that will lead to changing the goal.

Goals provide guidelines to which learners compare their current task performance (Bandura, 1986; Locke & Latham, 1990). The effects goals have on motivation and efficacy depend on specificity, proximity, and difficulty. Goals that provide information of specific standards, attainable in a reasonable time, and challenging are more likely to enhance performance. Goals that are general, require long periods of time to accomplish, very easy, or overly difficult may hinder performance. Children lacking division skills received instruction and practice over a series of sessions (Schunk, 1983). They were given a specific goal (number of problems to complete) or a general goal (work productively). Providing children with a goal and information that is attainable may increase self-efficacy for learning, which will lead to increased performance and skill acquisition. Bandura and Schunk (1981) gave children with low subtraction skills instruction and practice over seven sessions using seven sets of material. Some children pursued a proximal goal of completing one set each session. A second group received a distant goal of completing all sets by the end of the last session. The group of students who pursued the proximal goal reported more self-regulated learning during the independent practice portion of the instructional session, and resulted in the highest subtraction skills, self-efficacy, and intrinsic interest.

The effects of goals may also depend on the outcomes that are expected. These outcomes can be classified in two orientations: learning and performance (Meece, 1991). Learning goals focus on the process that is implemented in the acquisition of knowledge and skill. Performance (product) goals are more concerned with the completion of the

task; specifically the end product that emerges from the completed activity. Learning goals have been expressed using other terms such as task goals, intrinsic goals, or mastery goals. Performance goals are synonymous with ability, extrinsic, or product goals. When students have a task goal orientation, they see mastering the material as primary. When students have a performance-approach goal orientation, they see demonstrating their ability to others essential. Depending on the type of goal (whether learning or performance) has been associated with skill acquisition, which is a product of self-regulated learning strategy use.

In a study conducted by Schunk and Swartz (1993a), learners demonstrated higher skill acquisition when presented with a learning goal and progress feedback. Learners also scored higher on skill than learners who were given general goals. In a study by Ablard and Lipschultz (1998), high achieving seventh grade students described their use of self-regulated learning strategies. Results of the study indicated the total self-regulated learning score was significantly related to achievement goals. More specifically, students with low mastery and low performance goals had significantly lower total self-regulated learning scores than students with high mastery and low performance goals and students with high mastery and high performance goals.

Locke and Latham (1990) defined goals as something the individual is consciously trying to attain, but it is external to the individual. The definition implies the environmental or social structure of the learning environment has an impact on the student pursuing a mastery goal or a performance goal. Ames (1992) identified aspects of the following variables are critical to creating mastery goal orientations in the classroom: tasks, evaluation and recognition, and authority. Her research asserted to effectively

foster a mastery goal orientation in the classroom, the classroom context should foster interesting, engaging, challenging and meaningful tasks; an authority structure that emphasizes choice; responsibility and independence; as well as evaluation that focuses on improvement, effort and progress. Using the variables identified by Ames (1992), Salisbury-Glennon et al. (1999) observed two classrooms in a school promoting a learner-centered approach. She observed one classroom as having a more performance-approach goal orientation; the other classroom was labeled as task goal oriented. Students in the task goal oriented environment demonstrating greater use of self-regulated learning strategies substantiated the observation. The findings support similar empirical findings of Pintrich and Schraben (1992) and Ames and Archer (1988).

Learning goals result in higher academic achievement and skill acquisition; influences persistence and effort; enhances self-efficacy and promotes the use of more self-regulated learning strategies evident through deeper processing of information. The research favors the adoption of learning goal orientation and suggests that teachers de-emphasize the use of performance goals. The results found by Ainley (1993) suggested there are benefits to pursuing ability goals along with task goals. Urdan, Pajares, and Lapin (1997) provided more evidence to the claim these two goal orientations could possibly coexist. Although, it was found that ability goals weakened the positive relationship between tasks goal and persistence, findings showed ability goals had little effect on motivation and performance outcomes when gender, grade point average, and task goals are controlled. Wolter, Yu, and Pintrich (1996) indicated the adoption of a learning goal orientation with relative ability goal orientation resulted in a general

positive pattern of motivational beliefs including task value, and self efficacy, as well as high levels of cognitive strategy use, self-regulation and academic performance.

Schunk (1996) explained how goals affect motivation, self-efficacy, and strategy use by distinguishing the differences between learning and performance goals. Learning goals focus students' attention on processes and strategies that help them acquire competencies. Students who pursue a learning goal are apt to experience a sense of self-efficacy for attaining it and the motivation to engage in task-appropriate activities. Self-efficacy is substantiated as they work on tasks and note progress. Perceived progress in skill acquisition and a sense of efficacy for continued learning sustain self-regulatory activities and enhance skillful performance. On the other hand, performance goals focus attention on task completion, which does not attend to processes or strategy use. As students work on tasks, they do not employ effective self-monitoring techniques and rely on comparisons of their peers to determine progress, leading to incorrect attributions to ability among students who experience difficulties, which can negatively effect motivation.

Effective self-regulation depends on holding an optimal sense of self-efficacy for learning during task engagement (Bandura, 1986; Bouffard-Bouchard, Parent, & Larivee, 1991; Zimmerman, 1989). If students lack confidence (i. e., self-efficacy) and effective motivation control strategies, they may focus on performance goals rather than learning goals or even abandon the task all together (Butler, 2000). Etmer and Schunk (1997) interpolated the interdependence of goals, motivation, and self-efficacy as pivotal to self-regulated learning. Learners who adopt a goal may experience a sense of efficacy for attaining it, which motivates them to attend to instruction, persist, and expend effort.

Self-efficacy, through self-evaluation, is substantiated as students observe their goal progress because perceptions of progress convey they are becoming more skillful. Stone (2000) summarized the relationship between goals, motivation, self-efficacy, and self-regulated learning strategy use. Self-efficacy reflects the confidence in one's ability to complete tasks, which should influence the type of goal orientation whether it is a learning or performance goal orientation. A positive self-concept, specifically high self-efficacy, should invoke more self-regulation. Learners who are confident they can learn the material are more likely to implement self-regulated learning strategies consequently, effecting academic achievement.

Self-Regulated Learning Strategies

Leblanc, Leroux, Laveault, Oliver, and Shaffer (2000) considered self-regulated learning to be an integral component of the formative function of learning. It is a culture of learning that encourages the student to exercise his or her self-regulated learning strategies when participating in an activity or when studying or doing homework. It contributes to better overall functioning and rewarding academic performance. Self-regulated learning strategies are the compilation of executable plans a learner uses in order to attain a goal. These plans of action are rooted in the phases, processes, and subprocesses of self-regulated learners. The use of self-regulated learning strategies decreases the anxiety and increases self-efficacy, which is directly related to goal attainment and academic achievement. These positive effects of self-regulated strategy use make it apparent their use, regardless of the domain, is beneficial while participating in the learning process.

Self-regulated learning strategies are classified in two categories: metacognitive strategies and cognitive strategies. Cognitive strategies are those strategies that focus on information processing such as rehearsal, elaboration, and organization. Metacognitive strategies address the behaviors that the learner displays while engaged in the learning situation. Some of these tactics help students control attention, anxiety, and affect (Weinstein & Mayer, 1986). Metacognition is the awareness, knowledge, and control of cognition. There are three general processes that make up self-regulatory activities: planning, monitoring, and regulating. Planning includes activities such as goal-setting and task analysis. These strategies help to activate, or prime, relevant aspects of prior knowledge that makes organizing and comprehending the material easier. Monitoring activities include tracking one's attention as one reads, and self-testing and questioning. These assist the learner in understanding the material and integrating it with prior knowledge. Regulating refers to the fine-tuning and continuous adjustment of one's cognitive activities. Regulating activities are assumed to improve performance by assisting learners in checking and correcting their behavior as they proceed on a task (Higgins, 2000).

Pressley and Ghatala (1990) acknowledged self-monitoring as the centerpiece of self-regulated thinking. McWhaw and Abrami (2001) issued 111 high school students a 1000-word essay. Their study reported that self-monitoring was evident in the students whom were labeled high interest in comprehending the passage. The information gained from self-monitoring is used to determine one's goal progress. Self-monitoring is most helpful when it addresses the specific conditions under which the behavior occurs.

Self-regulated learners use self-recording to track where instances of behaviors occurred along with features of time and duration of occurrences. Zimmerman, Bonner, and Kovach (1996) described a self-monitoring procedure where students might record information such as date, assignment, time started, time spent, and information about the study context. They can also monitor their self-efficacy by reporting how well the student expects to score on an upcoming quiz and their confidence in obtaining that score. Important criteria for self-recording include regularity and proximity. Regularity refers to recording on a continuous basis as opposed to intermittently. Irregular observations yield less reliable results. Proximity means the behavior is observed close in time to its occurrence rather than long afterwards (Schunk, 1997). Proximal observations provide continuous information to use in gauging goal progress (Mace, Belfiore, & Shea, 1989).

Motivational strategies are those strategies that a learner uses to cope with stress and emotions that are sometimes generated when they try to overcome occasional failures and become good learners (Garcia, 1995). Wolters (1999) explained that some strategies students use to maintain or increase their effort or persistence on a particular academic task. One strategy is to provide themselves with consequences for accomplishing their learning goals. Zimmerman and Martinez-Pons (1986, 1990) found evidence when they examined the self-regulated learning strategies in high school and elementary school students. Students reported they would work to maintain their effort at completing the homework by promising or giving themselves a reward. Jackson and Molloy (1983, 1985) found that students who provided themselves with rewards completed more arithmetic problems than students who provided themselves with punishment or students who did not self-consequate. These findings indicated students elevated their desire to

complete academic tasks by increasing their extrinsic reasons for completing the task usually through providing themselves with additional rewards or punishments based on some self-identified goals.

Another strategy used by students is to reduce the distractions in the environment. This is recognized as environmental structuring (Purdie & Hattie, 1996) and it concentrates on students' efforts to arrange or control their surroundings to make completing a task more likely to occur without interruption. Wolters (1998) found that students reported using various methods for controlling distractions by managing different aspects of how, when, and where they completed particular tasks. The learners reported various aspects of their physical or mental readiness for completing a task. Students did things such as drinking coffee, eating food, or taking naps to make themselves more attentive and to facilitate their ability to finish tasks.

In order to maximize their persistence and effort, students work to make the task more intrinsically motivating to complete (Wolters, 1999). College students were required to hand-copy an array of letters until being told to stop (Sansone, Weir, Harpster, & Morgan, 1992). Some students would modify the task to make it less repetitive and boring. Although the different approach to completing the task made it more difficult and challenging, the students' desire to complete it was increased. Sansone, Wiebe, and Morgan (1999) conducted a follow-up to this study by giving students the opportunity to decide when they would discontinue copying the letters. The results of the study found students who purposefully increased the interest of the task tended to copy more letters.

Regulation of motivation also occurs through self-verbalization or self-talk. Self-verbalization is emphasizing, stressing, or articulating some already identified reason for completing a task (Wolters, 1999). Wolters (1998) found evidence of its effectiveness when he presented college students with four academic tasks, and asking them what would they do if they were faced with problems they faced within the instruction. Many students reported they would think about or reemphasize, the reasons accomplishing the task is important. Highlighting the attainment of good grades or doing well in class, and articulating these desires would provide the boost necessary to overcome obstacles that the instruction may present. The tactic is used to make the learner more immediately cognizant of the reasons they accepted as justification for working on the task. Schunk (1982) found students who self-verbalized yielded the highest motivation during self-directed practice and mathematical achievement.

Zimmerman and Martinez-Pons (1986) developed and validated a structured interview for assessing students actions directed at acquiring information or skills that involved agency, purpose, and instrumentality self-perceptions by learners. The self-regulated learning categories of the interview schedule were drawn from existing literature focusing primarily on social learning (cognitive) theory research. Some of the categories included goal setting, environmental structuring, self-consequencing, self-evaluating, organizing and transforming, seeking and selecting information, and rehearsal and mnemonics strategies. The study concluded that high achieving students utilize a greater use of 13 of the 14 identified self-regulated learning strategies. The one category that failed to relate to student achievement, using this instrument, was self-evaluation. Students reported use of these strategies provided predictive power on standardized

achievement test (SAT) scores. Ninety three percent of the students could be correctly classified as high or low achievers according to their reported use of self-regulated learning strategies. Higher achievers relied heavily on social sources of assistance more specifically using teachers and peers as sources of social support. They also sought assistance from other adults (parents) significantly more often than low achieving students. Purdie and Hattie (1996) proposed fourteen such self-regulated learning strategies: self-evaluation, organization, transformation, goal-setting, search for information, self reinforcement, search for social support, revision, memorization, environmental setting, repetitive practice, note taking, and self-management.

Goals, motivation, and self-efficacy influence the self-regulated learning behaviors a student exhibits. Salisbury-Glennon, Gorrell, Sanders, Boyd, and Kamen (1999) conducted a study at an institution that espoused a learning centered approach to learning. The purpose of the study was to determine the self-regulated learning strategies that were fostered in a learner centered approach. With 114 students participating in the study, the self-regulated learning behaviors were determined by a modified version of the Self-Regulated Learning Interview Schedule (SRLIS). A score assessed by the Patterns of Adaptive Learning Survey (PALS) determined the goal orientation. The participants demonstrated use of self-regulated learning strategies such as organizing and transforming, seeking social assistance from teachers, goal setting and planning, and seeking information respectively. The students relied less on rehearsing and memorizing, self-evaluation, and record keeping and monitoring. The students were divided into four clusters according to their goal orientation: learning oriented, performance oriented, undifferentiated, and performance-avoiders. The clusters were predictors of the self-

regulated learning strategies found suggesting learning strategy use may be affected by the learner's goal orientation.

Self-regulated learning has been perceived as an independent process that takes place without the intervention of external sources. The thought is learning and regulation of learning takes place covertly, and evidence of learning may be observed overtly through certain changes in behavior. Some say learning can occur without any observable change in behavior. The strictly internalized view of learning minimized thought on the influence of social and environmental factors for learners in the learning process. Interactions with others may be viewed as the learner having less autonomy and control over what he or she learns. Seeking assistance from others (e. g., parents, teachers, or peers) is looked upon as being a moderate self-regulated, independent learner. These sentiments were evident in a study conducted that used self-regulatory processes and strategies (i. e., goal setting and self-evaluation) to minimize another self-regulation learning strategy: help seeking.

Cunningham, Krull, Land, and Russell (2000) conducted a study with suburban elementary school students. The intent of the research was to employ goal setting and self-evaluation strategies to alleviate or minimize six target behaviors. One of these behaviors, considered to be a negative behavior by students and teachers, is help seeking. Help seeking is defined in this study as "… a tendency to seek help from classmates, teachers, and parents when attempting to solve problems prior to attempting to solve them independently" (p. 1). The students were taught goal setting and self-evaluative techniques through Specific, Measurable, Action-planned, Realistic, and Timely. The process is referred to by the acronym S. M. A. R. T (Covey, 1997). This provides a step-

by-step framework for students to follow as they set academic goals. Students were taught how to set meaningful and realistic goals, how to value their time, prioritize their work, make a plan of action, and make their plans become real. The intervention resulted in the appearance of transferring learning responsibility from the teacher to the student. The amount of teacher time on the student was reduced.

The processes (e. g., goal setting, social comparison, self-verbalization) and the subprocesses (i. e., self-observation, self-judgment, and self-reaction) are the framework through which learners self-regulate. The specific actions or activities learners use in each of these processes are arranged and rearranged depending on the personal (cognitive), environmental, or behavioral variables. These specific actions and activities are considered to be self-regulated learning strategies. Self-regulation includes such activities as attending to and concentrating on instruction; organizing, coding, and rehearsing information to be remembered; establishing a productive work environment; using resources effectively; holding positive beliefs about one's capabilities, the value of learning, the factors of influencing learning, and the anticipated outcomes of actions; and experiencing pride and satisfactions with one's efforts (Schunk, 1989). An increasing body of research substantiates that learners' use of self-regulation strategies sustains learning efforts and promotes academic achievement (Schunk, 1989; Zimmerman & Martinez-Pons, 1992). For a variety of reasons, learners have different academic and social experiences. These experiences shape their goals, motivation, and belief in ability. The environment, within which one's learning takes place, can also attribute to ability to self-regulate. Due to an infinite number of variables, one's development has influences

on their development into a self-regulated learner. These strategies are important in how self-regulated learning is developed as well as how self-regulated learning is measured.

Development of Self-Regulated Learning

Paris and Newman (1990) summarized research addressing the developmental changes underlying children's capability to regulate their learning. Before the age of seven, children appear naive and overly optimistic about their ability to learn. They begin school with a vague understanding of what is involved in academic tasks. Their strategy knowledge is fragmented; and they rarely reflect on their performance. Effort is viewed as related to success. As the child approaches adolescence, perceptions of learning become more accurate. Understanding of academic tasks is developed and their monitoring of their cognitive strategies grows with age. At this point, it is realized that effort alone is not sufficient for success. These incremental changes are hypothesized to depend on children's building personal theories of self-competence, academic tasks, cognitive strategies, motivation, and social cognitions. Where a child is deficient in self-regulation, there have been interventions that have been utilized to promote development of this process in learning.

The acquisitions of a wide range of competencies emerge in a series of regulatory skill levels (Schunk & Zimmerman, 1997). Boekaerts et al. (2001) addressed four development levels of regulatory skills: observation, emulation, self-control, and self-regulation. The development of self-regulation is dependent upon social agents such as parents, coaches, teachers, and peers. An observational level of skill occurs when learners are introduced to the major features of a skill or strategy from watching a model executed. Perceived similarity to a model and vicarious consequences of a model's use

will determine an observer's motivation to develop the skill further (Zimmerman & Rosenthal, 1974). "Vicarious learning accelerates learning and saves us from experiencing negative consequences" (Zimmerman & Schunk, 2001, p. 128). An observational level of proficiency can be assessed through the description of the strategy or hypothesized results of the strategy used (Zimmerman & Blom, 1983). Teachers who model strategies and verbalize their thought processes as they perform tasks can enhance students' self-regulatory development greatly (Graham & Harris, 1989a, 1989b; Palincsar & Brown, 1984; Sawyer, Graham, & Harris, 1992).

The opportunity for the learner to use the model moves them from the observational level to the emulation level. It is considered to be emulation because there is seldom an exact imitation of the use of the model; only the general principles of style and function are enforced. This is necessary in the development of self-regulatory skills because learners need to perform strategies personally to incorporate them into their schema. The source of guidance, feedback, and reinforcement is socially driven so the model continues its teaching functionality (Kitsantas, Zimmerman, & Clearly, 1999).

The learner's deliberate practice of skills is demonstrated at the self-controlled level. Performance in the presence of an instructor or reliance on the model makes it difficult to determine whether or not the learner is confident in using the information that is attained from using these environmental cues. The learner may not have moved from the emulation level if these things are still present in the environment. At the self-controlled level, dependency is on representational standards. These include what the learner remembers (images and text) about the model and the teacher's performance in using the model. The learner demonstrates use of self-regulation in a simulated

environment structured by the teacher. The scaffolding approached is implemented to promote mastery of skills in the absence of external influences. Acquiring skills on one's one requires more than exposure to a teacher or model; it also depends on extensive practice on one's own (Ericsson & Lehman, 1996). This phase focuses on the development of the fundamental processes rather than outcomes.

The final level, self-regulation, is evident when learners can adapt their performance in changing personal and contextual conditions. These changes and modifications can be made through effective self-monitoring and self-reactive processes that have been developed with practice. This sustains motivation and self-efficacy in the process of the skills that have been developed. While the self-regulation is being developed, learning the process is important to assure goal attainment. As a variety of occurrences are experienced and self-efficacy is enhanced, the learner can move from concerns about the process to setting specific performance goals that will produce outcomes.

Self-regulated learning is neither a function of intelligence; nor is it developed automatically through maturation; nor is it acquired passively and reactively from the environment. Self-regulation is not inherent, but it is a learned response that can be taught and controlled by the learner (Iran-Nejad, 1990). Zimmerman (1990) said, in a given situation, self-regulated learners are aware of the information and skills they must possess, and they take the steps necessary to acquire these items. Self-regulation is a developed systematically and in a multiphase hierarchy. The initial stages of the development process depend on social guidance. This social guidance is reduced as learners demonstrate skill and strategy acquisition. There is a growing body of evidence

that the speed and quality of a learner's self-regulatory development can be enhanced significantly if learners proceed according to a multilevel developmental hierarchy (Zimmerman & Schunk, 2001). There are strategies that self-regulated learners use that are overt and observable by others. There are some covert occurrences that characterize the self-regulated learner also. Existing measurement of self-regulated learning allow the learner to report both overt and covert behaviors.

Measuring Self-Regulated Learning

There is consistent debate concerning the phenomena of learning. Some theorist stay learning is an observable behavior. Other theorists contend learning is taking place and can occur internally without any external observation notable. When a learner self-regulates, it can be argued that there are some external and internal processes and subprocesses that occur. To provide evidence that self-regulation is occurring, instruments have been developed to assess this process. Observations, stimulated recall, interviews, and questionnaires can all be used in classroom settings (Garcia & Pintrich, 1994). Discussed here are three such instruments that have been used in assessing self-regulation.

The Motivated Strategies for Learning Questionnaire. The origination of the Motivated Strategies for Learning Questionnaire (MSLQ) was to be used as a tool in efforts to evaluate the "Learning to Learn" course at the University of Michigan. The "Learning to Learn" course stressed the concepts of cognitive psychology and how they could be applied to learning strategies (Deming et al., 1994). The MSLQ is a self-report instrument designed to assess students' motivational orientation and their use of different learning strategies. It is based on a general social cognitive view of motivation and

learning strategies. In the development of the MSLQ, the learner is considered to be an active processor of information whose beliefs and cognitions are important mediators of instructional input and task characteristics. This instrument acknowledges the relationship between motivation and cognition. It contextualizes motivation and learning strategies by assessing them within the specific course as opposed to generalization across several courses.

The MSLQ is composed of two main sections: a motivation section and a learning strategies section. The motivation section comprises of 31 items that assess students' goals and value beliefs for a course, their beliefs about their skills to succeed, and their anxiety about tests. There are two subscales within the motivation section that assess perceived self-efficacy. There are another three subscales that are used to measure value beliefs: intrinsic goal orientation, extrinsic goal orientation, and task value beliefs. The learning strategies section includes 50 items (31 items concerning the use of metacognitive and cognitive strategies and 19 items concerning management of different learning resources). The metacognitive subscale includes planning, monitoring, and regulating. There are three subscales that assess the cognitive strategies students' use: rehearsal, elaboration, and organization strategies. Previous results using the MSLQ suggest that when students engage in some aspects of metacognition, they tend to report planning, monitoring, and regulating and they also do better in terms of actual achievement; which is in line with general assumptions about self-regulated learning. The resource management items elaborate on regulatory strategies such as time management, environmental structuring, effort, peer learning, and help seeking. There are 81 total items on the instrument that are scored using a seven point Likert scale. It asks students

to report on concrete behaviors in which they engage. The items ask students about actual behaviors they might use as they study their course material. Table 1 illustrates the subscales that correspond with each of the two sections of the MSLQ. It also outlines the items of the instrument that provide scoring for each subscale.

Table 1

Motivated Strategies and Learning Questionnaire scales, categories, and items related to self-regulated learning behaviors

Scales and Categories	Items Comprising the Scales
Motivation Scales	
Intrinsic Goal Orientation	1, 16, 22, 24
Extrinsic Goal Orientation	7, 11, 13, 30
Task Value	4, 10, 17, 23, 26, 27
Control of Learning Beliefs	2, 9, 18, 25
Self-Efficacy for Learning & Performance	5, 6, 12, 15, 20, 21, 29, 31
Test Anxiety	3, 8, 14, 19, 28
Learning Strategies Scales	
Rehearsal	39, 46, 59, 72
Elaboration	53, 62, 64, 67, 69, 81
Organization	32, 42, 49, 63
Critical Thinking	38, 47, 51, 66, 71
Metacognitive Self-Regulation	33, 36, 41, 44, 54, 55, 56, 57, 61, 76, 78, 79
Time & Study Environment Management	35, 43, 52, 65, 70, 73, 77, 80
Effort Regulation	37, 48, 60, 74
Peer Learning	34, 45, 50
Help Seeking	40, 58, 68, 75

The Learning and Study Strategies Inventory. In the early 1980s, in response to a need arising from under prepared college students entering higher education, Weinstein and her colleagues began work toward the development of a diagnostic instrument that would assess an individuals learning strategies (Weinstein, Schule, and Cascallar, 1983). The Learning and Study Strategies Inventory (LASSI) was developed to address the need for a diagnostic instrument that could be used by academic advisors, college staffs, or

advisors to identify students' strengths and weaknesses. It could provide at-risk students with feedback or information about strategies optimizing their success in a variety of learning situations common to higher education settings (Melburg et al, 1993). The LASSI is composed of 77 items and includes the following scales: anxiety, attitude, concentration, information processing, motivation, time management techniques, selecting main ideas, self testing, study aids, and test strategies (Prus, Hatcher, Hope, & Grabiel, 1995). Each scale has five to eight items each to which respondents indicate how well the item describes them. The items are scored on a five point Likert scale (Olivarez & Tallent-Runnels, 1994). The first five scales measure affective strategies that involve personal factors influencing learners' academic performance. The last five scales measure cognitive strategies that cause students to evaluate learning by applying specific techniques such as processing information, reviewing and retaining information for mastery, and preparing for tests (Demming et al., 1994).

Eldredge and Palmer (1990) summarized the scales used in the LASSI instrument. The Attitude scale is composed of eight items focusing on student's interest in education and school, and determines the degree to which worrying about tests affects concentration. The function of the eight items in the Motivation scale is to assess students' efforts in staying on task with assignments and maintaining interest. The Time Management scale, with its seven items, examines student use of study schedules and other time management principles related to achieving academic tasks. The Concentration scale has eight items that focus on student's ability to minimize distractions on class assignments. The eight items in the Information Processing scale address the student's use of mental imagery, verbal elaboration, comprehension

monitoring, and reasoning. The Selecting Main Idea scale, with its five items, ask about the student's ability to pick out key points in discussions and textual information. The eight Study Aid items examine the degree to which students create or use support techniques or materials to help them learn and remember new information. The Self-Test scale, containing eight items, focuses on comprehension monitoring, and students reviewing and preparing for class tests. The test asks students if they know how to approach different types of test questions and if they prepare appropriately for tests and quizzes.

The LASSI has also been used to measure cognitive change and affective growth in regularly admitted students and developmental studies students (Nist, Mealey, Simpson, & Kroc, 1990). The other purpose of the study was to examine the predictability of the LASSI with regards to students' grades in other courses. The instrument was able to show cognitive and affective growth in regularly admitted students and developmental studies students, following a strategy instruction course, and was considered an accurate predictor of grades for regularly admitted students. In 1995, Prus and his colleagues looked at the LASSI being used as a predictive tool. They conducted a study investigating the capability of the LASSI to predict first year academic success of college students. It was to specifically determine the extent to which the scores on the LASSI predicted freshman grade point average and retention. The scores from the scales did provide significant amount of variance in grade point average that was not accounted for by traditional entry-level student background variables such as race, gender, SAT verbal score, SAT math score, and high school rank. Three of the scales (i.e.

motivation, concentration, and self-testing) demonstrated significant correlations with retention.

The LASSI has been modified to also assess how high schools students study and learn. The items were modified using high school level vocabulary, and reflect learning tasks and demands on high school environments (Eldredge & Palmer, 1990). Melburg, Lettus, and Bonesteel (1993) also felt a need to modify the LASSI. The purpose for their modification was to adapt the original instrument to suit adult learners needs and add items relevant to adult student populations. They also wanted to determine if the modified version of the LASSI (called the A-LASSI) changed any psychometric properties of the original instrument. It is the contention of the researcher the LASSI can play a major role in the identification of student learning strategies relate to success in distance education.

The Self-Regulated Learning Interview Schedule. There are few empirical articles that address self-regulated learning strategy usage in environments other than situated learning contexts. "Although research on self-regulated learning in naturalistic contexts is limited to date, it is unlikely that this [self-regulated learning] emerges directly from formal instruction" (Schunk and Zimmerman, 1998). Zimmerman and Pons (1986) developed the Self-Regulated Learning Interview Schedule (SRLIS). The SRLIS was pilot tested in six different contexts: classroom, home, writing assignments outside of class, mathematics assignments outside of class, test preparation, and when poorly motivated. The primary purpose of the SRLIS was to measure self-regulated learning strategies. The secondary goal was to determine if there is a correlation between reported use of self-regulated learning strategies and students' achievement track. Another issue of

interest, to be discovered by the instrument, is the identification of the self-regulated learning strategies that were most extensively used by high achieving students.

There are 15 categories (illustrated in Table 2) incorporated in the SRLIS that were determined on the basis of prior research and theory of self-regulated learning. Previous research on students in controlled learning environments has revealed substantial evidence human achievement is heavily dependent on the use of the strategies featured in the Self-Regulated Learning Interview Schedule (Bandura, 1982; Mischel & Michel, 1983; Schunk, 1984). The Interview Schedule is an open-ended self-report instrument and the data collected were measured according to strategy use, strategy frequency, and strategy consistency.

Table 2

Categories and explanation of categories associated with self-regulated learning

presented in the Self-Regulated Learning Interview Schedule

Categories of strategies	Definitions
Self-evaluation	Statements indicating student-initiated evaluations of the quality or progress of their work
Organizing and transforming information	Overt or covert rearrangement of instructional materials
Goal-setting and planning	Setting of goals and subgoals and planning of sequencing, timing, and completing activities related to goals
Seeking information	Efforts to secure further tasks information from nonsocial sources
Keeping records and monitoring	Efforts to record events or results
Environmental structuring	Select or arrange the physical setting to make learning easier
Self-consequences	Arrangement of rewards or punishments for success or failure
Rehearsing and memorizing	Efforts to memorize material by overt or covert practice
Seeking social assistance	Solicitation of help from peers, teachers, and adults
Reviewing records	Rereading of test, notes, or textbooks to prepare for class or future tests
Other	Learning behaviors that is initiated by others such as teachers or parents, and all unclear verbal responses

One of the distinctions of the social cognitive theory of self-regulation is its reference to the role the environment has in the learning process. It emphasizes the triadic relationship between personal, behavior, and environmental variables. The World Wide Web creates an environment that is more open than the static, centralized classroom environment. Conversely, the traditional classroom environment allows the learner to observe the modeling of expected behaviors. Wilson (1997) said modeled behavior is lacking in most distance education environments, especially in an asynchronous, web-based course. Modeling can be the demonstration of a physical task or it can be the mental modeling of thought patterns. The mental modeling can be observed through the instructor or the expert constructing concept maps, schematics, flow charts, outlines, or any other type of graphic organizer. The modeling of the required behaviors for success enhances self-efficacy in the learner. An observed increase in self-efficacy also enhances motivation and the setting of higher goals.

During their academic pursuit, most students have developed and used strategies in a traditional, face-to-face learning environment. Given the difference in context, there may be a deficiency of these skills' effectiveness in a web-based environment. There is concern that these strategies, due to their context specificity, may not be transferable to a distance environment. Dille and Mezack (1991) confirmed that distance-learning courses often lead to social isolation and require greater reliance on independent learning skills. They found students required less need of concrete experiences were expected to be well suited for distance education formats. Students who needed more concrete experiences required interactions between peers and teachers. The isolated environment that a web-

based course promotes may negate a dependency on strategies they have previously relied on and force them to exemplify different behaviors.

Diaz and Cartnal (1999) addressed the social dynamics that a distance education environment places on learning preferences and use. The study compared the behaviors between students in an on-campus class and equivalent distance course. The students in the distance course were found to be more independent learners than those in the on-campus course. The more independent learners were less collaborative with other students in the course while the students in the on-campus course were more collaborative and competitive. Their motivation was driven by the presence of their peers and rewards from the class (extrinsic motivation). One the other hand, the distance course students were driven by intrinsic motives and depended on self-consequating. Gamon and Shin conducted a study including 99 undergraduate students in two web-based courses. The researchers used nine items from the motivation section and 13 items from the learning strategies section of the MSLQ. This study found that learning strategies and motivation are directly related to the student's academic achievement. The two motivating factors expressed by the students were doing better than their peers (performance goal orientation) and expectation of doing well in the course. Motivation and learning strategies seemed to be the most important factors in this study concerning web-based learning. These findings supports Pintinch and Johnson (1990) and Weinstein and Underwood (1985) where it was found that learners who used more motivational and learning strategies learned more than those who used fewer strategies. They also concluded that motivational and learning strategies could be controlled by learners and improved through instruction.

Distance education students work in an environment that is different from what they are most familiar. They are not provided instruction with the same support system as received in a traditional, face-to-face environment. They do not have the immediate accessibility to peers and experts in the field. This requires the student to possess the ability to interact with the information in an isolated environment. According to social cognitive theory, the environmental and social variables contribute to the relationship between behaviors and cognitions of a learner in their development and use of self-regulated learning strategies. This type of isolation requires the learner to self-regulate their motivation, confidence, and cognitive abilities (Wilson, 1997). It is hypothesized that, even more than in traditional classrooms, self-regulatory behavior is critical when distance learning is the primary method of instruction. The student that self-regulates will be more successful at distance learning than the student who has problems in the area of self-regulation.

Distance Education

Distance education has been defined as the delivery of instruction in which time and geographic location separate students and teachers (McIsaac & Gunawardena, 1996). Distance education courses exist as a means to serve students in remote areas, with conflicting schedules, job demands, or family responsibilities rendering them unable to participate in traditional education. It started in the mid 1800s in the form of a correspondence course. It eliminated the restrictions of time and space in access to instruction. Technological developments such as radio, television, and computers have enhanced the power of distance education to deliver instruction in more than textual form (e. g., audio, graphics, and video). Computer networks and the Internet have become the

most frequently used technologies used by online learners providing a global communications system (Harasim, 1996). The development and uses of these new technologies had an impact on increasing the number of students that distance education could service.

The elimination of time and place restrictions would influence how learners would interact. Moore (1989) discussed three types of interaction: learner-instructor, learner-content, and learner-learner. Learner-instructor interaction is important in that instructors are responsible for stimulating and continuously maintaining learners' interest in the topic, motivating students to learn, assessing students' progress. Learner-content interaction is defined as the intellectual interaction between the learner and the topic of study. According to Moore, learner-content interaction is significant in an online environment because it changes learner's behavior toward an educational goal. "It is not too difficult to present information over a distance, but getting people to participate and making learning active at a distance is much harder" (Moore & Kearsley, 1996, p. 133). Learner-learner interaction provides an opportunity for information, ideas, and dialogue to be exchanged between the students about the course. The dependency of computer technology in distance education delivery, especially web-based instruction, introduces a fourth interaction.

Hillman, Hills, and Gunawardena (1994) introduced learner-interface interaction. Learners must understand not only the procedures for working with interface, but also the reasons why these procedures obtain results. This fourth type of interaction links the other three types of interaction. Learners must be able to use online technologies in order to interact and communicate with instructors, peers, and the course content. Students, in a

study by Styles and Zariski (2000), did not perceive the online environment as optimal in providing feedback, explanation, or interaction with other students on supportive social and cognitive levels. The absence of interaction can inhibit student success and may even force online students to drop out of online courses (Miltiadou & McIsaac, 2000). Interaction in an online environment is one of the most important factors that influence the success or failure of a program. Success or failure of distance education programs is determined by the attrition rate of the course. Attrition rates in distance courses tend to be 40 to 50 percent higher than the ones in traditional face-to-face classrooms (Dille & Mezack, 1991).

Characteristics of Successful Distance Learners

Recent information in distance education confirms the results of the demographics of a distance learner obtained from a 1984 survey. The learners typically were married and had children; most have full time jobs, which suggests that they are working while they are involved in the learning process (Galusha, 1998). The educational background ranges from less than high school to possessing a degree from a university (Sheets, 1992). Rekkedal (1983) found a significant relationship exists between prior educational level and persistence in a distance course. Also, students who have had prior experience in nontraditional educational opportunities persisted more than those who have had exclusive experiences. The study reports that older students, especially those over 50 years old, have higher course completion rates. This was attributed to older students having developed better coping skills to handle problems that may occur in a distance environment. These overt characteristics of a distance learner provides a portrait that the typical distance learner is employed and has personal commitments are responsible for

his or her efforts to be successful in the pursuit of furthering educational goals. These motivating factors are often different for younger learners or those learners in a traditional setting (Galusha, 1998). These are not the only characteristics a distance learner must posses to be successful.

Characteristics that appear to be predictors of success are high self-confidence and academic accomplishment. Variables that appeared in the literature that were significant with distance education course completion were locus of control, age, and number of distance courses completed. Learners with an internal locus of control are defined as one who holds the belief that the outcome of a situation is contingent on his or her own behavior, appears to have the higher rates of completion (Dille & Mezack, 1991). Kerka (1996) wrote that self-directed (self-regulated) learning is associated with an internal locus of control. Research findings suggest the combination of personal (such as learning style), environmental, and social factors must be taken into account when predicting academic success in distance learning programs (McIsaac and Gunawardena, 1996). The social and environmental variables are a component of the triadic reciprocity of self-regulated learning. This relationship between the environment, behaviors, and personal (cognitions) aspects of self-regulation are mediated, according to social cognitive theory, by self-efficacy. The evidence of research stating these particular characteristics have been found as predictors of success in a distance education environment validates the need for a learner to develop and exemplify the use self-regulated learning behaviors.

Age as a predictor of dropout has shown significant results when used as an independent variable (Cooper, 1990). Until recently, adult learners have made up the

population of learners who have participated in distance education experiences. They have been trained for traditional face-to-face lecture style of learning. Many adult learners have been away from the school system for a long time. This separation of time has made them anxious and possibly questioning their confidence to achieve academically. However, their motivation is high and they have a will to learn (Wilson, 1997). They are more concerned for learning for the sake of learning. The influx of adults taking distance education courses has occurred because of the proliferating demands of our technological society (Parker, 1999).

Brem and Boyes (2000) identified four ways a student can utilize and improve on their ability to monitor what they know and what they do not know (i. e., metacognition) in a web-based environment. The student can put the project aside for a brief time. Doing so will allow for continued revisiting of the material, which improves memory and comprehension. Nelson and Dunlosky (1991) found short breaks improve the ability to accurately assess what has been learned. Another tactic used was to verbalize what had been found. Chi, DeLeeuw, Chiu, and LaVancher (1994) discovered keeping a running dialogue is effective in highlighting inconsistencies and gaps in knowledge. Verbalization can occur internally or externally. The student initiates dialogue with parents, teachers, or others about their project and information that has been found. This verbalization is not limited to oral or textual media; it can be expressed graphically (e. g., concept mapping). Yet, another aspect students should focus on, to improve metacognition, is to develop strong content knowledge. The student can enhance their knowledge about a subject and help refine searches for relevant materials by researching synonymous keywords. Finally,

the student can ask for help by referencing resources such as librarians, instructors, and peers will help in interpreting materials critically to extract information.

Most institutions have an open admissions policy in granting permissions for learners to participate in web-based courses. There are few criteria outside of possible financial and technical requirements. The pursuit of academic achievement in a distance program requires skills that transcend pure academic content and requires high levels of organization, and goal commitment. Previous academic experiences may not have required the self-direction and motivation skills that are essential for distance study. Most of the research studies on adult distance education clearly indicated that a successful distance learner is one who is highly motivated, who experiences initial success and possesses good time management skills (Moore, 1990; Candy, 1991). Distance education programs are less able to provide under prepared students with the necessary skills and interventions for success in this environment (Melburg et al., 1993). Some institutions issue the potential students a self-assessment instrument (see Appendix A). The results of this assessment will encompass recommendations from the institution regarding whether or not the student should engage in courses online, but it is still up to the student to decide to take the course online. The items ask the students to evaluate themselves in regards to general characteristics such as motivation and learning styles. The development of the items for these instruments are based on characteristics that have been considered necessary to be successful in distance learning environments; they are similar to characteristics of self-directed and self-regulated learners. Although the instrument is general and has no affect on permission to take a distance courses, the fact

institutions draw their prospective student's attention to such a document prior to their enrollment infers the necessity of such skills.

CHAPTER THREE: METHOD

The correlational study addressed four self-regulatory behaviors (e. g., time and study environment management, intrinsic goal orientation, extrinsic goal orientation, and metacognitive self-regulation) and investigated their relationship with academic performance in web-based courses. Previous research in self-regulated learning provides evidence of academic performance as a function of self-regulated learning behaviors in traditional settings. Distance education literature hypothesizes, but provides few studies including adult learners and the relationship between self-regulated learning behaviors and academic performance in a web-based course. The contextual issue is exponential in that instruction is available to learners in varying subject domains as well as the physical environment in which learning is novel to this group of learners. This research developed a process that can be followed by other proponents of self-regulated learning and distance education. It provides a means where other self-regulated learning behaviors can be investigated and included in the creation of a tool that will be of interest and assistance to institutions, instructors, course developers, and students in predicting success in a web-based course according to self-regulated learning behaviors. This chapter describes the participants in this study; materials used for data collection; communication between the administration, faculty, students, and researcher; and general overview of each of the procedures involved in analyzing the data collected.

Participants

The participants in this study were 106 students (85 female; 21 male) enrolled in distance learning courses offered by a community college located in southwest Virginia. The distance learners participated in the following courses during the Fall 2002 semester: Business, College Orientation, Database Management, English/Literature, Health, Introduction to the Internet, Mathematics, Microcomputer Software, Programming, Psychology, Sociology. Through confirmation by each instructor, each course was generally categorized as either a humanities or technical course. Fifty-one percent of the participants were enrolled in technical courses; forty-nine percent were enrolled in humanities courses.

The age of the participating students ranged from 17 to 58. Figure 2 illustrates the number of students who participated by age group (i. e., 17-22, 23-32, 33-42, 43-50, and over 50). The age groups having the most participation among the distance learners were the 17 to 22 age group and 23 to 32 age group with 30 students each. However, 72 percent of the learners participating in this study represented the "non-traditional" student (i. e., above the age of 22). The line graph indicates a steady decline in the number of

students with the increase in age.

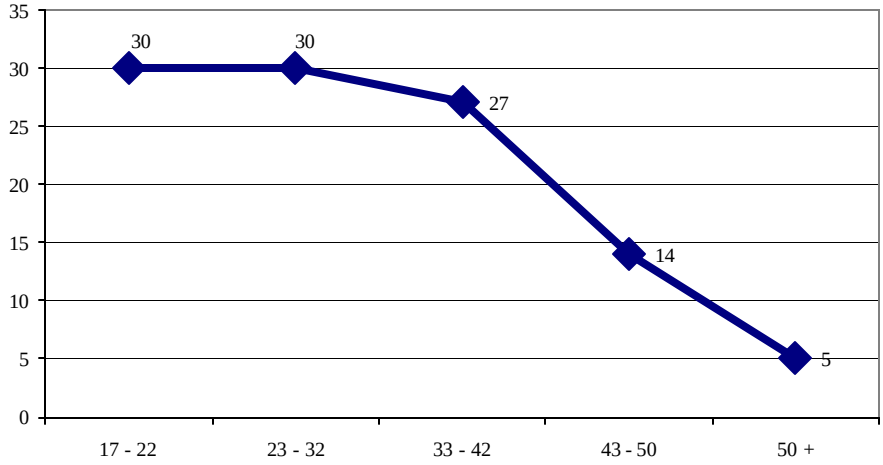

Figure 2. Number of participants according to age grouping

The 106 distance learners declared themselves as a member of one of four ethnic groups (see Figure 3).

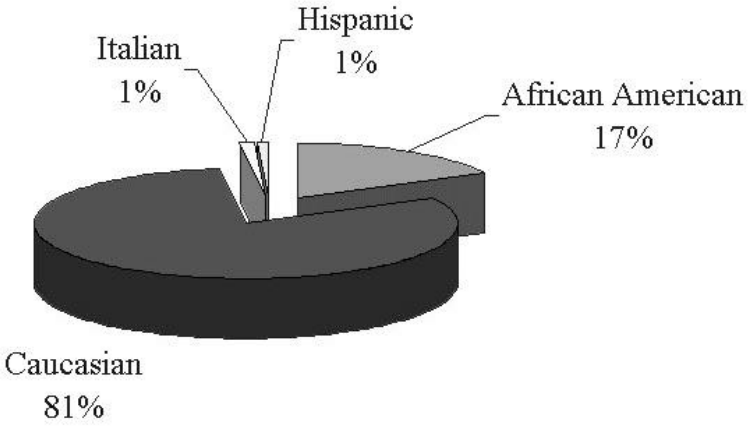

Figure 3. Percentage of ethnic representation of participants who volunteered to participate in this study

The majority of the participants in this study supported the demographic of students in previous accounts related to distance learners: Caucasian, female learners who were non-traditional students.

Materials

Learners who participate in courses in a web-based environment are separated by time and space from the instructor and their peers. They are not instantaneously available at a central location and time to immediately observe these behaviors. Networking technologies were utilized to communicate via the Internet. Due to the separation by time and space, the forms made available to the participants were stored and maintained on a server that published the forms electronically via the Internet. The Participant's Consent Form (Appendix C) was made available to the participants for their awareness of information relevant to their involvement in the research study. By way of the Participation's Consent Form, the participants were given an opportunity to acknowledge their agreement (or disagreement) to participate in the study. Upon their decision to participate in the study, they gained access to the questionnaire (see Appendix D). The questionnaire was used to capture responses to 28-items related to four self-regulated learning behaviors, as well as, demographic information. The participants reported self-regulated learning behaviors by rating themselves on a self-report instrument.

Questionnaire. The participants accessed items from four categories of the Motivated Strategies for Learning Questionnaire (MSLQ). The MSLQ is a self-report instrument designed to assess college students' motivational orientation and their use of different learning strategies for a college course (Pintrich, Smith, Garcia, & McKeachie, 1993). There are two sections that make up the original instrument: a motivation section

and learning strategies section. The motivational subscales are based on general social cognitive model of motivation that proposes three general constructs (Pintrich, 1988a, 1988b, 1989): expectancy, value, and affect. Participants responded to items in two of the subscales in the motivational section: intrinsic goal orientation and extrinsic goal orientation. These two subscales measured value beliefs.

The learning strategies section is based on a general cognitive model of learning and information processing (Weinstein & Mayer, 1986). This section has three general types of scales: cognitive, metacognitive, and resource management. The participants in this study responded to items associated with the metacognitive self-regulation and the time and study environment management categories. These categories are representative of the metacognitive and resource management scales respectively. Metacognitive self-regulation is concerned with the use of strategies that help students control and regulate their cognitions. It includes planning (setting goals), monitoring (of one's comprehension), and regulating (e. g., adjusting reading speed depending on the task). Time and study environment management provides information on a student's use of time as well as having an appropriate place to study.

The items associated with categories of the MSLQ are scored on a 7-point Likert scale, from 1 (not very much like me) to 7 (very true of me). Scores on each of the subscales are determined by taking the mean of the responses on items that make up that category. For the purposes of this research, there will be four categories used. The 81 items that are associated with each category of the original version of the MSLQ are in Appendix C. Upon initial introduction of the original version of the MSLQ, analyses were conducted on items in the MSLQ using 380 Midwestern college students. Factor

analyses were performed on the motivational categories and learning strategies categories of the instrument. These analyses identified the items associated with specific subscales of the instrument. The results of the factor analysis created a theoretical model for the motivational and learning strategies scales. The model of four subscales of the MSLQ can be observed in Figure 4. The numbers on the arrows represent the factor loadings resulting from factor analysis. The boxes in Figure 4 symbolize the specific items on the questionnaire and their association with each subscale.

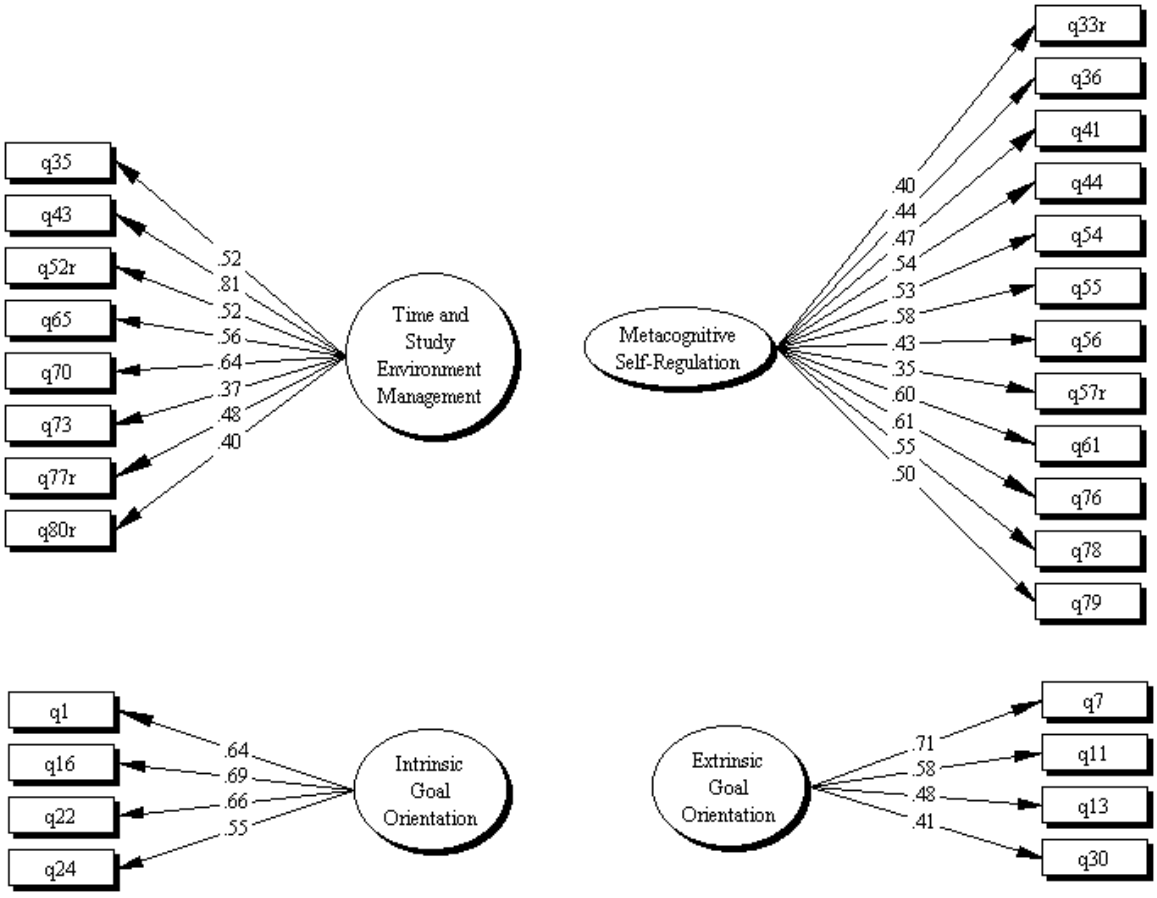

Figure 4. Correlation between items and categories after initial factor analyses was conducted on the Motivated Strategies for Learning Questionnaire using 380 undergraduate students in a traditional classroom environment (Pintrich et al., 1993).

Procedures

This section provides specific information concerning virtual communication between the researcher and instructors, students, and administrators of the community college delivering the courses at a distance. It contains references to correspondence as well as forms used in the data collection process. These forms can be found in the Appendices. Table 3 outlines a summary of the events that transpired.

Table 3

Actions taken by researcher, instructor, and students by week concerning preparations for conduct of study

Week	Actions Taken
0	• Met with Director of Distance Learning to present research idea. • Met with distance learning faculty to present research study
1	Sent email to Director of Distance Learning to confirm instructor participation
2 - 3	Instructors sent response to researcher agreeing to allow students to participate in study
4	Researcher inquired about names of courses and classification of course as humanities or technical from instructors
5 – 6	Instructors respond with name of course and classification of course as humanities or technical courses
6 – 7	• Researcher edit web-based forms for data collection • Researcher consults with server administrator to store forms and data on server
8	• Researcher sent email to instructors providing hyperlink to electronic forms associated with research study • Instructors forwarded email to students • Students access hyperlink to participate in research study
9	Students access hyperlink to participate in research study
10	• Access to electronic forms for data collection was discontinued

The researcher met with the Director of Distance Learning and distance-learning instructors to present the research study and solicit participation from students enrolled in their distance learning courses. The researcher sent an email to the instructors who agreed to allow their students to volunteer for participation in the research study. This email was sent on the eighth week of the community college's academic calendar. The decision to start the study on the eight week was to increase probability in the variability of grades between students. The email was forwarded to the students who were enrolled in a distance-learning course being taught by the participating instructor. If they volunteer to participate in the study, the students were instructed to select the hyperlink [included in the email message] giving them access to the Participant's Consent Form.

The Participant's Consent Form provided information to the students about the research study. By agreeing to participate, the students confirm their reading and understanding of the information on this form and they were given immediate access to the questionnaire. The students selected a response (i. e., a value from 1 to 7) for each of the 28-items on the questionnaire. On the Participant's Information section of the questionnaire, they also provided demographic information regarding their age, ethnicity, gender, name of course, and grade the current grade they had in the course at the time they completed the questionnaire. After providing information for all items on the questionnaire, the students submitted the information to a comma delimited text file stored on a web server located on the campus of a university in the state of North Carolina. The data was imported and formatted in Microsoft Excel. Later, it was imported

into the SAS statistical analysis application where it underwent factor analysis, multivariate analysis of variance, and regression analyses.

Data Analysis

Correlational analysis implies the following: the total observation is a randomly drawn sample, the sampled distribution is a multivariate normal distribution, and all of the variables are dependent variables. These types of analyses do not attempt to infer cause and effect relationships.

Factor analyses. Factor analyses include several correlational analyses to examine the interrelationships among variables (Carr, 1992; Gorsuch, 1983). Daniel (1988) informs factor analysis is designed to examine covariance structure of a set of variables and to provide an explanation of the relationship among those variable in terms of a smaller number of unobserved latent variables called factors. Factor analysis is a theory-testing model. The hypothesized model specifies which items (variables) will be correlated with which factors. The hypothesized model is based on a strong theoretical and/or empirical foundation (Stevens, 1996).

Confirmatory factor analysis, a subsidiary of factor analysis, determined if the data received from the students in the web-based courses fit the theoretical structure of the MSLQ on the four categories used in this study (see Appendix C). The results of the path analysis found there to be significant differences between the theoretical model and the data collected from the 106 participants in this study. The factor analysis procedures specified the strength of the correlation between the item and the subscales (later referred to as categories) of self-regulated learning behaviors. Each item was confirmed to be associated with categories of self-regulated learning behavior; or if not, it may not

associate with any category and eliminated from consideration. Factor analysis offered a viable method for evaluating construct validity of the instrument with the participants of this study according to their context in learning and age.

Discriminant Analyses. Another focus of this study investigated the relationship between self-regulated learning behaviors and type of course. Due to the different domains of learning (e. g., math, science, English, Literature), the relationship between the use of behaviors and the domain in which they are used deserves attention. In order to describe this relationship, descriptive discriminant analysis was conducted. According to Kerlinger and Pedhazure (1973) "the discriminant function is a regression equation with a dependent variable that represents group membership." (p. 337). Stevens (1996) points out that discriminant analysis makes descriptions parsimonious because several groups can be compared on multiple variables. The basic prerequisites for conducting discriminant analysis are that two or more groups exist which can be presumed different on several variables and that those variables can be measured at the interval or ratio level (Klecka, 1980). According to Huberty (1994), descriptive discriminant analysis is appropriate because the type of course is predetermined. The criterion variables were the four self-regulatory behaviors, and the grouping variable was the type of course. The specific method of discriminant analysis used in this study was multivariate analysis of variance (MANOVA). The final stage of this study required analysis involving multiple regressions.

Regression Analyses. After each item was confirmed to represent a latent factor (subscale), multiple regressions statistically correlate the numerical factor of each subscale with the grade provided by the participant. The grades ranged from zero to 100

providing continuous data points. Multiple regression techniques include the factor coefficient, factor score of the category, and the grade to determine the strength of the relationship. Multiple regressions were appropriate due to the existence of several independent variables (intrinsic goal orientation, extrinsic goal orientation, metacognitive self-regulation, and time and study environment management) and one dependent variable (grade). Multiple regression determined how much each of the independent variables factor into the dependent variable.

CHAPTER FOUR: RESULTS

The focus of this study is to determine if there exists a correlation between self-regulated learning and academic performance in web-based courses. The self-regulated learning behaviors of the 106 distance learners who took part in this study were assessed via their responses to 28 items on a web-based version of the Motivated Strategies for Learning questionnaire (MSLQ). This chapter will provide information concerning the processes that were put into practice to 1) define the number of categories associated with self-regulated learning, 2) determine the relationship between the type of course and self regulated learning behaviors, and 3) create the mathematical formula to predict success in a web-based course. The function of this chapter is to inform the reader of the results of the following inquiries:

1) Is there a relationship between the employment of self-regulated learning behaviors and the domain (i. e., humanities or technical courses) in which learning occurs?
2) Is there a significant relationship between a student's management of time and study environment and their academic performance in web-based courses?
3) Is there a significant relationship between a student's intrinsic goal orientation and their academic performance in a web-based course?
4) Is there a significant relationship between a student's metacognitive self-regulation and academic performance in a web-based course?
5) Is there a significant relationship between a student's extrinsic goal orientation and their academic performance in a web-based course?

Item-factor and factor-category relationships

The 28 items of the MSLQ the participants responded to were associated with four categories of self-regulated learning: intrinsic goal orientation, extrinsic goal orientation, metacognitive self-regulation, and time and study environment management. This association between the items and the categories was established through factor analysis. Factor analysis is a set of procedures used to take variables (items) that are alike and group them under one variable called a factor (Kachigan, 1982). Factor analysis is viewed as a data reduction technique used to reduce the number of overlapping measured variables (i. e., the 28 items) to a smaller set of factors (i. e., four categories). The number of factors produced is generally smaller than the number of initial variables (Green, Salkind, & Akey, 2000). The initial factor analysis using the MSLQ was conducted based upon responses to items provided by 380 undergraduate students in a "traditional" psychology course offered by the University of Michigan. The learners who participated in the present study ranged in age from 17 to 58 participating in courses offered by a community college in a "non-traditional" learning environment.

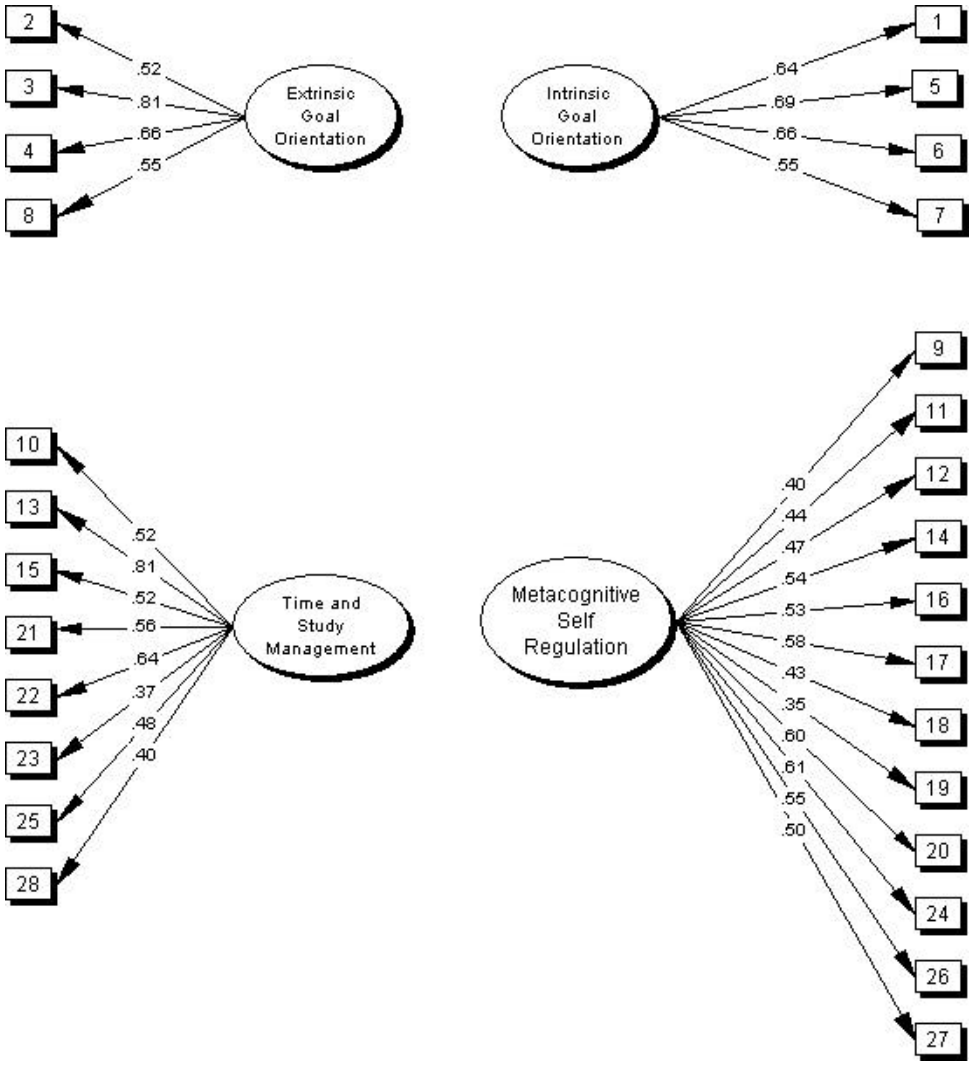

Figure 5. Correlation after first factor analyses was conducted on the 28 items and four categories from the Motivated Strategies for Learning Questionnaire using 380 undergraduate students

Figure 5 shows the items and the categories of the theoretical model created to validate the items of the MSLQ after factor analysis was conducted using 380 undergraduate students. The number in the boxes corresponds with the item number on the questionnaire (also see Appendix E). The arrow between the item number [in the box] and the category [in the oval] indicates there is a relationship between the item and the

category. The decimal value on the arrow indicates the strength of the relationship or the coefficient assigned to the corresponding item. This was the comparative model used in factor analysis conducted using the same 28 items with the present distance-learning students. Due to the demographic and environmental characteristics of the learners participating in the present study, the procedures of factor analysis were exercised.

Factor analysis required two stages: factor extraction and factor rotation. Factor extraction determined the number of factors necessary to categorize the 28 items. The factor extraction process began with a variation of factor analysis called principal component factor analysis. Principal component factor analysis identified the factors that represent abstractions of the 28 input variables. In other words, this determined the number of factors with which each of the 28 items will be associated. Table 4 is the result of the 28 items being input and extracted from a correlation matrix during the principal component factor analysis phase.

Table 4

The percentage of total variance accounted for, and the associated eigenvalues, for the extracted factors in a factor analysis of a set of 28 items (variables) associated with self-regulated learning behaviors

# of Factors	**Eigenvalue**	**Incremental Portion of Variance (%)**	**% of total Variance** (Cumulative)
1	7.26689462	25.95	25.95
2	3.02609876	10.81	36.76
3	2.22918706	7.96	44.72
4	2.16038257	7.72	52.44
5	1.55531127	5.55	57.99
6	1.29652817	4.63	62.62
7	1.07374831	3.83	66.46
8	**1.03154124**	**3.68**	**70.14**
9	.94057630	3.36	73.50
10	.86809679	3.10	76.60
11	.81743861	2.92	79.52
12	.64791291	2.31	81.83
13	.63206558	2.26	84.09
14	.55768485	1.99	86.08
15	.50906622	1.82	87.90
16	.47635748	1.70	89.60
17	.43795776	1.56	91.17
18	.38800656	1.39	92.55
19	.33619316	1.20	93.75
20	.30596490	1.09	94.85
21	.27236687	.97	95.82
22	.24388069	.87	96.69
23	.21632001	.70	97.46
24	.18611759	.66	98.13
25	.16201704	.58	98.71
26	.13501743	.48	99.19
27	.12206024	.44	99.62
28	.10521503	.38	100.00

Each of the 28 items was considered an individual factor, therefore, 28 categories were extracted. According to the incremental portion of variance column in Table 4, the first extracted factor accounted for 25.95 percent of the variability in the data collected. Extracting a second factor accounted for another 10.81 percent for a cumulative percentage of approximately 36.67 percent. The first extracted factor usually accounts for the largest part of the total variance inherent in the data collected. The second factor extracted and the succeeding factor incrementally less variance (Kachigan, 1982).

There are two criteria used to statistically determine the number of factors to extract: 1) the absolute magnitude of the eigenvalues of categories and 2) the relative magnitudes of eigenvalues of categories. An eigenvalue is the equivalent number of variables the factor represents. It is the amount of variance of the variables accounted for by a factor (Green et al, 2000). According to Table 4, four factors would account for the same amount of variance in the data, as would approximately 2.1604 variables.

One frequently used criterion for determining the number of factors to extract is "to retain factors to the point where an additional factor would account for less variance than a typical variable; that is, less than one eigenvalue" (Kachigan, 1982, p. 246). This is sometimes referred to as the mineigen criterion. According to Table 1, the extraction of eight factors equates to the same variance in the data as 1.035 variables. Extracting an eighth factor adds an additional 3.68 percent to the total variability of the data collected. This means extracting eight factors to represent the variables (i. e., the 28 items) is accountable for a cumulative 70.14 percent of the variability in the data collected from the 106 participants in this study. The extraction of a ninth factor would have the same

variance as .94057630 variables, which is less than one variable. The extraction of any number of categories greater than eight was in violation of the mineigen criterion.

The next stage of the factor analysis involved establishing a relationship between the eight factors and the 28 items affiliated with the questionnaire. This occurred in the factor rotation stage of factor analysis. The rotation technique provided a means of redefining the factors so the explained variance of the 28 items is distributed among the newly defined eight factors. It redefined the factors in order to make sharper distinctions in the meanings of the factors (Kachigan, 1982). The factor rotation determined the strength of the relationship between each item and one of the eight factors. There are three commonly used rotation methods: varimax, quartimax, and equimax. The varimax rotation method minimizes the number of items that have high correlations on each factor. The quartimax rotation method minimizes the number of factors to explain each item.

Of the various rotation techniques, the equimax rotation method was exercised in this study. The equimax rotation method is a combination of both the varimax and quartimax rotation methods. Its goal is to minimize both the variables (items) that correlate with a factor and the number of factors needed to explain a variable (item). Using this method assured that each item would correlate with only one of the eight factors. The equimax rotation method functioned from the creation of a factor correlation matrix. Simultaneously, each item was evaluated across each category and with each of the other items within a factor to determine the strength of the items relationship to a factor. Figure 6 elucidates the associative nature of each item to one of the eight factors.

The decimal values corresponding to the arrows provide information concerning the strength of the items relationship to the factor.

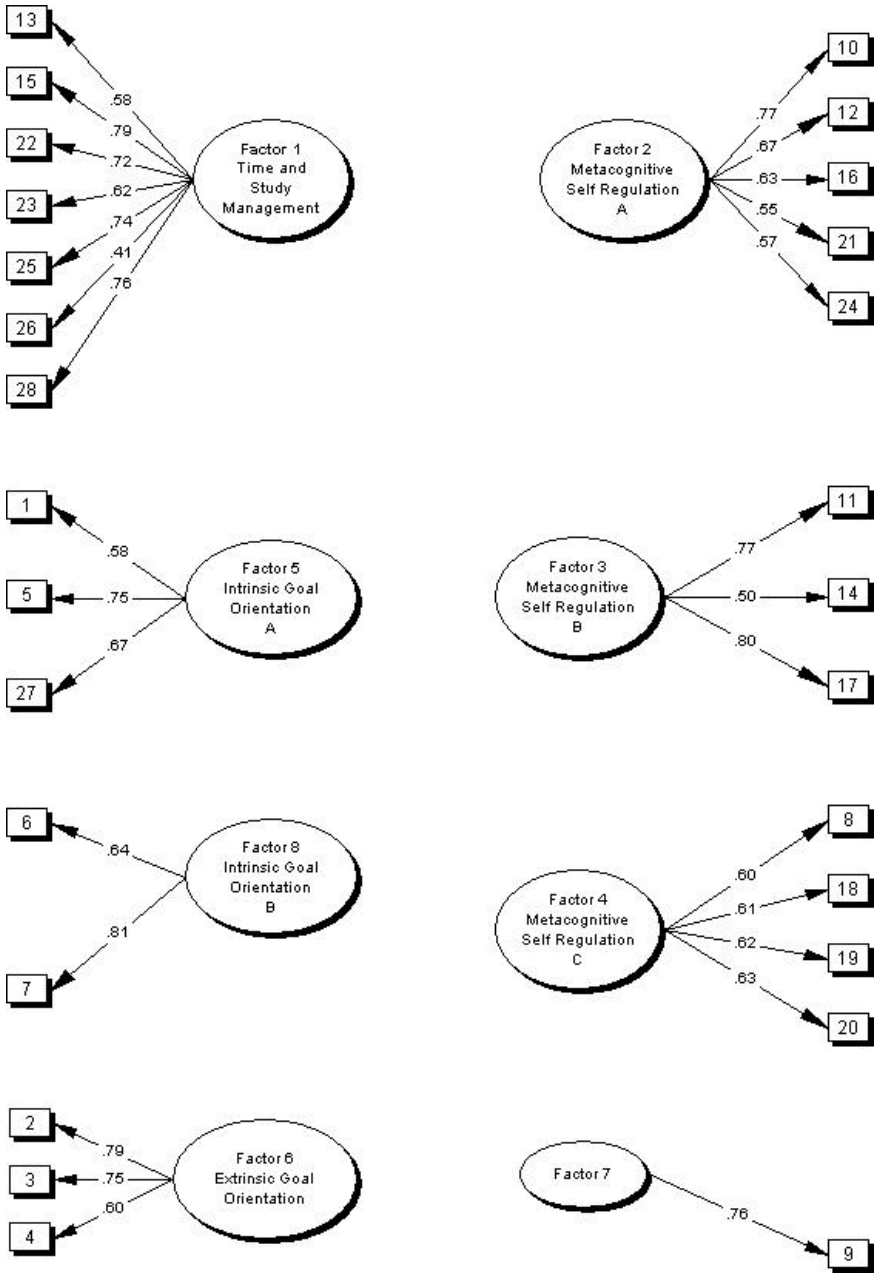

Figure 6. Correlation between the items and the number of factors necessary to explain four categories of self-regulated learning behaviors after 1st Equimax Rotation Method

Figure 6 denotes the structure of a proposed model according to the data collected from the 106 distance learners. The factor extraction process extracted eight factors. The focus of this research is based on four categories of self-regulation. Factor analysis functions based on an established theoretical model. Therefore, these eight factors serve as abstractions (i. e., represented affiliates) to the four categories of self-regulated learning. The relationship between each factor and category of self-regulated learning behavior depended on the items that loaded onto the factor. For example, items 13, 15, 22, 23, 25, 26, and 28 correlated with Factor 1 after the factor rotation procedure. According to the theoretical model (see Figure 5), these same items were affiliated with time and study environment management. This provides rational for Factor 1 to be affiliated with time and study environment management in Figure 6. In Figure 6, items 2, 3, and 4 correlate with Factor 6. According to the theoretical model (see Figure 4), these items were affiliated with the category extrinsic goal orientation. After factor rotation, this validated the affiliation of Factor 6 with extrinsic goal orientation in this study.

In comparing the theoretical model (Figure 5) and the model produced in the present study after the first factor analysis (Figure 6), there exist more factors in Figure 6 than there are categories of self-regulated learning behaviors. Factor analysis is a theory-testing model, not a theory-creating model. The hypothesized model specifies which variables (items) will be correlated with which factors (subscales). The hypothesized model is based on a strong theoretical and/or empirical foundation (Stevens, 1996). Given that fact, in some cases, more than one factor represented a category of self-regulated learning behaviors. Again, the items associated with each factor determined the factor's affiliation with a category. For example, in Figure 6, items 11, 14, and 17 were correlated

with Factor 3; and items 8, 18, 19, and 20 were correlated with Factor 4. According to the theoretical model (Figure 4), these items [with the exception of item 8] were correlated with the category metacognitive self regulation. According to Figure 6, Factor 1 represents time and study environment management; factors 2, 3, and 4 represent metacognitive self-regulation; Factors 5 and 8 represent intrinsic goal orientation; and Factor 6 represents extrinsic goal orientation. There are three items loaded onto Factor 5 and two items from the questionnaire loaded onto Factor 8. Items 1, 5, 6, and 7 are associated with intrinsic goal orientation according to the theoretical model (see Figure 5). There was one isolated occurrence where only one item correlated with only one factor.

Figure 6 shows item number nine of the questionnaire correlated with factor seven. Because item nine is a single item loaded on a single factor, there was little statistical or theoretical evidence to determine which category of self-regulated learning behaviors (e. g., extrinsic goal orientation) factor seven was affiliated. This occurrence prompted closer evaluation of this item. Further analysis of item nine was prescribed to observe the relationship between it and the other items of the questionnaire. Table 5 is the resultant correlation matrix produced from the further analysis of item nine.

Table 5

Correlation matrix showing the strength of the relationship between item 9 and the other 27 items using the MSLQ according to information provided by participating distance learners

	Item 1	Item 2	Item 3	Item 4	Item 5
Item 9	0.1183	-0.0127	-0.1454	-0.2012	-0.1224
	Item 6	Item 7	Item 8	Item 10	Item 11
Item 9	0.0008	0.0060	-0.0956	0.1947	0.1207
	Item 12	Item 13	Item 14	Item 15	Item 16
Item 9	0.1694	0.2852	0.1465	0.3242	0.2715
	Item 17	Item 18	Item 19	Item 20	Item 21
Item 9	0.0821	-0.0497	0.2716	-0.0181	-0.0770
	Item 22	Item 23	Item 24	Item 25	Item 26
Item 9	0.0724	0.1170	0.0229	0.2584	0.1521
	Item 27	Item 28			
Item 9	-0.0542	0.1018			

Correlations ranged from –0.2012 to 0.3242. These are considerably low correlations explaining the isolation of item nine onto a single category.

Due to the low correlations between item nine and the other items affiliated with the questionnaire, it was eliminated from consideration and the data, again, underwent factor extraction and factor rotation. Table 6 resulted due to its elimination. It shows seven factors equates to the same variance as 1.05589436 variables in explaining the variability in the data collected. Extracting an eighth factor would only be responsible for an additional 3.64 percent of the variability. This extraction would explain the variance of

less than one variable (.98291775 variables). The extraction of any number of factors greater than seven would result in an additional percentage of variance by less than one variable. After the second set of factor analysis procedures [after eliminating item 9], it was determined seven factors explained 67.71 percent of the variability in the data using 27 items. After the number of necessary factors was determined, the Equimax Rotation

Table 6

The percentage of total variance accounted for, and the associated eigenvalues, for the extracted factors in a factor analysis of a set of 27 items (variables) associated with self-regulated learning behaviors

# of Factors	Eigenvalue	Incremental Portion of Variance (%)	% of total Variance (Cumulative)
1	7.23416296	26.79	26.79
2	2.93068621	10.85	37.65
3	2.18240300	8.08	45.73
4	2.09210948	7.75	53.48
5	1.54455283	5.72	59.20
6	1.24131087	4.60	63.80
7	**1.05589436**	**3.91**	**67.71**
8	.98291775	3.64	71.35
9	.94039900	3.48	74.83
10	.82105009	3.04	77.87
11	.71133457	2.63	80.51
12	.64687531	2.40	82.90
13	.59458631	2.20	85.10
14	.52315468	1.94	87.04
15	.50318284	1.86	88.91
16	.47481900	1.76	90.66
17	.38993370	1.44	92.11
18	.35054293	1.30	93.41
19	.31316239	1.16	94.57
20	.27245999	1.01	95.58
21	.25851469	.96	96.53
22	.21636115	.80	97.33
23	.18644303	.69	98.03
24	.16349664	.61	98.63
25	.14001395	.52	99.15
26	.12381282	.46	99.61
27	.10581445	.39	100.00

Method was again enforced to arrange the items' affiliation with each factor and the strength of the relationship. The items correlated with each factor determined the self-regulated learning category each factor represented. Figure 7 illustrates time and study

environment management were represented by Factors 1 and 7; metacognitive self-regulation was represented by Factors 3, 4, and 5; intrinsic goal orientation was represented by Factor 2; and extrinsic goal orientation was represented by Factor 6.

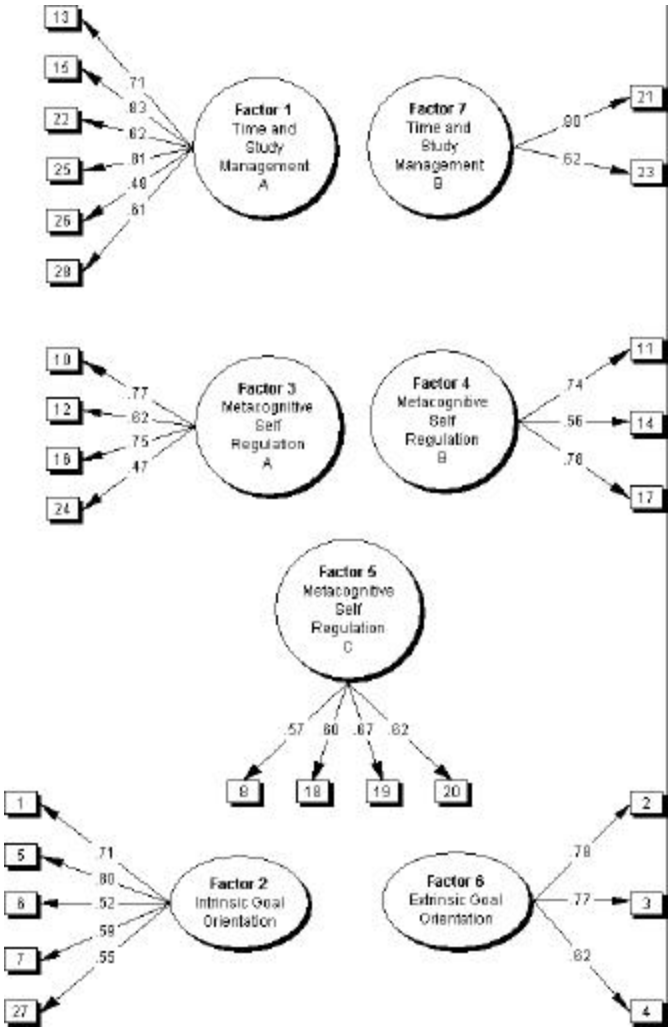

Figure 7. Correlation between the items and the number of factors necessary to explain four categories of self-regulated learning behaviors after the exclusion of item nine (Second Equimax Rotation Method)

The Domain of Learning

The participants in this study were enrolled in courses ranging from computer programming courses to sociology. As mentioned in chapter 3, the courses, in which the participants were enrolled, were categorized by the instructors as humanities or technical courses. The next phase of the study involved determining the relationship between the types of courses in which the learners were enrolled and their academic performance in the course.

Table 7

Relationship between course and grade

Source	DF	SS	MS	F	p
Course	1	667.731720	667.731720	2.99	.0872
Factor 1 (Time and Study)	1	1744.228621	1744.228621	7.80	.0063
Factor 2 (Intrinsic Goal)	1	810.088566	810.088566	3.62	.0600
Factor 3 (Metacognitive)	1	199.582788	199.582788	0.89	.3472
Factor 4 (Metacognitive)	1	90.351668	90.351668	0.40	.5265
Factor 5 (Metacognitive)	1	582.354945	582.354945	2.60	.1098
Factor 6 (Extrinsic Goal)	1	29.392775	29.392775	0.13	.7177
Factor 7 (Time and Study)	1	1799.415526	1799.415526	8.05	.0056

The different domains of learning could explain some of the variability in the students' academic performances. The researcher investigated the correlations between the types of courses and the grade the students received in the course by conducting a regression analysis. One of the objectives of a regression analysis is to determine if a relationship exists between two variables (Kachigan, 1982). The independent variable, in this analysis, was the course; and the dependent variable was the grade. Table 7 illustrates the results of regression analysis conducted. After the regression analysis, the course variable yielded a significance value of .0872. This value is greater than .05 ($p > .05$)

which concluded the type of course is not significant to how the students performed in the course. The type of course was an important variable to investigate because if the domain is found significant ($p < .05$) the COURSE variable becomes a factor necessary to include in predicting academic performance of learners engaged in a distance learning environment.

One of the inquiries of this research concerned the relationship between the employment of self-regulated learning behaviors and the domain in which learning occurred. To describe the relationship between self-regulated learning behaviors and domain of learning, a multivariate analysis of variance (MANOVA) was conducted. A MANOVA tests the hypothesis that the population means for the dependent variables are the same for all levels of a factor. The independent variables for a MANOVA are called factors and each factor has two or more levels. The MANOVA also includes multiple dependent variables rather than a single dependent variable (Green et al., 2000). In this study, the independent variables were the seven factors representing the categories of self-regulated learning behaviors; the dependent (grouping) variable was the type of course the participants were enrolled (humanities and technical courses). Table 8 is the result from the MANOVA conducted using each self-regulated learning behavior factor individually and collectively. In the analysis of the relationship between the domain and all factors representing self-regulated learning, it was found there is a significant difference ($p = .0274$) in the employment of overall self-regulated learning behaviors between humanities and technical courses.

Table 8

Significance of self-regulated learning behaviors in humanities and technical courses

	Wilk's Lambda	F	p
All Factors Included (Factors 1-7)	.8548	2.38	.0274
Time and Study Environment Management (Factor 1 and Factor 7)	.9997	.02	.9839
Metacognitive Self-Regulation (Factor 3, 4, and 5)	.9014	3.72	.0138
Intrinsic Goal Orientation (Factor 2)	.9681	3.42	.0671
Extrinsic Goal Orientation (Factor 6)	.9855	1.52	.2197

When each factor was isolated and the MANOVA was conducted, time and study environment management, intrinsic goal orientation, and extrinsic goal orientation returned significance values of .9839, .0671, and .2197, respectively. These significance values are greater than the standard significance value (p-value) of .05. These significance values being greater than .05 indicate there is no difference in the use of self-regulated learning behaviors associated with time and study environment management, intrinsic goal orientation, and extrinsic goal orientation and the learning domain pertaining to humanities and technical courses. However, there is evidence ($p = .0138$) the application of affiliate behaviors of metacognitive self-regulation (Factors 3, 4, and 5) differ between the two types of courses.

The Mathematical Formula

Twenty-seven items were affiliated with seven factors to determine the relationship existing between intrinsic goal orientation, extrinsic goal orientation, metacognitive self-regulation, time and study environment management and academic performance. Several of the questions this research attempted to answer involved the relationship existing between these self-regulated learning behaviors and academic performance in a web-based course.

Multiple linear regressions were performed to investigate the relationships between the seven factors affiliated with the self-regulated learning behaviors and academic performance. The overall objective of regression analysis is 1) to determine if a relationship exists between two variables, 2) to describe the nature of the relationship in the form of a mathematical equation, 3) to assess the degree of accuracy of the prediction achieved by the mathematical regression equation, and 4) to assess the relative importance of the predictor variables in multiple regression (Kachigan, 1982). The multiple linear regressions were used to determine the relationships and the strength of those significant relationships between the factors of self-regulated learning and academic performance. In the multiple regression models, the course grade was set as the dependent variable and each of the seven factors were considered the independent variables. The type of course was excluded in the regression models because the regression analysis found the course not to be a significant contributor to the academic performance of the participants.

In the full regression model, the seven factors (i. e., the independent variables) were simultaneously included with the grade (i. e., the dependent variable). The results of

this analysis returned a significance value of .0017 (see Table 12). This value is less than the comparative significance standard of .05 ($p < .05$). This indicated there is a significant correlation between self-regulated learning behaviors [addressed in this study] and academic performance in web-based courses.

Is there a significant relationship between a student's management of time and study environment and their academic performance in web-based courses?

During the factor analyses phase of this study, Factors 1 and 7 were affiliated with time and study environment management. During the regression analysis phase of the study (see Table 9), Factors 1 and 7 returned significance values of .0071 and .0055 respectively. When both factors (i. e., Factor 1 and Factor 7) were simultaneously placed in a full regression model (see Table 12), time and study environment management returned a significance value of .0009. These findings suggest there is a significant relationship between time and study environment management and academic performance in web-based courses.

Is there a significant relationship between a student's intrinsic goal orientation and their academic performance in a web-based course?

The factor analyses phase of this study affiliated Factor 2 with the self-regulated learning behavior of intrinsic goal orientation. During the regression analysis phase conducted during this study, Factor 2 reported a significance value of .0267 (see Table 9). In the full regression model (see Table 12), intrinsic goal orientation reported a significance value of .0373. These analyses confirm the existence of a significant

relationship between intrinsic goal orientation and academic performance in a web-based course.

Table 9

Results of multiple linear regressions comparing seven factors associated with self-regulated learning behaviors and grade

R-Square	Coefficient Variable	Root MSE	Grade Mean
.205226	17.79465	15.10531	84.88679

Parameter	Coefficients	SE	t	p
Constant	84.88679245	1.46715704	57.86	<.0001
Factor 1 (Time and Study)	4.05361613	1.47412695	2.75	.0071
Factor 2 (Intrinsic Goal)	3.31584221	1.47412695	2.25	.0267
Factor 3 (Metacognitive)	2.21525897	1.47412695	1.50	.1361
Factor 4 (Metacognitive)	.61689457	1.47412695	.42	.6765
Factor 5 (Metacognitive)	-2.17550043	1.47412695	-1.48	.1432
Factor 6 (Extrinsic Goal)	.20564603	1.47412695	.14	.8893
Factor 7 (Time and Study)	4.18334836	1.47412695	2.84	.0055

Is there a significant relationship between a student's metacognitive self-regulation and academic performance in a web-based course?

Factors 3, 4, and 5 were found to be associated with the metacognitive self-regulation category of self-regulated learning behaviors after the factor analyses procedures conducted in this study. In the regression analyses phase of this study, Factors 3, 4, and 5 returned significance values greater than .05 (see Table 9). The significance values were .1361, .6765, and .1432 respectively. In the full regression model (see Table 12), metacognitive self-regulation returned a significance value of .2717. The findings of this study indicate there does not exist a relationship between metacognitive self-regulation and academic performance in web-based courses.

Is there a significant relationship between a student's extrinsic goal orientation and their academic performance in a web-based course?

Factor 6 was found to be associated with extrinsic goal orientation as a result of the factor analyses procedures conducted earlier in this study. During the regression analysis phase, Factor 6 returned a significance value of .8893 (i. e., p = .8893) which is greater than .05 (see Table 9). In the regression model produced (see Table 12), extrinsic goal orientation returned a significance value of .8983 which is greater than .05. This confirms there does not exist a significant relationship between extrinsic goal orientation and academic performance in web-based courses.

Table 10

Significance values for factors associated with Time and Study Environment Management

Source	DF	SS	MS	F	p
Factor 1	1	1725.339390	1725.339390	7.23	0.0084
Factor 7	1	1837.542371	1837.52371	7.70	0.0065

Factors 1 and 7 were associated with time and study environment management after factor rotation during the factor analysis phase of this study. Since there are two factors associated with this particular category of self-regulated learning behavior, it is necessary to isolate these two factors (holding all other factors constant) to determine which of these two factors (i. e., Factor 1 or Factor 7) is responsible for the significant finding. In initiating the General Linear Model (GLM) procedure, using factor 1 and 7 as

the independent variables and grade as the dependent variable, both Factor 1 and Factor 7 return significance values of .0084 and .0065 respectively. Table 10 concludes both factors [1 and 7] contributed to the significant finding of the positive relationship between time and study environment management and academic performance.

Three factors characterized metacognitive self-regulation (factors 3, 4, and 5). These initial findings conclude metacognitive self-regulation does not contribute to academic performance in web-based courses. The three factors associated with metacognitive self-regulation were isolated to determine the factor or factors responsible for the insignificant relationship between metacognitive self-regulation and academic performance.

Table 11

Significance values for factors associated with Metacognitive Self-Regulation

Source	DF	SS	MS	F	p
Factor 3	1	515.2740937	1725.339390	1.94	.1666
Factor 4	1	39.9586858	39.9586858	.15	.6987
Factor 5	1	496.9442205	496.9442205	1.87	.1743

Table 11 summarizes the results from further statistical analysis. Factors 3 ($p = .1666$), Factor 4 ($p = .6987$), and Factor 5 ($p = .1743$) return significance values greater than .05. This concludes all three of the factors associated with metacognitive self-regulation are not significant to academic performance in web-based courses. Therefore, a relationship between metacognitive self-regulation and academic performance does not exist. Five regression models were conducted to determine the self-regulated learning behaviors that would contribute to academic performance. Table 12 summarizes the findings from each multiple linear regression model.

Table 12

Summarization of Multiple Linear Regression Model Results

Model	Factors	Self-Regulated Learning Behavior	MS	MSE	F	p
Full Model	1 – 7	Overall	824.85061	228.17028	3.62	.0017
Model 1	1, 7	Time and Study Environment Management	1781.44088	228.56077	7.47	.0009
Model 2	3,4,5	Metacognitive Self-Regulation	350.73	265.51436	1.32	.2717
Model 3	2	Intrinsic Goal Orientation	1154.45500	259.42487	4.45	.0373
Model 4	6	Extrinsic Goal Orientation	4.44048	270.48270	.02	.8983

The significance values (p-values) in Table 12 that are less than .05 indicate the corresponding self-regulated learning behaviors have a significant, positive relationship with academic performance. Therefore, the corresponding self-regulated learning behaviors contribute to predicting academic performance in web-based courses.

$$\textbf{academic success} = 4.05 * \text{Factor 1 Score} + 3.32 * \text{Factor 2 Score} + 4.18 * \text{Factor 7 Score} + 84.89$$

Figure 8. The predictive formula for academic success in a web-based course

It has been determined there exists a significant relationship between time and study environment management and intrinsic goal orientation with academic performance. Next, the nature of this relationship is demonstrated in the creation of a mathematical formula. Figure 8 illustrates the relationship of the numerical values presented in the compilation of information from Table 9. Table 9 informed the existence

of a linear relationship between academic performance and time and study environment management and intrinsic goal orientation by the reported significant values (p-values) for factor 1, factor 2, and factor 7 being less than .05. The predictive mathematical formula consists of a y-intercept (constant) and slope (factor coefficient) to predict academic success. Since there are three predictors (i. e., factor 1, 2, and 7) there are three factor coefficients and a constant that create the academic success predictive mathematical formula. The factor coefficient, factor score, and constant (y-intercept) are used to predict the academic success of a learner in a web-based course. The factor coefficients and constant are derived from the Coefficients column of Table 9. In this study, it has been determined that the constant is 84.88679245. This means that 84.88679245 is added to each predictor in the formula to determine how successful a potential distance learning participant would be in a web-based course.

The factor coefficients serve as weighted values to be multiplied by the corresponding factor scores. The factor coefficient in the predictor formula was derived from the Coefficients column of Table 9. The three factor coefficients correspond to the three factors determined to be significant predictive factors for academic performance (i. e., factor 1, 2, and 7). The factor coefficients for factors 1, 2, and 7 are 4.05, 3.32, and 4.18 respectively. This means, for example, two students who differed by one point on their factor score for factor 1 would be predicted to differ by 4.05 points in the predicted value for academic success in a web-based course (Howell, 2002). The following example provides a practical explanation on how the mathematical formula is used to predict academic success in a web-based course.

From the statistical analyses performed on the data associated with this study, a mathematical formula for predicting academic performance in a web-based course was derived (see Figure 8 above). The potential distance learner accesses the 28 items of the MSLQ (see Appendix D). The distance learner responds to each of the 28 items by rating [on a Likert scale from 1 to 7] how closely each item exemplifies behaviors they exercise while engaged in learning. The factor score for a factor would be calculated by taking the responses of the items associated with a given factor, adding them together, and dividing the sum by the number of items associated with a given factor. For example, items 13, 15, 22, 25, 26, and 28 were loaded onto Factor 1 (see Figure 7). The potential distance learner may respond 4, 5, 5, 6, 7, and 2 (Likert scale from 1 to 7) for each of these items respectively. This will total 29. The total of 29 will be divided by 6 (the number of items associated with factor 1). This results in a factor score of 4.83 for Factor 1. The factor score for Factor 1 (4.83) is multiplied by 4.05 (i. e., the factor coefficient for factor 1). This results in a product of 19.5615 (4.83 * 4.05 = 19.5615). The process is repeated for Factor 2 and again for Factor 7. The three products are added to 84.89 (i. e., the constant) to result in a value that will be used to determine the potential distance learner's success in a web-based course offered by a community college. The predictors included in the mathematical formula used to predict academic success in a web-based course explained approximately 21 percent of the variance that may occur in the academic success rating value calculated.

CHAPTER FIVE: DISCUSSION

The purpose of this study was to investigate the relationship between self-regulated learning behaviors and academic performance in web-based courses. The inquiries of this study implicated four specific categories of self-regulated learning: time and study environment management, intrinsic goal orientation, extrinsic goal orientation, and metacognitive self-regulation. From information provided by 106 participants enrolled in distance learning courses offered by a Virginia community college, this study provided the evidence concerning the relationship between self-regulated learning behaviors and academic performance in web-based courses.

There is some disagreement as to whether self-regulated learning is a broad, general process that can be applied in any learning situation (Corno, Collins, & Capper, 1982) or a context specific heuristic (Pintrich & Garcia, 1991) which changes with each learning situation. The null hypothesis of this study was there would not be a difference in the employment of self-regulated learning behaviors between humanities and technical courses. The findings of this study add support to findings of Pintrich and Garcia (1991) that self-regulated learning behaviors are context specific. In this study, the category of self-regulation that drove the significant findings was the employment of metacognitive self-regulation. Metacognitive self-regulation strategies are the behaviors that learners display while engaged in a learning situation. More specifically, these are the behaviors associated with planning, monitoring, and regulating the learning process. Weinstein and Mayer (1986) found these strategies to be useful in controlling attention, anxiety, and affect. The distance learner has to exercise his or her metacognitive abilities in order to interact with the content, instructor, classmates, and/or the interface that the distance-

learning environment posed (Moore, 1989; Hillman et al, 1994). This study reported the use of metacognitive self-regulated learning behaviors were distinct between humanities and technical courses. This study reported a difference in the employment of self-regulated learning behaviors between humanities and technical courses rejecting the null hypothesis. Although there a difference was found in the employment of self-regulated learning behaviors between the two types of courses, the type of course did not have any impact on students' academic performance.

Although it was found there not to be a correlation between the types of courses and the grade participants received in the course, the study investigated the relationship between self-regulated learning behaviors and academic performance. Again, the study assumed the null hypotheses that there would not be a significant difference between the mean scores of time and study environment management and academic performance (i. e., the grade the learner earned in the course), intrinsic goal orientation and academic performance, metacognitive self-regulation and academic performance, and extrinsic goal orientation and academic performance. This significant finding, in a web-based environment, supported the findings of Schunk (1989) and Zimmerman and Martinez-Pons (1992) that learners' use of self-regulation strategies sustains efforts and promotes academic achievement. This relationship was established with evidence of significant findings between intrinsic goal orientation and academic performance, as well as, time and study environment management and academic performance. The findings relative to the specific self-regulated learning behavior of intrinsic goal orientation support findings of other studies that monitored the effects that pursuing goals with an intrinsic (learning goal) orientation resulted in evidence of higher academic achievement than those students

who possessed an extrinsic (ability) goal orientation (Bandura & Schunk, 1981; Schunk & Swartz, 1993a; Ablard & Lipschultz, 1998). These findings rejected the null hypotheses pertaining to time and study environment management and academic performance, as well as, intrinsic goal orientation and academic performance.

In the traditional setting, learners have immediate accessibility to their peers where they can monitor their peers' behaviors and formulate relationships between those behaviors and their academic performance. The dependency on grading creates this competitive environment for learning. The motivation for performing in a class may derive from external sources (i. e. extrinsic goal orientation). In the isolation condoned by learning via the web, these external sources are not readily available and the learner is dependent on internalized motivating factors. They are not accessible to their peers' behaviors nor do they have immediate access to their peers' performance. Pertaining to the relationship between extrinsic goal orientation and academic performance, the findings of this study failed to reject the null hypothesis concluding there not to exist a significant difference between the mean score of extrinsic goal orientation and the grade the learner received in the course. External motivating factors do not represent themselves well in the asynchronous, web-based environment. This study confirms that the distance learner has to employ behaviors that are going to be associated with learning goals (i. e., internal motivation sources as opposed to performance goals (i. e., external motivation sources).

In the traditional and synchronous instructional setting, the learner has a structured time and place where the instruction will be administered. Web-based courses provide an opportunity for learners to engage in instructional opportunities at any time

and any place. The minimal time and space constraints that a distance learning environment creates requires the structuring of time in which to start and continue engagement with the content, instructor, peers, and/or interface becomes the responsibility of the learner where in the traditional environment, these responsibilities belonged to those other than the learner. Issues related to the time that the distance learner engages in the course material is, in part, a mechanism used to reduce the amount of distractions that may be encountered.

Controlling the environment in which learning is taking place is called environmental structuring (Purdie & Hattie, 1996). The findings addressing the importance of the relationship between time and study environment management and academic performance concur with the Wolters (1998) reported use of methods for controlling distractions by managing how, when, and where the learners completed certain tasks. In his study, he indicated the use of motivational strategies of self-regulated learning (i. e. reducing distractions) affected their performance academically. Boekaerts et al. (2001) confirmed the development and exercise of self-regulated learning behaviors were greatly influenced by the environmental components of the learning context. The present study confirmed the value in managing time and environment in a web-based learning environment. In the traditional setting, many of the motivating factors related to learning are driven by students' access to their peers and their instructor. The instructor is present for immediate feedback during the learning process in order to assure learners are on task and comprehending materials. In a web-based course, it is the learners responsibility to simulate a learning environment will have these same characteristics.

Inquiries of the relationship between these four categories of self-regulated learning behaviors and academic performance lead to the creation of a mathematical formula to predict the academic success of a potential distance learner based upon their self-regulated learning behaviors. Appendix F provides a description of each event involved in using the mathematical formula to predict academic success in a web-based course. Self-regulated learning was assessed using the MSLQ. Responses on the MSLQ are provided on a Likert scale using values from 1 to 7. Given this, the lowest score that can be received on any category of self-regulated learning is 1. The highest score attainable on a category is 7. Because the mathematical formula involves the use of scores from these categories, the predictive numerical values could range from as low as 96 to as high as 166. From this, it was determined the formula is not an efficient predictor of a grade from 0 to 100. However, it could be utilized in determining students' potential for academic success in a web-based course. The practical application of this tool is summarized below.

Potential students could express their interest in enrolling in web-based courses offered by an educational institution. The administrators or instructors responsible for the deployment of web-based courses could provide the students access, via the World Wide Web, to the 28 items used in this study (see Appendix D). The students would respond to each of the items [on a Likert scale from 1 to 7] to rate themselves in regards to the item. Upon submitting responses to all of the items, a factor score would be calculated for the predictive factors (i. e., factors 1, 2, and 7) associated with categories of self-regulated learning (i.e. time and study environment management and intrinsic goal orientation) in the formula derived from the study. Each factor score would be multiplied by the factor

coefficient of each factor. The products from the multiplication of each factor score and factor coefficient will be added together along with the constant (i. e., 84.89) to produce a numerical value between 96 and 166. Using the predictive formula, a student who scored from 96 to 120 (average scores from 1 to 3 on categories of self-regulated learning) would be a student who employs minimal self-regulated learning behaviors and may not be successful in a web-based environment. The student who scores from 121 to 166 (average scores from 4 to 7 on categories of self-regulated learning) would be a student who is employs sufficient self-regulated learning behaviors, therefore, he or she has the potential of being academically successful in a web-based environment. The value that is returned to the administrator, teacher, and student would provide counsel regarding the potential academic success the student may have in a web-based course.

This study outlined a process that led to the development of a tool to determine academic success. It focused on intrinsic goal orientation, extrinsic goal orientation, metacognitive self-regulation, and time and study environment management and each of their relationships with academic performance in a web-based environment. This study could be replicated to investigate the relationships of other self-regulated learning behaviors such as test anxiety, self-efficacy, rehearsal, organization, or effort regulation with academic performance. Further studies could include undergraduate or masters candidates in a variety of distance learning courses or those who are involved in specialized instructional programs.

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APPENDICES

Appendix A

Is Distance Learning right for me?

The following is a self-administered, self-scored tool to help you decide if distance learning courses are right for you. Distance learning courses are ideal for some students because they provide opportunities for student who cannot participate in traditionally scheduled class at the college.

Distance learning courses can be fun, exciting, challenging, convenient and enriching. **However, distance learning courses are not for everyone.** Distance learning courses are not an easy way to earn credits. Actually, succeeding in distance learning courses requires a high degree of self-motivation, self-discipline and independence. Before deciding to enroll in a distance learning course, please take this self-test to help you decide how well distance learning courses fit your circumstance and characteristics.

To use the checklist simply indicate "Yes" or "No" to each of the statements below. There are no "right" or "wrong" answers so be as honest with yourself as you can and then use the feedback below to decide if a distance course is for you.

		Yes	No
1	I am able to work independently.		
2	I am self-motivated.		
3	I am a self-starter.		
4	I am a good "time manager".		
5	I am an organized person - I can structure my time easily for tasks.		
6	I am capable of self-discipline.		
7	I have good study habits.		
8	I can capably take objective exams.		
9	I can capably read for comprehension.		
10	I can capably prepare and study for exams.		
11	I can capably take subjective exams.		
12	I can capably take notes from lectures, textbooks or television programs.		
13	I could easily call an instructor with questions about my course.		
14	I have unlimited access to a computer that is connected to the Internet.		

		Yes	No
15	I am comfortable asking questions in class when I need clarification.		
16	I am goal directed - if I set my sights on an end result, I usually achieve it.		
17	I am able to gather information visually.		
18	I am not a procrastinator - I like to get things done today, not put them off for tomorrow.		
19	I consider myself capable of independent learning - I do not necessarily need regular contact with a faculty member.		
20	I am in control of my time - I decide how to use my time.		
21	I am confident of my academic abilities.		
22	I consider myself a mature adult.		
23	I do not give up easily, even when confronted with obstacles.		
24	I believe I am responsible for my own education - what I learn or do not learn is ultimately my responsibility.		
25	I consider myself an average reader.		
26	I am capable of doing college-level work.		
27	I can allocate five hours each week for each distance learning course.		
28	I have a clear understanding of how to use an Internet browser to retrieve information.		
29	I have experience in surfing the Internet to find information		
30	I understand that distance learning course require more of my time than traditional courses.		

Score Clear

Appendix B

Intrinsic Goal Orientation

1 In a class like this, I prefer course material that really challenges me so I can learn new things

16 In a class like this, I prefer course material that arouses my curiosity, even if it is more difficult to learn

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

24 When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade

Extrinsic Goal Orientation

7 Getting a good grade in this class is the most satisfying thing for me right now

11 The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade

13 If I can, I want to get better grades in this class than most of the other students

30 I want to do well in this class because it is important to show my ability to my family and friends

Metacognitive Self-Regulation

33r During class time I often miss important points because I am thinking of other things

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

41 When I become confused about something I'm reading for this class, I go back and try to find the most important ideas

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

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

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

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

57r There have often been times I have been reading for this class but don't know what the reading was about

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

76 When studying for this course I try to determine the information I don't understand well

78 When I study for this class, I set goals for myself in order to direct my activities while logged on to the course

79 If I get confused as I take notes from the course information, I make sure I sort it out afterwards

Time & Study Environment Management

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

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

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

65 I have one place where I login to my online course most frequently

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

73 I login to the course regularly

77r I don't spend very much time on this course because of other activities

80r I often do not have enough time to review my notes or readings before an exam

Appendix C

Informed Consent Form
for Participants

This document provides information that you need to be aware of as a potential participant in this study. All participants who plan to be involved in this study must read this Informed Consent Form for Participants. To be allowed to participate, you must click on the "I WISH TO PARTICIPATE" button at the end of this document indicating consent to participation in the study.

Project	The relationship between self-regulated learning behaviors and academic performance in web-based courses
Investigators	Robert Cobb, Jr., Doctoral Candidate Instructional Technology, Virginia Tech Dr. Mike Moore, Advisory Committee Chairperson Instructional Technology, Virginia Tech
Purpose	The purpose of this study is to investigate the relationship between the use of four self-regulated learning behaviors (intrinsic goal orientation, extrinsic goal orientation, time and study environment management, and metacognitive self regulation) and academic performance. From the correlations made between these self-regulated learning behaviors and academic performance, a mathematical model will derive. This mathematical model will serve as the foundation for the functionality of a web-based inventory. This research will also investigate the use of self-regulated learning behavior in humanities and technical courses.
Procedures	• You will read the Informed Consent Form for Participants • You will agree or disagree to participate in the study • You will complete questionnaire
Potential Risks	This research does **NOT** present any physical, mental, or emotional hazards or risks.
Potential Benefits	Information regarding the relationship between self-regulation and academic performance in a web-based environment will allow institutions and course developers/facilitators to communicate to their students the SPECIFIC necessary behaviors that are need to achieve at a high academic level in this still novel environment. You will provide information that will serve as the functionality for a web-based tool that schools offering web-based courses will be able to use. This tool could be used to assess certain self-regulatory strategies and provide the potential student with feedback regarding their current behaviors and predict academic performance.
Anonymity and Confidentiality	There will be no traceable evidence of the identity of those who participate in this study. At no time will the researcher release results of the study to anyone other than individuals working directly with the study without the written consent of the participant.
Compensation	Participants in this study will not receive any financial compensation for their involvement in the study.
Freedom to Withdraw	You have the right to withdraw from the study at any time.

Approval of Research	This research has been approved by the Institutional Review Board (IRB) for Research Involving Human Subjects at Virginia Polytechnic Institute and State University and by the Department of Teaching and Learning.
Participant's Responsibilities	Listed below are your responsibilities if you choose to participate in this study: • Read the consent form for understanding of your rights and responsibilities for participating in this study • Respond to the items on the questionnaire It should take you no longer than 15 minutes to complete all activities associated with this study
Participant's Permission	I have read and understand the Informed Consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project. If I participate, I understand I have the freedom to withdraw at anytime without penalty or retribution. I agree to abide by the rules of this project.
	I WISH TO PARTICIPATE I DO NOT WISH TO PARTICIPATE

Should I have any questions about this research or its conduct, I may contact:

Robert Cobb, Jr.	Telephone:	E-mail:
Investigator	336.334.7550	rcobbjr@vt.edu
Dr. Mike Moore	Telephone:	E-mail:
Faculty Advisor	540.231.5587	moorem@vt.edu
Dr. David Moore	Telephone:	E-mail:
Chair, Institutional Review Board (IRB)	540.231.4991	moored@vt.edu

Appendix D

Questionnaire

Directions:
Please read each statement below. On a Likert scale from 1 to 7,you will rate yourself on how closely each statement relates to you. Click in the circle to the left of the number of your choice. The meaning of each numerical value is in the scale below.

1 Not Very Much Like Me	2 Not At All Like Me	3 Somewhat Not Like Me	4 Somewhat Like Me	5 Like Me	6 Much Like Me	7 Very True of Me

1	In a class like this, I prefer course material that really challenges me so I can learn new things	○ 1	○ 2	○ 3	○ 4	○ 5
2	Getting a good grade in this class is the most satisfying thing for me right now	○ 1	○ 2	○ 3	○ 4	○ 5
3	The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade	○ 1	○ 2	○ 3	○ 4	○ 5
4	If I can, I want to get better grades in this class than most of the other students	○ 1	○ 2	○ 3	○ 4	○ 5
5	In a class like this, I prefer course material that arouses my curiosity, even if it is more difficult to learn	○ 1	○ 2	○ 3	○ 4	○ 5
6	The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible	○ 1	○ 2	○ 3	○ 4	○ 5
7	When I have the opportunity in this class, I choose course assignments that I can learn from even they don't guarantee a good grade	○ 1	○ 2	○ 3	○ 4	○ 5
8	I want to do well in this class because it is important to show my ability to my family and friends	○ 1	○ 2	○ 3	○ 4	○ 5
9	During class time, I often miss important points because I am thinking of other things	○ 1	○ 2	○ 3	○ 4	○ 5
10	Before I study new course material thoroughly, I often skim it to see how it is organized	○ 1	○ 2	○ 3	○ 4	○ 5
11	When reading for this course, I make up questions to help me focus my reading	○ 1	○ 2	○ 3	○ 4	○ 5

12	When I become confused about something I'm reading for this class, I go back and try to find the most important idea	1	2	3	4	5
13	I make good use of my study time for this course	1	2	3	4	5
14	If course readings are difficult to understand, I change the way I read the material	1	2	3	4	5
15	I find it hard to stick to a study schedule	1	2	3	4	5
16	Before I study new course material thoroughly, I often skim it to see how it is organized	1	2	3	4	5
17	I ask myself questions to make sure I understand the material I have been studying in this class	1	2	3	4	5
18	I try to change the way I study in order to fit the course requirements and the instructor's teaching style	1	2	3	4	5
19	There have often been times I have been reading for this class but don't know what the reading was about	1	2	3	4	5
20	I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying for this co	1	2	3	4	5
21	I have one place where I login to my online course most frequently	1	2	3	4	5
22	I make sure that I keep up with the readings and assignments for this course	1	2	3	4	5
23	I login to my online course regularly	1	2	3	4	5
24	When studying for this course, I try to determine the information I don't understand very well	1	2	3	4	5
25	I don't spend as much time as I should on this course because of other activities/obligations	1	2	3	4	5
26	When I study for this class, I set goals for myself in order to direct my activities while logged on to the course	1	2	3	4	5
27	If I get confused as I take notes from the course information, I make sure I sort it out afterwards	1	2	3	4	5
28	I often do not have enough time to review my notes or readings before an exam	1	2	3	4	5

Participant's Information

Age [ ] Ethnicity [ ] Gender [ ]

In which online course are you enrolled [ ]

What grade do you currently have in your online course [ ] (Between 0 and 100)

Click Here to Submit Responses

Appendix E

Intrinsic Goal Orientation

1 In a class like this, I prefer course material that really challenges me so I can learn new things

5 In a class like this, I prefer course material that arouses my curiosity, even if it is more difficult to learn

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

7 When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade

Extrinsic Goal Orientation

2 Getting a good grade in this class is the most satisfying thing for me right now

3 The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade

4 If I can, I want to get better grades in this class than most of the other students

8 I want to do well in this class because it is important to show my ability to my family and friends

Metacognitive Self-Regulation

9 During class time I often miss important points because I am thinking of other things

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

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

19 There have often been times I have been reading for this class but don't know what the reading was about

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

24 When studying for this course I try to determine the information I don't understand well

26 When I study for this class, I set goals for myself in order to direct my activities while logged on to the course

27 If I get confused as I take notes from the course information, I make sure I sort it out afterwards

Time & Study Environment Management

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

13 I make good use of my study time for this course

15 I find it hard to stick to a study schedule

21 I have one place where I login to my online course most frequently

22 I make sure that I keep up with the readings and assignments for this course

23 I login to the course regularly

25 I don't spend very much time on this course because of other activities

28 I often do not have enough time to review my notes or readings before an exam

Appendix F

Step	Event	Description
1	Administer Instrument	Administer the 28-items (see Appendix D) to the potential distance learning student
2		Add the values of the responses to items 13, 15, 22, 25, 26, and 28
3	Calculate Factor 1 Score	Divide the sum of the responses to items 13, 15, 22, 25, 26, and 28 by 6 (the number of items associated with Factor 1). This will give the Factor 1 Score
4		Add the values of the responses to items 1, 5, 6, 7, and 27
5	Calculate Factor 2 Score	Divide the sum of the responses to items 1, 5, 6, 7, and 27 by 5 (the number of items associated with Factor 2). This will give the Factor 2 Score
6		Add the values of the responses to items 21 and 23
	Calculate Factor 7 Score	Divide the sum of the responses to items 21 and 23 by 2 (the number of items associated with Factor 7). This will give the Factor 7 Score
7	Factor 1 Product	Multiply the Factor 1 Score by the Factor 1 Coefficient (4.05)
8	Factor 2 Product	Multiply the Factor 2 Score by the Factor 2 Coefficient (3.32)
9	Factor 7 Product	Multiply the Factor 7 Score by the Factor 7 Coefficient (4.18)
10	Determine academic success rating	Add the Factor 1, Factor 2, and Factor 7 products to the Coefficient (84.89). This will give you a value between 96 and 166.
11	Evaluate LOW academic success rating	If the academic success rating calculated is between 96 and 120, the potential distance learner may **NOT** perform well in a web-based environment
12	Evaluate HIGH academic success rating	If the academic success rating calculated is between 121 and 166, the potential distance learner may perform well in a web-based environment

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B. S., Technology Education — May 1994
Virginia Polytechnic Institute & State University — Blacksburg, VA

Work Experience

North Carolina A & T State University — Greensboro, NC — 8/02 - Present
Adjunct Instructor

- Disseminate instruction for undergraduate students to enhance problem solving capabilities using computer aided design and drafting applications
- Provide opportunities for students to solve relevant problems in technological and engineering disciplines
- Responsible for the analysis, development, design, integration, and evaluation of instructional materials for architectural, computer-aided design, and electronic design courses

Virginia Tech — Blacksburg, VA — 5/01 – 8/02
Computer Technician

- Service faculty, staff, and students in troubleshooting hardware/software problems
- Hardware/software installation and troubleshooting in Windows and Macintosh environments
- Consultant to faculty, staff, and students with the use of computer applications in the educational technology laboratory

North Carolina A & T State University — Greensboro, NC — 7/99-5/00
HelpDesk Computer Consultant

- Responsible for setting up computer stations for faculty, staff, and students and installing campus licensed software to conduct business operations via LAN accessibility
- Utilize a variety of communication media to confer with computer technicians and supervisor in conjuring accurate troubleshooting procedures
- Instruct students on incorporating internet and intranet services to fulfill academic expectations
- Utilization of interpersonal skills and technological expertise with faculty, staff, and students during computer consultations, troubleshooting, and hardware/software installation

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- Utilize AutoCAD Release 13 & 14 to produce mechanical, architectural, and electrical drawings
- Mathematical and theoretical analysis of electronic component and circuit behavior
- Transfer and analyze information from electronic schematic diagrams to identify electronic components, produce computer generated printed circuit board layouts, and incorporate techniques to fabricate functional electronic circuits
- Development of curriculum in area of computer aided drafting/design and electronics that integrates general academic theory and practical experiences which emphasizes troubleshooting/problem solving activities and cooperative learning experiences that are transferable beyond secondary education

Professional Involvement

Pyramid Drafting and Design Society, Co-Advisor
Computer Aided Drafting and Design Advisory Committee, Member
Association for Educational Communications and Technology, Member
Kappa Delta Pi International Honor Society for Educators, Member
Epsilon Pi Tau International Honor Society for Professionals in Technology, Member
Frederick Douglass High School's Teacher of the Year

Publication

Perkins, R. & Cobb, Jr., R. (2001). Issues related to creating web-based high school courses. *Virginia Society for Technology in Education Journal, 16* (1), 30-36. Available at http://www.vste.org/communication/journal/attach/Fall%202001.pdf

Computer Experience

AutoCAD, Mechanical Desktop, Microstation, SilverScreen, Microsoft Office Suite, Macromedia Director, Macromedia Authorware, Macromedia Cold Fusion, SoundEdit Pro, CoolEdit Pro, Adobe Photoshop, Adobe Premiere, Persuasion, CadKey, ToolBook