THE RELATIONSHIP BETWEEN LEARNERS' MOTIVATIONAL SCHEMAS, LEARNERS' AFFECT, AND CHANGES TO LEARNERS' ACHIEVEMENT GOALS: A TEST OF THE COGNITIVE CHANGE OF MOTIVATIONAL BELIEFS MODEL

A dissertation submitted in partial fulfillment of the requirements for the degree

Doctor of Philosophy

by

MATTHEW A. EASTER
DECEMBER 2010

The undersigned, appointed by the dean of the Graduate School, have examined the dissertation entitled

THE RELATIONSHIP BETWEEN LEARNERS' MOTIVATIONAL SCHEMAS, LEARNERS' AFFECT, AND CHANGES TO LEARNERS' ACHIEVEMENT GOALS: A TEST OF THE COGNITIVE CHANGE OF MOTIVATIONAL BELIEFS MODEL

presented by Matthew Easter,

a candidate for the degree of doctor of philosophy of Educational Psychology,

and hereby certify that, in their opinion, it is worthy of acceptance.

_____
Assistant Professor Jessica Summers

_____
Distinguished Professor David Jonassen

_____
Associate Professor David Bergin

_____
Assistant Professor Stephen Whitney

_____
Associate Professor William Miller

ACKNOWLEDGEMENTS

I would like to thank all my committee members and Dr. Jeannine Turner for their help with this dissertation study.

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CHAPTER 1: Overview

Introduction

In education, the study of motivation has been extensively researched (Eccles & Wigfield, 2002; P. K. Murphy & Alexander, 2000; Pintrich, 2003). The majority of the literature in this field has focused on how learners' motivation influences cognition and achievement (Pintrich, 2003). That is, research has traditionally focused on how learner motivation affects cognition towards, and performance on, various academic tasks. Fewer studies have investigated changes in learners' motivation. Exceptions include researchers who have investigated the change of learners' motivation in the context of their development and progression in school (for comprehensive reviews see Wigfield & Eccles, 2002; Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). Findings from these studies generally suggest that as learners progress in school, their motivation declines (Eccles, Wigfield, & Schiefele, 1998). Reasons for such changes include learners' reactions to successes and failures and influences from teachers, parents, peers, and school contexts (Wigfield, et al., 2006).

Other researchers investigating motivational change have focused on the development of expertise and have generally found that motivation increases with this development (Alexander, Jetton, & Kulikowich, 1995; Zimmerman & Kitsantas, 1997). These investigations and theories have led to an understanding of what motivational changes learners undergo and how these changes affect their cognition. However, few have considered the actual processes that explain how learners come to change their motivations toward academic tasks. Given this paucity of

research, researchers in educational psychology have recently called for models that further elaborate on the changes of motivational beliefs (P. K. Murphy & Alexander, 2000; Pintrich, 2003; J. C. Turner & Patrick, 2008).

Another recent trend in the educational literature has been the call for research to investigate the relationships between motivation, cognition, and affect. In an introduction to a special issue on emotions in *Educational Psychology Review,* Linnenbrink (2006) explains that such relationships have been addressed by educational researchers, but this line of research has been typified by more surface level investigations that do not truly integrate the three constructs. Given these issues, researchers have now begun to elaborate on theoretical models that attempt to integrate motivation, affect, and cognition (Eynde & Turner, 2006; Meyer & Turner, 2006; Pekrun, 2006; Schutz, Hong, Cross, & Osbon, 2006). However, these investigations have not discussed how the construct of affect may influence the motivational change process, and more specifically, they have not discussed how the links between affect and cognition might relate to changes in learners' motivational beliefs.

Pintrich (2003) has noted that there is a clear need to further study how learners' cognition can influence their motivation toward academic tasks. Additionally, researchers have noted the need to study how affect plays a role in the relationship between cognition and motivation (Eynde & Turner, 2006; Linnenbrink, 2006; Meyer & Turner, 2006; Pekrun, 2006; Schutz, et al., 2006). I suggest that changes in learners' motivation can be understood by exploring changes in learners' cognition. In addition, I believe that affect could interact with changes in learners' cognitions which will then have an effect on the changes to learners' motivational beliefs. While a majority of motivational theories in education are decidedly cognitive in nature, there has been a lack of attention to how changes in cognition could

influence changes in motivation. For example, theories such as self-efficacy beliefs (Bandura, 1989), goal orientation (Ames, 1992; Elliot & Harackiewicz, 1996), and self-regulation (Zimmerman & Kitsantas, 1997) all have cognitive aspects that are said to influence motivation, but the mechanisms for influence are unclear. Similarly, theorists such as Borkowski and Muthukrishna (1995), Winne and Marx (1989), and Pintrich (2000a, 2000c) have more directly tied processes of cognition to motivation, but there is no discussion about how change in cognition and affective states can influence change in motivation. I propose that the conceptual change literature can help clarify how learners' cognitions, or schemas, relate to their motivational beliefs.

Conceptual change theory is primarily focused on the structure of human knowledge, how this knowledge undergoes change, and factors that influence the change process. I believe that theories of conceptual change can be used to better understand the cognitive processes that lead to changes in learners' motivational beliefs. Further, the recent research on affect has shown that it could be an important aspect of the motivational change process. Therefore, the purpose of this study is to explicate and propose a model of motivational belief change that borrows from the conceptual change literature and incorporates other important aspects including affect. I believe that such an articulation of motivational change is warranted because the underlying process for motivational change has not been explicitly outlined. Additionally, no theory that I am aware of has been able to provide detailed suggestions for how motivational beliefs can be changed, why certain actions will enact this change, and how other factors such as affect relate to this change.

The Conceptual Change of Motivational Beliefs Model

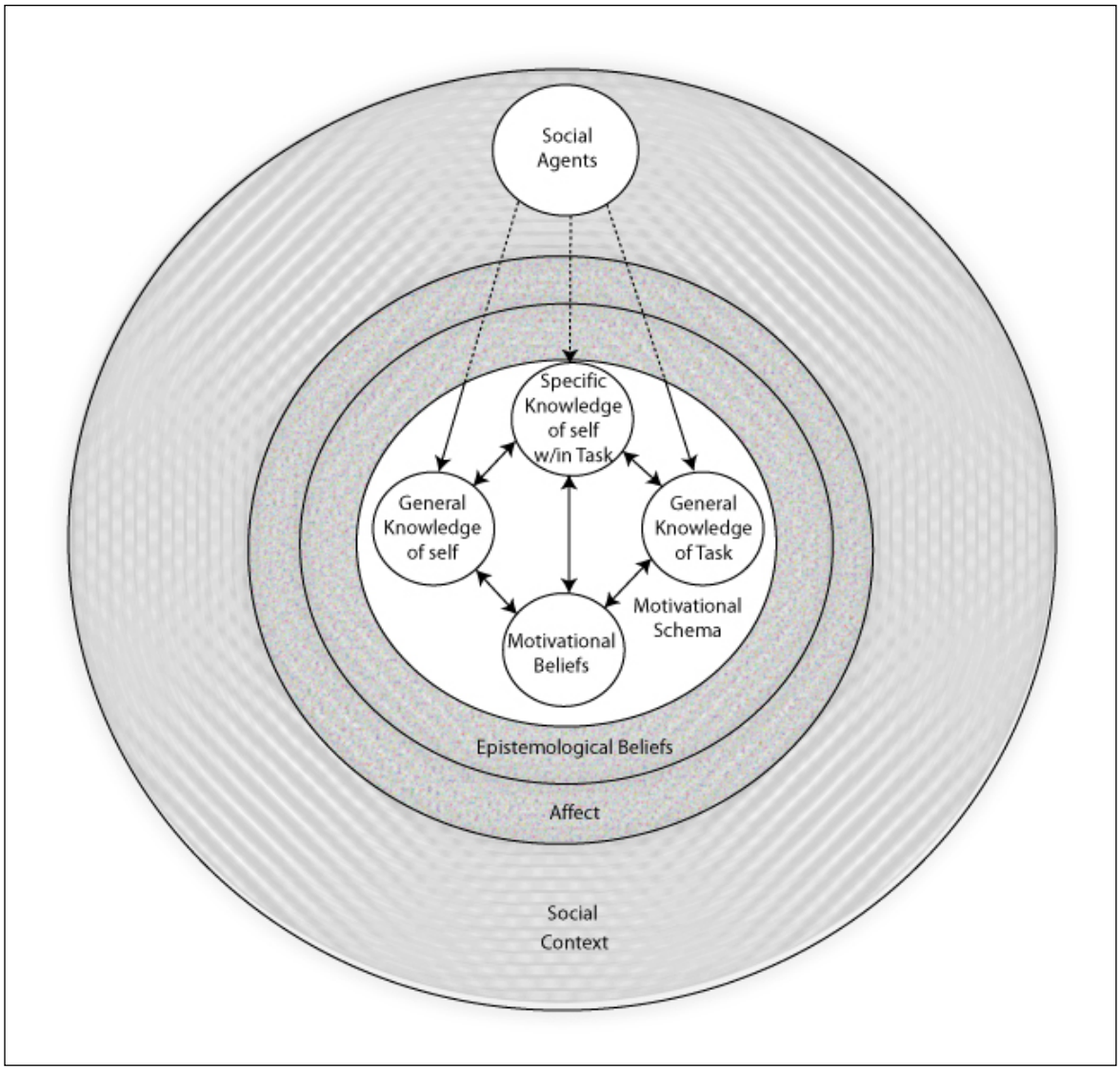
The proposed Conceptual Change of Motivational Beliefs Model (CCMBM) is graphically represented in Figure 1. The aspects of the CCMBM include: 1) learners' motivational schemas; 2) learners' affective states and epistemological beliefs; 3) social agents that influence the learners' motivational beliefs; and 4) the social context in which learners and social agents are situated. The CCMBM incorporate characteristics from both historical and contemporary conceptual change theories. Learners' prior knowledge and ontological[1] categories (i.e., historical characteristics) are integral in the motivational schemas of the learners; while factors such as affect, epistemological beliefs, social context, and social agents (i.e., contemporary characteristics) are integral in how new knowledge about motivational beliefs is processed in one's existing motivational schema. Therefore, the learner's cognitions are synonymous with the learners' motivational schemas in this model.

Figure 1 also graphically represents the transmission of new knowledge from social agents and the individual processing of this new knowledge in the learner. The arrows from the social agents in the figure represent new knowledge about motivational beliefs that is incongruent with learners existing motivational beliefs. This knowledge originates from social agents (e.g., peers, teachers, parents, media, etc.) in a given social context. The knowledge is then filtered by learners' current affective states and epistemological beliefs which interact with the processing of the information in the motivational schema. This schema contains three ontological categories (i.e., learners' common and shared knowledge categories about their motivational beliefs): knowledge of self, knowledge of task, and knowledge of self within task.

[1] Ontological categories are typically discussed in the context of the physical sciences (see Chi, 1992). In this dissertation study, ontological categories denotes that self, self within task, and task are seen as common and shared knowledge types among learners in which knowledge germane to motivational beliefs can be categorized within learners' schemas.

Each category represents prior knowledge the learners possess that informs their current motivational beliefs. Incongruent knowledge could change any combination of existing schemas in the ontological categories leading to

Figure 1: The Conceptual Change of Motivational Beliefs Model



changes in motivational beliefs, and these changes are seen on a continuum of weak conceptual change to strong conceptual change. It is important to note the relationships between knowledge

types, motivational beliefs, affective filters, and epistemological beliefs are seen as an iterative and concurrent process. That is, the model does not assume a linear process regarding these aspects, and that each aspect both influences and is influenced by the others. In other words, they are believed to interact together to influence motivational change.

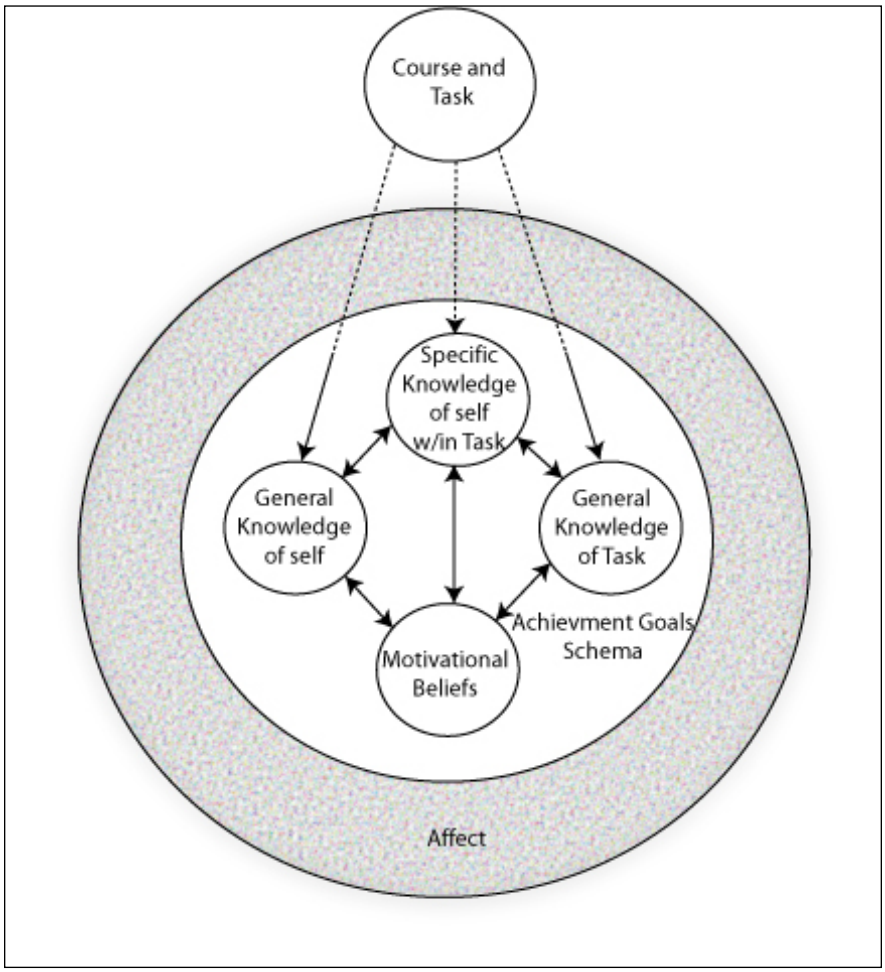
In sum, the educational research has clearly called for models that attempt to incorporate cognition, motivation, and affect. In addition, the research is noticeably lacking in the study of how motivational beliefs change. In this dissertation study, I will further explicate the aspects of the CCMBM and detail the results of a study that designed to investigate two particular aspects of the CCMBM. These aspects were the motivational schema and affect. As such, this study is not intended as a full test of the CCMBM but more of a first step in establishing a line of research that does fully investigate the model. Given the cognitive nature of this model, a cognitive, motivational framework of achievement goal theory proposed by Elliot and Church (1997) was used to investigate the influence of learners' motivational schemas on motivational change. In addition, how affect may interact with the motivational schema to influence the motivational belief change process (see Figure 2) was investigated.

Research Questions

The CCMBM provides a cognitive framework for researchers to investigate changes in learners' motivational beliefs; however, this framework has yet to be empirically validated. Therefore, the purpose of this study was to investigate the validity of the CCMBM. Given the scope of the CCMBM, this study was limited to focusing on two important aspects of the CCMBM: the learners' motivational schemas and affective states and their relationship to the motivational change process. To evaluate the CCMBM, achievement goal theory was utilized as motivational beliefs framework. The participants' motivational beliefs were assessed for both

previous courses and for task within a current course. The use of this theory of motivational beliefs and the interest in learners' motivational schemas and affective states in courses and tasks

Figure 2: Aspects of the CCMBM to be assessed in the study



informed the following four research questions of this study:

1. Do the characteristics of the learner's motivational schemas (i.e., how well articulated) about previous courses relate to changes in the learner's motivational achievement goals for a task?

2. Does affect interact with the characteristics of the learner's motivational schemas about previous courses to relate to changes in the learner's motivational achievement goals for a task?
3. Do changes in the learner's schemas about self, task, and self within task predict changes in the learner's achievement goals for given tasks in a course?
4. Does affect interact with the changes in the learner's schemas about self, task, and self within task to predict changes in the learner's achievement goals for given tasks in a course?

Educational Significance

The model discussed in this dissertation study suggests that motivational change is a cognitive process that includes aspects of the individual learner, such as affect, as well as aspects of the learner's environment, such as social contexts. Such a model could assist both teachers and researchers in promoting adaptive motivation in the classroom. By recognizing that learners' schemas play an important role in their motivation, we can use techniques borrowed from the conceptual change literature to help learners adopt effective motivational beliefs. However, the model that I present has yet to be empirically validated. This study that sought to empirically validate two important aspects of the CCMBM: the motivational schema and role of learners' affective states in the motivational change process.

In the following literature review, I will first discuss the two variables of interest to this study: achievement goals and affect. This discussion will also include a section that outlines previous research that has investigated the relationship between these two constructs. I will then move to a more detailed discussion of the CCMBM by first reviewing conceptual change theories that have contributed to various aspects of the CCMBM. After this, I will discuss the

various aspects of the CCMBM in more detail and propose the research questions for this study. I will then detail the various aspects of the research conducted to evaluate these research questions and describe the impact of the study's findings on research of the CCMBM and research on motivational constructs in education.

CHAPTER 2: Literature Review

Achievement Goals

Goal theory research has a long tradition in the field of education. These investigations have included research on learners' specific goals for particular academic tasks and on general contents of goals that attempt to explain why a learner is motivated (Pintrich, 2000a). Achievement goal theory can be seen as an intermediary explanation of these two approaches in that achievement goals are focused on learners' purposes or reasons (i.e., general goals) and standards of evaluation (i.e., specific targets) for pursuing a particular academic tasks (Pintrich, 2000a). In this area, various achievement goals have been proposed including learning, task, task-involved, and mastery goals that refer to students' focus on learning (Ames, 1992; Dweck & Leggett, 1988; Elliot & Church, 1997; Pintrich, 2000a). Performance, relative ability, and ego-involved goals have been used to describe students' focus on self, ability, or performance in a social comparative context (Ames, 1992; Dweck & Leggett, 1988; Elliot & Church, 1997; Pintrich, 2000a). Initially, these constructs were viewed as dichotomous goals (i.e., mastery versus performance) that learners orient towards to meet their academic goals. More recently, researchers have proposed that learners' approach and avoidance motivations need to be considered in the achievement goal theory framework (Elliot & Church, 1997; Elliot & Covington, 2001; Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001).

Achievement Goal Theory

Achievement goal theory most often applies a social-cognitive framework to understand learners' strivings for competence (Ames, 1992; Dweck & Leggett, 1988). This framework views achievement goals as purposes that learners have for engaging in task and incorporates

cognitive processes that have affective and behavioral outcomes (Ames, 1992; Dweck & Leggett, 1988). That is, these goals integrate patterns of beliefs, attributions, and affect that guide learners' behaviors for approaching, engaging, and responding in achievement situations (Ames, 1992; Dweck & Leggett, 1988). Researchers using this achievement goal theory framework have suggested two categories of achievement goals: "*performance* goals (in which individuals are concerned with gaining favorable judgments of their competence) and *learning* goals (in which individuals are concerned with increasing their competence)" (Dweck & Leggett, 1988, p. 256). The latter of these goals is also often referred to as a mastery goal (Ames, 1992; Elliot & Church, 1997). These two types of goals then serve to create a framework for learners to interpret, experience, and act in achievement contexts, and clarify why and how learners pursue goals in these contexts (Dweck & Leggett, 1988).

As Ames (1992) explains, mastery and performance goals represent different metrics for success on academic tasks, different reasons for engaging in academic tasks, different ways of thinking about the self and academic tasks. Learners with mastery or learning goals are attempting to develop skills, trying to understand their work, trying to improve their competence, and/or trying to achieve mastery based on self standards (Ames, 1992; Dweck & Leggett, 1988). In contrast, learners with performance goals are attempting to increase or demonstrate their academic ability by focusing on comparisons with others, surpassing normative standards, and/or by achieving academic success by doing as little as possible (Ames, 1992; Dweck & Leggett, 1988). These two different approaches to learning have been linked to different academic and psychological outcomes for learners. Mastery goals have typically been associated with adaptive motivation, adaptive emotions, and high cognitive engagement (Ames, 1992). In contrast, performance goals have typically been linked to less adaptive motivation and emotion (Ames,

1992). As Elliot and Church (1997) point out, these views of mastery and performance only focus on approach distinctions of achievement goals and motivation. Noting this as a potential weakness, Elliot and Church (1997) proposed a hierarchical model of achievement motivation that included the prior conceptions of mastery and performance and added distinctions of approach and avoidance motives. The addition of the approach and avoidance constructs then lead to a 2 X 2 achievement goal theory framework.

The 2 X 2 Achievement Goal Theory Framework

Initially, the introduction of approach and avoidance motivations led to the conception of a three level achievement goal framework: 1) performance-avoidance goals; 2) performance-approach goals; and 3) mastery goals (Elliot & Church, 1997). Learners orienting towards performance-avoidance goals are said to be focused on avoiding looking incompetent to others, and learners orienting towards performance-approach goals are said to be focused on showing their competence to others (Elliot & Church, 1997; Pintrich, 2000b). Learners adopting mastery goals are focused on learning and mastery of academic content (Elliot & Church, 1997; Pintrich, 2000b). Research utilizing this trichotomous achievement goal framework has generally found that performance-avoidance goals are associated with negative learner outcomes and that mastery goals are associated with positive learner outcomes (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Pintrich, 2000a, 2000b). The effects of performance-approach goals have been associated with both positive and negative outcomes for learners, but it appears that performance-approach goals can generally be seen as adaptive in the educational context (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Pintrich, 2000a, 2000b). A current trend in the achievement goal theory literature has been the dichotomization of the mastery goal construct.

In this 2 X 2 achievement goal theory framework, mastery goals have been reconceptualized as either mastery-approach goals or mastery-avoidance goals (Elliot, 1999; Elliot & McGregor, 2001; Pintrich, 2000c). Mastery-approach goals are analogous to previous conceptions of mastery goals, while mastery-avoidance goals are seen as a focus on not mastering the task or avoiding not learning the task (Elliot & McGregor, 2001; Pintrich, 2000a, 2000c). This avoidance of incompetence is made in reference to the absolute performance on a task or in reference to individual past performances on a task (Elliot, 1999; Elliot & McGregor, 2001). According to Pintrich (2000b), mastery-avoidance goals can be hard to conceptualize. Examples such as a "perfectionist" not wanting to be wrong, a basketball player not wanting to miss a free throw, a person not wanting to leave a puzzle incomplete, and a student not wanting to learn something the wrong way have helped to explain ways in which mastery-avoidance goals may be different from mastery-approach or performance-approach goals (Elliot & McGregor, 2001; Pintrich, 2000b). Research on mastery avoidance goals has found that they positively correlate with the three other achievement goals and are negative predictors of performance on multiple choice and essay exams (Hulleman et al., 2005). Elliot & McGregor (2001) found that mastery-avoidance positively correlated with state test anxiety, mastery- and performance-approach goals, and was a positive predictor of worry and emotionality. Further, mastery-avoidance has been shown to be positively predicted by incremental theories of intelligence, negatively predicted by perceived competence, and a negative predictor of intrinsic motivation (Cury, Elliot, Da Fonseca, & Moller, 2006).

Research utilizing the trichotomous and 2 X 2 achievement goal theory has contributed to our understanding of learners. However, this line research has not investigated the individual processes that may enact changes in learners' achievement goals. Some research has delved into

how classroom goal structures may influence shifts in learners' achievement goals (Ames & Archer, 1988; Anderman & Young, 1994; Husman, Brem, & Duggan, 2005; Nolen & Haladyna, 1990; Patrick, Turner, Meyer, & Midgley, 2003; Roeser, Midgley, & Urdan, 1996; Wolters, 2004), but individual factors of learners that could relate to this change are noticeably lacking. In the CCMBM, such factors include learners' motivational schemas and individual filters that could influence the incorporation of new knowledge into these schemas. Of particular interest to this dissertation study is the impact the individual filter of affect may have on the individual changes that learners may experience regarding their achievement goals.

Affect

Affect and emotions have been largely neglected in educational research (Pekrun, Goetz, Titz, & Perry, 2002; Schutz & Lanehart, 2002; J. E. Turner, Husman, & Schallert, 2002). As many researchers have noted, the majority of research on emotions in education has focused on the construct of anxiety (Pekrun, et al., 2004; Pekrun, et al., 2002; Schutz & Lanehart, 2002). More recently, researchers have begun to expand their inquiry into what emotions are prevalent in academic contexts and how these emotions influence learning, motivation, and self-regulation (Eynde & Turner, 2006; Linnenbrink, 2006; Linnenbrink & Pintrich, 2002; Meyer & Turner, 2002; Pekrun, Elliot, & Maier, 2006; Pekrun, et al., 2002; Pintrich, 2003; Schutz & DeCuir, 2002; Schutz, et al., 2006; Schutz & Lanehart, 2002; J. E. Turner, et al., 2002). This recent expansion has suggested that affect and emotions are an integral part of almost every aspect of the teaching and learning process (Schutz & Lanehart, 2002). Of these aspects, the nature of affect in educational contexts and their subsequent influence on learners' motivation have most widely been discussed.

The Nature of Affect

One issue in the literature regarding affect is the terminology that is used to describe these constructs. Researchers in the field of affect have traditionally used emotion, affect, and mood as interchangeable terms, and this has led to some confusion about the constructs that are addressed (Linnenbrink, 2006). As such, researchers are now suggesting that some guidance and standardization of terms is needed to better articulate the nature of affect. For instance, some researchers have suggested that emotions should be viewed as short, intense episodes related to a particular event; affect should be viewed as a more global, trait-like construct; and moods should be viewed as somewhere in between in that they are longer lasting than emotions but not as long lasting as affect (Linnenbrink, 2006; Linnenbrink & Pintrich, 2002; Meyer & Turner, 2006; Schutz, et al., 2006). Other researchers have noted that emotions and moods need not be seen as separate constructs but more of a continuum of emotions (Pekrun, 2006). Although debate still exists, it does appear that some agreement exists for viewing affect as a more global construct that encompasses both moods and emotions (Linnenbrink, 2006; Linnenbrink & Pintrich, 2002; Meyer & Turner, 2006). Also of interest to recent research has been the level at which emotions are investigated.

The current literature on emotions can be viewed as focusing on the structural level, the process level, and/or the social historical context level of emotions (Linnenbrink, 2006; Schutz & DeCuir, 2002). Many of the current theories of emotions study the construct at both the structural and process level. For instance, the control-value theory of achievement motivation specifies that emotions arise from various learner appraisals that are categorized as subjective control and subjective value appraisals (Pekrun, 2006; Pekrun, et al., 2002). Such a specification can be viewed as a structural study of emotions because it investigates the underlying factors that

inform emotions. The control-value theory of achievement motivation also links the appraisals that learners make to different types of emotions that include prospective outcome emotions, retrospective outcome emotions, and activity related emotions (Pekrun, 2006; Pekrun, et al., 2002). By doing so, this theory also investigates the process level of emotions in that explains how specific emotions are formed. In much the same way, Schutz and colleagues have discussed how learners' appraisals of goal pursuits can lead to various emotions and regulation of emotions during test taking activities (Schutz & DeCuir, 2002; Schutz, et al., 2006). Unlike the structural and process level, the study of the social historical context level has received less attention in the research.

Although some theories of emotions discuss the social historical context of emotions, few theories centrally focus on this level. Pekrun (2006) notes the importance of the social context in understanding how emotions vary across gender and culture. Others have noted the importance of the social historical context in understanding the underlying structures of emotions and in understanding how teachers' personal histories influence their emotions (Schutz & DeCuir, 2002; Schutz, et al., 2006). One exception to this lack of focus on the social historical context is the dynamic component systems approach to emotions in which emotions are seen as highly situated (Eynde & Turner, 2006). In this theory, emotions are said to be composed of multiple components, to emerge from mutual regulations of the various components, and to be context sensitive (Eynde & Turner, 2006). As such, the dynamic component systems theory of emotions places the social historical context at the forefront of investigating emotions in education. As all of the recent literature depicts, the nature of emotions in the educational context is continually emerging. Of particular interests to the current study has been the links that have emerged between emotions, affect, and achievement goal orientations.

Affect and Achievement Goal Theory

The relationship between emotions, affect, and achievement goals is not a new discussion in educational research literature. For instance, Dweck and Leggett (1988) report that different achievement goals have differing impacts on affect with more performance oriented students reporting anxiety and boredom for challenging tasks and mastery oriented students reporting more positive emotions and affect. Similarly, other studies have consistently found that mastery goals relate to positive affect towards school subjects and school in general (Kaplan & Maehr, 1999; Linnenbrink, 2005; Meece, Blumenfeld, & Hoyle, 1988; Nolen & Haladyna, 1990). Performance goals have sometimes been associated with both negative affect (Meyer, Turner, & Spencer, 1997; Julianne C. Turner, Thorpe, & Meyer, 1998) and positive affect (Meece, et al., 1988; Nolen & Haladyna, 1990; Roeser, et al., 1996). In more current literature, researchers have extended these views and findings in light of the recent study of emotions and affect discussed above.

In his control-value theory of achievement emotions, Pekrun (2006) states that subjective control appraisals and subjective value appraisals of achievement activities and outcomes precede achievement emotions. Subjective control appraisals include such things as attributions for success and expectancies for success while subjective value appraisals include such things as intrinsic and extrinsic values (Pekrun, 2006). The emotions that one experiences are then related to the appraisals that one makes for achievement tasks. For instance, if a learner perceives control of an achievement outcome and values the outcome then anticipatory joy may be felt, but if the outcome is not valued, then anticipatory relief may be felt (Pekrun, 2006). This control-value theory of emotions states that mastery approach goals will focus learners' attentions on mastery of the academic tasks, how they control their competencies on academic tasks, and on

the positive value of the academic task (Pekrun, et al., 2006). In contrast, performance goals will focus learners' attentions on normative achievement with performance approach goals causing a focus on attaining positive outcomes on academic tasks, on controlling these outcomes, and the positive value of the academic tasks (Pekrun, et al., 2006). Performance avoidance will focus learners' attentions on the possibility of failing the academic tasks, on the possible lack of control regarding the academic task, and on the negative value of failing the academic task (Pekrun, et al., 2006).

Given these theorized relationships, the control-value theory of emotions predicts that mastery approach goals will facilitate positive activating emotions (e.g., pride), performance approach goals will facilitate positive outcome emotions (e.g., relief), and performance avoidance goals will facilitate negative outcome emotions (e.g., anxiety; Pekrun, 2006; Pekrun, et al., 2006). In other words, learners' achievement goals can directly influence their emotions. To evaluate these notions, Pekrun et al. (2006) conducted two studies that surveyed German and American college students to elicit their initial achievement goals and resulting emotions in introductory psychology courses. In study one, German students were asked about their emotions in relation to their achievement goals for studying in a course, and in study two, American students were asked about their emotions regarding their overall achievement goals for the course (Pekrun, et al., 2006). Results suggest that mastery goals are positive predictors of enjoyment of learning, pride, and hope, and are negative predictors of boredom and anger about learning. Performance-approach goals were positive predictors of pride, while performance-avoidance goals were positive predictors of anxiety, hopelessness, and shame. Pekrun et al. (2006) concluded that these results were largely in line with the theorized relationships of achievement goals and emotions described by the control-value theory of achievement emotions.

Therefore, this control value theory of motivations posits that achievement goals will have a direct influence on emotions. Other researchers have posited that the relationship between achievement goals, emotions, and affect is more iterative.

Linnenbrink and Pintrich (2002) present a model of achievement goals and affect that views the relationship between the two constructs as asymmetrical and bidirectional. In this model, affect is seen to encompass both moods and emotions which relate to achievement goals in different ways. Given their view of moods as more stable than emotions, Linnenbrink and Pintrich (2002) believed that moods would influence achievement goals, and that achievement goals would then influence less stable emotions. The resulting emotions could then influence moods which highlights an indirect effect of emotions on achievement goals (Linnenbrink & Pintrich, 2002). Therefore, the relationship between emotions, affect, and achievement goals is both reciprocal and bidirectional (Linnenbrink & Pintrich, 2002). That is, emotions can impact learners' achievement goals via emotions direct impact on moods.

The literature on affect and emotions shows that these constructs are important in understanding motivation in academic context. More specifically, this literature suggests that affect and emotions play a crucial role in learners' achievement goals, and as Linnenbrink and Pintrich (2002) suggest, this relationship is likely to be reciprocal with achievement goals influencing emotions and affect influencing achievement goals. Given these theories, the CCMBM includes affect and emotions as a potential filters of information that relate to changes in learners' motivational beliefs. In the CCMBM, it is proposed that affect and emotions will have an impact on the conceptual change that learners may experience regarding their motivational beliefs. To understand how affect and emotions may impact this change process it is first important to understand how the conceptual change process of the motivational schema is

likely to occur. To do this, I have borrowed from both past and more contemporary theories of conceptual change.

Conceptual Change

The central tenets to the CCMBM presented in this study are that 1) conceptual change theory can be used to understand the transformations of learners' motivational beliefs and 2) conceptual change theory can be used to explain the enactment of such changes. At its core, conceptual change theory is concerned with how learners' change their ideas or knowledge. Theories from various disciplines including cognitive psychology (Carey, 1988; Chi, 1992; Smith, di Sessa, & Roschelle, 1993; Thagard, 1992), social psychology (Eagly & Chaiken, 1993; Tesser & Shaffer, 1990), and science education (Chinn & Brewer, 1993; Strike & Posner, 1992; Vosniadou, 2002) have investigated the various aspects of conceptual change including the conditions that foster change, the sources of influence on this change, the longevity and strength of the change, and the facilitation of changes (for a comprehensive review see Dole & Sinatra, 1998). Because there is a breadth of conceptual change research and the model presented in this study is cognitive in nature, I will primarily review conceptual change from theories of cognitive psychology that are germane to the CCMBM. I will begin this review by discussing past theories of conceptual change including theories of Jean Piaget and schemas that provided the theoretical underpinnings to these early conceptual change theories. I then review more contemporary theories of conceptual change that have begun to investigate the influence of motivation and affect on the change process.

Theories of conceptual change

A major predecessor to conceptual change theories was Jean Piaget. Piaget (1950, 1952) described a process of accommodation in which learners could change existing knowledge to

provide better explanations for new knowledge and/or experiences. Piaget not only provided a framework for how learners might change their conceptions, but he also provided a theoretical perspective that helped understand how learners construct these conceptions or knowledge in the form of schemas. This conceptualization of schemas is central to understanding the changes that learners' knowledge may undergo.

Piaget (1950, 1952) believed that schemas are cognitive structures consisting of organized patterns of knowledge or actions that humans develop to understand the world and cope with their surroundings. These schemas are developed via a process termed assimilation, or the process of incorporating new knowledge into existing schemas (Piaget, 1950). These early conceptions of schemas have been expanded on by several researchers in cognitive psychology (Rumelhart & Ortony, 1977; Shank & Abelson, 1977; Spiro, 1980). For example, Rumelhart and Ortony (1977) theorized that schemas exist for concepts of objects, situations, events, sequences of events, actions, and sequence of actions, and that a schema can be viewed as a stereotype of any given concept (Rumelhart & Ortony, 1977). Central to this theory are four assumptions about the nature of schemas: (1) Schemas are said to have variables; (2) Schemas embed with one another; (3) Schemas have different levels of abstraction; and (4) Schemas represent knowledge in an encyclopedic, as opposed to definitional, manner (Ortony & Rumelhart, 1977). Spiro (1980) describe the nature of schemas as complex and constructive, noting that contextual factors such as tasks, texts, and situational contexts could impact how these schemas are organized. These theories provide a lens for understanding how knowledge is represented and to a certain extent, how this knowledge is constructed. However, these theories do not address how knowledge structures may undergo change. Thus, conceptual change theorists began to elaborate

on the Piaget's (1950, 1952) notion of accommodation to further explain how learners may experience changes in their knowledge structures.

Piaget (1952) notes that when we find our existing schemas to be insufficient for understanding new knowledge or experiences, we will often accommodate our schemas for the new information. Accommodation is the process of restructuring existing schemas to provide better explanations for new knowledge and/or experiences that better fit reality (Piaget, 1950, 1952). In cognitive psychology, early conceptual change theories have been dominated by two schools of thought. While researchers such as Chi, Slotta, and de Leeuw (1994) have presented conceptual change theories that focus more on a radical or revolutionary changes in conceptions, other researchers such as Smith, di Sessa, and Roschelle (1993) have describe the change process as evolutionary.

From a revolutionary change perspective, Chi et al. (1994) assume that conceptions are assigned to ontological categories by the learner, and that conceptual change occurs when concepts are reassigned to different categories. In this view, ontological categories are seen as common shared categories of knowledge (Chi, et al., 1994). Chi et al. (1994) applied this theory primarily to learning science, positing that ontological categories included matter, processes, and mental states. An example of an ontological shift would be a learner changing conceptual information about electricity from the matter ontology (e.g., that electricity has amounts and takes up space) to a process ontology (e.g., that electricity is the interaction of atomic structures). This misconception of electricity as matter is common because most introductory texts use an analogy of water to explain the process of electricity; therefore, learners will often attribute matter like qualities to electricity like that it has volume (Chi, et al., 1994). Such ontological shifts are seen as a radical restructuring because it requires learners to fundamentally change

their knowledge of a given concept. That is, a learner brings a certain ontological category to any concept to be learned, and when this prior ontological category does not match the instructed ontological category, learners must undergo a radical shift in thinking to recategorize the concept (Chi, et al., 1994).

In contrast to this radical restructuring, Smith et al. (1993) argue that the refinement of prior knowledge should be the focus of learners' conceptual change rather than replacement or radical reorganization of prior conceptions. In this view, constructivist tenets of continuity and functionality of knowledge are used to develop a systems level of analysis regarding conceptual change. While continuity refers to the gradual process refining of old ideas by combining them with other old ideas and new ideas, functionality is concerned with the perceived utility of both old and new ideas (Smith, et al., 1993). By using continuity and functionality, a systems level of analysis allows for a view of conceptual change as a process of gradually refining integrated sets of knowledge as opposed to one particular misconception. Thus, conceptual change occurs in the context of new knowledge, utility of the new knowledge, and utility of prior knowledge (Smith, et al., 1993). Although radical and evolutionary conceptual change theories have contributed to our understanding of how learners' conceptions change, these theories were narrowly focused: Dole and Sinatra (1998) indicate that these early theories were primarily focused on the process and the outcome of conceptual changes. More recently, conceptual change theories have begun to expand this focus to investigating how contextual influences, such as motivation and affect, can influence the change process.

Contemporary Theories of Conceptual Change

Early theories of conceptual change focused on the process and outcomes of conceptual shifts. Pintrich, Marx, and Boyle (1993) categorized these as "cold" theories of conceptual

change, and they argued for a need to include motivational aspects into "hot" theories of conceptual change. This notion of including "hot" constructs has been influential in the articulation of contemporary conceptual change theories. Two theories that exemplify this new view of conceptual change are the Cognitive-Affective Model of Conceptual Change (CAMCC; Gregoire, 2003) and the Cognitive Reconstruction of Knowledge Model (CKRM; Dole & Sinatra, 1998). Both of these theories are considered part of the "warming" trend in the conceptual change literature because they have included various motivational constructs in their articulation of the conceptual change process (Sinatra, 2005).

Gregoire's (2003) CAMCC proposes that cognitive processing mediates the change process, that motivation and affect mediate cognitive processing, and what gets noticed in the environment results from an individual's attitudes, goals, and prior beliefs. This theory focused on teacher's subject-matter belief change, and the change process begins when individuals are presented with reform messages in a particular environment (Gregoire, 2003). Once this reform is introduced, an individual will evaluate if the reform implicates the self, and if it does not, then positive or neutral affect is enacted and shallow processing occurs leading to superficial or no belief change (Gregoire, 2003). If the reform does implicate the self, then the learner experiences negative affect and evaluates environmental aspects, leading to either threat or challenge appraisals of the message (Gregoire, 2003). If a threat appraisal is made, then avoidance intentions occur, leading to shallow processing and superficial or no belief change; however, if challenge appraisals are made, then approach intentions occur leading to deep processing of the reform and either true conceptual change or no belief change. The CAMCC borrows from cognitive theories of conceptual change as well as from theories of attitude change from social psychology (Gregoire, 2003; Sinatra, 2005). Much like the CAMCC, Dole and Sinatra's (1998)

CRKM borrows from the same two fields of cognitive and social psychology; however, their model is more iterative in its view of "hot" conceptual change and can be applied to a broader variety of learners (Sinatra, 2005).

The CRKM assumes that conceptual change begins with a message that is incongruent to a learner's existing conceptions, proposing that characteristics of the learner and characteristics of the message iteratively influence cognitive change (Dole & Sinatra, 1998; Sinatra, 2005). Characteristics of the learner that influence the change process include their motivation and the nature of the existing conception. Specifically, the CRKM posits that learners will be motivated to process the message if there is dissatisfaction with their current conception, if the message is personally relevant to them, if the social context of the message presentation is persuasive, and/or if the person has a heightened need for cognition (Dole & Sinatra, 1998). If the learner's existing conception is strongly formed, coherent, and committed to, then learners may not be as likely to engage in conceptual change (Dole & Sinatra, 1998). Characteristics of the message including its comprehensibility, coherence, plausibility, and persuasiveness will also influence the likelihood of conceptual change (Dole & Sinatra, 1998). The characteristics of the learner and the incongruent message combine to influence the engagement of the learner in processing the new information, and if this processing is high, then strong or no conceptual change is likely (Dole & Sinatra, 1998). Conversely, if this engagement is low, then weak or no conceptual change is more likely (Dole & Sinatra, 1998).

In sum, past and contemporary theories of conceptual change have allowed us to understand the process of change, the outcomes of change, and the contextual factors that can influence change. As such, the CCMBM has included radical, evolutionary, and contextual factors in its explanation of the motivational change process that learners undergo. It is my belief

that all of these theories have added to our understanding of knowledge change, and that these theories need not be looked at as competing. Indeed, it is likely that learners may undergo radical or evolutionary change depending on the contextual factors of individual differences among learners, the nature of the new knowledge presented, and individual differences among social agents that present this new knowledge; therefore, the CCMBM incorporates these factors in explaining how learners experience changes in their motivational beliefs. Of particular interest to this study is the relationship of affect and emotions to the change process. What follows is a detailed discussion of the various aspects of the CCMBM including how these aspects relate to the conceptual change literature and how given characteristics of these aspects could relate to the change of learners' motivational beliefs. I start this discussion with a description of motivational schema, followed by a discussion of the roles of social context and social agents, and finally discussing the relationship of individual filters, including affective filters, to the change process. Because it is a variable of interest to this study, I will use achievement goal theory as an example throughout the discussion of motivational belief change.

The Model

The Motivational Schema

The motivational schema consists of the learner's motivational beliefs and three categories of knowledge that inform these beliefs: knowledge of self, knowledge of task, and knowledge of self within task. To illustrate how these knowledge sources can impact motivational beliefs, I will discuss the motivational beliefs theory of achievement goals. Placing these achievement orientations in a learner's schema is not explicitly discussed by achievement goal theorists; however, there is support for doing so in the literature. Indeed, Pintrich (2000a)

noted that achievement goal theorists seem to assume that these achievement orientations are represented by schematic means:

> As such, achievement goals would represent a structured knowledge unit . . . about the purposes for an achievement task as well as other elements in terms of how success and competence are defined, the role of effort and errors (Maehr, 2001), and standards for evaluation. These elements would be activated together—that is, the whole schema or theory would be activated—as the individual encounters relevant information in the context (p. 97).

Likewise, Maehr (2001) believed that schemas or knowledge structures could focus a learners attention onto either approach or avoidance orientations towards tasks. In the CCMBM, this structured knowledge unit consists of three knowledge types (knowledge of self, knowledge of task, and knowledge of self within task) that are represented as ontological categories of knowledge.

Ontological Categories of Knowledge and Motivational Beliefs According to Chi (1992), knowledge structures could be organized into ontological categories which learners create to understand the world. The CCMBM proposes that ontological categories pertaining to knowledge of self, knowledge of task, and knowledge of self within task shape learner's motivational beliefs and vice versa. These types of knowledge have been termed as ontological categories to denote that they are seen as common and shared knowledge types among learners in which knowledge germane to motivational beliefs can be categorized within learners' schemas. In an achievement goal context, knowledge of self would include such constructs as overall success in school, overall success in learning, how effort and ability are perceived to have defined these successes, and overall competence as a learner. Knowledge of task would include such constructs as difficulty of the task, standards for evaluation on the task, novelty of the task, and domain specific knowledge related to the task. Knowledge of self within task would include such constructs as past performances on similar tasks, specific competence towards the task, self

standards for success on the task, and how effort and ability are perceived to influence success on the task.

As Pintrich (2000a) suggests, these constructs would likely be activated together in any given achievement situation to form an achievement goal orientation. For example, assume that a learner who has been successful in math is given a math assignment. The learner perceives the given task as similar to other tasks that they have done well on because of their ability and knows they have been successful because they have outperformed their friends. The learner also knows that they will be evaluated on this assignment through a normative grading system. In this example, it is tenable to conclude that the learner would adopt a performance-approach goal orientation for completing the task.

Now assume that the learner brings the completed assignment home to show their parents their high achievement on the task. If the parents were to question the student about how and why particular problems were solved, this could begin to challenge several of the learner's constructs in the knowledge types. That is, the learner may perceive that completing the assignment correctly is not the metric of success on the assignment, but understanding the material is the determinant of success. This process of parental influence could enact a conceptual change process about the learner's understanding of the task, possibly leading to the adoption of a mastery goal orientation. Of course, many factors are going to influence the change that the learner may undergo, and some of these factors will be associated with the ontological knowledge structures.

Factors of ontological categories influencing the change process. Much like the conceptual change model presented by Smith et al. (1993), the CCMBM assumes that prior knowledge plays an important role in the change process. The prior knowledge sphere contained

in the ontological categories is the primary influence on learners' motivational beliefs. As such, the way in which this knowledge is constructed is vital to understanding changes in learners' motivational beliefs. As Dole and Sinatra (1998) point out, the strength, coherence, and commitment of learners' existing conceptions are likely to influence the conceptual change a learner experiences. The strength of an existing conception is related to how connected it is to other existing conceptions, or is the existing conception ". . . well formed and detailed or sparse and fragmented?" (Dole & Sinatra, 1998, p. 118). Adopting this notion in the CCMBM entails that existing knowledge constructs are either strongly or weakly formed within a given ontological category and/or across ontological categories. The CCMBM also adopts the notions of coherence and commitment that are proposed in the CRKM. Coherence refers to the existing conception's ability to explain a given event or phenomenon, and commitment refers to the relationship of the existing schema to variety of sources such as various sensory inputs and cultural background (Dole & Sinatra, 1998). Here again, the CCMBM purports that these two factors are on a continuum of high to low within and/or across ontological categories.

The strength of, coherence of, and commitment to prior knowledge then serve to influence the quality of conceptual change that learners experience within ontological categories of knowledge. As such, the conceptual change of knowledge has a direct impact on the changes in learners' motivational beliefs. If any combination of strength, coherence, and/or commitment is high regarding existing knowledge, then any changes in knowledge are likely to be weak or non-existent. Therefore, changes in motivational beliefs are far less likely. For example, the math learner discussed previously had an existing conception that success on their assignment was measured by successful completion and a high grade, thus contributing to their performance-approach achievement orientation. If we assume that their previous math assignments have been

normatively graded, this knowledge is likely to be strong and coherent in the knowledge of self within task ontology. Further, if we assume that all assignments in the learner's school are graded in a similar manner, then knowledge is likely to be strong and coherent across ontological categories of knowledge of self within task and knowledge of self, and the learner is likely to be very committed to this knowledge as a part of the school's culture. Given these factors, it is reasonable to assume that the knowledge of "success equals understanding" will have little to no effect on the learner's knowledge structure; therefore, the learner's adoption of a mastery goal orientation is unlikely in this scenario.

Conversely, if the learner has experienced other tasks in school where the message is "success equals understanding," then the learner would more likely to adopt the knowledge of "success equals understanding" because the knowledge structures would be weaker, less coherent, and the learner would be less committed to this knowledge. The quality of belief change to a mastery goal orientation would be directly related to the how strongly and coherently the new knowledge was integrated into the knowledge of self within task. That is, the learner may experience a strong belief change if the new knowledge was strongly and coherently integrated into prior knowledge. As a result, the learner may experience a moderate belief change if the new knowledge was moderately and somewhat coherently integrated into prior knowledge. Alternatively, the learner may experience a weak belief change if the new knowledge was weakly and not coherently integrated into prior knowledge. On the other hand, a strong belief change could lead to the learner's adoption of a mastery orientation for all similar future tasks, and a moderate belief change could lead to the adoption of a mastery goal orientation while maintaining a performance orientation for similar future task (i.e., have multiple goals). A weak

belief change could lead to the learner adopting a mastery orientation for this task, but maintaining a performance orientation for this and similar future tasks.

The motivational schema of the CCMBM is central to both understanding the source of motivational beliefs and how these motivational beliefs change. Motivational schemas consist of prior knowledge that is ontologically categorized into knowledge of self, knowledge of task, and knowledge of self within task. This prior knowledge informs one's motivational beliefs, and it is plausible to conclude that motivational beliefs inform one's prior knowledge. The relative strength of, coherence of, and commitment to prior knowledge has a vital influence on both the quality of conceptual and belief change. However, the nature of prior knowledge is not the only factor influencing the quality of motivational belief change. It tenable to conclude that the nature of the social context in which the achievement situation occurs and the characteristics of the social agents that are presenting knowledge will have an intricate influence the change of motivational beliefs.

Social Context and Agents

Dole and Sinatra (1998) noted the importance of the social context on conceptual change in cognitive restructuring model of change; however, their view appeared to be focused only on the social agents within this context. The CCMBM proposes that the change process of motivational beliefs always occurs in an influential social context that not only includes social agents that impart knowledge, but also includes cultural variables that influence the change process. Such a notion relates that both the cognition and the motivation in the model are situated (Anderson, Greeno, Reder, & Simon, 2000; Hickey, 1997; Pintrich, 2003). That is, the change process in the CCMBM is reliant on contextual factors including the characteristics of the learner's cultural background, characteristics of the culture in which the social context is

occurring, and characteristics of social agents with whom the learner interacts. Indeed, J. C. Turner and Patrick (2008) have asserted that understanding how and why learners' motivations change requires a situated approach. It should be noted that I am not supporting the CCMBM as a socio-cultural model like that suggested by J. C. Turner and Patrick. Instead, the model has been designed to incorporate various theories in hopes of making it more coherent and useful for understanding motivational change.

According to Salomon and Perkins (1998), it is optimal for researchers and educators to view learning not simply as an individual or sociocontextual phenomenon, but rather as a combination of both with acknowledgement of each as a process in its own right. For example, in one theorized relation, individual learning can be less or more socially mediated in different social contexts. In the proposed model, for example, the individual is represented figuratively by the innermost schema and surrounding epistemological and affective filters. Encompassing the individual components are social agents that may act directly or indirectly on the individual via the social context. Thus, although one can never truly separate the individual from his/her sociocontexual milieu, one must acknowledge the individual as a participant in his/her own motivational change process. As Pintrich (2003) notes, both cognitive-individual and socio-cultural perspectives have much to contribute to the fields of cognition and motivation, and attempts should be made to integrate the two theories. Therefore, social context and social agents are incorporated into the model and hypothesized to have influences on the changes of learners' motivational beliefs.

Various characteristics of the social context and social agents can influence why and how individuals change their conception about motivational beliefs. The inclusion of these characteristics in the CCMBM not only takes into account the individual processes involved in

the changes of learners' motivational beliefs, but also takes into account how these individual processes interact with relevant social contexts and social agents. By doing so, the CCMBM takes into account cognitive-individual as well as socio-cultural factors in explaining the change process that leads to a more comprehensive view of conceptual and motivational change. It also provides a lens for both teachers and researchers to use in understanding how to influence change of learners' motivational beliefs.

Factors of social context influencing the change process. By acknowledging that individual cognition exists within and is affected by the social context, we recognize that prior knowledge is influenced by the culture in which the individual resides. These cultural influences could originate from societal, familial, school, classroom, and group norms and values. An appropriate example of individual learning mediated by varying socio-cultural influences is provided by Salomon and Perkins (1998), wherein they describe how a basketball player must practice alone in order to hone his skills as well as practice with teammates, thereby situating his learning and skill development in an authentic social environment. His motivation for practicing basketball alone likely stems from environmental stimuli (i.e. teammates, coaches, games on TV) from which he derives norms and values that will contribute to his motivational schema, in turn, influencing his continued development and subsequent behavior as a player.

In CCMBM, these norms and values are thought to have implications on prior knowledge that is brought to bear on incongruent knowledge presented to the learner, and also need to be considered when analyzing motivational belief change. For instance, if a learner's social context is a highly competitive undergraduate program, then performance orientations are going to be more resistant to change. Furthermore, changes to these motivational beliefs could be detrimental to the learner's progress in the program. However, if this same learner enters a mastery-focused

graduate program, then changes to performance orientations may occur more readily because of the new cultural surroundings. However, these changes are not certain to occur and are dependent are the characteristics of the social agents that are providing new knowledge.

Factors of social agents influencing the change process. Like the multiple agents that affect a basketball player's motivational schema, social agents in CCMBM are seen as any potential source of information from which new knowledge can be gleaned. This could include individuals like teachers, peers, and parents or informational medium such as texts, television, and the internet. Though much of the research examines the processes of didactic interactions as the simplest form of social contextual processes, it is likely that social context is much more dynamic and complex than what can be reasonably presented in a single study (Erickson, 1996). Thus, the model tries to capture the range of potential agents that could act on an individual's motivational schema at any given time. Characteristics of these agents will have an influence on the perception of the knowledge that is transmitted. For instance, if a learner is a member of the "jocks" social group and sees a member of the "nerds" social group using understanding as a measure of success, then the learner is not likely to incorporate this information into any existing prior knowledge. Yet, if the learner from the "jocks" sees another member of the "jocks" using understanding as a measure of success, they are more likely to accommodate their knowledge processes. As Bandura (1986) notes, the similarity of an agent along with status, prestige, competence, and expertise of an agent will influence the likelihood of a learner modeling behavior from an agent. The CCMBM adopts these characteristics of social agents to explain their influence on a learner's change process and proposes that if social agents have these characteristics, then learners are more likely to adopt incongruent knowledge that is presented from such social agents. In addition to information provided by the characteristics of social

agents, the model also considers how social agents present new knowledge that may be incongruent with prior knowledge.

Dole and Sinatra (1998) believed that properties of a message include comprehension, coherence, plausibility, and compelling qualities, and that these properties influence the learner's accommodation of a message. The CCMBM places these characteristics in the social context because they are seen as qualities that are controlled by the social agent. In this view, the onus of responsibility is placed on the social agent to present new knowledge that is comprehensible, coherent, plausible, and compelling. If this is done, then the CCMBM speculates that the learner will more readily incorporate the new knowledge into their existing schema and engage in the motivational change process as a result. These new knowledge characteristics likely influence and/or interact with the characteristics of the social agent. If new knowledge is comprehensible and coherent but not plausible and compelling, then a learner may not accommodate the new knowledge. However, if the social agent has similar characteristics to the learner, has expertise, and is competent, then the same knowledge may be more likely to be accommodated by the learner. Conversely, if the new knowledge has all the characteristics that would otherwise predict accommodation, but the knowledge is presented by a dissimilar non-expert with low competence, then the learner may not incorporate the new knowledge. Therefore it is important to consider both new knowledge characteristics and characteristics of the social agent when investigating the changes of motivational beliefs. An additional consideration is the beliefs that learners hold for the nature and origin of knowledge, or their epistemological beliefs.

Epistemological Beliefs Filters

Epistemological beliefs have received recent attention in the educational literature. From an educational psychology perspective, epistemological beliefs are concerned with beliefs about

". . . the definition of knowledge, how knowledge is constructed, how knowledge is evaluated, where knowledge resides, and how knowing occurs" (Hofer, 2002, p.4). Although several developmental models of epistemological beliefs exist, most models theorize that individuals progress from dualistic beliefs to subjective beliefs to more contextualized beliefs about knowledge and knowing (Hofer, 2002; Hofer & Pintrich, 1997). Such beliefs are hypothesized to have an impact on learning (Schraw & Sinatra, 2004), and conceptual change (Mason & Boscolo, 2004; Qian & Alvermann, 2000; Sinatra & Pintrich, 2003). As such, these beliefs have been included in CCMBM because of their possible influence on conceptual change and motivational beliefs. In this model, they are seen as "filters" that act on the processing of incoming incongruent messages. In other words, epistemological beliefs will influence the way that new information is processed in the three ontological knowledge categories, thereby influencing motivational beliefs.

Factors of epistemological beliefs filters influencing the change process. There is some disagreement about whether epistemological beliefs are global or domain specific, and whether epistemology is associated with other constructs in motivation and cognition (Hofer & Pintrich, 1997). Given these issues, the CCMBM does not align itself with any particular developmental theory of epistemological beliefs. The focus of the CCMBM is on the developmental similarities that epistemological beliefs share and how these developmental categories could influence the change process. According to Hofer (2002), most developmental theories of epistemological beliefs propose a continuum that move from objectivist, to relativist, and then to constructivist epistemological beliefs. Objectivists will see knowledge as certain and have dualistic tendencies of seeing knowledge as right or wrong, while relativists perceive knowledge as uncertain and perceive the rightness or wrongness of knowledge a subjective (Hofer & Pintrich, 1997).

Constructivists will see knowledge as constructed by the individual and perceive rightness or wrongness as contextualized (Hofer & Pintrich, 1997). In the context of the CCMBM, such views could profoundly impact how learners encounter and process knowledge, and ultimately, if learners accommodate new knowledge in existing schemas. Indeed, Pintrich (1999) believed that dualistic epistemological beliefs (ex. knowledge is either simple or difficult) could hinder learners' conceptual change processes by causing learners to stop thinking and not fully consider alternate points of view. On the other hand, learners with more subjective epistemological beliefs (e.g., knowledge is uncertain and malleable) would be more likely to evaluate new knowledge and engage in conceptual change (Pintrich, 1999).

Affective Filters

As the literature on affect and achievement goal theory has shown, affect and emotions can play crucial role in learners' achievement goals (Kaplan & Maehr, 1999; Linnenbrink, 2005; Meece, et al., 1988; Meyer, et al., 1997; Nolen & Haladyna, 1990; Pekrun, 2006; Pekrun, et al., 2006; Roeser, et al., 1996; Julianne C. Turner, et al., 1998). This research then highlights the importance of affect in the study of learner motivation. Most of this work has typically noted how achievement goals and motivation will influence the emotions that learners endorse. However, as Linnenbrink and Pintrich (2002) state, the relationship between these variables is likely to be reciprocal with each influencing the other. The CCMBM adopts this notion of reciprocity and notes that affect will likely interact with the changes in learners' schemas because it will have influence on how the learner perceives knowledge from the social context. The CCMBM then posits that resulting motivational beliefs will influence the affect that students endorse for the task and similar future tasks. Therefore, this affect is likely to be felt when in similar future context which will again influence the motivational beliefs that learners' endorse.

It is important to note that the CCMBM views affect in terms of the more global construct that Linnenbrink and Pintrich (2002) describe. That is, affect in the CCMBM is seen as encompassing both emotions and moods.

Factors of affective filters influencing the change process. In the CCMBM, affective states interact with both the incongruent knowledge being presented and with the prior knowledge that is brought to process this knowledge. Indeed, Pekrun et al. (2002) note that emotions may have an effect on motivation by, ". . . facilitating emotion-congruent ways of processing self-related and task-related information" (p. 97). However, it is less clear how each particular type of emotion may influence a learner's adoption or rejection of new information. As Pekrun et al. (2002) note, emotions like boredom will likely be detrimental to motivation, while emotions like pride will likely increase motivation. Other emotions like relief or anxiety could have either debilitating or enabling effects on motivation (Pekrun, et al., 2002).

In the context of the CCMBM, negative deactivating emotions like boredom would likely hinder the change process because the learner is not apt to engage in processing any new information, while positive deactivating emotions (e.g., relief) and negative activating emotions (e.g., anxiety) could be either a hindrance to or facilitator of the change. In Gregoire's (2003) model, the negative activating emotion of anxiety is seen as a major contributor to engagement and the change process if individuals have appropriate coping mechanisms. In much the same way, the CCMBM proposes that certain levels of negative activating emotions and positive deactivating emotions could facilitate the change process depending on individual differences in the learner. Similarly, positive activating emotions may have a negative affect on conceptual change. For instance, if the emotion pride is associated with the prior knowledge of outperforming others, the learner may be less likely to accommodate this knowledge associated

with the notion that understanding equals success. Conversely, if pride was felt as result of being successful at understanding the material, then the learner might adopt this new knowledge. As such, the CCMBM does not purport that any emotion of X has Y effect on the change process. Rather, the model suggests that affective states, along with individual differences in coping with such states, are important aspects to consider when investigating the motivational change process.

Research Questions

The CCMBM provides a framework for researchers to investigate the changes that learners may experience in motivational beliefs. As this review illustrates, this model is cognitive in nature, considers the social context as an influence, and considers individual factors such affective states as an influence. Given its cognitive nature, the CCMBM may be helpful in exploring changes in learners' achievement goals in academic contexts. The literature regarding achievement goals is prolific and illustrates how important these goals can be to achievement in academic setting; however, the specific processes of individual change in these goals have not been addressed by the literature. Such investigations could help further inform classroom instruction that could effectively promote more adaptive achievement goals. Therefore, one purpose of this study is to examine the hypothesized motivational schema of the CCMBM and its relationship to changes in learners' achievement goals. The CCMBM also theorizes that individual filters such as affect can interact with the motivational schema to influence the motivational change process. Further, literature investigating the relationship between achievement goals and affect has shown that affect can influence learners' achievement. Therefore, the second purpose of this study is to examine how affect may interact with learners' motivational schemas and its relations to changes in learners' achievement goals.

Two particular aspects of the learners' motivational schemas are of interest to this study. The first is the characteristics (i.e., the level of articulation) of the motivational schema and the second is the changes in the ontological categories (i.e., schemas about self, self within task, and task) of the motivational schema. The characteristics of the motivational schema will be evaluated in reference to previous courses and a mastery oriented task, as learners' motivational schemas for a course are likely to be more salient (i.e., learners are likely to have more experiences in a course that will in turn inform their schemas). The relationship of changes in learners' schemas about self, self within task, and task will be investigated in reference to a performance-oriented and mastery-oriented task of the course. Only tasks are being used for this investigation because they will prime learners to adopt different achievement goals, and thereby possibly enact changes to learners' achievement goals. Given these areas of interest, the following four research questions are proposed:

1. Do the characteristics of the learner's motivational schemas (i.e., how well articulated) about previous courses relate to changes in the learner's motivational achievement goals for a task?
2. Does affect interact with the characteristics of the learner's motivational schemas about previous courses to relate to changes in the learner's motivational achievement goals for a task?
3. Do changes in the learner's schemas about self, task, and self within task predict changes in the learner's achievement goals for given tasks in a course?
4. Does affect interact with the changes in the learner's schemas about self, task, and self within task to predict changes in the learner's achievement goals for given tasks in a course?

Regarding the first research question, it is expected that stronger, more coherent, and more committed learner motivational schemas will result in less change to these schemas. That is, the more well articulated the motivational schemas that learners possess for having achievement goals, the harder it will be to change their achievement goals. As for the second research question, it is expected that affect will interact with these characteristics of the motivational schema and its relation to changes in learners' achievement goals. Regarding the third research question, it is expected that changes in learners' schemas about self, task, and self within task will result in changes to learners' motivational beliefs. More specifically, it is hypothesized that changes to schemas about self will more strongly predict changes in learners' achievement goals, changes in schemas about self-within task will predict-although not as strongly as changes to self schemas-changes in learners' achievement goals, and changes in schemas about task will predict-although not as strongly as self and self within task schemas-changes in learners' achievement goals. The differences between the predictive qualities of the schemas is expected because self schemas are likely to be the most coherent and committed to schemas, and task schemas are likely to be the least committed to schemas. Finally, the hypothesis for the fourth questions is that affect will interact with changes to learners' motivational schemas and its relation to changes in learners' achievement goals.

CHAPTER 3: Methods

Research Context

Participants

A total of 129 undergraduate students from a large research university in the Southeastern United States were recruited to participate in this study. These students were enrolled in an Introduction to Educational Psychology course and many were taking the course as part of a teacher development program at the university. Students from four different sections of the course were recruited to participate. The Majority of these students were white (80%), female (81%), and under the age of 23 (92%). In addition to this primary data collection, 36 students were recruited from two summer sections of the Educational Psychology course to participate in a pilot study.

Course

The Educational Psychology course was offered as part of the teacher education sequence at the southeast university. This semester-long course was recently restructured as part of an attempt to align the course with state standards for preparing teachers. Four different units were covered throughout the semester: 1) classroom environment; 2) conceptual understanding/individual differences; 3) meaningful learning/complex thinking; and 4) motivational theories and practices. The course utilized four different assessment techniques including quizzes and microteachings. The quizzes were more performance-oriented assessments that required students to know specific content of the course. They included 10 items that were multiple choice, short answer, true/false, and/or fill-in-the-blank. Quizzes were taken in class and

no make up quizzes were allowed. The quizzes were designed to assess the learners' abilities to identify, describe and classify the course content. The microteachings were more mastery-oriented assignments that required students to apply course content to an authentic task of teaching other students about the content. This was a group task designed to assess learners' abilities to model instructional strategies that facilitate conceptual learning, higher-level thinking skills, and applications of motivational principals. It was believed that these two tasks would act as primers for students to adopt different achievement goals. That is, the differing focus of recall and recognition on the quiz as opposed to f ocus of application on the microteaching might promote changes in learners' achievement goals thereby providing data to help answer the research questions of the study.

Procedures

Three separate data collections at three different times throughout the semester were conducted. These data collections utilized pencil and paper survey items to assess the variables of interest to the study. The first data collection occurred during the first week of the Educational Psychology course. During this Time 1 data collection, students were asked about their achievement goals, motivational schemas, and affect for past courses that they perceived as similar to the Educational Psychology course. The second data collection occurred immediately after a quiz on the first unit of the course. During this Time 2 data collection, students were asked about their achievement goals, motivational schemas, and affect for completing the quiz. The third data collection occurred immediately after students completed their microteaching assignment for the course. During this Time 3 data collection, students were asked about their achievement goals, motivational schemas, and affect for completing the microteaching. As students completed the latter two assignments during different times of the semester, no specific

times for these data collections were established. However, all Time 3 data collections occurred after the Time 2 data collection. Prior to these primary data collections, a pilot study was conducted utilizing the same procedures as above.

Measures

Student demographics

Student demographical data were collected during the Time 1 data collections of the study. Students reported their student number, age, gender, ethnicity, and year of study. Student numbers were collected during each of the three data collection in order to match student responses across time periods.

Achievement Goals

The 2 X 2 achievement goal questionnaire (AGQ) was used to assess students' achievement goals during all four data collections. This scale was initially presented by Elliot and McGregor (Elliot & McGregor, 2001) but has since been revised to remove affective wording and make the questions more normative (Cury, et al., 2006). This 12-item revised scale (see Appendix A) includes four subscales: 1) mastery approach (3 items; "I want to learn as much as possible from this class"); 2) mastery avoidance (3 items, "I want to avoid learning less than it is possible to learn"); 3) performance approach (3 items; "It is important for me to do better than other students in this class"); and 4) performance avoidance (3 items; "I want to avoid performing poorly compared to other students in this class"). Reliabilities for these four subscales range from .91 to .89, and previous confirmatory factor analyses have indicated a good fit for the four factor structure of this scale (Cury, et al., 2006). Students rated their responses to these questions on a 7 point Likert-type scale.

Affect

To measure students' affect in this study, a scale[2] that takes items from the Positive and Negative Affect Scale (PANAS; Watson & Clark, 1994), the Affects of Success and Failure scale (Russell & McAuley, 1986), and feelings of self-worth/outcome dependent emotions (Brown & Dutton, 1995). This 24-item scale assessed: 1) positive emotions (12 items, "competent"); and 2) negative emotions (12 items, "guilty"). Students responded to these in relation to their feeling about previous similar courses (Time 1) and to how they felt while completing the tasks during the Time 2 and Time 3 data collections on a 5 point Likert-type scale.

Motivational Schemas

An initial set of 16 items was created to assess students' motivational schemas for endorsing achievement goals (see Appendix A). Students answered these questions in reference to the responses they gave on the AGQ. An example of the presentation style of these the AGQ and motivational schemas questions is included in Appendix A. The motivational schemas scale was used to assess students' motivational schemas about their achievement goals during all three data collections. The items for this scale include three hypothesized subscales: 1) knowledge of self (5 items, "These goals help define who I am as a student"); 2) knowledge of self within task (6 items, "I have been successful in this type of courses when I have these goals"); and 3) knowledge of task (5 items, "These goals are based on what I know about the material"). Students rated their responses to these items on a 7 point Likert-type scale. In addition to these 16 quantitative items, students were asked to respond to three open-ended, qualitative items (see Appendix A). These items were designed to capture the relative strength, coherence, and

[2] I would like to thank Dr. Jeannine Turner for supplying me with this scale. Dr. Turner has created this scale but has not published or tested it yet. She has agreed to let me use and evaluate the scale for this study.

commitment that learners have for their motivational schemas. Students were asked to respond to these qualitative-type items during pilot study data collections.

Analyses

Pilot Study

The pilot study occurred during the summer semester prior to the primary data collection. The study included the same data collection procedures that were discussed for the primary study. The primary goal of this pilot study was to evaluate the reliability of the affective and motivational schemas subscales and to evaluate the validity of the motivational schemas scale's three factor structure. In addition, the pilot study data collection was used to refine the procedures and presentation of the measures to students. The reliability of the subscales was tested using Cronbach's Alpha, and a lower threshold of .60 was set for the analysis.

Two procedures were used to evaluate the validity of the motivational schemas scale. First, the three qualitative-type items were used (see Appendix A) to assess the factor structures, and then an exploratory factor analysis was used to further investigate the validity of the three factor structure. For the first validity check, I began by identifying students who scored above and below one standard deviation from the mean on the Time 1 data for each of the quantitative subscales (i.e., knowledge of self, knowledge of self within task, and knowledge of task). Qualitative responses from students scoring in these ranges of one, two, and all three scales were then compiled and randomly organized. These responses were sent to two raters who were briefed on the purpose of this study and on the three factors in the motivational schema. The raters then coded the responses as pertaining to one, two, or all of the subscales in the motivational schema and identified what subscales the responses related to. Interrater reliability between the raters of at least .90 was established as a benchmark. Once interrater reliability was

met, the coded responses were compared to the students' scores in the subscales to investigate if the students' qualitative responses reflected their quantitative responses.

Primary Study

Research questions one and two. The primary purpose of the first research question was to determine if the characteristics of students' motivational schemas for previous courses would impact the change learners might experience in their achievement goals for mastery tasks in similar courses. To investigate this relationship, a repeated measures MANOVA was conducted. For this analysis, each of the four achievement goals measured at Time 1 and Time 3 were included as dependent variables (i.e., mastery approach, mastery avoidance, performance approach, and performance avoidance), time was included as an independent variable, and the three subscales of the motivational schema measured at Time 1 were included as independent variables (i.e., knowledge of self, knowledge of self within task, and knowledge of task). Therefore, this analysis investigated if characteristics of learners' motivational schemas for similar courses to the Educational Psychology course impacted the changes in achievement goals that learners might experience in achievement goals for mastery oriented tasks in the Educational Psychology course.

The three motivational schema variables for this analysis were first divided into three levels and coded as weakly articulated, articulated, and strongly articulated. To do this, the students' responses to Time 1 motivational subscales were placed on normal curves. Students scoring one standard deviation above the mean on a motivational schema subscale were coded as strongly articulated, students scoring within one standard deviation of the mean on a motivational schema subscale were coded as articulated, and students scoring below one standard deviation of the mean on a motivational subscale were coded as weakly articulate.

These data were then evaluated in regards to the cell sizes that would result from such a coding. As Stevenson (2002) notes, cell sizes should generally be greater than the number of dependent variables. Upon evaluation, it was determined that the coding led to several inadequate cell sizes.

In an attempt remedy this issue, the variables were coded as either strongly articulated or weakly articulated using a median split technique. Another evaluation concluded that inadequate cell sizes for the MANOVA still remained; therefore, the three motivational schema scores were aggregated into one single score. The scores were then standardized and categorized as before (i.e., weakly articulated, articulated, and strongly articulated); however this still resulted in inadequate cell sizes. A median split technique was then applied to the single score, and those scoring above the median were coded as having a strongly articulated overall motivational schemas and those scoring below the median were coded as having a weakly articulated overall motivational schema. This technique provided adequate cell sizes for the MANOVA. Finally, variables from the student demographic data were evaluated for inclusion as possible covariates by investigating a correlation matrix, and no demographic variables were deemed appropriate as covariates.

In addition to investigating research question one, the repeated measures MANOVA also addressed research question two. This question was concerned with the interaction between affect and the characteristics of the motivational schema, and the role that this interaction might play in changes to learners' achievement goals. To investigate this question, the repeated measures MANOVA discussed above was rerun and included learners' Time 3 reports of positive and negative affect as covariates. These covariates were modeled as interactions in the repeated measures analyses. This procedure allowed for an investigation of how positive and

negative affect towards a course might interact with the characteristics of learners' motivational schemas and it relation to changes in learners' achievement goals for a mastery oriented task.

Research questions three and four. Research question three was concerned with the relationship that changes in learners' schemas about self, task, and self within task have with changes in learners' achievement goals for tasks within a course. To investigate these relationships, linear growth models using a hierarchical linear modeling (HLM) approach were utilized. These two level HLM analyses included Time 1, Time 2, and Time 3 achievement goals and motivational schema data. As Raudenbush and Bryk (2002) state, linear growth models can be highly effective in measuring longitudinal data with more than three occasions of measurement. Therefore, I conducted four separate HLM models with each of the four achievement goals as measured at Time 1, Time 2, and Time 3 as dependent variables. Students' reports on the three motivational schema subscales were included in each of these four models as independent variables. This then addressed the concerns of research question one.

In the four HLM analyses, the measures of achievement goals at the three time points were considered as nested within students. Therefore, the level one independent variables of the four HLM models represent the three time points of the data collections and were entered as group-mean centered. Group-mean centering was utilized as time was not expected to vary among the participants. The level two variables of these models were those associated with individual factors (i.e., the three motivational schema subscales), and these variables were entered as grand-mean centered as they were expected to vary among participants. Following the suggestion of Raudenbush and Bryk (2002), these four models were conducted in two steps: (1) an unconditional model was investigated; and (2) an analysis of time and individual variable's relation to the changes in achievement goals was investigated. The unconditional model allowed

for an assessment of the proportion of variance in the dependent variables that can be explained at both level one and level two. An intraclass correlation coefficient was calculated from these estimates to determine the amount of between-group variance left unaccounted and was used to justify the analysis of individual, level 2 variables. The level one models are represented in the following equation:

Equation 3.1

$$Y_{ti} = \Pi_{0i} + \Pi_{1i}a_{ti} + e_{ti}$$

where Y_{ti} is the achievement goal for student i at t time, Π_{0i} is the initial status of students' achievement goals, Π_{1i} is the expected change in achievement goals for person i over the data collection, and e_{ti} is error. This model was primarily used to establish dependent variables for the level 2 models.

As the prediction of the level 2 variables on the initial status of students is not of interest, only level two variables were modeled on the expected change (i.e., Π_{1i}) in achievement goals from the level one models. These level two models are represented in the following equations:

Equation 3.2

$$\Pi_{0i} = \beta_{00} + r_{0i}$$

and

Equation 3.3

$$\Pi_{1i} = \beta_{10} + \beta_{11}(\text{Self})_i + \beta_{12}\,(\text{Self in Task})_i + \beta_{13}\,(\text{Task})_i + r_{1i}$$

where β_{00} is the adjusted initial status of students' achievement goals, r_{0i} is error, β_{10} is the adjusted expected change in achievement goals, $\beta_{11\text{-}13}$ are the effects of the respective individual variables on the expected changes in achievement goals, and r_{1i} is error. Evaluating significance

of the beta coefficients of the later model provided answers to research question one. That is, if β_{10} is statistically significant, then students will have experienced a significant change in a given achievement goal, and if any of the $\beta_{11\text{-}13}$ were statistically significant, then the respective individual variable will have been shown to relate to any changes in a given achievement goal.

To evaluate the final research question regarding the interaction of affect with learners' motivational schemas, the above two level analyses were rerun with positive affect and negative affect towards tasks as measured at Time 2 and Time 3 included as covariates at level one and entered as grand-mean centered. Once again, unconditional models were evaluated to justify any Level 2 analyses that were conducted. The level one models for these analyses are represented by the following equation:

Equation 3.3

$$Y_{ti} = \Pi_{0i} + \Pi_{1i} a_{ti} + \Pi_{2i} (\text{pos affect})_i + \Pi_{3i} (\text{neg affect})\ e_{ti}$$

where Y_{ti} is the achievement goal for student i at t time, Π_{0i} is the initial status of students' achievement goals, Π_{1i} is now the expected change in achievement goals for person i over the data collection, Π_{2i} is the expected change in achievement goals for person i over the data collection adjusted for positive affect, Π_{3i} is the expected change in achievement goals for person i over the data collection adjusted for negative affect, and e_{ti} is error. As before, this model was primarily conducted to establish outcome variables for the level two analyses.

For the level two analyses involving affect, two variables from the level one analyses were modeled at level two. These two variables were the expected changes in achievement goals for person i over the data collection adjusted for the two separate affective variables. Again, the three motivational schema subscales served as independent variables for these analyses. The level two models are represented by the following equations:

Equation 3.4

$$\Pi_{2i} = \beta_{20} + \beta_{21}(\text{Self})_i + \beta_{22}\,(\text{Self in Task})_i + \beta_{23}\,(\text{Task})_i + r_{2i}$$

and

Equation 3.5

$$\Pi_{3i} = \beta_{30} + \beta_{31}(\text{Self})_i + \beta_{32}\,(\text{Self in Task})_i + \beta_{33}\,(\text{Task})_i + r_{3i}$$

where β_{20} and β_{30} are the expected change in achievement goals adjusted for the respective affective variable, $\beta_{21\text{-}23}$ and $\beta_{31\text{-}33}$ are the effects of the respective individual variables on the expected changes in achievement goals adjusted for the respective affect variable, and r_{1i} is error. If statistically significant, the β_{20} and β_{30} showed that the respective affective variable significantly predicted the respective achievement goal. The $\beta_{21\text{-}23}$ and $\beta_{31\text{-}33}$ then tested for significant interaction effect between a respective motivational schemas subscale and a respective affective variable on the respective achievement goal.

CHAPTER 4: Results

Pilot Study

Data Collection Procedures and Reliability

The pilot study included 36 students of which a majority were white (85%) and female (80%). The study showed that no changes to the planned data collection procedures were warranted. The timing and presentation of the questionnaire were not seen as problematic for the instructors or students. The reliability tests for the two subscales of the affective scale and the three subscales of the Motivational Schemas scale all showed acceptable consistency. For the affective scale, the positive emotions subscale's reliability was .91, and the negative emotions subscale's reliability was .85. For the motivational schemas subscales, the self subscale's reliability was .85, the self within tasks subscale's reliability was .91, and the task subscale's reliability was .94. Given these results, all subscales of the affective and motivational schemas scales were considered reliable.

Motivational Schemas Scale Validity

For the qualitative validity check, the initial interrater reliability between the two coders was .81 which fell below the established .90 or above criterion for interrater reliability. To remedy this issue, responses that represented the differences in the raters' codings were gathered, and the raters and I then met to discuss the discrepancies in their coding. During this discussion, it was clear that the major discrepancy in the raters scoring was differentiating between the self

and self within task subscale. As the raters described how they viewed these two aspects, they began to come to an agreement on the codings, and the interrater reliability rose to the acceptable level of .93.

Having established an acceptable interrater reliability, the qualitative coding and quantitative scores were evaluated to investigate how closely they "match". That is, students who scored highly on a quantitative subscale of the motivational schema should have qualitative responses that have been coded as the same subscale of the motivational schema, and students scoring below one standard deviation on a given subscale should not be coded on that subscale. The evaluation of these data identified a problematic trend with the self subscale. Students rated as high on self from qualitative responses often had high quantitative scores on both the self subscale and the self within task subscale, and students with high quantitative scores on the self subscale were often qualitatively coded as high on both self and self within task. In other words, it appeared that the self and self within task subscales were not separating into different constructs.

To further investigate the factor structure of the motivational schemas scale, an EFA with principle axis factoring and varimax rotation was conducted on the 16 items. The analysis yielded two factors with eigenvalues over one, and the factor solution accounted for 70.9% of the total variance. Four of the self items and four of the self within task items loaded onto one factor, and four of the task items were loading onto the other factor (See Table 1).

Table 1: EFA for Initial Motivational Schemas Scale

	Factor	
	1	2
Self		
These goals help me achieve success in many aspects of school	.78	
These goals work well for me in school	.78	
These goals define who I am as a student	.48	.44
I have had many instances when these goals have been effective for me in school	.77	
When I don't have these goals, I do not achieve success in school		.50
Self Within Task		
I frequently have these goals for this type of course	.73	
These goals have worked for me in this type of courses	.81	
These goals helped me achieve success in this type of courses	.85	
I have been successful in this type of courses when I have these goals	.76	
When I did not have these goals, I have not been successful in this type of courses		.57
I have had many instances when these goals helped me achieve success in this type of courses	.71	
Task		
Material in courses like this is more easily understood when I have these goals	.50	.66
These goals are important for the material in these type of courses		.83
These goals are effective for the material in these type of courses		.77
These goals are based on what I know about the material		.79
These goals are important for what I need to know in courses like this		.84

There was evidence one self item crossloading and one self within task item crossloading, and one self and one self within task item loaded onto the task factor. The results of the EFA, when taken into account with the results of the qualitative validity check described above, showed that the self subscale was problematic.

Upon further investigation of the self subscale and how it might be indistinguishable from the self within task subscale, it was determined that the word "school" in the self subscales

might be the root of the problem (e.g., “These goals work well for me in school”). That is, school did not substantially differentiate itself as a component of the self or was not broad enough to define the self as opposed to the self within task. Therefore, the self items were rewritten (see Appendix A) to clearly delineate self (i.e., “every course”) from self within task (i.e., “this type of course”). Item 4 “These goals help me define who I am as a student” and Item 1 with its reference to “many aspects of school”, were deemed as qualitatively different from the previous self questions and were retained. In addition, items that crossloaded were replaced and clearer reverse coded items were included for each of three subscales, and item 16 was removed as it did not reference “material” and was deemed qualitatively different from the other task items (see Appendix A). This revised scale was then utilized in the primary study with plans to further investigate the validity using quantitative techniques.

Primary Study

Motivational Schemas Scale Validity

Before conducting the statistical investigations of the research questions, the Motivational Schemas scale’s validity was once again tested. Confirmatory Factor Analysis (CFA) was utilized to evaluate the scales validity. The CFA was conducted on the three factor structure of the Motivational Schemas scale and yielded the following fit statistics: χ^2 (87) = 115.91, $p > .05$; Comparative Fit Index (CFI) = .90; Tucker and Lewis Index (TLI) = .88; Standardized Root Mean-Square Residual (SRMR) = .10; Root Mean-Square Error of Approximation (RMSEA) = .08 (CI: .03, .12). Item loadings for the self subscale ranged from .23 to .75, item loadings for the self within task subscale ranged from -.01 to .75, and item loadings for the task subscale ranged from .18 to .89. These fit statistics were approaching acceptable fit level but did not meet established criteria for fit (Hu & Bentler, 1999).

Given that the fit statistics did not meet conservative criteria for acceptable fit, the Wald test was used to determine which items to delete from the scale. The test suggested that a total of four items be trimmed from the scale (see Appendix A). The CFA conducted with the remaining 11 items (see Appendix A) yielded the following fit statistics: χ^2 (41) = 45.93, $p > .05$; Comparative Fit Index (CFI) = .98; Tucker and Lewis Index (TLI) = .97; Standardized Root Mean-Square Residual (SRMR) = .06; Root Mean-Square Error of Approximation (RMSEA) = .05 (CI: .00, .11). Item loadings for the self subscale ranged from .37 to .75, item loadings for the self within task subscale ranged from .67 to .75, and item loadings for the task subscale ranged from .72 to .87. This new 11item model showed good fit (Hu & Bentler, 1999), but the results of the Chi square difference test ($\Delta\chi2$= 69.98, Δdf = 45, $p < .05$) suggested that a significant amount of fit was lost by using the less parameterized model. Therefore, the original 15 item scale would be preferred to this 11 item scale.

To assure that a "least" parameterized model was not preferred to the 15 item scale, one last CFA was conducted with the minimum of three items per scale. The highest loading items for each of the three subscales were selected from the 15 item scale's CFA to create a 9 item scale (see Appendix A). The fit statistics for this model were: χ^2 (24) = 31.38, $p > .05$; Comparative Fit Index (CFI) = .96; Tucker and Lewis Index (TLI) = .94; Standardized Root Mean-Square Residual (SRMR) = .06; Root Mean-Square Error of Approximation (RMSEA) = .08 (CI: .00, .11). Item loadings for the self subscale ranged from .39 to .77, item loadings for the self within task subscale ranged from .68 to .77, and item loadings for the task subscale ranged from .73 to .86. This 9 item model showed relatively good fit (Hu & Bentler, 1999), and the results of a Chi square difference test between it and the 15 item scale ($\Delta\chi2$= 84.53, Δdf = 24, $p >$ .05) suggested that a significant amount of fit was not lost by using the least parameterized

model. As Hu and Bentler (1999) point out, more parsimonious models are preferred to more complex models when significant fit is not lost; therefore, this least parameterized scale was utilized in the primary study's analyses.

Research Questions One and Two

The first research question investigated the relationship between the articulation levels of the motivational schema and the changes in participants' goals from Time 1 to Time 3. This relationship was explored using a repeated measures MANOVA. The multivariate tests for within-subjects effects showed no statistically significant results for either time, F (4, 69) = 1.41, $p > .05$ or schema articulation and time, F (4, 69) = 1.59, $p > .05$. A statistically significant multivariate between-subjects effect was observed for schema articulation, F (4, 69) = 4.57, $p < .01$ ($\eta_p^2 = .21$). Given the results of the multivariate within-subjects effects, no univariate effects were explored. The univariate analyses for between-subjects effects of schema articulation showed a statistically significant relationship for performance approach (PAP), F (1, 72) = 7.96, $p < .01$ ($\eta_p^2 = .10$); performance avoidance (PAV), F (1, 72) = 7.01, $p < .05$ ($\eta_p^2 = .09$); and mastery approach (MAP), F (1, 72) = 15.66, $p < .001$ ($\eta_p^2 = .18$). For all three variables, students held significantly stronger motivational schemas than weak motivational schemas; however, these results were not of interest to the current research question. Further, they were of no surprise given the median split coding technique used for the articulation of motivational schemas variable.

The second research question investigated the relationship between the articulation levels of the motivational schema and the changes in participants' goals from Time 1 to Time 3 while including positive and negative affect added as covariates. This relationship was explored using

repeated measures MANOVA. The multivariate tests for within-subjects effects showed no statistically significant results for time, F (4, 69) = 2.00, $p > .05$; time and positive emotion, F (4, 69) = 2.11, $p > .05$; time and negative emotion, F (4, 69) = .93, $p > .05$; or time and schema articulation, F (4, 69) = 1.68, $p > .05$. A statistically significant multivariate between-subjects effect was observed for positive emotion, F (4, 69) = 3.58, $p < .05$ ($\eta_p^2 = .19$) and for schema articulation, F (4, 69) = 3.85, $p < .01$ ($\eta_p^2 = .20$). Given the results of the multivariate within-subjects effects, no univariate effects were explored. The univariate analyses for between-subjects effects of positive emotion showed a statistically significant covariate relationship for PAP, F (1, 72) = 10.52, $p < .01$ ($\eta_p^2 = .14$) and PAV, F (4, 69) = 14.94, $p < .001$ ($\eta_p^2 = .19$). Although significant, this covariate had no significant effects on the within-subjects analyses. The between-subjects univariate analyses for schema articulation showed a statistically significant relationship for PAP, F (1, 72) = 6.83, $p < .05$ ($\eta_p^2 = .10$); PAV, F (1, 72) = 6.28, $p < .05$ ($\eta_p^2 = .09$); and MAP, F (1, 72) = 12.95, $p < .01$ ($\eta_p^2 = .17$). For all three variables, participants again held stronger motivational schemas than weak ones, and again, these results were of no interest to the current research question.

Research Question three and four

The third research question investigated the relationship between the changes in students' motivational schemas and changes in students' achievement goals across the three data collection periods. This relationship was explored using Hierarchical Linear Modeling (HLM). The first step in the HLM analyses was to evaluate the unconditional model of slopes for the four outcome variables (i.e., PAP, PAV, MAP, and MAV) to determine the amount of variance that could be explained by the Level 1 (i.e., Time) and Level 2 (i.e., self, self within task, and task) variables.

The intraclass correlations of the slopes for PAP (.01), PAV (.00), and MAP (.00) were too small to justify the HLM analyses. That is, there was not enough variance in the growth rate of students' achievement goals to be accounted for by Level 2 variables. However, the interclass correlation of the slope for MAV (.08) was found to be large enough to justify the HLM procedures. An HLM analysis was then investigated for MAV with the Level 1 variable of time in the model and the Level 2 variables of Self, Self within task, and Task in the model (See Table 2 for results).

Table 2: Hierarchical Linear Models for PAP, PAV, MAP, and MAV with Time

Independent Variables	Dependent Variable	Coefficients	df	*t-ratio*
Level One				
Time (β_{10})	MAV	-.15	134	-.89
Level Two				
Self (β_{11})	MAV	-.12	134	-.89
Self Within Task (β_{12})	MAV	.49	134	1.01
Task (β_{13})	MAV	.06	134	.15

The above results show that MAV did not significantly change over time, and that students' motivational schemas had no impact on the shifts, whether significant or not, in MAV achievement goals.

The fourth and final research question sought to investigate the impact of positive and negative emotions on the relationship investigated in the third research question using HLM. In these analyses, positive and negative affect were added as Level 1 independent variables, and the

affective variables' interaction effect with the Level 1 outcome variables were modeled as outcome variables at Level 2. As before, the analyses began by evaluating unconditional models for both positive and negative affect. For positive affect, the interclass correlations for PAP (.16), PAV (.27), MAP (.27) and MAV (.07) justified the Level 2 analyses. For negative affect, the interclass correlations for PAP (.12), PAV (.50), MAP (.41), and MAV (.20) also justified the Level 2 analyses. Given these results, all variables of interest were included in the HLM analyses (see Tables 3 and 4 for results).

Table 3: Hierarchical Linear Models for PAP, PAV, MAP, and MAV with Positive Affect

Independent Variables	Dependent Variable	Coefficients	df	*t-ratio*
Level One				
Positive Affect (β_{20})	PAP	.58	129	4.67***
	PAV	.47	129	3.62**
	MAP	.31	129	3.68**
	MAV	.14	129	1.14
Level Two				
Self (β_{21})	PAP	.06	129	.31
	PAV	.07	129	.20
	MAP	-.18	129	-1.42
	MAV	-.10	129	-.59
Self Within Task (β_{22})	PAP	.34	129	1.18
	PAV	.39	129	1.33
	MAP	-.09	129	-.44
	MAV	-.16	129	-.55
Task (β_{23})	PAP	-.06	129	-.27
	PAV	.08	129	.35
	MAP	.09	129	.56
	MAV	.22	129	1.05

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

Table 4: Hierarchical Linear Models for PAP, PAV, MAP, and MAV with Negative Affect

Independent Variables	Dependent Variable	Coefficients	df	*t-ratio*
Level One				
Negative Affect (β_{30})	PAP	.48	129	2.54*
	PAV	.25	129	1.26
	MAP	.22	129	1.74
	MAV	.10	129	.57
Level Two				
Self (β_{31})	PAP	.07	129	.22
	PAV	.07	129	.20
	MAP	-.55	129	-2.47*
	MAV	-.68	129	-2.10*
Self Within Task (β_{32})	PAP	-.18	129	-.39
	PAV	-.06	129	-.13
	MAP	.11	129	.38
	MAV	.10	129	.25
Task (β_{33})	PAP	.01	129	.03
	PAV	.16	129	.43
	MAP	.13	129	.56
	MAV	.18	129	.53

Note. *= $p < .05$

The above results suggest that positive affect had a positive relationship with PAP, PAV, and MAP, and negative affect had a positive relationship with PAP. The students' motivational schemas appeared to have no impact on the relationship between students' positive affect and achievement goals; however, the self schema did appear to impact the relationships of two achievement goals (MAP and MAV) and negative affect. In both instances, higher reports of self schema appeared to be related to lower reports of the achievement goal when accounting for students' reports of negative affect.

Chapter 5: Discussion

Summary of Findings

This study was conducted to assess specific aspects of the proposed Conceptual Change of Motivational Beliefs Model (CCMBM) by exploring the different aspects' relationships to changes in students' performance approach (PAP), performance avoidance (PAV), mastery approach (MAP), and mastery avoidance (MAV) achievement goals. Findings suggest that the CCMBM's factors had little impact on students' achievement goals. More specifically, the results suggest that the articulation of students' motivational schemas has no impact on the changes in students' achievement goals, and that students' positive and negative affect had no impact on the relationship between the schemas' articulation and achievement goals. Additionally, the results suggest that the proposed knowledge types (knowledge of self, knowledge of self within task, and knowledge of task) within the motivational schema had minimal impact on the changes in students' achievement goals. Knowledge types did have an impact on achievement goals dependent on the students' negative affect.

Findings for Research Questions One and Two

Research questions one and two were primarily focused on the impact of the motivational schema's articulation on students' achievement goals (i.e., PAP, PAV, MAP, and MAV) and the role that affect played in this relationship. For these analyses, the students' scores on the three Time 1 motivational schemas subscales were aggregated to a single score and coded as strongly

articulated or weakly articulated. This articulation variable served as an independent variable in repeated measures MANOVA's while the students' reports of achievement goals for previous similar courses (i.e., Time 1) and for the mastery oriented task (i.e., Time 3) served as dependent variables. These variables were used in the initial repeated measures MANOVA to investigate research question one's interests in the relationship between the articulation of motivational schemas and the shifts in students' achievement goals. To investigate research question two's interest in the impact of affect on the proposed schema articulation and achievement goal relationship, positive and negative affect were added as covariates to a second repeated measures MANOVA.

For research question one, it was hypothesized that students with weakly articulated motivational schemas would experience significantly greater shifts in their achievement goals than student with strongly articulated schemas. The results of the first repeated measures MANOVA showed that there were no significant ($p > .05$) multivariate effects for shifts in students' achievement goals from Time 1 to Time 3, and no significant ($p > .05$) multivariate effects for students' schema articulations at Time 1 on any shifts that students had in their achievement goals from Time 1 to Time 3. In other words, the students did not experience significant changes in their achievement goals, and articulation of their motivational schemas had little to no impact on any changes in their achievement goals. This result is counter to the hypothesized relationship of weakly articulated motivational schemas leading to significantly more change in achievement goals.

For research question two, it was hypothesized that students' reports of positive and negative affect would interact with the articulation of students' motivational schemas to influence the schema articulations relationship with achievement goals. The results of the second

repeated measures MANOVA showed that their continued to be no significant ($p > .05$) multivariate effects for shifts in students' achievement goals from Time 1 to Time 3 when controlling for the effects of positive and negative affect. Also, there were no significant ($p > .05$) multivariate effects for students' schema articulations at Time 1 on any shifts that students had in their achievement goals from Time 1 to Time 3 when controlling for the effects of positive and negative affect. That is, affect did not significantly interact with changes in students' achievement goals, and affect had no significant impact on the relationship between the articulation of students' motivational schemas and shifts in achievement goals. As before, this result does not support the hypothesized relationship of students' affect impacting the relationships that motivational schema articulations had to changes in students' achievement goals. This last analysis did reveal that negative affect was a significant covariate for both performance approach and performance avoidance; however, this relationship was of little surprise given previous findings on the relationship between affect and achievement goals (Dweck & Leggett, 1988; Kaplan & Maehr, 1999; Linnenbrink, 2005; Meece, et al., 1988; Nolen & Haladyna, 1990). Furthermore, it did not impact the variables of interest to this study and was of little interest to the current study.

Findings for Research Questions Three and Four

Research questions three and four were primarily focused on the impact of changes to students' motivational schema's subscales had on changes to students' PAP, PAV, MAP, and MAV achievement goals and on the role that affect played in these relationships. To investigate these two questions, Hierarchical Linear Modeling with time of data collection (Level 1) nested in the individual students (Level 2) was used. Separate HLM analyses were conducted for each of the four achievement goal outcome variables with time and, when appropriate, affective

variables were included at Level 1. Level 2 variables for these analyses included the three subscales of the motivational schema.

For research question three, it was hypothesized that changes in students' motivational schemas would predict changes in students' achievement goals. More specifically, it was proposed that changes in knowledge of self would have the most predictive power, changes in knowledge of self within task would have some predictive power, and changes in knowledge of task would have the least, but still significant, predictive power. Three of the four achievement goals in this analysis showed little to no variance to be accounted for by individual student variables. For changes in PAP, PAV, and MAP, the predictive power of changes in students' motivational schemas could not be assessed as there wasn't adequate Level 2 variance to account for. One achievement goal, MAV, did exhibit a reasonable amount of variance at Level 2, and the planned HLM analysis was conducted on this outcome variable. Results of this HLM analysis demonstrated that the predictors of self, self within task, and task were not significant predictors of changes to MAV. That is, the results suggested that students did not experience significant changes in MAV, and that none of the motivational schema subscales had any predictive power for shifts in students' MAV achievement goals. Therefore, the hypothesized relationships between students' knowledge types and achievement goals were not observed.

The hypotheses for the fourth and final research question were that affect would interact with the proposed motivational schema's knowledge types to influence the predictive impact the knowledge types had on the four achievement goals. An investigation of the Level 2 variance for these analyses suggested that individual variables were appropriate to assess. That is, there was adequate Level 2 variance for the relationships between all four achievement goals and the two affective variables, and HLM analyses were appropriate to investigate all variables of interest.

The subsequent eight HLM analyses showed that positive and negative affect had significant relationships to the outcome variables. Positive affect had significant and positive relationships with PAP, PAV, and MAV, and negative affect had a significant and positive relationship with PAP. However, positive affect had no significant impact on the motivational schemas relationships with the four achievement goals, but negative affect did impact the relationship between the self subscale and two achievement goals. For both MAP and MAV, higher reports of self schemas were significantly correlated with decreased achievement goals when accounting for negative affect.

Conclusions

Two aspects of the proposed CCMBM's motivational schema were assessed in this study, and overall, the findings of this study show little support for the CCMBM. The first aspect evaluated was the motivational schema's overall articulation and its impact on the changes in learners' achievement goals for previous courses to a mastery oriented task in their current course. It was expected that higher levels of articulation in the motivational schema would lead to lower rates of change among students' achievement goals. In addition, it was believed that positive and negative affect would have some influences on this relationship. The analyses conducted to assess these relationships found no impact of the schema's articulation on shifts in achievement goals and found that positive and negative affect had no impact on these relationships. These results then suggest that the level of articulation and affect did not play a significant role in changes to learners' achievement goals, and both of these findings are counter to the hypothesized relationships for research questions one and two. However, it should be noted that the results also suggest that there were no significant differences between learners' Time 1 and Time 3 achievement goals.

The second motivational schema aspect assessed was the ontological categories of self, self within task, and task. More specifically, analyses were conducted to investigate the relationship between changes in these categories and changes to learners' achievement goals from previous courses to a performance oriented task in their current course and then to mastery oriented task in their current course. In addition, the role negative and positive affect played in the relationships between these growth rates were explored. It was expected that changes in learners' reports of self schemas would be the most predictive of changes to learners' achievement goals while changes in learners' reports of task would be the least predictive of changes to learners' achievement goals. The results regarding these proposed relationships for PAP, PAV, and MAP showed there was little individual level variance to be accounted for. In other words, the differences between individual rates of change associated with these goals were negligible, and therefore, individual level variables, such as the measured ontological categories, would not be predictive of the achievement goals' growth rates. For MAV, there was an adequate amount of individual level variance to assess, but the results suggest that none of the three ontological categories were an individual predictor of differences among MAV growth rates. As such, these results provide no support for the hypothesized relationships put forth in research question three.

The above relationships between ontological categories' and achievement goals' growth rates were also explored in the context of learners' positive and negative affects at Time 2 and Time 3. For these analyses, it was expected that affect would have some impact on the predictive abilities of the ontological categories. When positive affect was considered, PAP, PAV, MAP, and MAV change rates did exhibit individual level variance. There were significant, positive relationships observed between positive affect and PAP, PAV, and MAP meaning that higher

reports of positive affect at Time 2 and Time 3 were associated with higher reports of the three achievement goals at those times. The analyses for the three ontological categories showed no significant relationships among the variables. That is, knowledge of self, self within task, and task had no predictive qualities for the interaction growth rate of positive affect and achievement goals.

For negative affect, all four achievement goals again exhibited individual level variance for the interaction change rates. PAP exhibited a positive, significant relationship with negative affect suggesting that higher reports of negative affect at Time 2 and Time 3 were associated with higher reports of PAP achievement goals for both the Time 2 performance and Time 3 mastery oriented tasks. An investigation of the ontological categories showed that self within task and task were not predictive of the interaction growth rate between negative affect and achievement goals. For PAP and PAV, the self category showed similar trends of non-significant relationships; however significant relationships between the self category and MAP and MAV interaction growth rates were observed. When considering negative affect, lower reports of self were associated with higher reports of both MAP and MAV. A majority of the results of these analyses did not lend support to the hypothesized relationships for research question four. The results suggest that positive affect had no impact on the relationship between changes in ontological categories and achievement goals. The results were similar when considering negative affect as self within task and task continued to exhibit no relationships to achievement goals; however, changes in the self category did appear to relate to changes in mastery goals when considering negative affect. This latter result did lend partial support to the hypothesis that affect would impact the relationship between ontological categories and achievement, and the

result lent partial support to the hypothesis that self would play the largest role in predicting changes in learners' achievement goals.

Discussion

Significant Findings

As noted in the conclusions above, this study provided little support to the CCMBM. However, the results regarding negative affect and the self ontological category did support the CCMBM. When controlling for negative affect, learners who increasingly related achievement goals to the self saw a decline in mastery oriented achievement goals. This result is in line with the predictions of the CCMBM as self schemas were believed to carry the most impact on changes to learners' motivational beliefs. As Dole and Sinatra (1998) suggest, the strength, coherence, and commitment to existing schemas are dependent on prior knowledge and are highly influential in the way in which learners might experience conceptual change. In adopting this view the CCMBM proposes that motivational schemas about the self, with their focus on overall qualities of the learner, would likely be the most dependent on prior knowledge and would be more likely strong, coherent, and highly committed to schemas. As such, changes in the focus on these self schemas would be the most impactful as they are likely to be the most influential schemas. The results of this study suggest that the learners' self schemas were the only schemas related to the motivational change process. It is likely that these schemas were defined by fewer mastery oriented experiences, and focusing on such experiences were associated with fewer reports of mastery achievement goals. Such relationships were only evident when filtered through learners' reports of negative affect.

Another important aspect of the CCMBM that this study addressed was the role affect plays in the motivational change process. As Pekrun et al. (2002) point out, the effects of

emotions, especially negative emotions, on motivation are not necessarily straightforward. The CCMBM adopts such a view by noting that emotions and affect are likely to play a role in the motivational change process, but a clear one to one relationship of a certain emotion leading to a particular change process is not posited. The single significant finding of this study lends some support to this notion. The self schema and mastery goal finding discussed above was in the context of controlling for negative affect, but the actual relationship that affect had is unclear. Negative affect was not significantly related to either type of mastery goal, and the relationship of negative affect was observed for both approach and avoidance, which are dependent on different drives and emotions (Elliot & Church, 1997). In other words, the directionality of negative affect's relationship is not discernable; however, support was still lent to the CCMBM as negative affect was shown to have some relationship to the change process in learners' achievement goals.

Non-significant Findings

The majority of the non-significant findings in this study clearly outweigh the findings that support the CCMBM discussed above: 1.) there were no support for the ability of the overall motivational schema to account for learners' motivational change processes; 2.) there was little support for the role that affect was purported to play in the motivational change process; and 3.) there was little support for the relation of the different motivational schemas to the motivational change process. Of course, this could lead one to conclude that the CCMBM is simply not a valid model of motivational change, but it is my belief that other factors would need to be considered before such conclusions are made.

Observed Power. The results of the MANOVA analyses in this study quite conclusively showed no support for the CCMBM. However, these non-significant results could be related to a

lack of power instead of no relationship. As Stevenson (2002) notes, a lack of power in multivariate analyses can lead to type II error. Observed power in the MANOVA for within subjects effects was .42 for time and .47 for time with schema articulation. When affect was considered the observed power for each was slightly higher with .57 for time and .49 for time with articulation. In other words, the MANOVAs for within subject effects had less than a 60% chance of detecting differences that were present. In most research, 70% to 80% chances of findings differences are preferred (Stevenson, 2002). Therefore, it is a possibility that the non-significant findings in this study were more related to lack of power instead of lack of differences. Remedies for such a lack of power include lowering the alpha level or increasing sample size (Stevenson, 2002). Lowering the alpha was not sought as this would then increase the likelihood of committing a Type I error, and increasing the sample size was not possible as the power analyses were conducted in a post-hoc manner.

Motivational Schemas Scale. Scale construction is a multilayered process that can include multiple revision steps (K. R. Murphy & Davidshofer, 2005). Given that this study represents the first tests of the motivational schemas scale, it is reasonable to conclude that further testing and evaluation of the scale is needed before accurate judgments about the motivational schemas and CCMBM as a whole can be made. Indeed, the results of this study exhibit some need to further revise this scale. Firstly, the fit statistics of the final scale do not meet all the conservative criteria for good fit. Despite the CFI and SRMR meeting acceptable fit criteria, the RMSEA was .08 and did not meet the level of equal to or less than .06 for conservative fit criteria (Hu & Bentler, 1999). Therefore, further revisions to the scale may be needed in order to assure validity of the subscales. Besides changes to the actual items, the presentation of the scale might need to be further altered to better tie motivational beliefs to the scales items.

For the pilot and primary study, the motivational schema items were presented after both the Achievement Goal Questionnaire (AGQ). Questions after each of the AGQ mastery and performance goal subscales prompted students to mark what their goals were related to (See Appendix A). The pilot study and primary study showed that students accurately marked these prompting items; however, it is still not clear if the students were responding directly to these answers when filling out the motivational belief subscale. Given the constraints of having to use paper and pencil surveys (i.e., there were no computers in the classroom), the presentation style presented in Appendix A was deemed to be the best way to ensure that students were in fact responding to the motivational schemas subscales as it related to their achievement goals.

Although not possible in the current study, steps could be taken to better ensure learners understood what the motivational schema items were referring to. For instance, online surveys could be used to give the students immediate feedback on what their AGQ scores indicate (e.g., "Your responses indicate you are concerned with demonstrating competence to others") and then immediately present the motivational schemas questionnaire as it relates to that real time feedback. Such a technique could also be employed to obtain more detailed investigations of motivational constructs and the motivational schemas that might inform them. For instance, the motivational schema questionnaire could be administered immediately after learners finish the mastery subscales and then again after learners finish the performance subscale of the AGQ. In this case, the schema items would either address why students had or didn't have the achievement goals they reported, and such responses would supply more comprehensive data about the motivational schema.

Data Collection Procedures. The data collection for this study occurred at a university located several hundred miles from the primary researcher. As the data were collected via pencil

and paper at various different time points throughout the semester, the primary researcher could not be present for each of these data collection, and quality assurance of the data collections did suffer some. Mainly, Time 2 surveys for one teacher were accidently misprinted resulting in the loss of AGQ and motivational schema data for that teacher. This data could not be recovered as Time 3 data were already collected before the mistake was realized. This did not directly impact the research questions of the study, but did make any exploration of teacher level differences in the data difficult. In addition to the misprint, a miscommunication led to the absence of a planned Time 4 data collection about the educational psychology class. Here again, the data could not be recovered, as the miscommunication was not clear till well after the class had ended, but again this did not centrally impact the research questions of the current study. Planned analyses were simply shifted from Time 4 to Time 3 with changes in the learners' achievement goals expected at the same rate. That is, the variables of interest were the motivational schema's level of articulation and its relationship to the changes that learners experienced in achievement goals, and the context of these changes (i.e., a class versus a mastery task) was not central to the current study.

Changes in Achievement Goals. Perhaps the most problematic aspect of the current study was the apparent lack of change that learners experienced in their achievement goals. The results of both MANOVAs showed that Time was not a significant factor for any of the four achievement goals, even when controlling for both positive and negative affect. That is, learners' previous achievement goals did not change, even when presented with a presumed novel task of teaching a class. Further, the interclass correlation coefficients associated with the HLM analyses showed little differences between the changes in learners' achievement goals as they progressed through the semester. Again, these findings suggest that learners experienced little change in

their reports of achievement goals as they participated in the typical, performance oriented task of taking a quiz and in the more novel, mastery oriented task of teaching a class. Having such small shifts in goals could have undermined the findings of this study. In other words, the motivational schemas could not explain motivational change because no motivational change occurred. Reasons for this lack of change could be related to the quality of learners' motivational schemas and/or the nature of the tasks the learners' participated in.

As Dole and Sinatra (1998) note, the more strongly a schema is articulated the less likely that schema is to change. The CCMBM adopts this notion to describe how the quality of the motivational schema can impact the learners' motivational change. Indeed, the first two research questions of this study were designed to evaluate this aspect of the motivational schema, and although no significant findings were found, there was some useful data regarding schema articulation in these analyses. For mastery approach (MAP) and mastery avoidance (MAV) achievement goals, the mean schema articulations ranged from 3.43 to 4.24, and for performance approach (PAP) and performance avoidance, the means ranged from 3.33 to 3.67. Since these items were based on a 5-point scale, all of these means were well above the midpoint of the scale. This might suggest that learners' motivational schemas were well articulated indicating that motivational change might have been difficult to elicit. Even if this were the case, the ability to enact change would still be somewhat dependent on the tasks learners engaged in.

The tasks designed to elicit motivational change in this study were a typical classroom quiz and a more novel microteaching assignment. It was posited that the quiz would serve as a more performance oriented task and the microteaching would serve as a more mastery oriented task. Therefore, it was believed that these tasks would serve to prime the students to adopt performance or mastery achievement goals. Yet, teachers of these courses were not necessarily

trained to stress the performance or mastery nature of the tasks. So, it is possible that the tasks were not explicit enough to prime learners' adoption of different achievement goals, and more explicit techniques might need to be employed. For instance, Barker, McInerney, and Dowson (2002) directed students to explicitly focus on either demonstrating competence, avoiding displays of incompetence, or mastering material when completing tasks and found evidence for different levels of processing among the three groups. Such explicit techniques might prove to be useful for eliciting motivational change.

Educational Significance

The Conceptual Change of Motivational Beliefs Model (CCMBM) discussed in this study frames motivational change as a cognitive process that includes aspects of the individual learner, such as affect, as well as aspects of the learner's environment, such as social contexts. Such a model could assist both teachers and researchers in promoting adaptive motivation in the classroom. By recognizing that students' schemas play an important role in their motivation, we can use techniques borrowed from the conceptual change literature to help learners adopt effective motivational beliefs. However, the results of this study provided little empirical validity for the Conceptual Change of Motivational Beliefs Model (CCMBM). Yet, the one significant finding of this study does have impact for both teachers and researchers

The results of HLM analyses involving negative affect, the motivational schema category of self, and the two mastery achievement goals suggests that motivational schemas focused on self can lead learners to endorse fewer mastery oriented achievement goals when one considers the influence of negative affect. As mastery goals are typically associated with more positive outcomes in education (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Pintrich, 2000a, 2000b), researchers and teachers are typically concerned with how to better promote these goals

in the classroom. The current study would suggest that stressing broad learner attributes that could be related to a self schema might be detrimental in promoting learner adoption of mastery oriented goals, but this suggestion must be considered within the context of negative affect. This suggestion is quite narrow as the study did not indicate if any schemas could promote mastery achievement goals nor did it clearly indicate how negative affect might affect the relationship between self schemas and mastery achievement goals.

In addition to assessing how learners' schemas and affect might impact motivational change, this study also represents the first evaluations of a scale designed to measure learners' motivational schemas. This scale, when combined with other motivational scales like the Achievement Goal Questionnaire, has the potential to give researchers and teachers an indication of what types of motivation learners have and why learners have those types of motivation. Having both these pieces of information could be highly valuable when attempting to promote more adaptive motivation in the classroom. Results of initial analyses assessing the scale indicate that it is both statistically reliable and valid; however, more investigation into item content and presentation is needed before such claims can be made with high confidence. Research with other types of motivational scales, presentation of schema items in more salient manner to the motivational questions they are referring to, and further tests of statistical reliability and validity will need to be conducted.

In sum, this study represents an initial evaluation of the CCMBM that provided little support for the model. Yet, concluding that the CCMBM is not valid, although plausible, is believed to be premature. Further studies assessing both different data collection techniques and different aspects of the CCMBM (e.g., the social context) could provide more support for the model. Such support would then provide a framework for both teachers and researchers to better

understand learners' motivational beliefs and begin to consider how they can influence these beliefs in both positive and negative ways. As J. C. Turner and Patrick (2008) point out, such endeavors could provide great value to motivational research as it relates to practical educational concerns.

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Appendix A

Student Measures

Achievement Goals Questionnaire

The following statements are about your goals for this class. Please indicate your level of agreement or disagreement with each item by choosing a number.

1	2	3	4	5
Strongly disagree				**Strongly agree**

1._____ My goal is to completely master the material presented in this class.

2._____ I want to do well compared to other students.

3._____ I want to learn as much as possible.

4._____ It is important for me to do better than other students.

5._____ My goal is to avoid learning less than I possibly could.

6._____ It is important for me to avoid doing poorly compared to other students.

7._____ It is important for me to understand the content of this course as thoroughly as possible.

8._____ My goal is to perform better than the other students.

9._____ I want to avoid learning less than it is possible to learn.

10._____ My goal is to avoid performing worse than other students.

11._____ It is important for me to avoid an incomplete understanding of the course material.

12._____ I want to avoid performing poorly compared to others.

Mastery-approach = 1+3+7.

Performance-approach = 2+4+8.

Mastery-avoidance = 5+9+11.

Performance-avoidance = 6+10+12.

How Did You Feel During the Quiz

Note: wording was changed to reflect a given task the students complete

This scale consists of a number of words that describe different feelings and emotions you had while completing the quiz. Read each word and then circle the appropriate number in the space next to that word. If you did "not at all" feel the emotion, circle 1; if did feel that emotion extremely, circle 5. If you felt some amount of that emotion, circle the number between 1 and 5 that best describes how you were feeling. Indicate to what extent you feel this way during the quiz.

1 not at all **2 a little** **3 moderately** **4 quite a bit** **5 extremely**

P	competent	1	2	3	4	5	P, FOSW	pleased with myself	1	2	3	4	5
N	angry	1	2	3	4	5	N, OD	sad	1	2	3	4	5
P	relieved	1	2	3	4	5	N, FOSW	ashamed	1	2	3	4	5
N	upset	1	2	3	4	5	P, FOSW	proud	1	2	3	4	5
P	content	1	2	3	4	5	P, OD	elated	1	2	3	4	5
P	grateful	1	2	3	4	5	P	confident	1	2	3	4	5
N	shocked	1	2	3	4	5	N, OD	unhappy	1	2	3	4	5
P, OD	happy	1	2	3	4	5	P	relaxed	1	2	3	4	5
N	afraid	1	2	3	4	5	N, FOSW	humiliated	1	2	3	4	5
N	guilty	1	2	3	4	5	P	satisfied	1	2	3	4	5
P	surprised	1	2	3	4	5	N	incompetent	1	2	3	4	5
N	disappointed	1	2	3	4	5	N	worried	1	2	3	4	5

P = positive; N=negative
OD=outcome dependent (Brown & Dutton) FOSW=feeling of self-worth (Brown & Dutton)

Pilot Study Motivational Schemas Questionnaire

The following statements are about your goals for courses that you have taken in the past that are similar to your current Educational Psychology course. Please indicate your level of agreement or disagreement with each item by choosing a number.

Not at all true of my goals						Very true of my goals
1	2	3	4	5	6	7

Self:

1. These goals help me achieve success in many aspects of school
2. These goals work well for me in school
3. These goals define who I am as a student
4. I have had many instances when these goals have been effective for me in school
5. When I don't have these goals, I do not achieve success in school

Self w/in task

6. I frequently have these goals for this type of course
7. These goals have worked for me in this type of courses
8. These goals helped me achieve success in this type of courses
9. I have been successful in this type of courses when I have these goals
10. When I did not have these goals, I have not been successful in this type of courses
11. I have had many instances when these goals helped me achieve success in this type of courses

Task:

12. Material in courses like this is more easily understood when I have these goals
13. These goals are important for the material in these type of courses
14. These goals are effective for the material in these type of courses
15. These goals are based on what I know about the material
16. These goals are important for what I need to know in courses like this

Please provide at least a paragraph (5-7 sentences) answer to the following questions:

1. What experiences in this type of courses best represent why you have these goals?

2. What aspects of these experiences caused you to have these goals?

3. How did these goals help you achieve success in this type of courses?

15 Item Primary Study Motivational Schemas Questionnaire

The following statements are about your goals for courses that you have taken in the past that are similar to your current Educational Psychology course. Please indicate your level of agreement or disagreement with each item by choosing a number.

Not at all true of my goals						Very true of my goals
1	2	3	4	5	6	7

Self:

1. These goals help me achieve success in many aspects of school
2. I do not have these goals for every course that I take
3. I have these goals for every course that I take
4. These goals define who I am as a student

Self w/in task

5. I frequently have these goals for this type of course
6. These goals have worked for me in this type of courses
7. These goals helped me achieve success in this type of courses
8. I have been successful in this type of courses when I have these goals
9. These goals are important for what I need to know in courses like this
10. For this type of course, it is usually not necessary for me to have these goals

Task:

11. These goals are important for the material in these type of courses
12. These goals are effective for the material in these type of courses
13. These goals are based on what I know about the material
14. Given the material in these types of course, it is usually not necessary for me to have these goals.
15. These goals are not effective for the material in this course

11 Item Primary Study Motivational Schemas Questionnaire

The following statements are about your goals for courses that you have taken in the past that are similar to your current Educational Psychology course. Please indicate your level of agreement or disagreement with each item by choosing a number.

Not at all true of my goals						Very true of my goals
1	2	3	4	5	6	7

Self:

1. These goals help me achieve success in many aspects of school
2. I have these goals for every course that I take
3. These goals define who I am as a student

Self w/in task

4. I frequently have these goals for this type of course
5. These goals have worked for me in this type of courses
6. These goals helped me achieve success in this type of courses
7. I have been successful in this type of courses when I have these goals
8. These goals are important for what I need to know in courses like this

Task:

9. These goals are important for the material in these type of courses
10. These goals are effective for the material in these type of courses
11. These goals are based on what I know about the material

9 Item Primary Study Motivational Schemas Questionnaire

The following statements are about your goals for courses that you have taken in the past that are similar to your current Educational Psychology course. Please indicate your level of agreement or disagreement with each item by choosing a number.

Not at all true of my goals						Very true of my goals
1	2	3	4	5	6	7

Self:

1. These goals help me achieve success in many aspects of school
2. I have these goals for every course that I take
3. These goals define who I am as a student

Self w/in task

4. These goals helped me achieve success in this type of courses
5. I have been successful in this type of courses when I have these goals
6. These goals are important for what I need to know in courses like this

Task:

7. These goals are important for the material in these type of courses
8. These goals are effective for the material in these type of courses
9. These goals are based on what I know about the material

Presentation Style of AGQ and Motivational Schemas Questionnaire (note both sections were presented on a single page using legal size paper)

SECTION B: What Were Your Goals For The Courses You Listed in Section B?					
The following statements are about your goals for the *microteaching*. Please indicate your level of agreement or disagreement with each item by choosing a number. **1 2 3 4 5** **Strongly Disagree** **Strongly Agree**					
1. My goal was to completely master the material.	1	2	3	4	5
2. I wanted to learn as much as possible.	1	2	3	4	5
3. My goal was to avoid learning less than I possibly could.	1	2	3	4	5
4. It was important for me to avoid an incomplete understanding of the material.	1	2	3	4	5
5. It was important for me to understand the content as thoroughly as possible.	1	2	3	4	5
6. I wanted to avoid learning less than it is possible to learn.	1	2	3	4	5
7. Did you answer a 4 or 5 on three or more of questions 1 thru 6?	a. Yes			b. No	
8. I wanted to do well compared to other students.	1	2	3	4	5
9. It was important for me to do better than other students.	1	2	3	4	5
10. It was important for me to avoid doing poorly compared to other students.	1	2	3	4	5
11. My goal was to perform better than the other students.	1	2	3	4	5
12. My goal was to avoid performing worse than other students.	1	2	3	4	5
13. I wanted to avoid performing poorly compared to others.	1	2	3	4	5
14. Did you answer a 4 or 5 on three or more questions 8 thru 13?	a. Yes			b. No	
You will need to refer to questions 7 and 14 from above to determine what you goals are related to.	**Circle <u>ONLY ONE</u> of the choices below:**				
If you answered yes to question 7, then your goals are related to:	a. Developing Competence				
If you answered yes to questions 14, then your goals are related to:	b. Demonstrating Competence				
If you answered yes to question 7 and 14, then your goals are related to:	c. Both Developing and Demonstrating Competence				

SECTION E: Why Do You Have The Goals That You Identified In Section D (*refer to your answers above)*?					
The following statements are about why you have your goals for the *microteaching*. Please indicate your level of agreement or disagreement with each item by choosing a number. **1 2 3 4 5** **Strongly Disagree Strongly Agree**					
1. These goals help me achieve success in many aspects of school.	1	2	3	4	5
2. These goals are important for the material in this type of course.	1	2	3	4	5
3. These goals have worked for me in this type of course.	1	2	3	4	5
4. I do not have these goals for every course that I take.	1	2	3	4	5
5. These goals are important for what I need to know in courses like this.	1	2	3	4	5
6. I frequently have these goals for this type of course.	1	2	3	4	5
7. These goals are based on what I know about the material	1	2	3	4	5
8. These goals helped me achieve success in this type of course.	1	2	3	4	5
9. These goals are effective for the material in this type of course.	1	2	3	4	5
10. For this type of course, it is usually not necessary for me to have these goals.	1	2	3	4	5
11. I have these goals for every course that I take.	1	2	3	4	5
12. These goals are not effective for the material in this course	1	2	3	4	5
13. I have been successful in this type of course when I have these goals.	1	2	3	4	5
14. Given the material in this type of course, it is usually not necessary for me to have these goals.	1	2	3	4	5
15. These goals define who I am as a student.	1	2	3	4	5

Vita

Matt Easter was born in Farmington Missouri and grew up in the nearby town of Park Hills. He attended and graduated from Central High school, received an Associates of Arts degree from Mineral Area College, received a Bachelor of Science degree from Central Methodist University, and a Masters degree from the University of Missouri. He now lives in Columbia Missouri with his wife, Danielle, and his daughter, Audrey.