

ABSTRACT

GREGORY, BRADLEY BARNES. Beliefs about Critical Thinking and Motivations for Implementing Thinking Skills Training in Pre-Service Teacher Education Courses: A Grounded Theory Model. (Under the direction of Drs. Jessica T. DeCuir-Gunby and Margareta M. Pop.)

Two overlapping gaps in the literature on the educational environment in the United States have given rise to this grounded theory study: the need to examine pre-service teacher educators' beliefs about critical thinking and the need to develop theory which can be used to inform our understanding of these beliefs. This study focused on a college of education faculty members' beliefs about critical thinking, and their motivations for implementing critical thinking skills training within their pre-service teacher education classrooms. Over the course of a spring semester, seven faculty members representing four academic departments were interviewed using a semi-structured interview format and were observed teaching for at least ninety minutes. They also provided their signature course artifacts or other culminating assignment descriptions for analysis.

The emergent model depicts a process flow by which pre-service teacher educators seek to promote reflective classroom practitioners, the emergent core category and ultimate goal of the process model. The five-phase model is characterized by an initial Beliefs phase informed by personal conceptualizations about critical thinking, efficacy beliefs, and evaluations of critical thinking outcomes. Motivations lead educators to adopt various strategies to promote reflective classroom practitioners in the Strategy Adoption phase via critical thinking immersion. The perceived outcomes of these strategies are assessed in the Assessment phase and serve to inform subsequent beliefs about critical thinking in the Reconceptualization phase of the model. Factors that contribute to critical thinking as well as hinder its development within the Reflection phase are provided and described. Results support the explanatory power of the Expectancy-Value Theory of Achievement Motivation,

which was used as the provisional theoretical framework for the study. In addition, implications for this study as well as for future research are discussed.

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Beliefs about Critical Thinking and Motivations for Implementing Thinking Skills
Training in Pre-Service Teacher Education Courses: A Grounded Theory Model

by
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BIOGRAPHY

Bradley Gregory grew up in Rocky Mount, North Carolina, and attended North Carolina State University where he earned a Bachelor of Arts in psychology with an emphasis in sport psychology. He then went on to the University of North Carolina at Chapel Hill to earn a Master of Arts in exercise physiology. During his first year at UNC, Brad taught courses in the physical education department. During his second year, Brad was selected to teach the laboratory sections of Physiological Aspects of Human Performance, an experience which served to completely alter his ultimate career trajectory. It was during this two-year period when he discovered his passion for teaching and realized that he would not be satisfied with a career that fell anywhere outside the realm of education.

Following graduation, Brad worked at Duke University Hospitals as a clinical exercise physiologist, first in a cardiac rehabilitation clinic and then in the Department of Behavioral Medicine as a member of an interdisciplinary team that was then working on three grant-funded clinical studies. It was during this time that Brad took an evening course in the Educational Psychology department at NC State University which finally confirmed that he, indeed, would only be happy teaching courses in education and psychology at the college level. He applied for full-time doctoral-level status during the spring of 2007, was accepted, and began his doctoral studies in the fall of that same year.

During Brad's first two years of PhD study, he dabbled in various potential research interests but was unable to find something that he felt suited his ultimate

research interests and personal teaching passions. During August of 2009, while reflecting upon his first graduate course at UNC, Brad finally discovered what would ultimately become his primary research interest and eventual dissertation topic: critical thinking. At the beginning of the first class session in 2004, his professor indicated, “When you’re an undergrad, we tell you ‘This is how it is’. When you’re a Master’s student, we tell you ‘This is how we *think* it is.’ And when you’re a doctoral student, we tell you ‘We have no idea what it is. You tell *us!*’” After having pondered this quote from five years earlier, Brad decided that it was time for educators to quit telling undergraduate students what they ought to know as well as how they ought to think. Thus, he began researching the ways in which we as persons can be explicitly taught to (critically) think, thereby allowing the thinker to maintain personal cognitive control over the learning process. As the learner continues to make this process his or her own, it becomes the responsibility of the learner (not the teacher) to also determine for himself quite literally how, when, and why to think, which will subsequently inform the learner *what* to think. Thus, the learning process remains where it should have been located all along: within the learner himself. Upon completion of his degree, Brad hopes to find employment where he can continue to share his knowledge of critical thinking with pre-service teachers, who might then be better able to model these thinking skills and dispositions in their future classrooms so that their students can decide for themselves what to think brought about by a more thorough understanding and appreciation of *how* to think.

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CHAPTER ONE: INTRODUCTION

In many college and university mission statements across the United States, there is an importance placed on the need for students to be able to think critically and reflectively (Kuhn & Udell, 2007; Douglas, 2000). In his book *How We Think*, John Dewey (1933) asserted that critical, reflective thinking is a basic principle for curricular purposes, and should be the central aim of education. He also claimed that the primary outcome of learning ought not to be the rote memorization of facts, but rather should be the promotion of critical minds, taught through good habits of thinking.

National reports on the quality of college and university education in the United States have avowed the fundamentality of teaching critical thinking skills to students (National Institute of Education, 1984). However, evaluation of progress toward this goal among undergraduates and graduate students has resulted in little support for the notion that critical thinking skills are being mastered (King, Wood, & Mines, 1990). Additionally, critical thinking skills are important outside of the ivory towers, particularly when one faces ill-defined problems. Kitchener and King (1990) defined these problems as those which “result when some of the elements necessary for a solution are unknown or not known with a specifiable degree of certainty” (p. 64). In any pluralistic and democratic society where citizens are confronted on a daily basis with tremendous amounts of often-unsubstantiated information and ill-defined

problems, critical thinking skills are vital. Thus, in such societies, the ability to think critically is a necessary ability to engage in active citizenship (Angeli & Valanides, 2009). In agreement with Dewey (1933), to promote capable democratic citizens, critical thinking should not be viewed as another option or plausible outcome of education, but rather as a crucial and indispensable part of any student's general education (Education Commission of the States, 2007). Thus, to begin to understand how critical thinking is taught within the college and university classroom, we must first understand how those we hold responsible for teaching critical thinking define and conceptualize the construct. Given that teacher beliefs play a large role in determining how instructional practices are designed and implemented within the classroom (Grove, Dixon, and Pop, 2009), it is necessary to understand the beliefs academics hold regarding critical thinking that serve to influence how they choose to navigate critical thinking preparation deemed necessary to prepare students for real-world problem solving and decision making.

This chapter provides background to the study in several areas including important definitions, a brief overview of critical thinking, its intended role in education, the theoretical framework of the Expectancy-Value Theory of Achievement Motivation, and a brief review of the grounded theory research method. The chapter concludes with the purpose of the study and the guiding research questions.

Definitions

The key terms used in this study are defined below:

- Critical thinking
 - Reflective thinking
 - Objectivity
 - Bloom's Taxonomy
 - Ill-defined problem
 - Motivation
 - Self-efficacy
 - Theory
 - Expectancy-Value Theory
 - Grounded Theory
-
- Critical Thinking: "Critical thinking involves a persistent effort to examine any belief or supposed form of knowledge in the light of evidence that supports it and the further conclusions to which it tends, as well as the ability to recognize problems, to weigh evidence, to comprehend and use language with accuracy and discrimination, to interpret data, to recognize the existence (or non-existence) of logical relationships between propositions, to draw warranted conclusions and generalizations and to test the conclusions by applying them to new situations to which they seem pertinent" (Watson & Glaser, 1939, p. 3).
 - Reflective Thinking: "the kind of thinking that consists in turning a subject over in the mind and giving it serious consecutive consideration" (Dewey, 1933, p. 3)
 - Objectivity: "Expressing or dealing with facts or conditions as perceived without distortion by personal feelings, prejudices, or interpretations" (Merriam-Webster Online Dictionary, 2011)

- Bloom's Taxonomy: one of the first systematic classifications of the cognitive operations used by students in accomplishing various academic goals. The Taxonomy is divided into six levels (or skills) which are ordered from least complex to most complex: Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956).
- Ill-defined problem: a problem that “results when some of the elements necessary for a solution are unknown or not known with a specifiable degree of certainty” (Kitchener & King, 1990; p. 64)
- Motivation: “the process whereby goal-directed activity is instigated and sustained” (Schunk, Pintrich, & Meece, 2008; p. 378).
- Self-efficacy: the belief that one can master a situation and produce positive outcomes (Bandura, 1997, 2010)
- Theory: “a plausible or scientifically acceptable general principle or body of principles offered to explain phenomena”, and “the general or abstract principles of a body of fact, a science, or an art” (Merriam-Webster, 2010).
- Expectancy-Value Theory: an achievement motivation construct that helps explain the likelihood that an individual will engage in a particular behavior. It is based on the personal expectancy (efficacy) and values placed on the outcomes of the task (Wigfield & Eccles, 2000).
- Grounded Theory: A qualitative method for developing theory that is grounded in data gathered and systematically analyzed (Glaser & Strauss, 1967). The particular conceptualization or methodology of grounded theory adopted by

Strauss and Corbin (1990) will be the framework for the sampling, data collection, and analysis of this study.

Background

Since the 1840s, the predominant method of instruction in the college classroom has been the lecture. This mode of teaching has become so widely accepted that it is natural to observe an entire classroom of students working individually on the same assignment or task while they are being instructed by the teacher (Davis, 1992). In 1984, after having studied a thousand classrooms in the United States, Goodlad (cited in Karmos and Karmos, 1987) concluded that “teacher talk” was the dominant classroom activity. Teachers rarely encouraged students to engage in dialogue amongst themselves, and rarely did they provide opportunities for collaborative student work through which they could set goals, develop alternate ways to achieve their goals, or become more self-regulated in their learning. He noted that the emphasis in most classrooms was on recall of facts, not on problem-solving, inquiry, or critical thinking. Paul (1990) claimed that schools were using out-moded instructional techniques because they focused primarily on didactic, lecture- and drill-based models of instruction. As a result of this type of passive learning, students fail to learn how to learn *about* information. They do not learn to gather information, analyze it, synthesize it, or assess it for consistency, bias, or logical soundness. As a result of being unable to analyze the logic behind questions, assumptions, and problems they face, they are unable to adjust their thinking accordingly. The National Assessment of

Educational Progress report discovered that “few students could provide more than superficial responses to (inference and analysis) tasks, and even the ‘better’ responses showed little evidence of well-developed problem-solving strategies or critical thinking skills” (1981, p. 2).

Similarly, it has been said that more contemporary education still emphasizes the memorization of content knowledge almost at the complete expense of critical thinking development (Kennedy, Fisher, & Ennis, 1991). In a recent study, Brophy (2008) concluded that, unfortunately, schools still focus on teaching students the “what” in terms of concepts and skills, and the students are still not taught when, where, how, or why they might ever use this declarative knowledge. Further, Brophy claimed that the reasons for learning are not obvious to students, and at times not even obvious to the teachers. This is especially true for abstract concepts and higher-level cognitive processes. He contended that which is taught is worth learning, but students often do not possess an appreciation for it unless their learning is actively scaffolded in ways that can help them appreciate it. Thus, critical thinking skills must be explicitly taught, since students are not acquiring them on their own by simply attending class. Given this lack of evidence for critical thinking ability among college students in the United States, there has been a renewed interest in how critical thinking skills are taught at the post-secondary level.

Over the past twenty years, teacher educators and educational psychologists have begun to focus on the nature and impact of teachers’ beliefs about teaching and learning (Calderhead, 1996). It has been demonstrated that teachers’ beliefs influence

how they choose to structure tasks and how they interact with learners (Richardson, 1996; Grove, Dixon, & Pop, 2009). Thus, it is important to understand the motivations, values, and beliefs educators hold about critical thinking in order to begin to understand why they may or may not regularly implement opportunities to engage in critical thought within their classrooms.

Evolution of Critical Thinking

Critical thinking, at least in theory, has long held a prominent position among goals of the educational system in the United States (Ennis, 1993). Technological advances have increased the public exposure to unsubstantiated information, which has elevated the importance of critical reading and thinking, thereby allowing the consumer to know what to believe or what to discard as false or biased. However, despite the growing importance of the ability to think critically, there still exists no single, precise definition of critical thinking that is collectively agreed upon by theorists and researchers (Kennedy, Fisher, & Ennis, 1991). Perhaps one of the difficulties in researching critical thinking thus far has been due to the many varied opinions and interpretations held regarding what the construct of critical thinking is and what it embodies. Before any substantive work can be undertaken, it is imperative that a consensus is reached so that educational researchers, regardless of specialization, can better understand what exactly is subsumed under the broad term of “critical thinking”. Only once a common definition is reached may we begin discourse on the purposes of critical thinking, and how it might be developed within the classroom.

John Dewey, an early advocate and leader in the study of thinking, used the term “reflective thinking” to refer to “the kind of thinking that consists in turning a subject over in the mind and giving it serious consecutive consideration” (1933, p. 3). He placed importance on a problem-solving focus to learning. Additionally, he emphasized the need for education to venture beyond the teaching of subject matter alone and to directly address the teaching of thinking.

Shortly after Dewey defined reflective thinking, Watson and Glaser (1939), who created one of the earliest and most well-researched tests assessing critical thinking skills, defined critical thinking as follows:

“Critical thinking involves a persistent effort to examine any belief or supposed form of knowledge in the light of evidence that supports it and the further conclusions to which it tends, as well as the ability to recognize problems, to weigh evidence, to comprehend and use language with accuracy and discrimination, to interpret data, to recognize the existence (or non-existence) of logical relationships between propositions, to draw warranted conclusions and generalizations and to test the conclusions by applying them to new situations to which they seem pertinent” (p. 3).

They then suggested that critical thinking could be broken down into two crucial elements: the predisposition (or attitude, which is an affective aspect) and ability (or skill, a cognitive aspect). Thus, to be a competent critical thinker, one must possess the *skills* necessary to carry out the cognitive steps listed above, as well as hold a *disposition* that systematically implements a healthy skepticism of new knowledge claims.

The skills frequently appearing among the various lists of critical thinking descriptions are: identifying assumptions (both stated and unstated, one’s own as well

as another's); clarifying, focusing, and staying relevant to the topic; understanding logic (which includes inferential, inductive, and deductive reasoning); and judging the reliability and credibility of sources of information. Specific dispositions can include such tasks as determining focus; maintaining focus on a question or conclusion; taking the entire situation into account; seeking out and offering reasons; being well informed of all possible explanations; searching for alternatives; and withholding judgment when evidence and reasons are not yet sufficient (Ennis, 1991).

Most definitions of critical thinking, which have appeared in the decades following Watson and Glaser's definition, have merely elaborated on elements presented in their definition from 1939. McPeck (1981) proposed a broad definition of critical thinking as "the propensity and skill to engage in an activity with reflective skepticism" (p. 8). Ennis replaced his older definition of "the correct assessing of statements" (1962, p. 6) with a newer one: "reasonable, reflective thinking that is focused on deciding what to believe or do" (1985, p. 46). Beyer describes critical thinking as "involving careful, precise, persistent and objective analysis of any knowledge, claim, or belief in order to judge its validity and/or worth" (1984, p. 271).

Thus, much of the research on critical thinking has traditionally focused on the skills aspect of critical thinking. However, as of the late 1980s, greater importance is now being placed on the dispositions associated with being a good critical thinker (Ennis, 1987). A student may quite feasibly possess good thinking skills while not being disposed or inclined to use them. According to Glaser, dispositions are part of a way of life. "Persons who have acquired a disposition to want evidence for beliefs, and

who have acquired an attitude for reasonableness have also acquired something of a way of life which makes for more considerate and humane relationships among [others]” (1941, p. 6). Therefore, I believe that any attempt to study critical thinking behavior must include an emphasis on not just the cognitive skills required to engage in critical thought, but on the disposition required to make an individual want to use these skills. As a result, motivations for wanting to prepare students for various responsibilities that require critical thinking skills as well as a critical disposition must be identified so that we may understand why formal critical thinking preparation occurs, or does not occur, in the classroom.

Expectancy-Value Theory of Achievement Motivation

In *Democracy and Education*, Dewey (1916) wrote:

“No one doubts, theoretically, the importance of fostering in school good habits of thinking. But apart from the fact that the acknowledgement is not so great in practice as in theory, there is not adequate theoretical recognition that all which the school can or need do for pupils, so far as their *minds* are concerned...is to develop their ability to think” (p. 152).

Therefore, Dewey identified a discrepancy that exists between what educators desire in theory and what they often establish in practice. On one hand, educators are said to value critical thinking and the outcomes they associate with being a critical thinker. On the other hand, however, instructional designs and practices are said not to adequately reflect their desired educational goals. The next section will examine the

Expectancy-Value Theory model of achievement motivation (Wigfield & Eccles, 2000) and use it to describe how personal beliefs about critical thinking may help explain why this inconsistency may exist.

Different motivations and values for implementing critical thinking

As has been demonstrated by the previously discussed literature (Kennedy, Fisher, & Ennis, 1991) and in agreement with the statement from Dewey (1916) above, most educators and educational researchers would espouse the notion that students should possess critical thinking skills and dispositions as a result of formal training in critical thinking. However, what has not been explicitly discussed in the critical thinking literature is why educators who already hold positive beliefs about critical thinking may not consistently or thoroughly implement opportunities for critical thinking in their classrooms. As was demonstrated by Torff (2005), many pre-service teachers who highly value critical thinking end up experiencing a decline in their evaluations of it as they gain experience in the classroom. Why do most active teachers experience this decline in implementation of critical thinking when previously (during pre-service training) they expressed the most positive beliefs about it as a construct? What causes them to lose sight of critical thinking skills training? Are they replacing higher-order cognitive skill training with something else in particular, or are they abandoning it altogether? A model is needed to help explain the discrepancy between what educators say they want educational outcomes to be and what they often do in practice to help students achieve them. Expectancy-value theory is useful in helping explain this discrepancy, in that individuals choose certain behaviors based on

outcomes expected and the values they assign to those expected outcomes (Borders, Earleywine, & Huey, 2004).

Expectancy-value theory (Eccles, et al., 1983; Wigfield, 1994; Wigfield and Eccles, 2000) is an achievement motivation construct that helps explain the likelihood that an individual will engage in a particular behavior. Specifically, this theory states that an individual's engagement in an activity is the product of two factors: the personal expectancy and value concerning successful completion of the task. According to the theory, not only task engagement, but also task persistence and task performance can be explained as well. Wigfield and Eccles (2000) claimed that task "choice, persistence, and performance can be explained by their beliefs about how well they will do on the activity and the extent to which they value the activity" (p. 68). By knowing the individual's expectancy of the task along with how highly the task is valued, we can explain whether or not the task will be performed, and, if so, how persistent he or she will be while engaged in it. In many theories of motivation, the aspect of value is completely ignored (Brophy, 2008), and this is an important concept to address when attempting to understand differences in pedagogical practices among educators.

According to Expectancy-Value Theory, it would follow that educators who (1) possess high efficacy beliefs about their ability to successfully model and teach critical thinking and (2) highly value the outcomes associated with teaching critical thinking would be those educators who most consistently teach sound thinking habits to their students. The combination of high expectancies and high evaluations of critical

thinking instruction is said to produce sufficient motivation to cause the individual to engage in the task as well as persist in the task (Eccles, et al., 1983). On the other hand, a combination of low expectancies/high evaluations, high expectancies/low evaluations, or low expectancies/low evaluations would not result in the necessary and/or sufficient motivations to cause such instruction to occur.

Furthermore, as the expectancy-value model tells us, educators who possess high evaluations of critical thinking but low personal efficacy beliefs in being able to model and teach critical thought are not as likely to explicitly teach critical thinking skills to their students as consistently as do those educators who possess *both* high expectancies and high evaluations. As such, it may be plausible to use this expectancy-value model of achievement motivation as one possible explanation for why a discrepancy exists between what educators say they value and what they are *known* to value through observing them in practice. This model would indicate that educators who do not possess high personal efficacy beliefs about being able to model and teach critical thinking would likely not be inclined to engage in this type of instruction, even though they may value the outcomes which they know to be associated with it.

Purpose of the Study

In this study, the grounded theory methodology articulated by Strauss & Corbin (1990) will be used to develop a theory of the process by which critical thinking is defined, conceptualized, and taught to pre-service teachers by college of education faculty. The study seeks to understand the influential factors and construct

relationships that influence the process from the adoption of the behavioral to the maintenance or persistence of the behavior. The specific behavior of interest is the teaching and modeling of critical thinking skills for pre-service teachers in undergraduate teacher education classrooms at a large Research 1 university in the Southeastern United States.

The purpose of this study is to 1) develop a theoretical model that can be used to explain how the teaching of critical thinking skills is incorporated into pre-service teacher education classrooms, and 2) investigate the personal beliefs and motivations academics possess that influence how and why these skills are implemented. Through understanding the process that educators who have successfully integrated the teaching of critical thinking skills into their classrooms have experienced, new knowledge will be gained that can be used to inform future studies investigating the most effective methods by which other pre-service teacher educators can successfully incorporate teaching and modeling critical thought for their students.

Given that critical thinking outcomes in the United States are not meeting the expectations of educational researchers (King, Wood, and Mines, 1990; Kitchener and King, 1990; Kennedy, Fisher, and Ennis, 1991) and various national reports on education (National Assessment of Educational Progress, 1981), I believe it is imperative that we identify ways in which critical thinking can be successfully taught to undergraduates so that more effective and more standardized methods of critical thinking skills transmission can become implemented within the college classroom. Furthermore, we must also identify what educators believe to be ineffective strategies

before recommendations for changes to current instructional design and practices are made.

Research Questions

The central question of this research is as follows:

Among pre-service teacher educators, is critical thinking a valued and esteemed outcome of undergraduate teacher preparation education?

The study overall, and the data gathering process in particular, will be guided by the following six questions:

1. How do academics define critical thinking across a wide range of teacher education specializations (ex: mathematics education, science education, literacy education, social studies education, etc.)?
2. Are pre-service teacher educators confident in their ability to train their students to become models of critical thought? In other words, what *expectancies* do academics hold about their abilities as they relate to critical thinking skills training?
3. What *values* do pre-service teacher educators assign to teaching students to become models of critical thought?
4. What motivations do pre-service teacher educators report for choosing whether or not to teach students how to become models of critical thought?

5. What factors do pre-service teacher educators believe contribute to their ability to implement explicit critical thinking skills training within the classroom or curriculum?
6. What factors hinder their ability to implement these skills?

The structure for the remainder of this document will be as follows: Chapter Two will delineate the methods utilized in this study; Chapter Three will present the results of the study; and Chapter Four will incorporate further review of the critical thinking literature and a synthesis of that literature with the findings of the present study.

The structure for this document is consistent with the implementation of the Corbin & Strauss (1990) grounded theory methodology in that the literature reviewed in this chapter was used in a limited sense and serves to illustrate the importance of this investigation in the field of critical thinking beliefs and motivations for implementing critical thinking skills training in the classroom. Grounded theorists begin data collection without *a priori* hypotheses concerning the specific constructs, factors, and factor relationships surrounding the phenomenon of interest (1990). As such, literature relevant to the teaching of critical thinking skills will be reserved for synthesis after the findings are presented (1990). Chapter Four will also present important implications, limitations, and conclusions of the study.

CHAPTER TWO: METHODS

Given the lack of knowledge regarding the specific constructs and variable relationships that make up the process of critical thinking instruction discussed in the previous chapter, this study was designed to investigate the process of teaching and modeling of critical thinking skills to pre-service teachers. The limited literature addressing critical thinking beliefs, motivations for teaching critical thinking skills, and methods by which it is done indicated that a qualitative design was an appropriate approach.

Based on this study's research questions, understanding the process of teaching critical thinking skills would require qualitative data to be collected from educators who can speak to the pedagogy of critical thinking. The grounded theory method allows for investigation of a behavior from the perspective of individuals who exhibit that behavior. Additionally, grounded theory gives voice to its participants in describing their experiences in their own words.

The grounded theory method of uncovering and explaining the process was particularly relevant to the research questions for this study as it was the process of teaching and modeling critical thinking skills to future teachers that was being explored. Due to this reasoning, grounded theory was chosen to guide a study design aimed at the development of a theory that informs the process by which critical thinking is defined, conceptualized, and taught in pre-service teacher education courses. Important factors and construct relationships that affect the process can be examined and explained through the use of this particular research design to produce

an emergent theory, which can then be used to inform future research of both qualitative and mixed-methods designs.

The Grounded Theory Method

During research projects I have previously conducted on critical thinking and teacher beliefs, my examinations of the research literature have failed to identify studies that have allowed educational practitioners to explain the beliefs they hold regarding critical thinking skills training. Furthermore, I have found no published studies that help explain their motivations for wanting to promote critical thought within their students, which may in turn influence whether they choose to explicitly teach such thinking skills through formal educational preparation. Therefore, a qualitative research study utilizing grounded theory is uniquely positioned to generate theory, grounded in data collected from pre-service teacher education faculty at a large land-grant research university, that informs these particular phenomena.

Grounded theory has enjoyed a wide utilization as a research methodology in its “home” discipline of sociology, as well as in nursing, and in related fields. However, it has been used less widely in education (Charmaz, 2006). This study provides a needed opportunity for observations to be made about the viability and applicability of grounded theory inquiry in education, and more specifically among classrooms of those charged with preparing our future teachers.

Due to the lack of knowledge regarding the specific constructs and variable relationships that make up the process of preparing future teachers to be competent

critical thinkers and models of critical thought, a qualitative grounded theory approach (Strauss & Corbin, 1990) will be utilized in this study. A well-established and theory-generating qualitative research method developed in 1967, grounded theory allows for discovery of important variables and themes not previously understood or even revealed (Glaser & Strauss, 1967). This research method is useful in developing theoretical explanations of sociological or psychological behavior grounded in data collected from those individuals exhibiting the behavior of interest.

Since its inception in 1967 (Glaser & Strauss), grounded theory has evolved into several different iterations, each focusing on a slightly different way in which theory is either generated or validated (Strauss & Corbin, 1990; Charmaz, 2000; Charmaz, 2001; Charmaz, 2006). The goal of the original methodology by Glaser & Strauss (1967) was solely to generate theory grounded within data. No existing theories or categories capable of informing theory were utilized in the production of these grounded theories. Later methodologies (Strauss & Corbin, 1990; Charmaz, 2000; 2001; 2006) have accommodated for the validation of existing theories in addition to the generation of new theory. That is, these newer methodologies allow the grounded theorist to provisionally use an existing theory or categories of a theory to test the theory's "goodness" in a context different from the one in which it was derived. Thus, certain grounded theory methodologies can help to validate existing theory, but only as long as the new data warrant it. Established theory may be used as a guiding framework around which initial phases of new qualitative inquiry is built, but the theory must be discarded if new data do not support its explanatory power within the

new context of inquiry.

Grounded Theory Method: Glaser & Strauss (1967)

The method of grounded theory introduced by Glaser and Strauss (1967) defined grounded theory as a method of discovery, and described grounded theory as both a methodology and a method (Cutcliffe, 2005). They defined grounded theory as “the discovery of theory from data systematically obtained from social research” (Glaser & Strauss, 1967, p. 2). Glaser and Strauss brought together new epistemological beliefs with practical guidelines for acting upon them. As such, these two men are heralded as the founding fathers of the grounded theory method, and it is their particular method upon which all other iterations of grounded theory have been founded (Charmaz, 2006).

Barney Glaser and Anselm Strauss worked very closely to develop techniques for analyzing qualitative data, and these techniques reflect their differing focuses within the discipline of sociology. Strauss came from the University of Chicago, which enjoyed both a long history and strong tradition in qualitative research. While attending the university, Strauss was influenced by Interactionist as well as Pragmatist writings. Thus, his thinking was strongly inspired by writers and philosophers such as G. H. Mead and John Dewey. From this background, Strauss contributed the following to the method of grounded theory: 1) the need for researchers to go out into the field, if he ultimately wants to understand what is going on, 2) the importance of theory, which has been grounded in reality, to help further develop a discipline, 3) the nature of experience as a process that is continually evolving, 4) the inherent active role a person

has in shaping the world in which he lives, 5) an emphasis on process and change over time, along with the variability and complexity of life, and 6) the interrelatedness of conditions, meaning, and action (Strauss & Corbin, 1990).

Glaser contributed substantially to the formation of grounded theory method, although his background was vastly different from that of Strauss. Glaser attended Columbia University and was highly influenced by Paul Lazarsfeld, who was an innovator of quantitative methods. Later during his training and while performing qualitative work, Glaser saw an acute need for a well-thought-out, explicitly formulated, and highly systematic set of governing procedures to address both coding and testing the hypotheses generated during qualitative inquiry. The two men began collaborating and fashioned a research process that is thoroughly qualitative in nature, but also retains some salient positivist aspects.

Through Glaser and Strauss came from vastly different schools of thought, they were otherwise closely bound by their primary discipline—sociology. Their seminal work, *Discovery of Grounded Theory: Strategies for Qualitative Research* (1967), was written to inform the practice of other sociologists. Indeed, the authors can be quoted from their opening chapter to support this notion: “This book is intended to underscore the basic sociological activity that only sociologists can do: generating sociological theory....Only sociologists are trained to want it, to look for it, and to generate it (sociological theory)” (p. 6). Above all, Glaser and Strauss’s grounded theory method was created to challenge the classical way of performing research (Charmaz, 2001), with their target audience being those who had been trained in

sociological research and were interested in generating sociological theory. Ultimately, the generation of sociological theory became the sole objective of their new method. As will be discussed in the next section, researchers from other disciplines adopted this method of theory generation and were able, via some fairly substantial modifications, to make it fit their own disciplines and areas of inquiry.

Glaser and Strauss described grounded theory as inherently action oriented. That is, social and psychosocial processes occur and involve change over time. The variations over time in the basic, underlying process can thus be explained by the two or more emergent stages which the researcher draws out from the data. These stages are said to differentiate and account for any seen variations in the participants' patterns of behavior (Cutcliffe, 2005). Thus, given this inevitable temporal variability, along with emergent stages which help to illustrate this variability, grounded theory is described as being necessarily action oriented in nature. Theory cannot be conceptualized without the identification of a single, basic social process, evident within at least two stages, that varies over time.

According to Glaser and Strauss (1967), the data collection and analytic procedures used to identify and understand this underlying social process constitute a logically consistent set of guidelines to follow which seeks to develop theory. They proposed that systematic qualitative inquiry inherently possessed its own logic and was thereby capable of generating theory. This logical method consists of a set of inductive strategies which is used throughout the process while data are being analyzed (Glaser and Strauss, 1967; Charmaz, 2006). In short, these strategies require the researcher to

start with individual cases, scenarios, and experiences, and develop progressively more abstract conceptual concepts and categories which are then used to synthesize, explain, and understand the basic social process within the collected data. The identification of patterns and patterned relationships help produce the resultant theory, which emerges from (and is thus said to be grounded in) the data. Indeed, this is the hallmark of grounded theory studies—deriving analytic categories directly from the data, and not from preconceived theories or hypotheses—regardless of whose particular approach is being utilized. Throughout the inquiry process, grounded theorists evaluate the fit between their own initial research interests and the emerging concepts and categories. The meanings, intentions, and actions of research participants must be studied to arrive at the concepts and categories which subsequently give way to hypotheses and, ultimately, the constructed conceptual theory. Again, this emphasis on understanding the personal experiences of those studied aligns intimately with the Interpretive nature of their grounded theory method.

It is important to note here that neither Glaser nor Strauss indicated that there was an irreconcilable difference between qualitative (Interpretive) and quantitative (Positivist) methodologies, despite their desire that the grounded theory method they authored also include positivist characteristics. Indeed, they make a poignant statement that “There is no fundamental clash between the purposes and capacities of qualitative and quantitative methods or data. What clash there is concerns the primacy of emphasis on verification or generation of theory—to which heated discussions on qualitative versus quantitative data have been linked historically” (Glaser & Strauss,

1967, p. 17). Not surprisingly, their version of the grounded theory method shares aspects of both paradigms. Given that the focus of grounded theory methods is to understand phenomena within their social contexts, assumptions and characteristics consistent with Interpretive Theory (Charmaz, 2001, 2006) are clearly visible within Glaser & Strauss's approach. Yet, given its heavy reliance upon a systematized set of analytic procedures that largely mirrors the scientific method, their grounded theory model is also heavily Positivist in nature as well.

Initially, Glaser and Strauss mutually acknowledged that “generating grounded theory is a way of arriving at theory suited to its supposed uses” (Glaser & Strauss, 1967, p. 3). Their form of theory generation stood in stark contrast with the then-accepted methods of theory generation which came about via logical deduction from a priori assumptions. Glaser and Strauss argued that the best approach to generating theory requires a systematic discovery of theory from data within social research. This would then allow the researcher to be relatively sure that the theory would fit and work within the context of that which was observed. Ultimately, Glaser and Strauss (1967) contended that the overall “goodness” and usefulness of a theory depends on how it was generated. Thus, any theory that has been inductively developed from social research is thereby necessarily better than a theory which has been generated through more traditional deductive methods.

A major hallmark of Glaser & Strauss's theory is the notion that absolutely no codes or categories—even those which may have been obtained through previous grounded theory studies—or theories should be brought into the grounded theory

coding sessions. The researcher should begin each session and persist with an open mind—and some would even say an “empty head” (Charmaz, 2006). No pre-existing ideas should be allowed to influence the development of concepts and categories, but each should emerge through close and repetitive analysis of the data. Thus, in keeping with this notion of approaching any new grounded theory study with an “empty head”, Glaser and Strauss vehemently argue against performing a literature review prior to initiating any new research study. They articulated this argument specifically to remove grounded theory from the realm of more traditional quantitative methods, in which literature reviews are performed, among other things, to illuminate theoretical and conceptual frameworks that can be utilized when developing research studies and interpreting findings (Strauss & Corbin, 1990). Unlike quantitative researchers, grounded theorists do not seek to determine which variables of interest should be included; rather, they let the data speak entirely for themselves. The guiding purpose in grounded theory is to discover relevant categories and the relationships that exist between them. Therefore, by refusing to pre-define what of interest will emerge, there is minimal, if any, risk of forcing concepts or categories from such preconceived ideas upon the data (1990). More contemporary grounded theorists (Strauss & Corbin, 1990; Charmaz, 2001; 2006) have taken issue with this approach. In order to allow previous literature to speak, on some level, to grounded theory research, they have developed their own grounded theory methodologies and have thus provided a place for seemingly relevant ideas and theories to inform new studies.

Grounded Theory Methodology of Strauss & Corbin (1990)

Since the introduction of their grounded theory method in 1967, Glaser and Strauss have taken grounded theory in somewhat different directions (Charmaz, 2000). Though they shared in the initial shaping of grounded theory into a systematic method and methodology of theory generation, a rift began to form between these two founding fathers, which ultimately lead to an ideological split. Strauss began collaborating with Juliet Corbin, an academic and nurse by training, and a second major iteration of grounded theory emerged (Strauss & Corbin, 1990). This new form of grounded theory moved the methods toward the *verification* of theory and away from the generation of theory, which until now had been the main focus of grounded theory. Though Strauss & Corbin's (1990) view of theory still retains some positivist leanings, it successfully infused a greater degree of Interpretive thought into grounded theory through an emphasis on relationships among concepts, which ultimately leads to greater understanding. Additionally, these relationships ultimately form a framework that can be used to explain or even predict social and psychosocial phenomena (1990).

Corbin, who spent 15 years in close collaboration with Anselm Strauss, indicates that data analysis requires that researchers interpret data and that these interpretations constitute an unavoidable limitation (1998). She questions how one can remove oneself, one's perspectives, one's experiences, and one's personal philosophies from the comparative process. She acknowledges that a researcher can only analyze and make comparisons via the Constant Comparative Method based on what he or she reads in the data, and that hopefully by staying "close" to the data, the researcher can remain outside of the interpretive process. However, Corbin does note that this second

notion is highly unlikely, if not impossible. Thus, Strauss and Corbin have drawn clear distinctions between that of *theory* and that of *description*. They emphasize both as fundamental hallmarks of grounded theory, whereas Glaser and Strauss only relied on theory. Strauss and Corbin (1990) contend that description can, indeed, retain aspects of the interpreter's own influences, but this is only acceptable when choosing certain words to invoke mental images of events, objects, and experiences for the reader. In this sense, it is perhaps okay for the researcher's own personality and style to be transmitted in the final document, so long as it only colors the description of context and not the theory which has been generated. They argue that without a thorough description of environments, feelings, attitudes, the overall social context, etc., one cannot truly understand the resultant theory since these contextual factors inevitably shape the realities of those who from whom the data were provided. This marks one defining contrast between their theory and that of Glaser and Strauss (Charmaz, 2006).

Strauss & Corbin (1990), along with Charmaz (2006) view grounded theory methods not as prescriptions or packages which must be followed through in a rigidly systematic and sequential order, but instead as a set of principles and practices that can be weighed according to need and implemented accordingly as warranted by the particular research context. One of these practices, which is perhaps one of the biggest differences between the grounded theory methodology of Strauss & Corbin and that of Glaser and Strauss, involves the role of existing theory in new studies. Whereas Glaser and Strauss vehemently deny that existing ideas, concepts, and theories have any place in grounded theory work, Strauss and Corbin claim that that which is already known

can be used as a point of departure when beginning a new study. That is, an already established theory can be used to inform the creation of a new grounded methods study, and can be efficacious when determining how to best approach a new line of inquiry. They even advocate for the use of existing theory to inform certain questions a researcher chooses to include in a semi-structured interview guide. Developing a pre-made interview guide from already established theory can help to determine if the existing theory applies in a new area of inquiry, and is thus supported as an appropriate practice in Strauss & Corbin's revised grounded theory methodology (Strauss & Corbin, 1990).

This idea that existing theories can be utilized in new grounded theory studies is where the additional emphasis on the verification of theory emerged as a salient aspect of grounded theory work (Strauss & Corbin, 1990). Through the provisional inclusion of existing theory, a researcher can verify if an established sociological or psychosocial theory generalizes to new social contexts. Thus, when existing theories are used as initially provisional starting points, Strauss and Corbin agree that grounded theory can proceed until the data would require a departure from them (1990).

Cutcliffe (2005) contends that the differences in perceptions of the roles of established theory was one of the principal drivers that led to significant and irreconcilable differences of opinion between Glaser and Strauss. This fundamental methodological difference between "emerging and forcing" (p. 426) created the rift that eventually caused the split, ultimately leading Strauss to begin collaborating with Corbin on a new methodology for grounded theory inquiry. While Strauss argues that

existing theory can play a role in informing the initial stages of a new study, Glaser adamantly disagrees that researchers should bring any preconceived ideas, conceptions, or theories to any grounded theory study. Glaser maintains that the researcher should allow the data to truly speak for themselves. He suggests the following to ensure that this is capable of happening: 1) trust the data, 2) engage in further comparative work, 3) allow your creativity as an analyst to be engaged, and 4) facilitate the access and application of tacit, implicit knowledge. Also, he contends that interview questions should be neutral, which allows the participants to respond without being unduly influenced by what they may perceive as social desirability. Furthermore, Glaser (1998) criticizes the use of pre-made interview guides as being overly directive. All too easily, they can dictate the direction of what should, in theory, be any initially directionless interview (Charmaz, 2006). Glaser contends that if precaution is not taken to ask neutral, non-leading questions, forcing data into preconceived categories may result, which invariably contradicts the fundamental tenets of the grounded theory method.

Strauss & Corbin's second significant departure from Glaser & Strauss's premier grounded theory methodology relates to the role of the literature review. While their new methodology does not explicitly call for a literature review to be done before every grounded theory study, they do argue that performing a literature review is not inconsistent with the objectives of grounded theory: theory generation and theory verification. They do note that the uses of technical literature are many, and they

provide a list of potential uses that literature can serve both before and during a grounded theory study.

To begin, Strauss and Corbin (1990) state that literature can be practically used by grounded theory researchers to stimulate theoretical sensitivity. Heightened theoretical sensitivity can surface when concepts and relationships from the literature are compared against the collected data. Although a researcher does not want to enter a grounded theory study with a pre-established list of concepts and relationships, certain ideas may turn up repeatedly in a literature review, which may warrant a closer look into their significance. Second, possessing knowledge of existing theories can provide ways of approaching and even interpreting data, based on what may already be provisionally known about them. Again, it is important to note that existing theories can inform initial stages of question development and data analysis, but it is crucial that they are denied further interpretive use if they fail to achieve agreement with the data. Third, literature can help stimulate questions, particularly if what one finds in the data is inconsistent with what one expects based on findings in the literature. Going back to the data or the literature and asking questions such as “Why is there a discrepancy?”, “What am I overlooking?”, and “Are the conditions different here?” can stimulate new ways of perception and interpretation. Fourth, familiarizing oneself with the literature can help direct theoretical sampling. The literature may be able to offer ideas about where to go to discover phenomena that directly speak to the development of your theory. Finally, Strauss and Corbin also suggest that the literature can be used as a method of supplementary validation. At the end of the study, when a researcher is

writing up his findings, he can make use of the literature by referencing it in appropriate places in order to further validate the accuracy of his findings. Or, he may want to show that his findings differ from those in the literature, and is thus able to offer explanations as to why. In this instance, Strauss and Corbin suggest that he be able to show, through thick description—a hallmark of their approach—what set or sets of conditions were operating in this particular situation, and how they impacted the phenomena of interest.

Given the potential ways in which they feel literature can inform grounded theory studies, Strauss and Corbin (1990) advocate the use of it, whereas Glaser (1978, 1992) certainly did not. Though Strauss and Corbin (1990) feel as though using literature, or even performing a formal literature review, can be efficacious when conducting grounded theory studies, they warn that what a researcher should not do is be tied to the literature in ways that could impede progress and suppress creativity.

The third major departure from Glaser & Strauss's approach concerns the nature of process within the data. One objective of all grounded theory studies, regardless of whose approach is used, is the identification of at least one social or psychosocial process. The notion of capturing social process is apparent in Glaser and Strauss's model from 1967, and involves identifying a core category that demonstrates variability over time. In their approach to grounded theory, Glaser and Strauss suggest that the use of constant comparisons between data and data, concepts and concepts, concepts and categories, and so forth, will automatically result in the emergence of this fundamental social process. However, in the book by Strauss and Corbin (1990), and

also in their article from the same year (Corbin & Strauss, 1990), the authors argue the identification of process needs to be made explicit in grounded theory studies, noting that this aspect of inquiry is often unknowingly omitted when one follows the methodology of Glaser and Strauss (Strauss & Corbin, 1990). They contend that unless a grounded theorist is “made keenly aware of the need to identify process, to build it into analysis, it is often omitted or done in a very narrow and limited fashion” (Strauss & Corbin, 1990, p. 144). They further suggest that, even when two or more stages are identified as occurring in the phenomenon, researchers often do not account for the variation in action, its rate of movement, or other changes in conditions that give rise to these stages. Thus, though Glaser and Strauss contend that grounded theory inquiry is inherently an action-oriented model, Strauss and Corbin do not believe that sufficient “action” is identified and described in Glaser & Strauss’s (1967) approach unless additional steps are taken. Thus, process has to be accounted for, and done so to a degree that is able to provide the reader a logical sense of flow of events. These events, as first purported by Glaser and Strauss, are brought about through the passage of time.

Strauss and Corbin (1990) list three ways in which change—which is the driver of process—can be identified within the data. They state that when investigating a social or psychosocial phenomenon, change can occur in the set or sets of conditions that lead to or cause the phenomenon. This produces a cascade of events that usually begins with a change in context, followed by a corresponding change or changes in action or interaction. Second, there may be a change in the intervening conditions that a

researcher identifies as exerting influence on action or interaction. For instance, it may be the case that a professor who once held high efficacy beliefs about teaching critical thinking skills to her students did so on a regular, consistent basis. However, if she somehow loses confidence in her ability to teach in this way, perhaps through a non-flattering course evaluation, this may affect her willingness to continue implementing critical thinking skills training in her larger curriculum via decreased efficacy beliefs. Finally, Strauss and Corbin indicate that the consequences of a previous action or interaction can serve to 1) add new conditions, or 2) alter the interaction among conditions that are already in existence. In the case of the professor who had received an unfavorable course evaluation, if she were successfully able to manage the situation, one would expect that her experience with this situation would affect how she handles similar situations if they were to happen in the future (Strauss & Corbin, 1990). Thus, by identifying these agents of change within the phenomenon, grounded theorists can paint a much clearer, much more descriptive picture for their readers, so that the innate presence of process can be better understood.

Though in agreement with Glaser and Strauss's notion that grounded theory methods can generate theory, Strauss and Corbin have created a methodology that breaks away from the narrow focus of theory generation and incorporates a means by which theory verification can occur as well. Through their insistence that established literature can inform new grounded theory studies, they advocate for the use of existing theories to help fashion the initial stages of the inquiry process. When existing ideas and theories are used within new areas of study, they can be further validated, and

validated in differing contexts, than the one(s) in which they were initially found to possess explanatory power. Additionally, Strauss and Corbin articulate how grounded theorists should address the nature and role of process within the data. Until this point in the history of grounded theory, researchers were more concerned with identifying process than they were with describing the contexts and conditions that fashioned and gave rise to the process. Strauss and Corbin argue that, unless such contextual factors are thoroughly described as well, any emergent theory will inevitably and invariably be lacking in conceptual fortitude (1990).

Grounded Theory Methodology of Charmaz (2006)

The late 1990s experienced yet another reconceptualization of grounded theory methodology. Many researchers, including Corbin herself, who were not fully satisfied with either Glaser & Strauss's or Strauss & Corbin's versions of grounded theory adopted new methodological guidelines. Among other things, these new guidelines consist of a much more intense and intentional utilization of coding, memo-writing, and sampling for theory development. These new 21st-century analytic strategies and methodological assumptions largely inform how grounded theory inquiry is conducted today (Bryant, 2002; Clarke, 2003, 2005; Charmaz, 2006).

Perhaps the most prolific current grounded theory researcher and writer who espouses these new guidelines is Kathy Charmaz. She claims that her version of grounded theory is a "symbolic interactionist theoretical perspective" (Charmaz, 2006, p. 10). The major defining feature of her grounded theory methodology revolves around the interpretive biases of the researcher, which, until now, were perceived as

unimportant and were therefore completely disregarded. Unlike the position of Glaser and Strauss, Charmaz has proposed a position which assumes that neither data nor theories are discovered. Instead, we (as researchers) are part of the world that we determine to study, and we are also a part of the data we collect. We actively and inevitably construct our grounded theories through many things, including our past and present involvements and interactions with other people, perspectives, and research practices by which we abide. Based on this, her methodology is the most Interpretive, and therefore the most Constructivist, version of grounded theory when contrasted against the previous two major approaches (Charmaz, 2000; 2006). Her version of grounded theory holds the assumption that any theoretical rendering we come up with offers an interpretive portrayal of the studied world and realities, not an exact picture of the world and its realities. Due to the fact that a researcher has his or her own biases, interpretations, and ways of making meaning for himself or herself, it would be erroneous to expect that an exact picture of the world *could* ever be fashioned (2006). Guba and Lincoln (1994) also agree that the experiences of the researcher cannot—and should not—be divorced from the interpretation he or she presents, and that grounded theory ought to embrace these resultant highly personal constructions.

In agreement with the University of Chicago school of thought which emphasizes symbolic interactionism, Charmaz (2006) notes that we should use certain pragmatist underpinnings inherent in grounded theory in order to advance interpretive analyses, and that grounded theory should exploit the personal and highly social constructions of reality interpretations. She lends credence to Glaser and Strauss's notion of bringing

an open mind to the analyses, but Charmaz also acknowledges that researchers automatically bring their own knowledge and biases with them into research studies. It is upon this idea that Charmaz fashioned her own methodology of grounded theory, in which the “purest” allowance of Interpretive and Constructivist thought informs the entire process of inquiry.

Thus, as can be seen from the descriptions of the three major methodology “movements” within the grounded theory framework, grounded theory has always contained both Positivist as well as Interpretive characteristics, although the degree to which either is expressed depends on the particular methodology being employed. Since its creation, grounded theory has aimed at uncovering meaning within the lives of those studied. The ways in which this occurs have been argued and debated for the past few decades, with Glaser and Strauss’s model from 1967 possessing the most positivist as well as least interpretive characteristics. Strauss and Corbin’s methodology from 1990 did away with some positivist aspects while embracing a more interpretive nature overall due to the new emphasis on interpretation and description. Charmaz then created a third major iteration of grounded theory methods, in which we see the Interpretive Theory influences reflected most strongly.

Just over forty years ago, Glaser and Strauss were fighting the dominance of positivistic quantitative research, and the hegemony quantitative research enjoyed within the inquiry process. Ironically, by 1990, the grounded theory method had become known not only for its rigor and utility, but indeed for its assumptions that were clearly aligned with Positivistic thought as well. Even so, while methodologists

have taken strides to move grounded theory toward a more Interpretive form of inquiry, it still retains some of its Positivistic roots. This inherent flexibility and legitimacy of grounded theory methods is therefore appealing to both qualitative as well as quantitative researchers, since grounded theory does not require abandoning one in favor of the other. Guidelines exist within grounded theory that describe the steps of the overall research process, and provide a viable avenue through it regardless of which methodology is used. Researchers across all disciplines can successfully employ grounded theory within both qualitative and quantitative paradigms simply by adopting and adapting these guidelines to their particular research needs.

A blending of grounded theory methodologies of Strauss and Corbin (1990) and Charmaz (2006) was used in the current study because both allow for an existing theory, or components of a theory, to be tested in a new context, which is not a provision of the initial grounded theory methodology of Glaser and Strauss (1967). Specifically, the methodology of Strauss and Corbin (1990) allows for existing theory to be provisionally tested during the initial stages of data collection and analysis, and the methodology of Charmaz (2006) indicates that some degree of personal voice from the researcher can be retained in the final analyses. Consistent with both of these methodologies, existing theory can be used if the data support its explanatory power, but must be discarded if the data begin to demonstrate otherwise. In this study, the Expectancy-Value Theory of Achievement Motivation (Wigfield & Eccles, 2000) was used during preliminary inquiry stages to assess its explanatory power of helping to understand the phenomenon of teaching of critical thinking skills within pre-service

teacher education courses at a large public Research 1 university in the Southeastern United States.

Perspective of the Researcher

Personal Experiences with Qualitative Research

A feature unique to qualitative inquiry is the central role of investigator as the instrument through which data are both collected and analyzed. In order for the data and their analyses to be accurate, valid, and reliable, the qualitative investigator must be trained in qualitative methods and design and prepared for the task (Strauss & Corbin, 1990; Charmaz, 2006). Part of this preparation occurs through training in formal qualitative theory and practice, as well as in field work undertaken as a necessary and fundamental component of such preparation.

I am a doctoral candidate in the Curriculum, Instruction, and Counselor Education department whose specialization is Educational Psychology. Part of my graduate curriculum and research collaboration experiences included theory and practice in qualitative methods, which served as vital preparatory tools leading up to envisioning, designing, and ultimately undertaking the current study. I completed extensive reading on theory, theory development, and grounded theory publications in a traditional qualitative methods course following several semesters of quantitative methods, including linear regression, multivariate statistics, and hierarchical linear modeling. I also gained practical qualitative research experience conducting interviews, analyzing qualitative data, and presenting research project findings at

conferences. My qualifications for conducting this study also include extensive reading and study in the area of the various major grounded theory methodologies which was part of my comprehensive doctoral examinations.

Prior to entering the doctoral program in educational psychology, I had received no training in qualitative inquiry or qualitative methods. My previous graduate training in exercise physiology and undergraduate training in psychology consisted of purely quantitative work, so I was (quite literally) ignorant of qualitative inquiry and what purposes it serves. During my master's program, one of my professors addressed qualitative research in rather unflattering terms. When asked what qualitative research was, my professor did not choose to answer the question directly. Rather, he indicated that out of 36 current faculty members within the department of Exercise and Sport Science, 35 of them were strictly quantitative researchers and had always been quantitative researchers. He then added that the only qualitative researcher among us was an adjunct professor, so he (literally) told us to "Do the math". Based on his rather condescending answer, I quickly dismissed qualitative research as either unimportant or impractical, or maybe even both. Only after I began to take courses in my doctoral program did I begin to see a need for inquiry that could generate answers to certain questions. In particular, I began to see qualitative research as possessing the practical ability to help us behavior rooted in personal beliefs and motivations. While some questions are quite readily answered with a "*p*" value and are thus easily addressed with a quantitative approach, others are not and warrant a different approach. Despite all of my training in quantitative

research methods, I somehow managed to come up with (and refuse to let go of) research questions that were best addressed via qualitative methods, which lead me to adopt the grounded theory method as the vehicle through which I would attempt to answer the questions in my dissertation research.

Development of Critical Thinking Research Interest

My interest in critical thinking was initially sparked during the first course I ever took during my master's degree program (as I articulated in my "Biography" section). However, this interest remained relatively latent until the second year of my doctoral program, during which I took two courses that presented very one-sided arguments for potentially sensitive topics. As was fitting with my usual "student mode" thinking, I mindlessly accepted what I was hearing until it became blatantly obvious that differing perspectives and counter-arguments were being deliberately excluded from these two courses. During one class session when I shared my beliefs that it was our responsibility as a community of learners to expose ourselves to all known perspectives and inform ourselves of all possible arguments both for and against these topics so that we could make the best decision possible as autonomous individuals, I was literally yelled at in front of my classmates for failing to accept and believe what I was being told. This caused me to consider multiple possibilities for why the instructor demanded that we not even bother with researching alternative perspectives relevant to the issue at hand, because according to him "the consensus shows the debate has been settled". It became apparent that there was an agenda driving that particular required course, and that exposing students to multiple ways to

evaluate a problem was not part of this agenda. Due to my feelings that this was a complete disservice to each and every student enrolled, I began to research critical thinking and how it could be cultivated within college students so that this type of indoctrination would not continue to occur. Furthermore, as I delved deeper into the literatures on critical thinking, cognitive development, decision making, and teacher beliefs, I arrived at the topic I would ultimately research for my doctoral dissertation: how to promote critical thinking not just within college students, but within pre-service teachers in particular. I thoroughly believe that there is a lack of critical thinking taking place at the undergraduate level, and this problem needs to be addressed *before* the undergraduate experience. Therefore, I feel as though critical thinking training must occur explicitly within teacher preparation courses so that these future teachers will be able to successfully understand the critical thinking process as well as model it for their future students. As with other abilities, critical thinking does not “just happen” by chance, or become promoted through simply showing up to class. It is a conscious, voluntary decision to engage in this type of thinking, and my experiences with teaching have reaffirmed this time and time again.

I have spent the past three years as a graduate instructor of Educational Psychology as well as Psychology of Adolescent Development. During these three years, I have obtained anecdotal evidence that further supports the idea that students are either not being presented with opportunities for critical thinking during their undergraduate education or psychology preparation, or that they are not recognizing these opportunities as such. I use informal assessments conducted at the end of each

class session to allow students to write their thoughts about the content that was covered on that particular day. Students are asked to reflect on what was discussed and apply it to either their current academic work, or to their future career. I use these reflections to help make sure everyone is attempting to apply new material. They also allow me to address student questions or concerns that may be included as well. The following quotes from undergraduate students in my classes have been submitted on their reflection cards:

1/19/11: "Teachers who assume students already possess the ability to think critically are not thinking critically at all because their beliefs have been founded on an assumption. This means they're not teaching us what they're trying to get *us* as the students to do." – Psychology major, Junior

3/21/11: "Critical thinking has been my favorite topic so far because it helped me realize how much I lack critical thinking skills." - History Education major, Junior

5/25/11: "I realized that I have been hearing the term 'critical thinking' for years, but I have never really learned what it is. I use experiential thinking very often and this could lead me to faulty conclusions." – Psychology major, Junior

5/25/11: "I thought I really knew what critical thinking was, but honestly you are never really taught about it or how to do it. It just shows that something so important can easily be taken for granted and teachers just expect you to know how to do it." – Political Science and Education major, Senior

8/23/11: "At first I thought I wasn't really a biased person, but after today I discovered I am. I also learned that critical thinking is a skill that does not come easy...it takes a lot of thought." – Elementary education major, Sophomore

8/23/11: "I am not a great critical thinker. It is hard for me to visually imagine things when they aren't laid out in front of me." – Elementary education major, Freshman

8/23/11: "I learned today that critical thinking has never been present in my education, and how much more interesting it makes a lesson." - Elementary education major, Freshman

These selected sources of data may suggest that students seem to believe that critical thinking is somehow an expected educational outcome of certain college courses, but that their instructors do not explicitly provide opportunities for these skills to be engaged and nurtured. These data may also suggest that students can go through seven semesters of undergraduate preparation in education and never develop a thorough understanding of critical thinking or how to do it. Anecdotal sources from my informal conversations with former undergraduate students also suggest that many of them feel frustrated that critical thinking has not been present in their previous educational experiences. Given that I agree with Dewey that it is our job as educators to teach our students how to think, I have decided to carve a professional research niche within the areas of critical thinking, cognitive development, and teacher beliefs. As a professional educator, I do not want the students in my classroom to simply walk away at the end of the semester with new facts they've memorized. Rather, I want them to leave with new understandings of themselves as learners and ultimately how to make important decisions within the real world based on new ways of thinking.

Undertaking Qualitative Research: The Critical Researcher

At the heart of qualitative inquiry training is reflexivity, often referred to as self-awareness, that must be attained and maintained by the researcher throughout the research process (Strauss & Corbin, 1990; Creswell, 1998). One of the virtues of being human is possessing subjective biases and philosophical assumptions, which in and of

themselves are not harmful. However, these must be recognized, evaluated, and kept in constant check during qualitative inquiry so that the researcher's preconceived ideas about how the world works or should work do not bleed over and into the resultant findings (Charmaz, 2006).

The crux of constructivist (or interpretive) theory—of which grounded theory is one method—is understanding as opposed to explanation or prediction. Those who espouse the constructivist definition of theory view theoretical understanding as inherently abstract and interpretive—how the theorist interprets the studied phenomenon ultimately informs the very understanding gained from interpretive work. Additionally, instead of seeking causality or emphasizing the recognition of patterns and connections that lead to linear reasoning, interpretive theories tolerate indeterminacy (Strauss & Corbin, 1990).

In addition to the interpretation of studied phenomenon, interpretive theory assumes multiple realities which are considered emergent from within their social contexts. This shares assumptions with those of symbolic interactionism, which emphasizes multiple realities, 'truth' as provisional, and life as necessarily driven by social processes. Thus, instead of attempting to explain reality—which interpretive theorists acknowledge as multiple and context-bound—there is an emphasis on determining *what* people assume is real, and *how* they construct and act upon their personal view of reality. This is the opposite of positivist theory, which assumes one universal reality, and that this reality is not dependent on personal or situational factors (Charmaz, 2006), but can be observed and explained regardless of social context.

Thus, in order to undertake a qualitative research study, and a grounded theory study in particular, the researcher must keep his or her personal paradigmatic lens in constant check and allow the participants to articulate their interpretations of reality. It is then up to the qualitative researcher to render these experiences through the emergent theory in a way that appropriately reflects the participants' articulations of a sociological or psychological process. Furthermore, this must be done through constant reflexivity that keeps his or her own subjective biases divorced from the new theory.

In order to minimize researcher bias, I performed no exhaustive literature review beforehand that would have otherwise served to inform the design of the current study. While any study worthy of being conducted must begin from the knowledge that it is both necessary and substantively relevant, the use of information acquired from previous research varies depending on the method of inquiry (Glaser & Strauss, 1967). In grounded theory inquiry, a literature review is not regularly used prior to commencement of the study which would thus serve to inform the research design or offer potential perspectives. Rather, it is used after the study has been completed and serves to inform findings and situate these results within the context of relevant bodies of knowledge (Glaser & Strauss, 1967; Creswell, 1998). Strauss & Corbin (1990) derived a grounded theory methodology that can be used to validate existing theory, but the chosen theory must only be treated as provisional and thus must be abandoned if data analysis does not warrant it further consideration. I chose to use a provisional model on achievement motivation known as the Expectancy-Value Theory and used it to provide the initial theoretical framework for my study, which is a practice consistent

with the Strauss and Corbin (1990) grounded theory methodology. It is my hope the cursory presentation of the literature at the beginning of this document serves to help the reader understand the problem under investigation and validate the claim that it has not been addressed or answered in previous studies. The more thorough, exhaustive discussion of the relevant literature occurs after the findings to help juxtapose results from this study with what is already known about teacher beliefs about critical thinking.

Researcher Biases. By virtue of being a human being, I possess biases and therefore had to identify these personal beliefs prior to conducting this study. To begin, I made a broad assumption that many students within the college of education would have an undergraduate experience similar to the one that I experienced as a psychology major. As such, I assumed that many of the professors taught in similar ways to the ones I had taken courses with many years earlier (ie: by lecturing, some group work, and predominantly multiple-choice tests). Thus, I expected that much of the data collected would resemble if not mirror some of the beliefs many of my previous professors would have also articulated.

Another bias stemmed from the fact that I, myself, am an educator in a college of education, and saw (to some degree) the participants in the study as my peers. This likely made me more confident in approaching them to inquire about their willingness to help inform the theory I would be creating. Though I did not know prior to commencement of the study who my participants would be, I felt reasonably confident that I would be able to find willing educators who would not mind contributing to the

inquiry process because I had developed professional relationships within many academic departments during my previous four years as a full-time doctoral student at the institution. Familiarity and personal comfort with many of the participants likely aided me during the recruitment phase of the study. However, this same familiarity probably caused me to “over-relate” on some occasions when analyzing and interpreting the data. For instance, during a few member checks I was writing memos as the participant was providing feedback on the emergent categories and themes. I found myself quick to agree when certain participants articulated unfavorable stories of students who simply did the minimal work required to achieve a passing grade. I believe I did this because I have also taught many of the same students and thus felt as though I could personally relate to the concerns being voiced to me. I also felt that being a fellow educator within the same college of education as the participants automatically meant that we inherently shared the same vision and goals for our classrooms and students, yet this assumption proved to be largely unfounded after the data collection had come to an end. Whereas critical thinking is always in the forefront of my mind as I plan and develop lessons, activities, and assessments in my classrooms, it may not be as salient in the minds of other educators who possess different educational goals and research interests.

Sampling

Qualitative research employs information-rich individual cases as the basis for the logic and power of the method (Strauss & Corbin, 1990). Purposeful, discriminant

sampling was used in this study to gather information-rich cases from college of education faculty members. Two purposeful sampling methods were employed—relational sampling and theoretical sampling—to ensure that individuals perceived as highly capable of speaking substantively into the emergent theory were recruited.

Throughout the study, relational sampling was used to select participants for subsequent data collection (Strauss & Corbin, 1990). Relational sampling refers to picking cases that meet some pre-specified criterion or various criteria. For this study inclusion criteria to be met were: full-time college of education faculty or staff who regularly teach undergraduate teacher training courses to pre-service teachers and who were teaching at least one course meeting this criterion during either the fall of 2010 or spring of 2011. Four academic departments were pre-selected in order to maximize the diversity of participant expertise content areas: Elementary Education, Middle Grades Language Arts & Social Studies Education, High School Science Education, and High School Math Education. Through electronic communication or an in-person meeting, I assessed all eligibility criteria for each potential participant. If faculty members met the study criteria, they were asked to participate in the study (See Appendix A for the email script used to describe the study to potential participants and assess the general eligibility criteria.).

In addition to relational sampling, theoretical sampling was utilized once the first set of data had been collected and initially analyzed. It is generally accepted in grounded theory that during theoretical sampling the researcher starts with the data, constructs tentative ideas about them, and then examines these provisional ideas

through further empirical inquiry (Charmaz, 2006). The overriding goal in this step of sampling is to selectively identify those persons and settings that are likely to prove most efficacious at informing the emerging theory. Thus, indiscriminate sampling has ended and specific persons and places for observation are now systematically chosen. Cases were now sought that helped to further the theory development. In this study, theoretical sampling was specifically used to ensure that the faculty members who participated in this phase of the study had adequately experienced the phenomenon of interest to provide rich description (Strauss & Corbin, 1990).

Unlike quantitative research, in qualitative research there exists no formula that can provide an appropriate number of participants to comprise the final sample size (Strauss & Corbin, 1990). Whereas quantitative research examines a phenomenon across a broad number of participants, qualitative research looks more much in depth at a phenomenon among relatively few individuals (Glaser & Strauss, 1967). However, decisions can be made at the onset of the study based on the sampling theory. The objective in the current study was to describe the experiences in the sample and to capture and portray the variability of their individual responses. Patton (1990) recommends that a minimum sample size number be specified that is based on expected coverage of the phenomenon, which can be modified later during the study if needed. Glaser & Strauss (1967) indicate that a minimum sample of three or four participants can be a viable sample size capable in yielding a theory if recurring theoretical data collection takes place and over time proves sufficient to yield theoretical saturation.

To maximize the potential for adequate phenomenon coverage, but while also bearing in mind the inclusion criteria, the estimated starting point was set at 8 to 10 participants. In grounded theory, however, the ultimate criterion for the final sample size is theoretical saturation (Glaser & Strauss, 1967; Strauss & Corbin, 1990). Saturation is said to be reached when no new data emerge (Strauss & Corbin, 1990; Charmaz, 2000; 2001; 2006). Thus, when the researcher begins hearing the same things over and over again, and is able to repeatedly demonstrate a category's validity and overall fit, it may be said that theoretical saturation has been achieved (Morse, 1995). Because the determination of the sample size evolved as the study progressed and was ultimately finalized during the data analysis phase, this discussion can be found in the following chapter.

Participant Recruitment

My proposed study included data collection at another location whose college of education also included elementary education, middle grades language arts and social studies education, high school science education, and high school mathematics education. Recruitment of faculty members within these specializations at another location would thus allow for the comparison of two "case studies" in regard to understanding how critical thinking skills training is undertaken at two separate institutions within the same four academic specializations. This second institution is a small, private, liberal-arts women's college, and thus represents a significant contrast from the institution which served as my "home base" during the data collection

process. However, despite several attempts to establish contact with a “gatekeeper” at this second institution who could grant me access to faculty within the college of education, I was unable to meet with anyone there who may have been able to help inform my grounded theory. In January and February 2011, the gatekeeper indicated that she had shared my research interests with the faculty members during a faculty meeting, and that two individuals had expressed initial interest in learning more about my research. However, their names were not shared with me, and repeated attempts to follow up with the gatekeeper proved unsuccessful. Thus, I was unable to recruit any participants from this second location.

At the institution where all data collection took place, an initial review of each website from four departments (elementary education, middle grades language arts and social studies education, high school science education, and high school mathematics education) provided a list of current faculty members who were then screened for eligibility for study inclusion. The initial screening began during the fall semester of 2010, during which three potential participants were identified and contacted. The remaining participants were contacted during the spring semester of 2011 after the initial data collection stages were complete. Similar to the final sample size determination, recruitment procedures evolved as the study progressed, as did the utilization of theoretical sampling. Participants observed and interviewed were beneficial in helping to determine not only which additional questions to ask during subsequent data collection, but which individuals might be capable of substantively informing the emerging theory. By the end of the theoretical sampling stage when

saturation had been reached for each category, a sample size of seven had been successful recruited.

Data Collection

Data were collected primarily by conducting one-on-one, in-depth interviews with each participant in the location of his or her choice. In each instance, interviews were conducted in the participant's campus office during office hours. These interviews were semi-structured in nature and were guided by the research questions. However, they were unstructured enough to allow the discovery of new ideas and themes as the participants provided their unique personal experiences and beliefs. Interviews lasted between 21 minutes and 73 minutes, with the mean interview length being 46.5 minutes. Interviews were recorded with a digital recorder and were transcribed within 2 days to preserve the "freshness" of the data in my mind as the study progressed.

Memos (or field notes) were taken during and directly after each interview. Memos are the written records of analysis that a grounded theorist keeps throughout the inquiry process that help relate data to the formulation of theory (Strauss & Corbin, 1990). Memoing as a process is said to be the "pivotal intermediate step between data collection and writing drafts of papers" (Charmaz, 2006, p. 72). As such, memoing is a crucial process within grounded theory research, as it allows the researcher to represent on paper what he has been abstractly thinking and considering about the data. Memos were also used to record informal conversations that may have occurred before

or after the semi-structured interview, thus allowing the researcher to obtain a more comprehensive interview record.

A semi-structured interview guide was utilized for all stages of the data collection process, and initial questions were provisionally used during the initial stages until data collected warranted a modification of interview questions. (See Appendix D.) The guide was designed to elicit extensive description from the participants using their own words to describe their subjective perceptions of critical thinking, how they defined it and conceptualized it, and how they taught the skills necessary for critical thinking in their classrooms. The interview guide was reviewed for appropriateness and suitability and approved by my advisory committee and the institutional review board prior to the start of data collection. Based upon what emerged during the initial data collection stages, the guide was modified to further refine questions that were not eliciting the intended information and to reflect the commonly occurring categories and concepts that required further development (Strauss & Corbin, 1990).

A secondary method of data collection involved participant observation. Long considered the cornerstone of effective fieldwork (Grinnell & Unrau, 2008), participant observation provides information that goes beyond only that which is seen or heard. It allows data to be obtained through all sensory registers, providing deeper levels of information than interviews, content analyses, and other forms of qualitative research. I used participant observations as a method to gather information on how classrooms and instructional activities were designed to promote critical thinking. Thus, I was able

to carefully document the nature of content, discussions, the dynamics between now only teacher and student but between student and student, and how the overall classroom environment may have influenced opportunity to engage in critical thinking.

In this study, each participant was observed teaching in the classroom for a minimum of 90 minutes. Classroom observation times ranged from 90 minutes to 120 minutes, with the mean observation length being 105 minutes. One observation took place during October of 2010, while the remaining six took place between January and April of 2011. All observations took place on campus in the building that houses the college of education. All data recorded during observations were noted on the Classroom Observation form (see Appendix B).

The classroom observation protocol used in the current study was developed as a result of having evaluated several existing observation protocols. No known published protocols center around critical thinking, so my committee co-chair and I pieced together the current protocol which was based on components found in the Reformed Teaching Observation Protocol, or *RTOP* (Pilburn, et al., 2000). We felt the *RTOP* incorporated classroom aspects that were most easily modified to capture the current phenomenon of interest—the teaching of critical thinking skills. Though the *RTOP* was originally designed for observing teachers of mathematics and science, we modified it and ultimately created an observation that allowed me to focus on classroom opportunities for critical thinking and critical engagement, along with interactions between and among students as well as the overall classroom environment. Furthermore, we felt that the utilization of the same observation protocol across all

observations would enhance my consistency as an observer, since it would contain a list of specific behaviors of interest that I would need to document, analyze, and understand before eventually incorporating them into the emergent model. Thus the observation protocol was used to ultimately enhance my credibility as a grounded theory researcher.

Another secondary method of data collection involved document analysis. Course syllabi, culminating project descriptions and rubrics, and signature artifact descriptions and rubrics were provided by the participants and analyzed. These three data collection methods were incorporated as a means by which to achieve triangulation (Creswell & Miller, 2000). Triangulation seeks to establish convergence among multiple sources of information as categories and themes develop, and prevents the emerging theory from being based solely upon one source of data (Charmaz, 2006).

Data Management

Prior to the commencement of the study, the Institutional Review Board (IRB) where the data collection was to take place approved the study. Each participant signed an informed consent form prior to the interview or classroom observation, whichever came first. (See Appendix C for this form.)

Before conducting each interview, the participant was given a pseudonym, and all references to the participant during the course of the interviewing and memoing processes used this assigned name in place of his or her real identity. I tape recorded each interview with the permission of the participants and transcribed each one

verbatim. I then reviewed each interview for accuracy prior to data analysis. I also incorporated memos into the transcripts as they were taken and systematically reviewed them along with the transcript prior to subsequent data collection.

I kept information from all interviews, observations, and documents confidential throughout the inquiry process. These raw sources of information were available only to me during the course of the study. Data provided to my peer reviewer were first transcribed and checked for accuracy and included participant pseudonyms for identification purposes. The majority of the findings have been presented in aggregate terms in the following chapters. Individual participants were not identified by name or by other identifiers that would single them out or serve to compromise their anonymity. The report contains representative quotations from each participant. Each time a quote is presented, it is attached to the pseudonym the participant was given prior to data collection. Throughout the course of the study all interview materials (transcripts, tapes, and memos), observation forms, and course documents were kept in a secure location.

Data Analysis

Open coding, also referred to as initial coding (Strauss & Corbin, 1990), is the first step in the overall grounded theory coding scheme and serves to name and categorize various phenomena through careful examination of micro-level data. Without this open coding step, no subsequent coding procedures could take place.

Two specific procedures within open coding help to give grounded theory concepts their “precision and specificity” (Strauss & Corbin, 1990, p. 62-63). These procedures, collectively known as the “constant comparative method of analysis” (Glaser & Strauss, 1967, p. 101-116), involve making comparisons within the data and asking questions of the data. These processes help the researcher to begin conceptualizing the data, which is the first formal step in analysis.

The conceptualization of data required that I break down the data and analyze them as tiny individual pieces. Thus, each sentence, paragraph, and observation was broken down. Each idea, incident, and event was assigned a name. These names (or codes) served to label each individual piece with something representative of a phenomenon, and were usually written or notated in the margins of observations and field notes. I also used a color-coding scheme to help keep track of codes and emergent themes. In open coding, discrete incidents and events are compared with each other as the researcher proceeds so that similar phenomena are labeled with the same name. This labeling (“coding”) of phenomena must occur first so that any emergent categories can be founded upon these conceptual labels (Strauss & Corbin, 1990).

During open coding, data were broken down into small discrete parts. Though the procedures of breaking down the data can occur in a number of ways (Glaser & Strauss, 1967), a common method that I used in this study involved line-by-line coding. This method of fracturing the data into their smaller parts occurred with each line of text in order to identify the problem and how it was resolved. Thus, everything

from the very first interview and observation to the final memoing was coded in this way. These parts were then closely examined and subsequently compared with other discrete data parts for similarities and differences. It is during these first analytical coding processes when the researcher asks questions about the data that help inform the phenomena reflected in the data. This questioning also helps the researcher to become aware of his own assumptions about the phenomena, which, once identified, can help lead him to new discoveries (Charmaz, 2006).

The next stage within open coding pertains to the discovery of categories, which arises through categorizing concepts that seem to share theoretical similarity. This combining of concepts helps to reduce the number of units the researcher is forced to manage. While not yet certain that certain concepts are necessarily related, they are treated as being provisionally related until the data warrant they be treated as unrelated (which will be determined during axial coding, the next stage of coding).

Categories are analytically developed by the grounded theorist, and help the researcher understand the data by placing it under a broad explanatory umbrella that also covers multiple other concepts. Categories must be named, which is a task required of the researcher if he is to remember them, think about them, and begin to develop them analytically (Strauss & Corbin, 1990). In addition to naming each category, the grounded theorist also needs to develop each category in terms of its properties and dimensions. Described here, properties refer to the attributes of a category, while dimensions refer to locations of a property along a continuum. For example, a category of personal beliefs emerged in the present study, with one of its

subcategories being “values” (or “evaluations”). All data pieces relating to values were color-coded in light blue and then compared against one another to begin extracting the properties which help to explain them. Some properties of these evaluations in general might be their direction (positive or negative), their strength (low or high), or their temporal duration or consistency across time. These properties can then be dimensionalized when they are applied to each incident within the data (Strauss & Corbin, 1990). For instance, evaluations of critical thinking outcomes can be represented on a continuum ranging from “negative” to “positive”; strength can be dimensionalized as “low” to “high”; consistency can be represented as “somewhat” to “always”. It is after the identification and naming of categorical properties and dimensions that “evaluations” can be specified and thus provisionally understood according to that which helps describe it.

In sum, open coding involves the conceptualization of data at the first level of abstraction, and is the initial step in data analysis (Strauss & Corbin, 1990). Open coding consists of deconstructing and fracturing of data into small components, each of which will be analyzed systematically. It is during this stage of coding where concepts, the building blocks of theory, are first identified and used to code individual data pieces. These codes are attached to discrete incidents and events, which are then combined into concepts. Concepts will be defined and redefined, often many times, over the course of a study as new data emerge. As they become developed, similar concepts become combined which gives rise to categories. A category is described a higher-order concept that subsumes many lower concepts that share commonalities.

Categories then become substantively developed and specified as their properties and dimensions are identified and named. All of these tasks are accomplished through asking questions about the data and making comparisons of the data during open coding, a highly systematic process woven through all stages of inquiry known as the constant comparative method. Once all of these steps had been taken in the present study, I was able to determine which codes and categories were unique to an individual participant, and which ones were more global and required further provisional testing. This allowed for the data analyses procedures to transition into the next phase of coding, known as axial coding.

After the data have been broken down, analyzed, and grouped into concepts and categories, they need to be put back together for another phase of systematic analyses. Axial coding, the second stage of grounded theory coding, is the process by which putting data back together and reconfiguring it in new ways occurs (Strauss & Corbin, 1990). This is accomplished through making connections between an identified category and its smaller sub-categories (Charmaz, 2006).

During axial coding, the researcher focuses on developing categories in terms of what contexts or conditions give rise to his categories. (It is useful here to use “category” and “phenomenon” synonymously.) More specifically, axial coding helps to uncover the context in which a category (phenomenon) is embedded, the action strategies by which the phenomenon is carried out or handled, and the resultant consequences of those strategies. Though multiple categories will emerge and become labeled during this phase of coding, Glaser and Strauss (1967) argue that the

identification of a core category—one that is informed based on the properties and dimensions of all interrelated categories—is one of the ultimate objectives for grounded theorists, and is to be the central category or thesis around which all other categories exist and inform. The naming of this core category occurs during the next stage of coding, theoretical coding. However, it is during axial coding where the groundwork is laid whereby the grounded theorist will soon be able to identify this core category and begin relating all other categories to it in a logical, sequential manner (Strauss & Corbin, 1990).

Strauss & Corbin (1990) state that, in order to begin locating and identifying this core category, the first step within axial coding must be the identification of a *phenomenon*. This is done by asking questions such as, “What are these data really referring to?” and “What is this action all about?” Once the phenomenon has been identified, the second step requires that the researcher begin looking for *causal conditions* that lead to the occurrences and/or development of the phenomenon or phenomena. These causal conditions, or antecedent conditions, are often identified by the words “when”, “while”, “since”, “because”, and the phrases “on account of” and “due to”. These causal conditions provisionally point to and may help explain *why* an educator might choose to engage in the behavior of research interest. Thus, by discovering these explanatory conditions, personal motivations for choosing to teach (or not teach) critical thinking skills can be uncovered and understood. The coding scheme generated through the open coding and axial coding stages of data analysis has been presented below in Table 2.1.

Table 2.1 Coding scheme used during open and axial coding with representative examples of codes

Provisional categories	Brief description	Examples of representative codes
1. Curricular influences	Internal (self-imposed) or external (other-imposed) factors that affect what or how content is taught	Personal interests Research literature Future teacher responsibilities
2. Definitions of critical thinking	Personal interpretations of skills consistent with critical thinking	Understanding why Weighing all sides Analyzing Thinking deeply
3. How to cultivate critical thinking	That which is required to promote critical thinking	Questioning yourself Applying knowledge Taking multiple perspectives Reflection
4. Instructional strategies	Classroom practices that promote critical thinking	Discussion Questioning Assessing own work Assuming other perspectives
5. Efficacy beliefs	Confidence in ability to successfully teach critical thinking skills to students and make it work	Observing growth as a learner Observing new procedural skills Hearing new perspectives
6. Evaluations of critical thinking	Level of importance placed on being able to think critically	See gray areas Prepare for future roles Prepare effective teachers

Table 2.1 (Continued)

7. Evidence of critical thinking	Observable proof that critical thinking is occurring	New thought processes New self awareness Evolving questions Explaining why
8. Lack of evidence of critical thinking	No observable instances of critical thinking	Low-order cognitive skills Performance orientation Short-sightedness
9. Teacher perceptions of critical thinking	Non-definitional beliefs about critical thinking	Important Practical Necessary
10. Motivations	Personal reasons for engaging in an activity	Prepare better teachers Promote better understanding as student Prepare for outside responsibilities
11. Contributing factors	That which helps critical thinking occur	Class structure / learning context Engagement Group discussion
12. Hindering factors	That which prevents critical thinking from occurring	Emotions Disengagement Laziness Performance orientation

The next step within axial coding involves identifying the *context* within which the phenomenon occurs. Action strategies chosen to manage, carry out, and respond to the phenomenon are housed within these contextual conditions. Identifying these contextual factors surrounding the phenomenon helps the researcher specify important conditions that give rise to action or inaction. So, in following the current example, we might say that “Under conditions where the desire to teach critical thinking skills is 1) constant and 2) strong, then x occurs.” On the other hand, we might also be able to say that “Under conditions where the desire to teach critical thinking skills is 2) intermittent and 2) weak, then y occurs instead.” Identifying the contextual details surrounding the phenomenon will help the researcher possess a greater understanding of the action (or inaction) and interaction exhibited by those being studied. Given that grounded theory is an action-oriented model, contextual factors are explicitly identified during axial coding due to the fact that they are capable of driving the action (or process) of interest (Strauss & Corbin, 1990).

At the same time the grounded theorist is looking for confirming evidence, he or she is also trying to uncover instances in the data where proposed statements of relationship might not hold up. These negative cases do not necessarily negate provisional relationships or disprove them. Rather, “they add variation and depth of understanding” (Strauss & Corbin, 1990, p. 109). It is just as important to find instances where proposed statements of relationship are upheld as finding evidence of instances where they do not. Knowing that there are negative cases that speak against the proposed ideas requires that the researcher go back into the data and find out why,

in certain instances, these provisional statements do not hold up. Strauss & Corbin (1990) claim that following through on such differences adds density and variation to the emerging theory.

Axial coding also involves relating sub-categories to categories. It inherently involves both inductive and deductive reasoning, spurred along by asking questions and making comparisons. The focus here is discovering and relating categories in terms of the conditions and contexts that give rise to these categories, or phenomena. Axial coding helps “clarify and extend the analytic power of your emerging ideas” (Charmaz, 2006, p. 63). The procedures specific to axial coding put the data back together in ways that enable the researcher to uncover the background details that operate behind the phenomena. Consequently, these phenomena ultimately drive the emerging theory.

Once the axial coding procedures in the present study were completed, measures intended to clean up the data took place. Quotations from each category were again reviewed for context and “fit” within the category. Codes and categories that were not used in a noted series of interviews resulted in transcript review to ensure that pertinent information had not been overlooked. Further, memos were used to track initial ideas (from the three data sources) that were to be theoretically abstracted to a higher level during the next stage of data analysis, theoretical coding.

The final stage of coding is theoretical coding, also referred to as selective coding (Charmaz, 2006), and serves the purpose of conceptualizing the story line based on the core category and all of its interrelated categories identified during the axial

coding process (Strauss & Corbin, 1990). During this stage of coding, all categories become integrated to form the final grounded theory. Though axial coding and theoretical coding are two discrete processes, they are very similar in nature; theoretical coding is simply done at a higher and more abstract analytical level (1990).

As of this point in the analytical process, the grounded theorist has multiple categories, and has described them in terms of their properties and dimensions. He also has established relationships between and among categories, thus representing an interrelated web of categories (phenomena). It is now time for him to take what is currently on paper and relate it to a conceptual story line that answers the question “What is my study all about?”

Strauss & Corbin (1990) list five steps that allow the grounded theorist to move from data on paper to emergent theory in the final document. The first step here is to explicate the story line. It is at this point where the researcher needs to identify the main problem, and identify that phenomenon which is most striking. Since much description has already been written down regarding the concepts and relationships in the data, it is now time to relate this descriptive story analytically. As was done in axial coding, the central phenomenon has been given a name. This particular phenomenon now becomes the core category.

The next step within theoretical coding involves relating all subordinate categories to this core category. This is done by means of the overall paradigm, which involves the contexts, conditions, action, strategies, and consequences that were identified during axial coding. As the researcher writes out the story, he arranges and

rearranges the various categories in terms of the paradigm until they fit the story. Juxtaposing the categories in their sequential order helps to provide an analytic version of the story that goes further than mere description (Strauss & Corbin, 1990); this is the third step of the theoretical coding process.

After this has been done, the next step within theoretical coding involves validating the relationships the researcher proposed during the ordering of his concepts (Strauss & Corbin, 1990). This involves writing hypothetical statements regarding the proposed relationships between and among categories. Once these statements have been formed, the researcher then goes back into the data to see if they broadly hold up for every person involved.

Once the theorist's provisional relationships have been validated, the final step within theoretical coding involves filling in any remaining gaps within categories (Strauss & Corbin, 1990). At this point, the grounded theorist actively seeks out and obtains data from persons and places that are deemed most likely to speak to the missing detail required to form a coherent, integrated theory. This process of returning to the field to collect additional data can be done to fill in any categories that lack conceptual density and specificity. It is also possible to return to previously coded material to look for new data that may have been overlooked earlier. Once all gaps are filled in, and all categories have become saturated, the researcher now has an analytic story line, a core category, and relationships between and among all other categories and this core category.

Reliability and Validity

Although the traditional scientific cannons of quantitative research are not applied to qualitative inquiry, there do exist guidelines that allow qualitative researchers to ensure their findings are valid and robust. In particular, Lincoln and Guba (1985) put forth a study design structure that helps to maximize the credibility, dependability, transferability, and confirmability of qualitative research findings.

While quantitative research speaks of internal validity—a measure of how well the research produces reasonable, trustworthy findings—qualitative research considers credibility as its parallel. In other words, how likely is it that a study produces findings that are well aligned with what the raw data portray? Lincoln & Guba (1985) suggest several steps to ensure the credibility of qualitative findings; these include raw data verification, peer debriefing, and member checking.

Raw data verification involves a constant process of returning to the data and comparing the emerging theory against discrete data pieces (Strauss & Corbin, 1990). Doing this helps to ensure that the theory stays true to the data, and is not a product of the researcher's own interpretations of the phenomena as they are viewed from his or her perspective. Throughout the study, the emergent categories and themes were constantly compared with previous interviews and observations.

The constant comparative method (CCM), created and first articulated by Glaser in 1965, is perhaps the most widely accepted aspect of the grounded theory method relative to grounded theory's systematic and scientific rigor (Charmaz, 2006). Many quantitative researchers who otherwise view qualitative research as non-

systematic and impressionistic often embrace grounded theory method as a legitimate means of inquiry and discovery due to high degree of rigor that can be achieved through the CCM if it is utilized throughout the inquiry process. Thomas and James (2006), two critics of grounded theory, have espoused the efficacy of the CCM however, declaring that it provides the foundation for grounded theory credibility upon which all over sources of credibility must rely.

The core of the CCM, which is utilized through all coding stages during grounded theory inquiry, consists of coding each incident or event within the data as soon as possible, and then comparing it for similarities and differences with any and all previous incidents that have already been coded in the same category (Dye et al., 2000). Therefore, instead of coding one interview or observation for new theoretical ideas (which would inevitably be compartmentalized within the single interview or observation in hand), coding is always done in relation to that which has already been coded. As such, previously coded material does not sit in a 'finished' pile while new data are coded separately. The grounded theorists makes these constant comparisons between codes and codes, codes and concepts, concepts and categories, and so forth, thereby allowing theoretical properties of the category to be generated along all stages of the coding process (Glaser, 1965). As progress is made, the grounded theorist will witness the theory solidify in the sense that major modifications will become fewer and fewer due to the tightening of his focus.

The guiding purpose of the constant comparative method is to keep track of ideas and make comparisons of data throughout the grounded theory process. This,

according to Glaser (1965), increases the probability that the emergent theory will be thoroughly integrated, logical, and clear given need to make theoretical sense of each comparison along the way. In making theoretical sense of his data, the grounded theorist is thereby forced to cultivate ideas on a level of generality that is necessarily higher than the material he is analyzing. Even with much diversity within the data, the researcher is forced to bring out principal uniformities as well as diversities, and subsequently account for any differences with concepts at high levels of abstraction that can be used to interpret and explain the social and psychosocial processes witnessed—and thoroughly grounded—in the data.

Peer debriefing, another method whereby credibility is enhanced (Miles & Huberman, 1994), involves the use of an outside qualified researcher to independently examine the data and provide his or her unique perspectives on the data. This peer also provides support, challenges assumptions, asks hard questions, and plays the devil's advocate (Lincoln & Guba, 1985) to help ensure that the data are being examined from multiple perspectives. Regularly scheduled peer debriefing meetings were held throughout the coding and analysis stages of the current study to enhance reliability.

In qualitative research, one method of augmenting reliability involves establishing intercoder agreement (Miles & Huberman, 1994). Intercoder agreement entails having more than one individual code sections of a transcript so that independent coding work can be compared across coders. This helps to determine whether different coders arrive at the same codes and themes during the data analysis stages. It is typical for coders to identify passages or sections of text that they have all

coded and then pinpoint agreement among codes. Any discrepancies are then re-evaluated and discussed among all coders in order to reach agreement.

To help establish intercoder agreement, I provided my peer with the first three interview transcripts and my initial color-coding scheme and asked her to code certain segments of interviews to assess reliability. After data collection had ended I provided her with the remaining transcripts and we repeated the same procedures. During our scheduled meetings, I presented and explained my prepared segments of the data record for my peer and then compared these with hers. Instances of coding and analysis convergence were then discussed and incorporated into the analysis. Coding discrepancies were identified, re-evaluated, and discussed in order to reach agreement.

Upon completion of all data analyses procedures, I constructed an outline that included the core category, other subordinate categories, and a brief description of how each category was related back to the overarching core category. I then contacted each participant to set up “member checks” (Lincoln & Guba, 1985) which were conducted either during participant office hours or over the telephone once the outline had been sent electronically for prior review. These meetings allowed the participants to review the emergent findings thus far, ask questions to clarify, as well as make suggestions or recommendations based on what was presented to them. Member check meetings lasted roughly thirty minutes. I kept memos during each meeting or phone conversation which were analyzed and, when appropriate, added to certain categories to add further explanatory power. These memos also included emergent questions which I posed to the participant during the member check meeting, and I recorded their

responses at that time. Member checks have been described as “the most crucial technique for establishing credibility” (Lincoln & Guba, 1985, p. 314) since it is ultimately the participants’ data and voices that serve to inform the final theory.

After the member checks, I further refined proposed processes and frameworks through a comparison to the literatures relevant to the phenomena of interest. I specifically sought out articles that supported as well as disputed the emergent theory and its conclusions for the study. Where necessary, I re-evaluated the raw data to confirm or deny parallels to the existing literature. These reports will be presented in the following chapters.

Transferability is another construct of qualitative inquiry that must be met in order to ensure quality study findings, and can be considered as a parallel to external validity in quantitative research. Transferability refers to the degree to which study conclusions and implications can be applied to other contexts outside the one in which the study took place. While the goal of qualitative inquiry is not to generalize to other populations, steps can be taken to increase the likelihood that findings do not speak to merely the sample represented. These include clearly articulating the sample makeup through criteria of inclusion and exclusion as well as meticulously describing the sample characteristics. Providing thick, rich description also serves to enhance transferability, and was obtained in the current study through the use of an open-ended interview guide that allowed participants to provide extensive, contextually detailed responses.

Dependability in qualitative research can be conceptualized as reliability in

quantitative research. It refers to the degree to which the overall research process remains consistent across time. Ensuring dependability in qualitative studies hinges upon the credibility of the researcher (Lincoln & Guba, 1985) and can be achieved through thorough use of field notes and memos which provides an audit trail (1985) that can be reviewed by peer debriefers or advisory committees as necessary. An audit trail refers to the retention of all data (interviews, observations, memos, etc.) and a transparent description of all steps undertaken during a study. These documents can be accessed and analyzed at any point during the data collection and analysis stages by an outsider reviewer to understand the processes carried out during inquiry (Schwandt & Halpern, 1988). Procedures used to clean the data described earlier and the constant comparative method helped to ensure that codes were applied consistently throughout the course of the study.

Confirmability indicates that a study's conclusions and implications are thoroughly grounded in the data articulated by the participants and not in the personal filter the researcher inherently brings to the inquiry process. I employed various methods discussed previously, including the creation of an audit trail, memoing, peer debriefing, and member checking, as ways in which to enhance confirmability of my findings. Additionally, I performed no exhaustive literature review specific to the research questions included in this study, and chose not to do so to ensure I did not bring any established categories and themes or preconceived ideas regarding what to expect or observe to the inquiry process.

The purpose of these systematic data collection, data analysis, and literature

review processes was to provide a highly plausible framework that described the process of teaching and modeling critical thinking skills to pre-service teachers. As such, I report findings that are thoroughly grounded in the data, and are not just the results of my own interpretations of them. However, although I have taken steps to minimize my biases and interpretations, it is inevitable that not all of my biases as a grounded theorist who is intimately invested in this research have been removed. Thus, as with any qualitative research findings, my voice remains present to some degree. I have presented findings from the current study in the next chapter.

CHAPTER THREE: RESULTS

Through the criteria-based selective recruitment and in-depth interviewing of study participants, rich and descriptive data were obtained that illustrate the process by which pre-service teacher educators at a large public university teach and model critical thinking to their students. The systematic analyses of these data revealed the main process educators have experienced and articulated, and will be referred to as the Teaching of Critical Thinking Process Model (TCTPM). This model also describes the context in which this process occurred or could occur and the conditions that facilitated or could facilitate movement through the process. The important contextual element that emerged was the influence of the affective disposition students bring into the classroom. Conditions associated with educators' movement through the process of teaching critical thinking skills included clearly defined conceptualizations of critical thinking, esteemed outcomes of critical thinking, and a cognitive skill set as well as an affective disposition to want to utilize these skills.

This chapter begins with a description of the details of sample characteristics and sample size. The TCTPM will then be presented as the current study's emergent theory along with the essential contextual features articulated above.

Sample Characteristics

As discussed in the previous chapter, the objective of sampling in qualitative inquiry is to capture and describe the range of experiences of participants as well as the variability in their responses (Patton, 1990). Based on the screening and inclusion

criteria, the educators in this study comprised a well-defined group but demonstrated a wide range of experiences as educators of pre-service teachers who represented four separate academic specializations. The in-depth investigation of these experiences offers the greatest strength in this qualitative study. The rigor of the analysis occurs through the fine-detail analysis of a defined group of educators who exhibit some variation in their experience of teaching and modeling critical thinking skills to the undergraduate pre-service teachers in their classrooms.

The 7 faculty members recruited for interviews and observations represented a homogenous sample across the following characteristics. All were currently employed at the university where the study was conducted and had been employed there for 2 to 24 years, with a mean current employment duration of 6.5 years. Previous public school teaching experience was common to all seven participants, and ranged from 5 years to 17 years with a mean duration of 10.5 years. One participant was a full professor and had thus been granted tenure. Five participants were full-time tenure-track assistant professors, and one was a doctoral candidate with 9 years of public school teaching experience. With the exception of one participant, all had been professional educators for the entirety of their careers. The exception was an assistant professor who had spent 4 years as a full-time researcher after a 10-year career as a general dentist. All of the full-time professors had obtained a doctorate degree in their area of specialization. Each participant resided in North Carolina area at the time of data collection.

I recruited seven participants for sampling in the present study. Given that the aim of grounded theory inquiry is not intended to relate findings that generalize to large populations but rather is to describe in detail how a relatively small group of individuals interprets and understands a particular sociological or psychological phenomenon (Strauss & Corbin, 1990), rich description of those sampled allows the reader to gain a broader perspective of the lives and stories of those being read about. This section serves to provide demographic data and background information of the seven participants whose stories have been detailed here. The order in which participants appear follows the same order in which they were interviewed (ie: Melanie, who was interviewed first, has been presented first in the participant descriptions). Of the seven participants, six are female. Two are African-American, and five are White. To protect participant anonymity, I have used pseudonyms exclusively throughout the body of this document. Table 3.1 contains a summary of the participant characteristics detailed below.

Melanie is an assistant professor in elementary education whose graduate training is in elementary science education. She regularly teaches the science methods courses for sophomores in the elementary education department as well as the Master of Arts in Teaching (MAT) science methods courses for graduate student licensure. At the time of data collection (January, 2011), Melanie had been at the current institution in a tenure-track position for 3.5 years. Prior to accepting her current position, Melanie completed her doctorate in science education at a large Research 1 university in Florida where she taught science methods courses as an adjunct professor for 5 years. Prior to

this, she completed her Master's in science education at a large Research 1 university in the U.S. where she taught science methods courses for 2 years. Before beginning graduate school, Melanie was an elementary teacher for 17 years. During the tail end of her seventeen-year teaching career, she began taking graduate courses at night, which ultimately led to her enrolling as a full-time graduate student.

Angela, another participant in the study, began teaching high school English in 1967 and continued teaching English and drama until 1979. She left the public school classroom to earn a Master's degree as well as a doctorate in English education. Prior to coming to her current institution, where she holds tenure, Angela taught at three major universities and has experience teaching English methods, English composition, Adult Literature, Writing Methods, and Teacher as Leader. She has also served as program supervisor and coordinator at her present institution and as coordinator at other public educational institutions. Currently, she teaches both undergraduate students as well as graduate students in middle-grades and high school language arts education courses leading to teacher licensure.

Todd is an assistant professor of science education in the elementary education department and has been in this position for 5.5 years at the time of data collection (February, 2011). He received his doctorate in science education from a large public university in the U.S. Previously, he was an assistant professor of elementary education and early childhood at a large public college in the Northeastern part of the U.S. where he taught science methods courses for teacher candidates. Currently, he teaches juniors and seniors in their science methods courses, as well as seniors in a

seminar course that focuses on instructional design and building an integrated unit of study they will use during student teaching. Prior to receiving his doctorate, Todd taught science in grades 6, 7, and 8 in public schools in the Southeast U.S. for a total of 8 years. He is the only male participant in the study.

Having been a general dentist for 10 years in Pennsylvania, Erica decided to leave dental practice to become a researcher in a neuro-anatomy lab. She held this research position for four years before returning to school to pursue her second doctorate in science education. Having earned this doctorate at a large Research 1 university in the U.S., Erica teaches three science methods courses for sophomores, juniors, and seniors who are future high school science teachers. At the time of data collection (March, 2011), Erica had been an assistant professor for 2.5 years. Prior to her graduate training in dental science, Erica taught high school biology for a total of 5 years in three different states. Erica is one of two African-American females sampled in the study.

Julia is an assistant professor of mathematics education and regularly teaches the four methods courses for high school mathematics teacher candidates as well as History of Math. She has also taught algebraic thinking for master's students. Prior to earning her doctorate in mathematics education, Julia taught middle school math for one year and then high school math for 12 years. Prior to entering her doctoral program, she taught at the community college level after having previously been employed as a full-time research fellow. Overall, Julia has taught mathematics for

over 20 years, and having already taught for 4 years at the present institution will go up for tenure review during the 2012-2013 academic year.

Melissa is the only doctoral candidate in the sample and expects to complete her degree in mathematics education in May of 2012. She taught high school math for 7 years and then at the community college level for 2 years. After having decided to go back to school as a doctoral student, she now teaches the course Teaching Mathematics with Technology for undergraduate middle-grades and high school mathematics teacher candidates. She earned her undergraduate degree at the same institution where she is now a full-time doctoral candidate.

Jody is an African-American female and was a tenured professor of elementary education at a small college in the Southeast U.S. prior to accepting this position at her current position. At her prior institution, she was head of the teacher education program, and now serves as a teacher education program coordinator in addition to regularly teaching various elementary education courses. Although her current position is not on a tenure track, Jody is excited to have more duties as a coordinator because she enjoys refining her responsibilities as a program supervisor. In addition to these duties, she also regularly teaches seniors in their elementary social studies methods course as well as their course in diversity.

The institution where data collection took place is a large, coeducational, public Research 1 university that includes twelve colleges that collectively enroll roughly 33,000 students in an urban setting. Its college of education consists of four departments and offers undergraduate, masters, as well as doctoral degrees. Currently,

there are approximately 2,000 total students enrolled in the college, which enjoys a 15-1 student-to-faculty ratio.

Table 3.1. Summary of Participant Characteristics: Pseudonym, Years of Collective College Teaching Experience, Tenure Status/Rank, Academic Department, Years of Public School Teaching Experience, and Additional Geographic Locations Where Previously Taught

Name	Experience	Rank	Academic Department	Public School Locations Taught	
Melanie	11	Assistant	Elementary Education Science	17	AL, FL
Angela	24	Full	Middle Grades Literacy Education	12	NC
Todd	6	Assistant	Elementary Education Science	8	NJ
Erica	2	Assistant	High School Science Education	5	CA, PA
Julia	4	Assistant	High School Mathematics Education	13	NC
Melissa	3	Lecturer	High School Mathematics Education	9	NC
Jody	11	Associate	Elementary Education Social Studies	5	NC

Sample Size

Lincoln and Guba (1985) state that an important criterion to be used when determining the appropriate point to stop sampling is informational redundancy, or the point at which no new data are emerging. The concept of informational redundancy parallels the concept of theoretical saturation from Glaser & Strauss (1967) and Strauss and Corbin (1990), and that of theoretical sufficiency as articulated by Dey (1999). The author of the current study prefers to use the term “theoretical sufficiency” from this point forward because, while both terms indicate that the data have been properly analyzed, theoretical saturation suggests “connotations of completion [and] seems to imply that the process of generating categories (and their properties and relations) has been exhaustive” (Dey, 1999, p. 116-117).

Microanalytic data review began with the first interview conducted, and continued throughout the open coding and analysis stages. In the current study, microanalysis was employed in a line-by-line coding method that allowed for new codes to be developed for each concept or idea articulated in the data. Each new code was given a code definition and its date of creation was recorded as well. Line-by-line coding was utilized during the open coding process for the first five interviews and observations. This process evolved into a combination of 1) searching for new concepts and creating the appropriate code labels and 2) evaluating the development of those concepts in the data. As the list of codes grew during subsequent data collection and analysis, the author began to consider the relationships between the developing codes (Strauss & Corbin, 1990) and refine the code list accordingly.

After having completed analysis of the first five interviews and observations, it became apparent that many of the same ideas were being described by the participants. However, their experiences of these emergent ideas showed variance. At this point, fewer codes were being created with each new interview and observation.

Due to the repetition of emergent themes as well as the volume and depth of the data in the first five interviews, the decision was made to use the sixth and seventh interviews and classroom observations as test cases for data saturation or redundancy in information gathered. Analysis of these new data sources proceeded in the same manner as the first five interviews with line-by-line analysis to uncover new ideas and develop existing, but still provisional, ideas.

Line-by-line coding analysis of these two interviews and observations revealed that while some slight variation existed within the categories, no new categories were emerging through these new data sources. No additional codes for freshly-discovered themes were created during the coding process. Categories that had emerged thus far as key factors in the process of teaching critical thinking skills included personal beliefs about critical thinking (its definition and intended roles), personal motivations for choosing to teach critical thinking, instructional strategies to cultivate critical thinking, perceived outcomes of critical thinking (including evidence of critical thinking as well as lack of evidence of critical thinking), and factors that either help or hinder critical thinking.

Given the depth of the data provided by the seven participants, the paucity of new codes emerging from the last two interviews during open sampling, and the vital

importance of analyzing the rich experiences of the study participants to a depth sufficient to reveal the contextual underpinnings of a very specific process, sampling for the interviews was completed with seven participants. However, based on new questions developed during the course of open coding, through selective (discriminant) sampling (Strauss & Corbin, 1990) the author chose three specific participants with whom to conduct follow-up interviews. These emergent questions can be seen in Appendix E.

The purpose of these additional interviews was to allow three individuals deemed especially capable of speaking to the phenomenon of interest to provide data to inform the emergent questions that had been noted during earlier interviews and observations. The three participants (Angela, Erica, and Julia) were chosen for additional interviews because they either possessed the clearest conceptualizations of critical thinking, or were the most definitive in their responses. It should be noted here that there are many ways to articulate the concept of critical thinking and it is common that many people have not crystallized their perspectives or conceptualizations of critical thinking (Paul, Elder, & Bartell, 1997). The category under examination at this point involved the factors that were believed to aid or suppress the critical thinking process. Line-by-line analysis of these follow-up interviews yielded no new codes or categories after the second interview was complete. Thus, theoretical sufficiency (Dey, 1999) had been reached for all existing categories upon completion of these three selectively-sampled interviews.

The Process: Beliefs About the Teaching of Critical Thinking Skills

The participants' rich and illuminating descriptions provided the framework for a process theory explaining how to promote critical thinking ability in the college classroom. The process of promoting critical thinking ability that was grounded in the data explains the personal beliefs and motivations professors of pre-service teachers hold that influence how and why they teach or could teach their students to become better critical thinkers. The creation of a provisional model began with the first interview during open coding and proceeded numerically through the second interview of the selective sampling stages.

A visual representation was developed of the procession from personal beliefs through the academic outcome of successful critical thinking promotion. The resulting flowchart was then filled in with each participant's journey, adding to and modifying it as deemed necessary by certain individual experiences. By the time the analysis had reached the follow-up interview from the second selectively-sampled participant, no new information was being added to the flow chart. After the author reviewed each participant's experience, the chart was ultimately organized and condensed to represent a parsimonious, logical flow of the process based upon common threads that ran through each participant's experience.

Grounded Theory Model Process Flow: An Overview

In this study, participants all indicated that their overarching goal was to create "reflective practitioners" in the classroom. To promote reflective practitioners, it was

agreed that critical thinking is necessary in achieving this type of educator who has mastered content area expertise and who understands how to effectively teach diverse students through possessing a thorough grasp of the nature of the learner. Thus, the core category that emerged from the current study was the objective to create reflective classroom practitioners through the development of critical thinking ability. This core category, as well as the entirety of the emergent model, can be seen in the Teaching of Critical Thinking Process Model (TCTPM) in Figure 3.1.

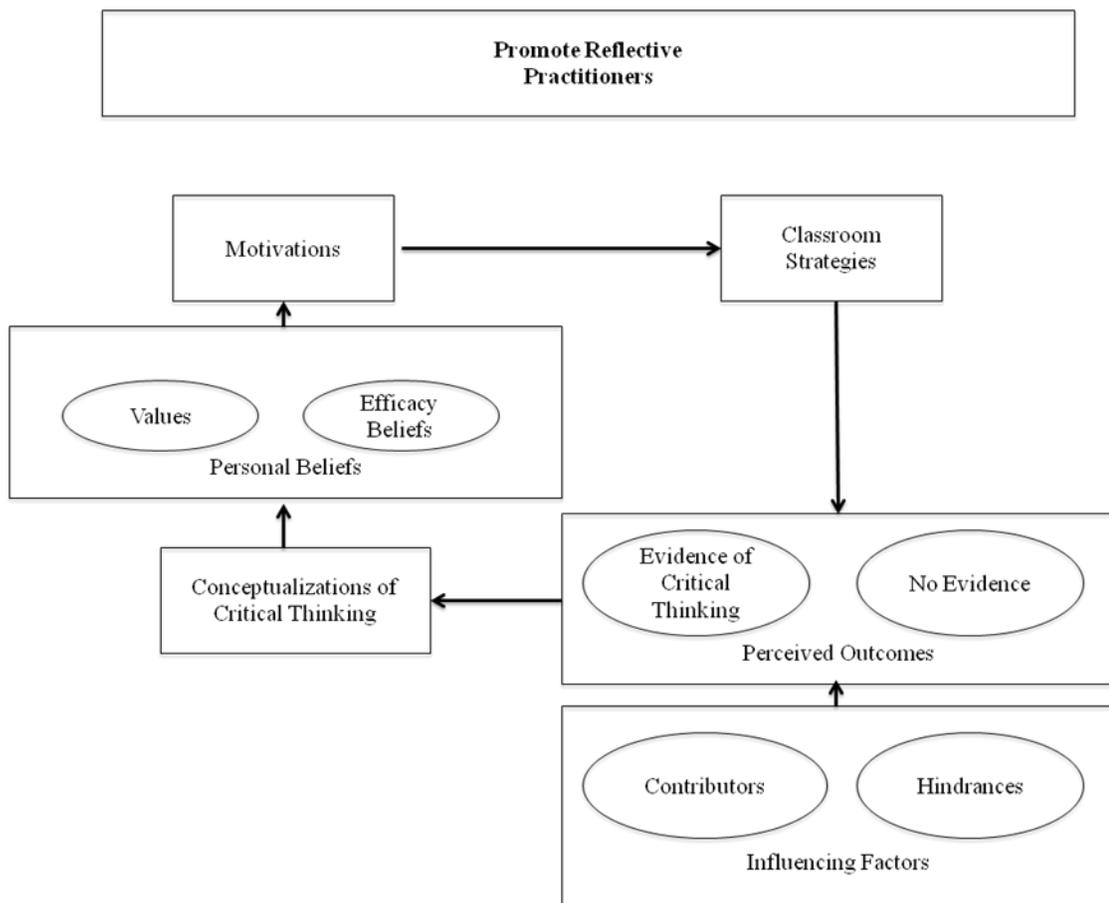


Figure 3.1: Teaching of Critical Thinking Process Model (TCTPM)

Though no consensus was reached regarding how critical thinking was defined or conceptualized, participants articulated many common shared aspects of the construct. These varied definitions and conceptualizations thus provided support for the notion that critical thinking is a broad construct that incorporates many different cognitive abilities. This category is labeled “Conceptualization of Critical Thinking” in the process model, and is considered by the author to be the starting point when seeking to understand how these seven educators began the process of teaching and modeling critical thinking for their pre-service teachers.

Overall, the motivational aspects to incorporate critical thinking skills training in pre-service teacher education courses in this study were largely influenced by two psychological constructs: personal efficacy beliefs and personal evaluations of critical thinking outcomes, which were themselves informed by subjective interpretations or conceptualizations of what critical thinking implies to the individual. When combined, efficacy beliefs and evaluations are said to possess explanatory power regarding task choice and persistence. This theory is known as the Expectancy-Value Theory of Achievement Motivation (Wigfield & Eccles, 2000) and helps to explain some aspects of the phenomenon of interest in the current study: teaching critical thinking skills to pre-service teachers. This “Beliefs Phase” has been depicted in Figure 3.2 and represents the conceptual underpinnings upon which the other phases of the model are built. This phase illustrates how the individual’s subjective conceptualization of critical thinking itself influenced personal efficacy beliefs about teaching critical thinking skills as well as personal evaluations of critical thinking outcomes.

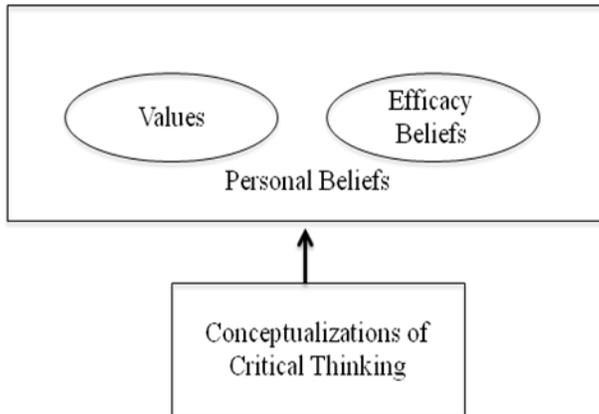


Figure 3.2: Beliefs Phase

Participants provided their reasoning for wanting to promote reflective classroom practitioners, and these constituted the data categorized within the category labeled “Motivations” in the model. These motivations were mostly specific to preparing effective future educators. However, six participants also indicated that critical thinking helped to create either better students or more critical consumers of “the real world”, or both, thus demonstrating their beliefs that critical thinking is important outside of the classroom as well. The overarching goal of promoting reflective classroom practitioners, found within the “Motivations” category, was informed by the categories within the “Beliefs Phase” of the model, which includes participants’ subjective conceptualizations of critical thinking.

In order to promote these necessary cognitive abilities required to successfully become a reflective classroom practitioner, education professors adopted a variety of classroom instructional practices to aid students in developing these thinking skills.

Strategies were chosen based on their perceived efficacy in cultivating sound critical thinking ability and were used to enhance higher-order cognitive skills that the participants indicated were well-aligned with what is required to be a critical thinker and, ultimately, an effective, reflective classroom practitioner. Participants described these particular skills, which will be elaborated on in the following section, as crucial and thus must be developed within students in order to ultimately produce effective, reflective classroom practitioners. The “Strategy Adoption Phase”, depicted in Figure 3.3, demonstrates how participants’ motivations to promote reflective practitioners influenced their choice of classroom strategies.



Figure 3.3: Strategy Adoption Phase

The process then moves to a category that includes the perceived outcomes of strategies used to promote critical thinking in the classroom. This category, labeled “Perceived Outcomes” includes what the participants articulated were evidences of critical thinking, which were the desired outcomes of the participants in the current study. This category also includes what participants believed to be observable absences of critical thinking, since no participant indicated that critical thinking takes place among all students and at all times within their classrooms. This phase has been labeled the “Assessment Phase”, and is the location within the process where

participants assessed the outcomes of their attempts to promote critical thinking through their adopted classroom strategies. This phase has can be seen in Figure 3.4 below.

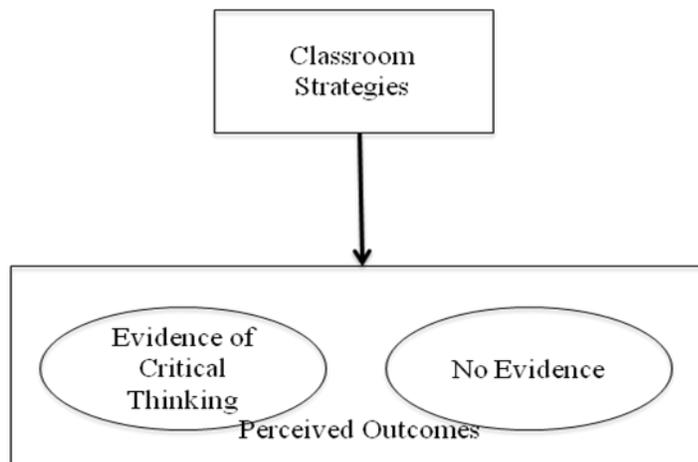


Figure 3.4: Assessment Phase

Positioned underneath "Perceived Outcomes" is a category labeled "Factors Influencing Critical Thinking". This category includes contributors that participants believed enhance the likelihood of critical thinking and also contributed to evidence of critical thinking. Included here are also factors that participants believed hindered a student's ability to grow as a critical thinker. This phase of the process, shown in Figure 3.5, has been labeled the "Reflection Phase" and indicates the point at which variance in critical thinking outcomes is evaluated.

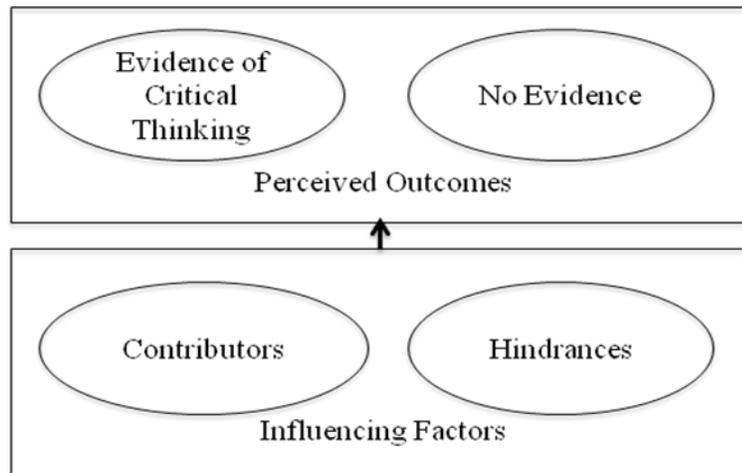


Figure 3.5: Reflection Phase

Classroom outcomes served to inform subjective conceptualizations of and beliefs about critical thinking, which then informed personal efficacy beliefs about one's ability to teach and model critical thought. These personal beliefs, in turn, influenced motivations to prepare reflective classroom practitioners. It is at the point of reconceptualization where the overall process becomes reinitiated upon completion of a previous cycle through the model. Reconceptualization is able to occur since the perceived outcomes of critical thinking appeared to help solidify conceptualizations about the construct itself. Thus, the process can begin again, but will now be based on the beliefs that have been informed (and perhaps altered) by the more recent subjective interpretations and conceptualizations of critical thinking. The influence of perceived outcomes on conceptualizations of critical thinking has been depicted as the "Reconceptualization Phase" in Figure 3.6.

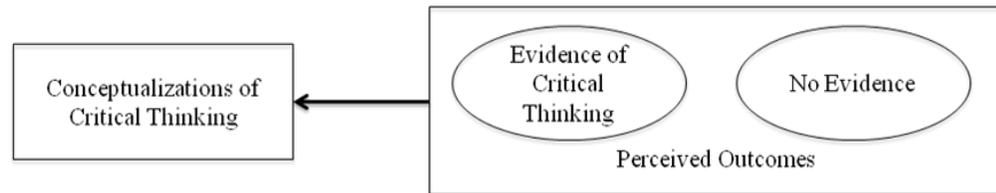


Figure 3.6: Reconceptualization Phase

The Emergent Core Category: Promoting Reflective Classroom Practitioners

The educational goal of wanting to promote good habits of thinking and the overarching desire to promote reflective classroom practitioners was common to all seven participants in the current study. In agreement with the claim from Dewey (1916) that no one doubts, at least in theory, the importance of producing the ability to think autonomously for oneself, all participants articulated a desire that the pre-service teachers in their classrooms would, through formal teacher preparation, become reflective practitioners who would possess the cognitive capacity and disposition to reflectively know “in the moment” how to negotiate instructional logistics. This process involves understanding which teaching strategies would be best suited to teaching content, when to teach certain content, and how to tailor instruction to students who may approach the learning process in a way that may be different than how the instructor himself or herself learned the same content as a student. This can be demonstrated clearly through a statement made by Jody, an elementary education social studies professor. She said:

They've got all these classes to teach during their student teaching, and I want them to really think about what they're going to teach, and when they're going to teach it, and how they're going to teach it.

Erica, a high school science education professor, echoed this sentiment when asked to describe her ideal classroom and the educational outcomes it would produce. She indicated:

The main goal...the overall goal...is to mirror what we want them to do. For me, it's that those who are going to be teachers are reflective practitioners. That they think about what they're going to do, they think about why they are going to do what they're going to do...they think about the students, they think about the actual content...they think about what they are doing, and how all of those meet as one. So I guess being reflective...reflective in the moment would be my ultimate goal.

Julia, a high school mathematics professor, shared similar feelings. She said:

But when you walk out of here, you know exactly what you need to expect of yourself as you're preparing to teach. *You* need to understand it in this way and you need to engage in that kind of thinking before you ever even plan a lesson. So that's kind of our sequence of things there.

As has been established by the previous quotations, the sample group indicated that teachers are most effective when they demonstrate this "reflective" aspect in their teaching endeavors. Furthermore, they demonstrated the belief that critical thinking is the vehicle through which this reflective capacity and disposition is developed and nurtured in pre-service teachers. When asked to describe how critical thinking and reflective practice might be related, middle-grades and high school Language Arts professor Angela articulated that:

Where I want them to come from is, in coming from their background and from their knowledge, what do they know about teaching writing and what writing processes are about...so all the things they've learned about in our class, and push back against anything on the Internet that they think violates that. Think

critically about what they see. There are just scads and scads of lesson plan sites on the Internet, and they're just everywhere...and what's key is for them to know what's quality and what isn't.

Julia shared that:

We've gotta teach teachers to be critical thinkers and to be reflective on those things. They've got to be out there thinking about where their students are coming from, and thinking where 30 of them are at once.

A third perspective, coming from elementary science education professor Todd, concisely summed up his thoughts as follows:

"I think being a reflective practitioner...I think that's a type of critical thinking."

Melissa, the doctoral candidate in high school mathematics education, had this to say about the role of critical thinking in promoting competent teachers:

I think it's a lot about reflecting. It's about thinking about students' understanding. That's what I think of in teacher ed when I think of critical thinking.

The previous quotes serve to underscore the importance participants placed on preparing reflective classroom practitioners, and help begin to clarify the roles critical thinking is believed to play in realizing this overarching goal articulated by professional educators in the sample group. Thus, given the shared desire within the sample group as it related to cultivating this important and needed disposition for reflective thinking in professional educators, the desire to produce reflective classroom practitioners emerged as the core category (Glaser & Strauss, 1967), around which all other categories revolve and are subordinately conceptualized in the emergent model. It should be noted, however, that reflection does not imply criticality. As articulated in

the definitions of reflective thinking and critical thinking in chapter one, these two types of thinking are not synonymous, although they may be mistakenly viewed as such and thus become incorrectly interchanged. While critical thinking implies a reflective component, reflective thinking does not necessarily imply criticality. An individual can be reflective without being critical. Thus, critical thinking is a smaller, more precise type of thinking that is found under the broader umbrella of reflective thinking (Murray & Kujundzic, 2005).

The next section will begin to discuss the emergent major categories from the current study and explain how they aid in achieving the development of reflective practitioners. These categories as depicted on the TCTPM are: Conceptualizations of Critical Thinking, Personal Beliefs, Motivations, Classroom Strategies, Perceived Outcomes, and Influencing Factors. The emergent categories, sub-categories, and major themes have been depicted in Table 3.2.

Table 3.2. Emergent categories, sub-categories, and major themes

Major categories	Subcategories	Major themes
1. Conceptualizations of critical thinking		
2. Personal beliefs	2.1 Efficacy beliefs 2.2 Values of critical thinking	
3. Motivations	3.1 Promote reflective practitioners 3.2 Promote short-term academic goals 3.3 Promote long-term societal goals	
4. Classroom strategies	4.1 Promote higher-order cognitive skills 4.2 Questioning 4.3 Discussion 4.4 Perspective taking	4.1.1 Application strategies 4.1.2 Analysis strategies 4.1.3 Evaluation strategies 4.1.4 Creation strategies
5. Perceived outcomes	5.1 Evidences of critical thinking 5.2 No evidence of critical thinking	5.1.1 New understanding of content 5.1.2 New procedural knowledge 5.1.3 New critical awareness of self

Table 3.3 (Continued)

6. Influencing factors	6.1	Contributors	
	6.2	Hindrances	
		6.2a Student hindrances	6.2a.1 Disengagement
			6.2a.2 Lack of professional knowledge
			6.2a.3 Educational unpreparedness
			6.2a.4 Performance orientation
			6.2a.5 Lack of initiative
		6.2b Teacher hindrances	6.2b.1 Failure to use explicit terms
			6.2b.3 Emotional context
		6.2c Logistics	

Personal Beliefs about Critical Thinking

Defining Critical Thinking

Upon having each participant describe his or her interpretations and understandings of critical thinking, it quickly became apparent to both myself and the participants that while critical thinking is understood to be an important outcome of education, not all participants possessed a thorough understanding of how to define critical thinking, or the best ways in which it might be explicitly taught to pre-service teachers. A few participants were very forthcoming about their perceived uncertainties, but were curious to ask me questions that helped them to further understand how critical thinking is commonly defined and conceptualized in the literature.

When asked to provide their own definition of critical thinking, some participants chose to list particular cognitive skills as their definition of critical thinking, whereas others listed the cognitive abilities that are expected of good critical thinkers. For example, Todd listed “analysis, synthesis, and evaluation” as part of his definition of critical thinking. These higher-order cognitive skills are consistent with the Bloom’s Taxonomy of Educational Objectives (Bloom, et al., 1956). Angela described her belief that critical thinking is an active awareness of “pushing back” on yourself, and in particular your beliefs and biases, in order to minimize your personal interpretive lens to allow for greater objectivity. Overall, the definitions provided aligned well with the current definitions of critical thinking, even when a participant may not have been very certain that his or her definition agreed with commonly

accepted definitions of the term. In order to ensure that participants were conceptualizing critical thinking consistently with what is found in the literature, the author provided the same standard definition of critical thinking to each participant after each person was given the opportunity to articulate his or her own working definition. The standard definition utilized by the researcher during all interviews came from Watson & Glaser (1939): “Critical thinking involves a persistent effort to examine any belief or supposed form of knowledge in the light of evidence that supports it and the further conclusions to which it tends, as well as the ability to recognize problems, to weigh evidence, to comprehend and use language with accuracy and discrimination, to interpret data, to recognize the existence (or non-existence) of logical relationships between propositions, to draw warranted conclusions and generalizations and to test the conclusions by applying them to new situations to which they seem pertinent” (p. 3).”

Given the importance of personal interpretations and understandings of critical thinking, and acknowledging the impact these conceptualizations necessarily have on other personal beliefs about critical thinking which will be discussed in the next section, I have chosen to present these data in table format below. I chose to present certain words in italics to indicate that the speaker placed particular emphasis on these words. Participants’ conceptualizations of critical thinking can be seen in Table 3.3.

Table 3.3: Participants' conceptualizations of critical thinking

Name	Conceptualization
Melanie	“Being able to see both or more sides of an issue and...you know, have a healthy skepticism. Being able to think through something without being swayed by media or other things...other friends or some other influences that aren't really delving into an issue itself. Thoughtful consideration of an issue and looking at all sides, and a healthy skepticism I think is the best way...to withhold making a decision on something until you know if it's really well thought-through.”
Angela	“I think it would probably entail process, because my field is very much a process field. So I would say critical thinking involves pushing back, theorizing, questioning, expanding, exploring, associating, connecting. And by questioning I don't mean what we see outside of ourselves, but that we question ourselves. And that's what makes it critical. Critical is not about criticizing. Critical is about questioning. Questioning material. Questioning outside perspectives. And then drawing conclusions on the basis of that. Taking information and putting it into a new form, or a new setting, or a new environment, and being able to think about how that might apply. Or knowing how is that different from another environment?”
Todd	“The learner is engaged in exercises or activities that ask them to analyze, synthesize, and evaluate. Over-expanding the definition. But I think analysis...synthesis...evaluation...those things.”
Erica	“High-order skills. The ability to analyze, to evaluate...and maybe to make something new, if that's what's needed. I think of...the ability to take in information and analyze it while you're reading it or hearing it, and ask questions of it at the same time. Does this make sense? What is the evidence for this actual statement? If they said this before they said <i>that</i> ...would one statement then mean the same as the other? So, constantly having to analyze what you read or hear. I think what I just said, because I didn't read it out of a book! (laughs) I think it's where you constantly analyze something and see if it logically makes sense.”
Julia	“Critical thinking is thinking about something deeply...intentionally playing devil's advocate with yourself in asking why, why, why? Constantly thinking about how you could justify this to somebody else? I'm intentionally thinking about things from different perspectives, not just the perspective that I naturally bring to it. All those things I think

Table 3.3 (Continued)

	<p>are kind of naturally encompassed in critical thinking. <i>Intentional</i> thinking...that's a really important part of it. I'm intentionally really pondering this from different perspectives. So that's kind of...<i>part...</i>of what critical thinking is to me. Critical thinking...I guess, is also thinking really hard about something. Questioning yourself...playing devil's advocate...thinking about things from more than one perspective...all of those things come to mind when I hear 'critical thinking'. Not sitting back and just taking it all in."</p>
Melissa	<p>"I thought about exploratory tasks we would give students. They'd have to analyze something differently. Or they'd have to solve a mathematical problem in a way that combined things they already knew. But with the teacher-ed hat on, I think critical thinking is more of two things: Them reflecting on what they're learning, and then transferring that to thinking about how their future students might learn. I think of prospective teachers thinking about their own understanding, and then thinking about potential students' understanding. And that's critical thinking to me, from the standpoint of our particular class. From my definition of knowing what you think and knowing what other people think...or how it may affect other peoples' thinking.... Now that I'm saying this out loud, I'm thinking that it may only apply to math ed, or math teacher ed! When I think about critical thinking outside of the classroom, I think about a morphing of the two...of the math definition and the math ed definition. Where it's really that you look at the 'given', and you look at your assumptions, and you see what your response should be to that. And you use all of your skills, maybe, to apply it to a new situation."</p>
Jody	<p>"I like to think about not so much <i>what</i> something is, but the <i>why</i>, the <i>what if's</i>, the upper-level kind of things that students have to have a little more time to grapple with. I think of something that isn't going to be easily answered. Or for the content, you're going to need to have many levels of experiences to really have a deeper understanding of it. Mostly upper-level Bloom's types of things. And I think it's a process of...analyzing content at multiple levels. So if we're thinking about content like...issues related to race and gender, that you think about it from a historical perspective. You think about that from...based on individuals who may have had their identity in a negative context. Think about that from a framework of your experience in society, as</p>

Table 3.3 (Continued)

well as others, so that you are comparing and contrasting multiple perspectives based on race and ethnicity. And that you're thinking about it as it relates to that particular perspective. So if you have race in the middle, and you have kids to analyze and critically examine race, that means they have taken their definition of it, and have expanded their exploration of it at different levels. If you're thinking about content, geography for instance...I think of analyzing the content more like experts would."

Conceptualizations of Critical Thinking

Based on the definitions provided, it was commonly seen that critical thinking is conceptualized by educators representing a wide range of teacher education specializations to be a process whereby higher-order cognitive skills such as analysis, evaluation, creation, and perspective taking are utilized in intentional manners with the goal of being able to make sense of what is being seen or heard. Consistent with what Angela and Julia stated, it also involves a constant need to keep one's own biases and beliefs under careful consideration as other perspectives are taken and assessed for their own logical soundness. This emerged as particularly true when understanding that future students may learn in ways that are not consistent with how the educators themselves learned. Thus thinking critically about how to set aside your own preferred teaching methods to reach diverse learners is necessary in obtaining the reflective mindset that allows one to know when certain teaching strategies work, and when they must be changed to best address present learning needs. This taking of multiple learning perspectives was a theme common to all participants in the study, and they

articulated that reflective practitioners are able to assume the necessary multiple perspectives to teach effectively.

Also, another theme common to multiple definitions provided is that critical thinking requires a “healthy skepticism” or “pushing back” that forces the individual to assess the validity of ideas before deciding upon what to believe. This can be conceptualized in terms of a dispositional trait that warrants cautious contemplation as the individual is confronted with new knowledge claims. As Julia stated, there is a desire to see students take ownership of the learning process and decide for themselves what to believe and what to discard. She explicitly stated that she does not want students to passively sit back and accept everything they hear, and this sentiment was echoed across interviews with other participants as well. Thus, this theme demonstrated that critical thinking involves a process of careful consideration of ideas which comes about through the intentional utilization of various higher-order cognitive skills, many of which are consistent with those found on Bloom’s Taxonomy of Educational Objectives (Bloom et al., 1956). Again, the author believes it is imperative to understand how critical thinking was conceptualized by the participants who informed the current theory because these beliefs interacted with personal efficacy beliefs and evaluations of critical thinking to inform participants’ motivations for ultimately desiring to promote reflective classroom practitioners.

It has been supported in the literature that beliefs teachers possess have the ability to influence what is taught within the classroom. Personal beliefs also affect how instructional design and practices are developed, thereby influencing how content

may be taught as well (Grove, Dixon, and Pop, 2008). This was evidenced in the current study, where personal conceptualizations of critical thinking influenced the choice of classroom strategies adopted in order to try and promote reflective practitioners.

Specifically, teachers' beliefs about their abilities as educators can help explain task choice and persistence within the classroom. Efficacy beliefs, or personal beliefs about one's abilities, arise from an individual's perceived ability to accomplish a particular task (Bandura, 1997; 2010). Values judgments are also capable of influencing content and instruction, and stem from judgments relating to whether engaging in a task is worth the time, energy, and resources required to carry it out (Wigfield & Eccles, 2000). Together, personal efficacy beliefs and values form the crux of Expectancy-Value Theory, and may help explain variance in the same behavior among a group of individuals.

Personal Evaluations (Values) of Critical Thinking Outcomes

In seeking to understand participants' evaluations of the outcomes associated with critical thinking, the author feels it is important to point out the shared perception that critical thinking is currently, and also may have been in the recent past, a buzzword or a "buzz phrase" that is ubiquitous in higher education. Participants indicated that critical thinking ability is highly esteemed at the undergraduate level, and revealed that it is purported to be a benchmark among various curricular standards. Participants unanimously reported that critical thinking is a valued outcome of education, and that they personally desired to see their own students become better

critical thinkers as a result of their undergraduate experiences.

Specifically, some participants stated their beliefs that critical thinking is now being likened to 21st-century skills, and this informed their understanding of what it means to be a critical thinker. Other participants stated that critical thinking is synonymous with creative thinking, while others felt as though critical thinking is the culmination of higher-order thought processes and thus enjoys its own distinct status among the cognitive skills. Despite these different conceptualizations, there emerged a theme across all participants that indicated their desire to see critical thinking enhanced among undergraduates.

Melissa and Erica both provided their thoughts as they relate to the current importance being placed on critical thinking. Both agreed that it has become a “buzz phrase” that is heard regularly at the college and university level. Melissa stated:

It’s something that’s in the forefront...it’s always in conversations about revamping the undergraduate curriculum.

In agreement with the presence of this notion, Erica also explained:

It’s one of the words. There’s a lot of talk around that. We want our students to think things out. How it plays out in each classroom, I don’t know. But I definitely hear it. For now, it’s a fairly good buzz word.

Todd’s perceptions of critical thinking indicated that 21st-century skills may be synonymous with critical thought. He also shared his belief that critical thinking implies higher-order cognitive skills consistent with those outlined in Bloom’s Taxonomy (Bloom et al., 1956), and that these skills are important at promoting productive members of society. He indicated:

What comes to mind initially is that it's an overused term. We throw that term around a lot without thinking critically about critical thinking! You know, I've always wondered if 21st-century skills...is that like a good re-casting of critical thinking? Because we hear that a lot. To me, critical thinking is just that: being a critical consumer of materials. You know, like how teachers are always faced with all these types of instructional strategies...teacher books, manuals that go along with kit-based instruction...so to me, if someone's thinking critically about these...or the textbook...they're looking at stuff and they're evaluating it. They're thinking what might work well with this...what are some of the limitations? How can we make this better? How does this sound like it might not be reasonable to do in today's classroom? I take the word 'critical' literally. So you're analyzing, you're synthesizing, you're assessing the importance or the value of something, and those are all things that I try to get the students to do. I also think we use the term 21st-century skills a lot now to talk about critical thinking. I'd argue that they're 19th-century skills. But to me, to be a productive member of society, you should be thinking critically about how is it addressed here. Since I've been here, North Carolina's new guiding program for beginning teachers, what they'll be evaluated based upon, is this idea of 21st-century skills. So I think critical thinking is these 21st-century skills.

Angela described the role of critical thinking as a necessary ability for teachers who need to critically evaluate educational and instructional technology for appropriateness within their future classrooms. She stated:

And we were talking specifically about technology...and about all the various changes in technology and about how fast they're occurring. And the research just can't keep up. So they're having to think 'critically' to use your word...but they're having to think *completely* about 'Do I want to use this because it's a cool tool? Or how might this be used to help a student learn a concept or practice a concept? Or how does the research apply?' So I went through some principles of technology and reinforced how important that's going to be for this generation for new teachers because it's all coming fast and furiously. And I said you're going to be the shining lights. You're going to have to throw a spotlight on this because people are going to expect you to have experience with this, which you do! And we talked about existing social networking. So if you had SmartPhones in your class, how could you really enhance writing, and social studies, and so forth? And so I said we really have no idea what's around the corner next month, or next semester, or next year.

Julia articulated her evaluations of critical thinking ability in terms of what its implications are on a more global level, and not necessarily constrained to the work force or classroom. Thus, she shared Todd's perception that critical thinking is vital for productive membership in society, and indicated that it is the responsibility of college educators to teach their students how to not only think critically for themselves, but how to develop these skills in their future classrooms for their future students. According to her, she felt that:

Whether we're preparing high school students for the work force or for college, critical thinking is one of those things that needs to be developed, and it's something that we need to be expecting of them. So here at the university, we need to be teaching our students how to think critically and how to engage *their* students in that kind of thinking as well, so...it's not just a local thing, but a global thing. I also think you don't want to sit back and let everyone tell you everything. I think it's always been the case, but I think especially in our social and political scene now...you'd better be thinking really critically about everything everybody is throwing at you. And not just accepting what somebody tells you. You can get into a lot of trouble if you're just accepting whatever is being thrown at you from media, newspapers. I think it's becoming more and more important as we're getting more information thrown at us about everything and from every direction. We've got to be critical thinkers about everything from the groceries I buy to where I'm going to vote. They're completely different things, but there is a lot to consider in those situations. We've got to constantly be asking ourselves questions.

Melanie offered support for the notion that critical thinking is important outside of the classroom as well, and is a vehicle through which individuals can make sound and informed decisions in many areas of life. She emphasized her positive evaluation of critical thinking outcomes by stating:

Through their whole...I mean everything that they do requires it. Whether it's listening to the news or any current issues. Voting, decisions about recycling, all those personal decisions...healthcare issues require that they make decisions

based on evidence. This mean they're better able to make decisions about their lives.

This idea was reiterated by Angela, who also believed that critical thinking allows the individual to acknowledge and assess multiple perspectives before coming to his or her own thought-out conclusion after having “pushed back” on the personal beliefs and assumptions that may have become comfortable over time. This becomes part of the role of critical thinking at the undergraduate level, a time in which students should push back against their own thinking and critically evaluate what they ultimately choose to believe. Angela affirmed:

Critical thinking helps you to see what might not be salient or pressing at first. It helps you understand yourself better as you push back on your own thoughts and interpretations, which can help you make informed decisions in politics, gathering information, and exploring alternative views. So I think it's a way of expanding our opportunities and ways of thinking and looking at the world and enriching our appreciation and knowledge of it. In many ways, I think critical thinking at the undergraduate level should make us question our roots. Do I want to stay the same? Do I want to adopt the same thinking as my parents or of the community I came out of? So I think it's important to expand students' choices through critical thinking. I think expanding the way they make decisions in their lives...I think that's a valuable part of critical thinking. And I'm a great admirer of people who can do that...who can get undergraduates to think about things differently.

She then went on to articulate her beliefs that critical thinking affects the individual on a daily basis regarding how he or she chooses to spend free time. This was the only instance in which a participant addressed discussed critical thinking in this way, but she substantively related it to her evaluation of becoming a sound critical thinker and how it affects other decisions that must be made if one is to function as a member of any democratic society. She indicated:

So for me and my personality, I start thinking about important things that might have otherwise been seen as ‘sideline’ types of things. So that requires me to push back against myself and talk back to myself. I think people who try to exist in a complex world have to use critical thinking all the time, whether they realize it or not. This even includes what you’re going to do with your time. We’re in a society that has leisure time, so what are you going to do with that? What do you value? What’s important to you, and why? You want to think about that differently. I attended a leadership program years ago, and that’s one of the things we talked about. How do you use your free time? Are we getting in our own way with the things we’re trying to achieve? And that really does require critical thinking...pushing back against self. I think in politics...making political decisions...voting decisions...all of those things require critical thinking...gathering information...exploring information, looking back, exploring alternative views...if we do it the way we should.

Overall, a common theme that emerged relevant to personal evaluations of critical thinking included the importance placed on becoming better able to make informed decisions on your own. Furthermore, this acquisition and utilization of autonomy was believed to be important and required as both a teacher and as a functioning member of society. Being able to gather information, evaluate what was gathered, and assess it for logical soundness prior to making a decision and acting upon it was observed to be a necessary skill set for active societal membership, and thus should be taught within the undergraduate classroom. The participants in this study indicated their beliefs that they as professional college-level educators feel responsible for ensuring that their students master critical thinking ability if they are to become reflective practitioners in their own classrooms as well as functioning members of our society.

Efficacy Beliefs about Teaching Critical Thinking

After having the participants articulate their own interpretations of critical thinking and their evaluations of various outcomes associated with critical thought, I had participants discuss their beliefs about being able to successfully teach and model this type of thinking for their students. These beliefs about one's ability to perform a specific task and obtain positive outcomes indicate each participant's self-efficacy (Bandura, 1997; 2010), and in this study were examined in relation to the successful promotion of critical thinking ability among pre-service teachers. Given that all participants shared their beliefs that critical thinking is a highly important ability to have, particularly for future educators, I wanted to understand the personal levels of perceived ability to foster the acquisition and development of these skills in the college classroom.

Analysis revealed that some participants possessed high efficacy beliefs in that they perceive themselves capable of successfully teaching and modeling critical thinking for their students, while others expressed uncertainty that they were doing so effectively. Those who indicated high levels of efficacy were the participants who most clearly articulated definitions of critical thinking that were largely consistent with those found in the literature. Participants who did not express consistently high efficacy beliefs were those who had provided their understandings of critical thinking with uncertainty, and were thus somewhat unsure that their interpretations of the construct were, indeed, consistent with its standard definitions.

Angela described here a typical lesson in her middle-grades language arts education class and felt as though she is able to promote critical thinking about writing evaluation over the course of the semester. She declared:

It has to be modeled, practiced, reaffirmed, questioned, all that. Because we work with a large class of students, and you have to see each one individually as well as see the whole class. And so, over time, I think that's a message that works for students. It's not a critical thinking lesson; it's a critical thinking... (makes horizontal pulling motion with hands) strand in my course, and I think that that works. Occasionally I'll have lessons for that day, or I'll have a mini-lesson and we'll have a discussion, and I can push back a little bit... and I can get students to push back... and I can see a light come on about a topic, especially with graduate students. So my response is based on how good their question is as well as how good their answer is. And so, by the end of the semester, they get really good at that. But they practice... it takes practice, and my feedback. So it's not just doing it. It's doing it with feedback. So I think I do it really well over time in teaching students how to respond to student writing... I also give examples of mistakes that I've made and I'll be able to talk about those as examples of how to push back about myself about my own assumptions and interpretations of those around me. And just because I happen to filter it through my own filter doesn't mean that that's what's really happening. So I do a lot of that kind of modeling. And I question, and we try to figure out and explore. And those are the kinds of things that I do that I think encourages critical thinking.

Todd discussed his perception that he is able to demonstrate the questioning mindset that he expects his elementary science education students to possess. He described his confidence in these abilities by saying:

I think I do a decent job with discussions about the textbook where I certainly don't want them accepting everything they read without challenging it or thinking about... how they may disagree with stuff. It's okay to disagree with the stuff we read. And I think I do that well.

Julia expressed her beliefs that she is able to teach these skills to her students as well, and suggested that mathematics naturally lends itself to the promotion of critical thinking. She shared these beliefs by stating:

I feel like I'm kind of at an advantage because it's kind of such a big part of teaching and learning math. It's an expected part of it: You *cannot* become a math teacher without thinking critically about at least the mathematics part and students' understanding of it. I think that algebra tile lesson is one that worked really well. It's one where a lot of students have come back afterward and talked about it again. And every time I teach it, it comes out that way: They're surprised at how much they learned, and they're surprised at how much they didn't know. Although they could do it, they think 'Oh my gosh, I *never* understood it in this way before. And it makes sense.' So that's the one I'd say I've done consistently well a few times because I've gotten that type of response before.

However, she went on to qualify her previous statement by saying that her efficacy beliefs are not consistently high across the different courses she teaches. She claimed this is due to her lack of comfort teaching courses that aren't fully aligned with her areas of expertise. To relay these concerns, she stated:

And I've taken a few courses in history of math before, but that is *not* my specialty area. It was one of those 'I'm staying ahead of them in the reading' survival things when you teach something for the first time and the second semester you improve it and go from there. It's a math class, but it's also a history class, and I don't know a thing about how to teach history. So I was constantly struggling with how to do both of those things and how to do them well. The second time I taught the class was far, far better because I learned more, more, more, and more. And I wish I could do it again! So there were some times during that course, and sometimes in the ones I normally teach, that were far less than ideal.

Melissa discussed having inconsistently high efficacy beliefs as well. She described her feelings as follows:

I think some things I'm better at teaching than others. So maybe it might be more content specific. I think maybe when I'm helping students understand about instructional design, because it's hard. They've got objectives, activities, and assessments that tie to each other that are geared for a wide range of learners. And I think I'm doing that well in the middle of the unit. I'll model that for them in their mini-lessons, and they'll usually get it. Now, sometimes in the transfer of their knowledge to practical skills...sometimes that's bumpy. So I think I do a pretty good job at pushing them to think...And I mirror,

hopefully, the kinds of questions that get asked in here with what they're being asked on their assessments. And sometimes I'm not very successful. But sometimes I am.

Melanie described her belief that to effectively promote critical thinking, you as the instructor have to attain and maintain a critical disposition yourself. She said:

I leave it open and have a lot of questioning. And having them tell me rather than me tell them. I'm always working on that, without providing my biases about certain issues.

At the end of the interview with Todd, I provided him with an opportunity to openly address any topics we had not yet touched upon, or to revisit an issue that he would like to further discuss. It was at this time when he spoke of his concerns regarding how educators view critical thinking, and suggested that it might not be as clear-cut as perhaps some make it out to be. His concerns are articulated here. He said:

I mean, I don't actually teach critical thinking skills, really. I mean, we do some...like evaluation of sources, application of materials. It's a hard question because it takes many forms. It *is* in the activities. It *is* in the assignments. It *IS* in the nature of the discussion. Truth is, I don't *know* how...I don't know if I'm teaching critical thinking well. Never been asked that question, so it's hard for me to...so I *think* I'm...as we're talking, I *think* I'm tapping into this critical thinking. I may be doing it not well *all* the time (laughs), so I'm not really sure. I mean I guess in trying to talk with you and clearly I haven't thought critically enough (laughs) about critical thinking. I'm not...it's not clear in my mind...I don't have a real clear conception maybe about what it is. And I'm hoping that will be a product of this work...some more clear guidelines as to what the heck we mean about critical thinking, and what we as teachers can do to promote it.

Angela, who had already provided her reasons for believing she regularly promotes critical thinking among her students, added this to our discussion:

"I don't think I could teach a lesson in critical thinking...and make it work."

Analysis revealed that not all participants possessed consistently high self-efficacy beliefs related to fostering critical thinking in the classroom. Those who reported high efficacy articulated potential factors that may affect efficacy beliefs, such as teaching a course for the first time, teaching outside of your areas of expertise, failing to maintain a critical disposition yourself, and possessing an uncertain conceptualization of what critical thinking is and how it can be taught to others. Those who did report high levels of efficacy indicated that students were taught how to critically examine and evaluate course material in content-specific ways. That is, skills were taught and modeled to promote critical thinking about how to evaluate writing in Angela's language arts class, and how to critically examine one's own assumptions about math problem solving in an algebra class. Thus, analysis from the current study determined that when these efficacy beliefs are high, they are high in relation to promoting critical thinking specific to the actual content area. This finding is consistent with the Immersion approach to critical thinking and will be discussed further in the next chapter.

Motivations for Implementing Critical Thinking Skills Training

The participants in the current study articulated many reasons why they chose to emphasize critical thinking skills among their pre-service teachers and design instruction so that these cognitive outcomes might be achieved. This major category of motivations was informed by the participants' personal beliefs in the emergent model. Upon careful consideration of the raw data, I concluded that these motivational

influences could be grouped into two distinct sub-categories: 1) the desire to promote mindfulness and higher learning outcomes as students, which was designated as a short-term goal, and 2) to prepare students for long-term goals and future responsibilities, such as those inherent in a democratic society. Participants believed that the attainment of both of these goals would further aid in the promotion of reflective classroom practitioners, since the teachers would thus possess an appreciation for effective learning strategies as well as an understanding of real-world decision making that would ultimately need to be cultivated in their own students.

Critical Thinking to Promote Short-Term Academic Goals

The first sub-category—to promote academic mindfulness—was a broadly defined goal that encompassed desires to see students become better stewards of their learning and the learning process. Participants indicated that critical thinking could help create a deeper, more meaningful understanding of classroom content when students consciously engaged these skills. Thus, critical thinking was perceived to be a tool that would allow students to obtain higher levels of mastery, and this was perceived to be possible across all content areas. This occurs because critical thinking allows the individual to come to understand not just “what”, but “how” and “why”, meaning that determining causality is now possible. Regarding the usefulness of teaching critical thinking as it relates to understanding *why* things occur, Julia stated:

The way we've got it organized is that the class I taught will be a course that they take the semester before their student teaching, along with a new class. And that new class is going to be a math class taught by us where we'll be

making connections between the upper-level mathematics courses they've been taking here in college with the high school math courses...helping them see the connections between the two. And that course will really be a place where we can get those 'why' questions answered sooner rather than later, which is going to be really, really nice. For example, a couple semesters ago in the same class that you observed this time, we were working with algebra tiles. It's a manipulative that we use in math instruction quite often and they're really, really helpful in visualizing the factoring of quadratics, completing the square, these sorts of things where we're working with polynomials...all polynomial operations, actually. And the students' first perspective of these is that 'Oh, those are toys. High school kids aren't going to want to use them. They're going to think that we're treating them as babies.' But as soon as when you introduce where this comes from, which is...historically, this is how algebra was done...algebra WAS a geometrical study. We didn't have symbols back when we started working with algebra. A square WAS represented as a square. That's what that is...it represents an area. And if we go back to what it actually means, students are going to understand it a lot better. So I want them to be able to assess where students are in their understanding, how to help 30 kids in our class build on their understanding, and expect them to not only understand something, but know why things work the way they do.

As is demonstrated by the preceding quote, Julia believed that deep understanding of mathematics content occurs when students are able to clearly articulate why things occur, or in this particular instance why certain teaching strategies that at first glance appear simple may ultimately prove highly effective at promoting learning. Critical thinking is a skill that enables students to go beyond simply acknowledging traditional strategies and understand the historical context that provides the justification for why such strategies are still being utilized. Thus, an appreciation of the historical perspective is possible at promoting this deeper understanding.

Another motivation participants reported for incorporating critical thinking skills training in the classroom was to promote an understanding of how, when, and

why certain instructional strategies would work and work most effectively for future students. Angela offered her support for moving students away from memorization of declarative knowledge and into a higher level of possessing procedural knowledge about teaching strategies.

They get better using more of a professional language that's more than 'It would be fun to do this activity' but rather I want them to get to the point where they think about how 'This activity or this pedagogy would work *because*'. Not because it would be fun, but because the research tells us the students would be engaged. So I'm trying to get them to understand...(corrects herself) I'm trying to get them to *practice* having a professional voice and using knowledge where they're turning it from declarative knowledge where they're reporting it into procedural knowledge where they can actually understand it and apply it. I want them thinking 'This would be a good activity *because*...and where would it fit? Where would it fit in my curricula? Where would it fit developmentally for the students as they're developing as writers? *When* is it okay to do this?'

Informing the elementary science education aspect of teaching for understanding was Todd, who indicated that this type of understanding is necessary when promoting classroom teachers who are capable of effectively navigating the "hows" and "whys" of inquiry learning. He shared that:

At the heart of it is, I guess I include what I perceive these candidates need to teach science education well in the classroom. So it's focused on their understanding of inquiry, how they move along the inquiry continuum, how they structure activities.... It would engage them in some thinking about *how* they would engage their pupils in teaching this content well. Ultimately I want these candidates to walk away with a working understanding and working knowledge of how to teach K-6 students effectively. So the outcomes would be, ultimately, a scientifically literate teacher. We want teachers who understand inquiry, understand why science is different, and understand ways to scaffold this for young students. So this working knowledge of science inquiry is what I'm after.

Jody broadened the necessity for training students to be critical consumers of teaching strategies and related her perspectives that this critical awareness of when to use certain strategies is vital in promoting a safe, inclusive learning environment for all students. Thus, the creation of a secure classroom context is dependent upon a teacher's critical appraisal of which strategies would be appropriate to include in daily activities, and how they should be carried out. She stated:

I do think it's part of my job to provide content and provide experiences where they feel successful in this course, and in creating safe, positive, effective environments for all kinds of learners. I think that's the goal for this class. At least that's my personal goal! That means they have to do some individual reflection and work, so they will analyze their "isms" and their preconceptions we all have. But I also want them to have strategies of being aware of when there's something that's not safe, or there's something about your class that's causing some type of undue burden on your students, as well as create that environment where everyone is included. So that's really what my goal is for this class.

Another reason participants chose to teach critical thinking relates to providing opportunities for students to come out of their comfort zones and begin thinking about topics and ideas in perhaps new ways, which participants also believed promotes more effective learning. Possessing new ways of thinking implies multiple perspectives from which content can be viewed, and thus analysis of ideas can occur from more than one angle. Furthermore, it was indicated that thinking and analysis from a single angle typically occurs because this perspective is the one most familiar to the learner, and is hence comfortable and may become problematic when used without conscious awareness. Angela described the importance of being able to pull students out of their comfort zones and provide them with new perspectives by saying that:

I think the role of critical thinking is...to...at the undergraduate level, is to get students out of their comfort zones. To find a new self, or to expand themselves. So it's about expanding their horizons. Therefore, I am in total agreement with taking political science courses. Science courses themselves, because of the scientific method or the scientific way of thinking, is a different way of thinking than in the humanities...a different way of writing. A different way of analyzing information, gathering information, and data. And we only know how to do that if we get exposed to other perspectives. And so I think that that exposure can set into play critical thinking. It's ultimately providing them with a pathway through which they can think differently.

Critical self-reflection was also believed to enhance learning in the classroom.

This allows students to become better stewards of the learning process as they take greater responsibility for their efforts. Erica spoke of her desire to see students assume more ownership over their learning and begin to rely less on the instructor to tell them what to do or how to do it. She believed that greater self-reliance leads to more careful evaluation of personal work, and indicated that reflective thinking is instrumental in helping a student realize when work has been done satisfactorily, or when it may have missed the mark. She indicated:

My goal in this particular activity was for them to be reflective. If you're reflective in your work, I'm just a piece of it. In this particular assignment, I wanted them to rely on themselves more, and they weren't. They would do the work and hand it in, hoping it was right. And then I would be the one doing all the work, and I don't want that. I need *you* to do more of the work. I need *you* to do more of the thinking.

It was her belief that students can become better as learners if they reflect on their work and assess its strengths and weaknesses instead of relying on the instructor to provide them with feedback. She went on to indicate that this increased self-reliance and reflective capacity is a goal that is common to all of her science education classroom lessons and activities. To her, this type of self-evaluative work would serve to increase

metacognitive awareness, implying that the student could rely on himself or herself to assess the quality of work without necessitating that another person perform these tasks for you. Seconding this opinion was Angela, who also indicated that she strives to infuse metacognitive awareness into her classroom activities on a daily basis as well.

Angela described her views by stating:

So kind of the typical class would start with writing... a focused free-write that is related to the topic of the day. So something that draws from the students' own experiences or requires them to do a little metacognitive thinking about their own cognitive processes... whether it be how they read literature, or how they write, what processes they use, how they revise.

Critical Thinking to Promote Long-Term Societal Goals

As was demonstrated above, participants in this study believed that critical thinking allows students to become better learners who possess a deeper understanding of academic course content. Additionally, they also believed that critical thinking serves to achieve long-term goals, and these were articulated in regard to promoting sound decision-making in a democratic society.

When asked to talk about the role of critical thinking outside of the classroom, Erica discussed the need to promote lifelong learners who would, by virtue of critical thinking ability, understand how to make informed decisions. She shared that:

Well for me, that's all about... probably scientific literacy... which is the whole goal. That's why I do what I do... so that when our students are out... when the K-12 student has graduated and they're in college or working, they're able to read the newspaper and think critically. They're able to make an actual judgment, about who to vote for. So when there's something like an oil spill,

they should be able to know why that event will impact them, even though it may be thousands of miles away. So with the whole realm of things that could happen around the world, there should be able to relate it to what might happen to them. To know why their fruits and vegetables are more expensive...or even less expensive...you know, why do they have kiwi in December? Is that a good thing?? Where are those kiwis coming from? How did they get there? So hopefully they're thinking those things and are not just thinking, 'Oh, this is fantastic! We can have kiwis in December!' Yeah, it's probably good, but what is the other story? I think that it helps to set the stage for our undergraduates to be lifelong learners. Because if you start reading things and hearing things with a critical lens, it will, I think, in some respects, entice you to read more on those things...so that it makes a little more sense to you.

Addressing new technologies that allow individuals to communicate and interact with other individuals across the globe in real-time, Erica also added the following:

So if we are closer as a world, then we need to be able to relate in more than one way. And we need higher levels of thinking to be able to do that. So it's my goal to have our students be more global in their ways to being and thinking and doing.

Jody stressed the importance of making students aware of some of the common misperceptions they may have about the real world, and in particular how it may not be as friendly as students believe it to be. To her, she felt that students needed to be directly confronted with this uncomfortable reality so that they can begin to think about ways in which the issues currently facing us may be addressed, ultimately to promote a society in which there are fewer tensions between and among various people groups.

She stated:

Students often think that the real world is much more harmonious than it really is, so I try to interject those (video) clips that demonstrate that we don't have that general respect for everyone, or that same value for everyone.

Angela also articulated her beliefs that future teachers can and should hold themselves responsible for helping to promote a better, safer society by becoming advocates for

their students. She indicated that various professional organizations are vehicles through which this type of advocacy work can be achieved. She stated:

And another way I get them thinking about those skills is professionally. I've asked them to join a professional organization that's an English education organization. And those organizations have an advocacy group or an advocacy section. So I talk to them about being advocates for their students but also being advocates for education and speaking out...and it's actually in that kind of professional environment where they can actually do that.

Classroom Strategies

Across four participants, there emerged a common theme that “teaching for understanding” is the dominant paradigm in this particular college of education. The next category that emerged in the process model includes various strategies that the participants routinely used to engage students in critical thinking to develop this level of understanding while also further developing their dispositions to become reflective future classroom teachers.

All common critical thinking teaching strategies articulated by the participants aligned well with the higher-order thinking skills included in Bloom's Taxonomy of Educational Objectives (Bloom, et al., 1956) and required the application of these cognitive skills to develop the content-area understanding that the participants desired to see among pre-service teachers. The seven educators in the sample desired to see their students routinely begin thinking about the ways in which they could inform their future lessons from the perspectives of the Application, Analysis, Evaluation, and

Creation levels of the taxonomy. Specific and varied examples related to each of these four cognitive skills across the academic specializations will be described. The next four sections will focus on how participants use various strategies to promote critical thinking within the classroom. Of these four sections, the first will describe specific strategies used to promote higher-order cognitive skills (application, analysis, evaluation, and creation). The next three will discuss questioning, discussion, and perspective taking as other strategies by which critical thinking can be further developed.

Teaching Higher-Order Cognitive Skills Strategies

Application Strategies. Although most participants indicated that being able to apply learning was an important component of becoming a critical thinker, all three science education professors sampled in the study specifically indicated that students are regularly expected to apply classroom content to daily activities. This included making predictions based on what has already been learned, coming up with questions to answer “how” and “why”, relating classroom content to current events, and designing instruction for theoretical learning environments. Todd began to share his inquiry-based learning activities in the elementary education science classroom based on an activity where students were expected to apply their learning to create questions that would subsequently be tested. He indicated:

I do a lot of hands-on, minds-on engaging. Like today, we did a sinking/floating activity with 10 items. So you ask attention-focusing questions first when they don't have a lot of experience. And then we'll progress through to these reasoning questions. How and why questions. So they had 10 objects and they had to come up with one question for each.

Melanie stated that applied, hands-on activities were a regular part of her classroom activities, and that she typically opened up the day with a current event discussion lead by one of the students. She said that:

I start with a current event presentation by a student. And one or two will start the class with a topic that they've researched on a current event and will present that to the class.

Erica, the high school science education professor, regularly assesses her students with application-level assessments, and thus tailors her classroom assignments to reflect this type of expected learning and to promote the mindset required to be an effective reflective practitioner, the promotion of which she previously stated was her overall goal for her students. She indicated:

So I try to balance giving them opportunities to be critical consumers of whatever that topic is. And I try to give them lots of applied projects and not give them many tests. I think I give them one exam in both courses. Most of my projects are application projects.

A specific example of this type of application-based assignment in Erica's course on high school science methods is called the Composite Class. She described this assignment by sharing that:

In an assignment called the Composite Class...students will have to describe the classroom that they are actually teaching. So I've pulled out and created my own actual class of about 35 students. And some love sports, some want to sit in the front, some want to sit in the back. So, you know, all of these things that you would normally experience in an actual classroom.

Analysis Strategies. Analysis strategies described in the study included tasks that required students to break down large, complex theories or ideas and examine their separate elements and how they may relate to each other. This section relates specific

examples of how the two high school mathematics education instructors (one assistant professor and one doctoral candidate) promoted the cognitive skill of analysis in their classrooms—classrooms that are specifically designed to teach for understanding. The first quote comes from Julia where she indicated her desire that future teachers understand not only why things work, but also understand methods by which they can relate the content to diverse learners by successfully analyzing their students' thinking. She said:

I want them saying 'Why does it work that way?' That's one of the big things we have been pushing from our sophomore-level class up until now is *why*. 'Why does it work that way? I know you're getting the right answer, but why does it work the way it does? Why does that make sense? Can you explain that in three different ways to somebody else?' So that's one of those things that goes all the way through. So as we think about and learn to plan lessons, and think about student thinking, we have to teach them how to analyze student thinking.

Melissa described a particular analysis strategy that required students to separately analyze two middle-grades students' understanding of geometry and then use this information to inform their own lesson plans. She said:

But I think asking them to analyze what they viewed in (the video clip of) David and Erica is an example of critical thinking in math ed, or teacher ed. So, we talk a lot about task design, about posing questions...and we try to give them some guidelines about how to do that. How to ask questions that aren't all one level. We talk about the differences between high and low cognitive demand. And so for the geometry lesson you observed, we talk about the Van Healy levels of geometric understanding, where students are supposed to progress through...your goal is to aim for the higher ones. So for the aim of critical thinking, that's what I do in my class.

Evaluation Strategies. Evaluation strategies generally required students to analyze separate components of a task or product, often with the end goal of providing

a value judgment regarding the “goodness” or “badness” of the product under investigation. Often, another goal of evaluation strategies was to have students redesign or otherwise make a product better. Teaching strategies geared toward promoting evaluation ability were articulated in many interviews and observed during classroom observations. A common theme that emerged in regard to these evaluation strategies was that they were used to promote mindfulness of knowing what constitutes good versus bad examples of content and instructional strategies. Todd described an analysis and evaluation project in his elementary science education classroom as follows:

We analyze reports...we look at the standard course of study standards...we look at the current state of testing and we analyze that and evaluate the value of that. So like we did this PCAST report to the president. So this real high-level report. One of the things we do is read the executive summary and then answer some questions. So, what are the main points from the reading? What do I disagree with from the reading? I think that's important...finding things you may disagree with. What are some things you may use in your own teaching? So that gets at critical thinking skills. And I get them to think about their own self-efficacy in teaching science.

He then described a lesson in which students were to critically evaluate the strengths and weaknesses of various standard elementary science activity kits and even of his own teaching abilities as their instructor. He shared that:

We did some work early on with science kit exploration. (Our) County uses a kit-based approach to science, and we brought down a selection of kits. We looked through them and thought critically about them. You know, what are some stumbling blocks with these kits? What are some strengths and weaknesses? So, without being explicit, I think a lot of what we do is in my mind, touching on critical thinking. The other thing I have them do is have them critique things we do in class, or assignments, or critique me. What are some strengths of this assignment? What are some things I do that could be done better?

In her high school science education courses, Erica regularly has her students evaluate their own work. Specifically, she indicated that whenever discrepancies arose between a student's expected grade and the actual grade received on the assignment, she had the student come up with his or her own argument based on why the grade should be reconsidered and possibly changed. It is this critical self-evaluative ability that she stressed is so important for reflective practitioners.

Build an argument for it. I say to them that your argument is your strongest point versus changing it, and then yeah, it's okay...but it's still then in your actual argument statement. So I use that now. It gets them to think about the rubric, and it gets them to think about their actual work.

Jody spoke at length about being critical evaluators of good versus bad examples of both classroom content and instructional strategies as well as being able to recognize what would be most effective to use in the classroom. She said:

And figuring out who's good and who's bad at what...so when they're observing their cooperating teacher, it's not so much 'labeling' certain things that are characteristics of good teachers, but knowing it when they see it. And being able to evaluate how complex that activity is. As far as our program goes, I think their field experiences provide the perfect context to continue the critical analysis. And I'll hear it in here when they're reflecting on something they've seen, or that they've thought about, or that they've analyzed...I know that they're doing it. They're not just being a warm body sitting in the back of the classroom. It shows intellectual engagement going on beyond just watching the teacher demonstrate how to use a SmartBoard. Was that a value-added experience? The things that they do in here are what I think they also get to do out in the field.

Her next statements spoke to the relatively new emphasis now being placed on critical thinking ability in her college of education. In particular, there is a new interest in having students become critical evaluators of lesson and instructional design so that

they can determine for themselves what would work most effectively in their future classrooms. Jody indicated that:

College-wide, there's a movement to interject lesson and instruction study somewhere in the early experiences of students. And that's a very complex process that I think demonstrates critical thinking. It's not so much saying 'What are the good elements of a lesson plan?', but let's craft one, let's refine it, let's do it again, so that they're really focusing on instruction. Maybe to some degree, diversifying our field placements so students will have an experience with all the types of diversity we talk about in the classes...that would require critical thinking outside of the class and outside of the school. Any kind of conversations where students are focused on the impact on student learning. I know that many units...the kids have some kind of product...before it was about writing a lesson plan that included certain components. Not *how* you were going to implement it, but just knowing what should be in a good lesson plan. Not just what you did, but now it includes a reflective component that asks you to analyze, synthesize, and evaluate what you did...I think that encourages critical thinking across the board. And that's something we didn't get when I was going through my teacher-ed program. How did what I did impact my students? Given the data that I got from that, how would I tweak it and do it differently next time? That sort of takes it to a whole new level.

Next, she described her expectations that students will develop the ability to evaluate good versus bad examples of classroom content in the elementary education social studies classroom. She articulated these expectations by saying:

So we go to the museum and I have them literally use what they see in that museum to construct those plans. Sometimes I put them in charge of finding the content for what we're studying. We were recently talking about images of gender that reinforce some of their stereotypes, and so in the blog, they had to go out and find media images and upload them to the blog so we could talk about them. And while I could have provided them with that, that makes me do the work that they need to do. You know, I already know how to do that. So I like to put them in that position where they're having to find some of the content. I also have them find good and bad examples of active learning...good and bad examples of didactic instruction...and while it would be easier for them if I provided it to them, I try to make them go through those steps.

Thus, participants indicated that effective reflective practitioners in the classroom will have developed the skills necessary to determine not only which content would be most suitable for promoting learning outcomes, but which instructional designs and strategies would be most efficacious in realizing these goals. This type of understanding requires that pre-service teachers begin to critically evaluate what they see and hear, and subsequently decide for themselves what they believe would be best suited to their own students and learning environments.

Creation Strategies. The highest cognitive skill as depicted by a revised version of Bloom's Taxonomy of Educational Objectives is creation (Pohl, 2000). When an individual is engaged in a cognitive skill found on the taxonomy, it is understood that he or she possesses the ability to carry out each of the lower-level cognitive skills relevant to the task at hand. Thus, there is an implied hierarchy built into the taxonomy itself (Kunen, Cohen, & Solman, 1981). In Todd's elementary science education classes, he indicated that his students are expected to come up with their own critical questions before each activity. In Angela's middle grades language arts education classes, she regularly has them create their own questions from the assigned readings. She described this activity by saying:

In one of my other undergraduate classes I also have them do a weekly Q&A where, based on the readings, they develop their own substantive professional question based on what the readings are and then answer that question.

For Erica's science methods courses, she routinely combines creation with evaluation so that students not only come up with their own classroom activities, but also decide

for themselves which activities would produce the greatest learning outcomes based on when and where they are included in the unit. She stated:

In our science methods courses, they have assignments where they have to create several things. But there are 3 that are similar. One is called Openers, one is Activities, and one is Formative Assessment. And they are relatively similar in what you do in them, and when you do them, and what you do with them. So for the senior students, they need to create 10 Openers, 20 Activities, and maybe 5 formative assessments. And there's a rubric. But one day in class, I could tell that there was beginning to be some frustration, which is generally a good thing. Because it means that they're thinking. So they were going back and forth with each other. And I really like it when I can sort of step out and step back and just listen. And they were going back and forth with each other about the differences between an Opener, and an Activity, and a Formative Assessment. And I found myself really smiling, because they were thinking about, 'Okay, if it's this...if it's really this at this time and in this place within this classroom, it's not really a formative assessment. It's an activity!' So it was good to see them thinking about what these things actually mean, and what would be useful, and when it would be useful out in the classroom.

Thus, the previous examples provided support for the notion that pre-service teachers are being provided with opportunities to engage in critical thinking based on the higher-order cognitive skills found within the hierarchy of Bloom's Taxonomy (Bloom, et al., 1956; Pohl, 2000). Interestingly, no participant articulated specific examples of activities designed to promote synthesis abilities, which is found between Analysis and Evaluation on the original taxonomy (Bloom, et al., 1956). Synthesis involves combining separate and often diverse parts or components into a whole. All other cognitive skills were, however, identified and discussed in relation to teaching for understanding within the pre-service teacher classroom. The previously described strategies used to promote the higher-order cognitive skills of application, analysis,

evaluation, and creation, combined to create the first sub-category within the major category of Strategies. Next, I will describe the sub-category of Questioning.

Questioning

The second major theme that emerged from within the major category of Strategies was the instructional strategy of questioning to promote critical thinking among pre-service teachers. This theme ran through all seven participants' interviews and observations, and was stated to be an effective way of challenging students' assumptions about their own understandings and encouraging them to view topics, ideas, and problem-solving from additional perspectives. Erica indicated that she relies on this strategy a great deal by stating:

I ask the students questions all the actual time. One of the things that I need to figure out about my students is what are *they* thinking.

Melanie offered her support for using questioning as a strategy when asked to describe and discuss what typically occurs in her classroom on a day-to-day basis. She indicated:

I think that during some of the activities we've done where I leave it open ended...I am thinking of one that we did with relative density of liquids and where they think through and make predictions about which liquids...how they would layer themselves. By leaving it open and have a lot of questioning. And having them tell me rather than me tell them.

In her middle-grades language arts classroom, Angela regularly employs questioning strategies to prompt the students to "push back" on their own interpretations and understandings when working with sixth-grade students who visit their classroom each week. This pushing back against commonly-held beliefs was

taken word for word from her data, and indicated that she does not want students blindly accepting their own biases and interpretive lenses, but would ideally have them constantly ask themselves why they hold the beliefs that they do. She relayed her attempts to promote this mindset by stating:

So I have them do a lot of that kind of work, where they'll do personal writing, and I don't mean 'personal' as in 'tell me a personal story'...but their own cognitive issues and thinking through...so we do that. We do a lot of writing in the classes. So that in and of itself is a critical piece. And I have them working with middle school kids...I have them reflect about that and question about that...and think about that, and how they responded to a student they're working with. How did that have an impact on the nature of their connection...or lack thereof.

Angela seeks to create a context of questioning within the classroom so that hopefully students will begin to question what they are seeing and hearing outside of their formal learning environments as well and thus become better critical consumers of entertainment and media. To accomplish this, she described that:

We use films to help our future middle school students to be able to question what they may see in film, or in movies, or do they take as gospel what they see on the internet.

Julia shared her beliefs about questioning and addressed the important role questioning plays when students critically examine answers and factual claims. She said:

As ideas are being thrown out, you constantly ask 'why'? Can you explain that to somebody else? Can you explain that in another way? What if I said this instead? You can't just let answers 'lie'. Really getting into critical discussions of things.

In all of her classes, Julia attempts to emphasize the understanding of mathematics as well as how to effectively teach mathematics. To describe these attempts, she shared ways in which she has incorporated questioning into her classes by indicating:

Regardless of the class, I make a point...I always have two goals every day. I want to push on the pedagogy, and I want to push on the mathematics...both. So you'll always see them engaged in mathematics at some point in time. You'll always see them being asked about their understanding of mathematics at some point in time. They'll be asked to make connections between that math and other math that they've taken by that time. So on the pedagogy side, you'll hear us talking about 'How could we best introduce these new ideas to students?' 'How can we assess student understanding of these things?' 'What are some common misperceptions regarding these things?' 'What does the research tell us about how students learn, or what they typically struggle with?'

During the "Teaching Mathematics in High School" classroom observation, Julia had her students participate in active exploration that revolved around random sampling and convenient sampling. At the end of the hour-long lesson, she posed specific questions to students that they were to answer based on their critical evaluation of the differences in results the two methods produced. A list of these questions appears below and demonstrates that students were expected to think critically about the activity and what implications it held for similar probability teaching strategies.

1. Why is random sampling more representative of reality?
2. What does random sampling do to remove bias?
3. How well did you recognize your own bias, or what's otherwise typical to you?
4. How can you make convenient sampling more representative of reality?
5. What do you notice when comparing results from these two steps in the activity?
6. Why did things change? What caused this change?
7. What implications does this activity have for sampling best practices?
8. What would you use in your classroom to follow this activity?

Discussion

A third sub-category of strategies that emerged as a common theme among the seven participants was that of using small group discussion or whole-class discussion to promote the open exchange of ideas and varying perspectives. This strategy often necessitates that the instructor offer little or no personal input into the discussion but would instead allow students to freely share their ideas and beliefs without having the environment dominated by the views of the instructor. Jody began describing her strategies for promoting discussion within her elementary social studies methods classes here, along with her strategies for having students continue to collaborate and share ideas outside of the classroom via electronic forums, which she felt has often been helpful for students who are hesitant to share their ideas in class.

I like to listen a lot. I use those smaller student conversations as the starting point for our whole-group debriefing and to start our lessons for the next time. Sometimes, for a formative type of assessment, I might have them leave a 'ticket at the door'...so when we talk about something sensitive like race, I'll have them check in on their way out the door and leave a post anonymously with me to sort of take the pulse of where they were emotionally in the class. My students also blog, probably 60-70% of the time. So if you think about 13 weeks in a semester, they might have 8-10 blogs that relate to the class somehow. Sometimes I'll leave prompts, and other times they'll come up with their own comments and questions...what questions do you have about this topic? And they'll use that to talk with each other. So discussion would be one strategy, coupled with wait time and accountability. So even if my students don't respond in here, the kinds of questions I ask them on assessments would require that they've been thinking about the content on that level to be successful.

Specifically, in her social studies methods course, Jody incorporates a great deal of student-to-student dialogue. She described these strategies by saying:

I do 'Think Pair Share' and other things that required them to think and report back. They'd start off with each other, and then report back as a group. So there are always conversations. And I try to give them anchoring points, whether it's artifacts in social studies, or lesson plans they might be examining...In this class, I try to do a lot of them talking with each other. I use more technology in my social studies class than I do in my diversity class, and I use lots of video clips of real people.

Jody also indicated her desire to see students routinely practice sensitive conversations that are likely to arise in the professional lives of teachers. She strives for a classroom environment where students feel comfortable talking through these theoretical issues so that they may be better prepared to address the actual conversations they may eventually need to hold. She shared that:

In this (social studies methods) class, we spend a lot of time rehearsing difficult conversations you may have with parents or colleagues...those practical or pragmatic skills that they might need as a teacher.

Melissa indicated that she regularly uses discussion-based activities in her Teaching Mathematics with Technology classroom. She stressed the importance of having students do class presentations and allowing classmates critique what they are seeing and hearing in these presentations. Melissa stated:

So we usually start and end off with some type of whole-group processing. If you were to look at my slides, there's always something at the beginning I use to open them all up with the same topic, and then I'll do that again at the end where they're all thinking about the same topic...just as a way to kind of bring the content together. Students present a lot in my class. I think that's important. They spend a lot of time in schools...maybe not as much as they should. But in my class, they have opportunities to present lessons to each other where they critique each other's ideas. And in a lot of the demonstrations, I usually do a lot of the 'telling' in demo mode. But for the content and pedagogy parts, I really try and break it up into lots of little small discussion times and then we'll come back together as a whole group.

Perspective Taking

The fourth and final subcategory of strategies the participants used in their classrooms is having students step out of their own understanding and take the perspective of another person. In particular, the perspective-taking strategies discussed in this study most often involved having the students actively attempt to assume the mindset of a child in the developmental age of the students they will eventually be teaching. So by having students try and adopt the thinking of younger adolescents or even of children, they were being presented with opportunities to identify and evaluate the most developmentally appropriate instructional designs and teaching methods for future learners. Melanie explained how she encourages students to assume the mindset of elementary students through the use of a sensory awareness activity she regularly includes in one of her science units. She described that:

One (activity) was a sensory awareness where I ask them to define different shades of green. But then having them come back with a discussion about how these experiences would be meaningful to kids.

Todd described how he attempts to create this perspective-taking ability in his own elementary science education students, which he hopes will aid in pre-service teachers' understandings of why certain activities would or would not work well with young children. He stated:

There's a warm-up type activity where we'll finish up something we began before, or they'll reflect on the reading, or just something to engage them when they walk in. So I segment those 75 minutes so we're not spending more than 35-40 minutes on one thing. So I engage them with activities they'd do with their students. We go through it as if they were youngsters and we'd talk and debrief, 'unpack' these activities from a pedagogical standpoint.

Erica articulated her instructional perspective-taking approaches that she felt have helped students reach a deeper appreciation for why certain classroom strategies would be most effective. She indicated:

I try to have them reflect on what we did...why we did one thing one way, whereas we did another thing another way...to have them realize why they would want to teach that way as opposed to another way. So we go back and forth between having them learn a little bit of the content, a little bit of the strategies for actually teaching it, and a little bit of reflecting why you want to teach it that way based on what the actual content is and how your students might see it. So there's a lot of going back and forth with it.

In her high school mathematics courses, Julia described daily perspective-taking opportunities as effective ways of gauging student learning, which serves as one type of formative assessment that can be used to inform subsequent instructional design. She said:

So if I'm working one-on-one with a student, or maybe with two students, how can I assess what that student knows? How can I understand what that student's understanding is, and how can I build on that to move them toward the next thing? It still may not be an entire lesson, so it will be two or three things in a row that will build on knowing where our students are and using those with small groups of students...so we're now no longer one-on-one but we're working with a group of four or five. So, how do you get discussion going? How do I know where each one of these students is, and how can I build on where they are and continuously assess as I go? So every single day, I need to push them on their mathematics, and their understanding of how students think about mathematics. Both ways.

Melissa also described her use of perspective-taking activities in her classroom, which usually involve small groups of students sharing with each other what the thought processes of high-school mathematics students might be. She described these as follows:

We do a lot of exploratory activities with the technology. And with the small group discussions, they have a lot of opportunities to share their thoughts of the content and technology. And they can also share what they think the students might think.

In all, these four major sub-categories of strategies (promoting higher-order thinking skills, questioning, discussion, and perspective taking) enjoyed wide utilization across the four academic specializations represented in the current study as vehicles through which critical thinking ability is enhanced in pre-service teachers. Often, one strategy for promoting critical thinking incorporated aspects of another strategy, such as Melissa's description of activities that require students to discuss in small groups their interpretations of how high school math students might learn certain problem-solving skills. Another example described how Julia created activities that had students identify potential areas of cognitive misunderstanding in high school math students, warranting that questioning the future teachers must be done to assess how they might attempt to diversify their instructional practices to meet learning outcomes. As such, many of the participants articulated that they often mesh one or more of these four common strategies together to promote greater critical thinking ability in their pre-service teachers. In sum, according to the beliefs articulated by the seven participants in the current study, becoming a successful reflective classroom practitioner requires that one has developed the ability to think critically about the content, instructional design and practices, and the unique perspectives of diverse learners.

Perceived Outcomes

The next major category that emerged from data analysis includes what the participants believed were outcomes of the strategies used in their classrooms to promote reflective practitioners through formal training in critical thinking. These outcomes have been broken down into two smaller sub-categories: Evidence of Critical Thinking, and No Evidence of Critical Thinking. The first to be reported here—Evidence of Critical Thinking—describes what participants believe to be hallmarks or characteristics of critical thinking. This sub-category will be described in terms of its three main outcome domains: Evidence of 1) new understanding of content, 2) acquisition of new procedural knowledge, and 3) new critical awareness of self. Next, I provide examples that demonstrated certain instances in which students were not engaged in critical thinking, and what characteristics accompanied lack of critical thought.

Evidences of Critical Thinking

New Understanding of Content. The first theme within the category of Evidences of Critical Thinking that emerged from the data spoke of students acquiring a new understanding of classroom content. Often, this was attributed to analyzing facts or ideas from a new perspective, or thinking about them in otherwise new ways. Melanie described perceived evidences of critical thinking among her students after the researching and discussing of current events. She stated:

And so it would probably be during a current event presentation and a student had done some research on a topic and had expressed a new understanding that countered their previous ideas about it. Many times they will come back and

say ‘I never knew about this or that’ and it’s shown that their thinking about the topic has changed somehow, you know, based on what they’ve learned.

Julia provided similar evidence of how a high school mathematics education student’s understanding of trigonometry had changed due to learning. She described this evidence by stating:

And he just stopped and said, ‘Oh my gosh, I’ve been doing trig for years and I never really knew what I was doing until today. And I can help the student in this way, or in that way, and what if I did it like this.’

Acquisition of New Procedural Knowledge. The second theme that emerged within the sub-category of Evidences of Critical Thinking deals with observing students identify new ways of applying their learning. Often this was observed in regard to instructional design and planning. Angela spoke a great deal about being able to see her students’ thinking evolve over time, particular as it relates to responding to others’ writing. She indicated that writing per se, an instructional strategy, helps students develop their own critical thinking abilities, as research in her field supports this premise, and as such she claimed to see the benefits of this strategy being carried over to other areas of language arts education. Angela said:

I think in my undergraduates I see evidence of it throughout the semester. I have them do these writing prompts. And I can see them evolve over time. And as they start to question what they’re reading more and understanding and thinking about practice and how they can put into practice. And what I see over time is that they get really good that that. Most of them do. They get better and better, with my feedback and guidance. They get better using more of a professional language that’s more than ‘It would be fun to do this activity’ but rather I want them to get to the point where they think about how this activity or this pedagogy would work *because*’...I also have students respond to each other as writers and I find they get a lot better at that. They get really good at that by the end of the semester in my “Teaching Writing” class...where they’re able to respond to each other. And they’re able to give more substantive

responses. And I see that as critical thinking because, in order to do that, you have to say more than ‘Oh, I like this!’ But they have to go inside of themselves and figure out *why* do I like this? What about *me* makes me resonate with this? What about this writing makes this work for me?

Angela next discussed perceived evidence of her students having developed a new professional language that is used when interacting with middle-school students, which is something she indicated takes time to promote and nurture. She stated:

Another reason I think that I do see it is because, by the time that they leave, they are able to respond to the 6th-graders that we work with in a very helpful, positive, guiding, gentle way...but in a way that gets results. And I see them using a different language. And that’s not something that you can teach in one lesson....So rather than thinking surface-level about what the students are thinking, they are now able to bring in a whole new host of knowledge to being able to see the students, and new ways of seeing their writing.

Jody also indicated that she sees evidence of critical thinking when students respond to their classmates’ work in more substantive ways than was once seen. She indicated:

I think I see evidence of that when students are questioning and critiquing each other’s work. So in these mini-lessons where they’re critiquing their peers, they are asked to provide warm and cool feedback. You know, something like, ‘I really liked this’, or ‘I might think about tweaking it this way’. I also think that in their selection of materials for unit design might be evidence of critical thinking.

Melissa recounted evidence of critical thinking when she observed her students changing their lesson plans based on their new understandings of the ways in which different students approach learning mathematics. She described this evidence as follows:

And they’re doing a better job this time around designing lessons...but it’s clear in their lesson plans, some at least, that they’ve taken to heart how some people approach things differently, and it’s coming out in their writing about how they would take that into their classes.

New Critical Awareness of Self. The final theme related to this sub-category speaks to students' perceptions of themselves, their abilities, or their understandings of the world and how these change due to what participants believe to be active engagement in critical thinking. Five of the seven participants indicated that this type of new critical self-awareness has been observed among some of the students in their classrooms. Todd articulated having seen this type of change occur that influenced how one of his elementary science education students thought about the development of classroom instruction based on student questions. He stated:

A student said to me, and I think she was thinking critically, about how the chapter suggested if a student asked a question about something, you're supposed to turn it into an experiment. So that was her question: 'So if a student asks a question, are we supposed to do this every time? Am I to build an activity around it?' And so I think that was an example of someone thinking critically about what we read in the text. And so she was wondering how realistic is this? How feasible is this in the classroom? Am I responsible for doing this?

Erica described having seen evidence of new self-awareness following frustration that set in after the students had begun to grapple with directions provided for a new activity. She described this evidence by saying:

But one day in class, I could tell that there was beginning to be some frustration, which is generally a good thing. Because it means that they're thinking. And I could see some of them realizing that maybe they needed to change something, or even if they didn't, they needed to recognize that it was a weakness.

In the following quotations, Julia provided her accounts of seeing students' self-awareness change, and how this new understanding often implies changes in the way instructional design and lessons should be constructed.

They're surprised at how much they learned, and they're surprised at how much they didn't know. Although they could do it, they think 'Oh my gosh, I *never* understood it in this way before. And it makes sense.'...So it's interesting because you very quickly finding them questioning each other in the same way because of the way I'm constantly pushing them and never telling them if they're right or wrong. 'Am I right?' 'Well, you tell me. *are* you right? Can you convince me you're right?' Those sorts of things...they start doing those things with each other as well.

She then went on to describe a critical incident in which a student showed evidence of critical thinking via his realization that his future students are not likely to view mathematics in the same way that he had been viewing mathematics. She shared this story by indicating her student said:

Wait! No, this isn't about me. This is about my students. Okay, how are they going to think about this? And he was talking to himself out loud as he was saying this. And this was a kid who often put up a fight, you know? 'Well, I learned it this way, so everybody else is going to learn it this way.' It was probably the first time where I ever saw him go, 'Wait a second...this isn't about me. I need to think about how somebody else would think about this.' And then he would ask himself different questions and I saw him totally get into it right there. So seeing him take that different perspective and think about it very differently...not just dismissing it. And I saw him sitting there asking people sitting near him 'Well, how did you do that? Why'd you do it that way? Does this make sense to you? What if I did this? What would you do then? What if a student did this?' And he really got going in a way that I've never seen him do before. So from that point on, he was definitely a different person, and a different teacher. There's no doubt about it.

Melissa discussed the use of the mathematical terms "amplifier" and "reorganizer" in her interview with me. According to her, an amplifier is technology that simply makes something faster, whereas a reorganizer is a type of technology that can change the way you think about or conceptualize something. She described how these technologies can impact student learning and thinking by sharing that:

One lesson we did involved fathoms, where they were asked to use a dynamically changing visual tool (Sketchpad) to find the least sum of squares. And some of them admitted they never knew that ‘squares’ literally came from a time when we actually used squares. And so that’s an example of when their thinking was reorganized. They’d just been using it (Sketchpad) to make things faster, and weren’t really using the benefit of some of the other ways the technology can be used.

Jody provided an example of seeing one student in particular develop a new disposition to begin thinking like a professional in her field would think when she stated: “I’m reading this article and asking questions that an economist would.”

Furthermore, she has seen evidence of critical thinking in the electronic discussion forums she has created for her elementary education social studies students.

She said:

If you read their blogs, they’re thinking at that deeper level. They will applaud each other, and they will applaud that deep thinking and for challenging themselves.

No Evidence of Critical Thinking

This section provides specific examples or critical incidents of what participants believed to be demonstrable lacks of critical thinking among their students. It should be noted that each of the seven participants was able to think back to events within the classroom that indicated students were not engaged in critical thinking, thus supporting the notion that critical thinking, though highly valued and desired, does not occur in all classrooms at all times.

To begin, Melanie discussed how emotional investment can, at times, prevent students from thinking critically, as this scenario was observed in one of her classes.

She stated:

A few years back I had a student who had been in high school with a student with M.S. The student went to China for an experimental procedure where they injected him with a certain type of human stem cells. And she presented this to the class. And it's unfortunate that...because I *know* that this type of stem cell treatment is ineffective for that type of disorder, but she was so enthusiastic and adamant that it had worked for him. She even said that the treatment allowed him to live 2 years longer than he was expected to live. So I stayed silent and didn't say anything...because I didn't want to let my knowledge of the topic negatively affect her emotional interest in what she was presenting.

Angela offered her beliefs about students who have not yet properly conceptualized what it means to be a teacher. According to her, these students are not able to differentiate between what they could do in the classroom versus what they should do in the classroom, thereby making substantive decision-making difficult or ineffective. She articulated her concerns by saying:

They still think teaching is about what you *do*, not about what you *think*. And so much we do as teachers has to be determined by what we *think* and what we know. And then, by what we know about our students, what we know about the content, what we know about the research about that content, and the pedagogy about that content...so you pull all of that together and then make a decision about what to do. And that's why decisions are so hard for teachers, because out of the thousand things we *could* do, what should we do that furthers where we're trying to go? So I think that's the most prevalent lack of critical thinking that I see.

Todd and Jody both indicated that many of their students have been overly concerned with what the classroom instructor thinks or wants in terms of class work to be graded. They felt as though these students failed to think critically about the content because they were, as Jody said, "chasing grades" and thus often missed opportunities to enhance their understanding of the content. Todd stated that:

More and more...most pre-service teachers are young female students who are really hung up on the right answer and hung up on what I expect.

Jody also described her beliefs that students often expect the teacher to do some of the required thinking for them. She said:

And when I can tell they haven't been thinking critically is when they want me to tell them what to say. I like to give lots of open-ended assignments so students can enter it wherever they can. 'Like, how many pages is that?' 'Exactly what are you looking for?' So that shows they are more concerned with my thinking, and not theirs.

Jody then went on to describe students who over-rely on memorization to try and do well on assignments, who by virtue of superficial learning strategies miss opportunities to further improve their mastery of the material. She stated:

And sometimes on exams, it's easy to see when they've memorized something and can reproduce it, but it's evident that it hasn't really entered their cognitive structure so that they're just giving it back. They can't really take it and apply it somewhere. So they might 'know' it and they might say 'I know this!', but what that really means is that they have a list of it, which means they can't apply it in another context...and that might be partially my fault, and it might be partially their fault. But the relationship with the content is not there. Umm...lesson planning, where they copy and paste things from the internet that don't require their students to think critically.

Erica indicated that it is apparent students are not thinking critically when they ask only low-level questions. She also stated that they fail to think critically when they do not follow the rubric or use it to critically evaluate their work prior to turning it in. She provided an example of a critical incident when she shared the following:

When do students not think critically? When they don't follow the rubric! When they ask very low-level questions that are basically around logistics. And this actually happened where a student handed in an assignment...and with every assignment there's a reflection. And he wrote in the reflection, 'I liked the assignment, but it would have been better *if...*' And then he went on to explain. But what he went on to explain was *exactly* what the real assignment was. And I thought, 'Okay, you didn't read the assignment. Nor did you look at the rubric!' And so he didn't show any critical thinking. You give the rubric to them knowing that that's what you should do, because that's what the

research says. But whether the student actually sits down and really compares it critically with the rubric...that doesn't always happen.

Julia added another outlook on identifying when students are not thinking critically and suggested that those who fail to actively attempt to see outside of their own experiences and learning preferences are often unable to critically consider how other learning strategies may benefit their students. She relayed a critical incident as follows:

And I remember one young man was sitting there, and was really struggling with using these new algebra tiles. He was like, 'Oh, it would be so much easier to do this by hand!' Because that's what he knew how to do. 'Well, I learned it this way, so everybody else is going to learn it this way. I would never do it that way because it works for me this way. I learned it this way, so if it works for me it should work for everybody else.'

The quote from Melissa about Sketchpad above in which she spoke about technological amplifiers and reorganizers also served to emphasize the idea that students may become "stuck" on viewing something from a single perspective and thus fail to see how it might serve other purposes when viewed differently. In this instance, she described Sketchpad as being capable of reorganizing their thinking about geometry, but her students instead saw it as a tool that merely sped up the problem-solving process. As can be seen in her previous quote, she noted that the failure to identify reorganizers as such can indicate that students are not thinking critically about the ways in which certain technologies can serve to enhance their fundamental understanding of the content.

Factors Influencing Critical Thinking Outcomes

The final major category that emerged from data analysis consists of factors that participants believed can influence the presence or absence of critical thinking within pre-service teacher education classrooms. The few articulated factors that are believed to promote critical thinking have been labeled “Contributors”, while those that are believed to reduce the likelihood of critical thought have been labeled “Hindrances”. These hindrances have been further broken down into those which are the result of the student, and those that are seen as the result of the teacher.

Contributors

To begin, Erica shared her beliefs that students are not going to think critically about content if they have developed no relationship with the actual content. She indicated that students need to have the content related to them in some way, and it is thus the responsibility of the instructor to ensure that this gap between student and content is bridged. If this does not happen, students will likely become bored and disinterested.

Content does not stand alone. It has to be related to the students, and will not be grasped unless this is done. The instructor’s job is to relate the content.

In other data collected from Erica, she felt as though establishing relationships with each student helps to promote critical thinking about the content. This occurs because these relationships allow the instructor to know what each student’s interests are, and can thus tailor the content to apply more directly to his or her students. This type of personal investment or “hook” can serve to increase student motivation and

engagement, which in turn can foster the desire to attain mastery as opposed to rote memorization.

Angela echoed the need for active engagement and also suggested that student-to-student interaction is also helpful at promoting critical thinking, particularly when students feel safe enough to question one another. She shared that:

If you have a trusting environment where the students are okay with being queried, not by just the teacher, but by each other...where you've set up that kind of discussion...that's kind of fun when those moments happen. So I think it has to be an interactive kind of thing.

Jody also indicated that students need to feel safe with the teacher as well as with each other before critical thinking about certain topics and ideas can successfully occur. In particular, Jody believed that students may only feel at ease discussing potentially sensitive topics such as gender and race later during the middle and end of the semester after the necessary relationships have been developed that calm students' fears about being able to become transparent about their personal beliefs and biases. To her, attempting to create a safe learning context where students are not anxious about being "outed" in front of their peers can enable critical thinking about these topics to occur.

As the interview with Melanie came to a close, she was asked to talk about any topics that had not been discussed, or to speak more about a topic that she would like to revisit and inform more thoroughly. She indicated that having critical thinking brought up to her explicitly through this research study has helped her to place more of a focus on it in her classrooms. She shared:

The fact is that this whole experience with you has made me think about it (critical thinking) more and maybe even address it more directly with students...you know, and I do talk to them about how kids who have some science background are better able to make decisions about their lives. But I do think that it helps in allowing their children learn to think critically. So I think that this has put it higher in my emphasis. I think it will be a good contribution to my classes...having thought about it and be more aware of it.

Todd added his own personal thoughts at the end of the interview as well, and suggested that it would be helpful if there were more of a universal language that educators could use when talking about critical thinking. At the time of data collection, he did not feel completely comfortable with his personal conceptualization of critical thinking, and indicated that more standard language would be useful for those whose job is to teach these types of skills. Furthermore, he felt as though this use of standardized language would also benefit the students, since the terminology would carry over into and be used in non-science classrooms as well.

Hindrances

Participants were readily able to provide numerous factors that they believed prevented or could potentially prevent students from engaging in critical thinking in the classroom. Six main areas or themes emerged within this sub-category that participants indicated were related to the student and role of the learner. These student-based themes have been labeled as follows: Disengagement, Lack of Professional Experience, Educational Unpreparedness, Performance Orientation, and Lack of Initiative. Following description of these six themes, two additional themes related to the role of the teacher will be discussed as well.

Student Factors: Disengagement. According to four of the seven participants, perhaps the most easily recognizable deterrent to critical thinking is simply student disengagement. The participants described disengagement to be perceived disinterest or boredom, which prevents students from wanting to actively participate in the learning process. To these four educators, student engagement is a necessary requirement before any critical thinking can be expected to occur. They spoke of how difficult it is to expect to students to think deeply about what they are learning when they are not engaged by the content or by the teacher. This issue was addressed and attributed to several factors, some of which were believed to be the fault of the student, whereas some were seen as the fault of the teacher. At the heart of the disengagement issue were concerns that students who believed content to be irrelevant or unimportant showed no indications that they would engage in critical thinking. Essentially, if no “hook” was present to draw them in and engage their thought processes, they remained passive and withdrawn from the learning experience. Angela described her concerns here:

It’s so hard to engage in critical thinking when you’re not engaging with the students. I think it’s hardest when I’m just giving out information.

Erica shared:

So if they’re asking a lot of basic questions, either they’re bored, or they don’t get it.

Julia articulated her beliefs that simply transmitting information, particularly when the instructor himself or herself does not possess a thorough mastery of the material, leads to student disengagement. She said:

And (class) turned into me just spouting stuff at them and them taking whatever they took in...or not! But I think it's far more difficult to engage in that type of teaching when you're not comfortable with it yourself.

Jody also added her beliefs that the proliferation of technology can be a deterrent to critical thinking among some students, particularly when they are using these devices in class for non-learning purposes.

Some of them have computers, and they're of course doing the Facebook thing, I would think. These kids are much better at multi-tasking than my generation might be, and they're much better than I am. So I'm not that concerned with them doing that, because some are still usually pretty engaged...not that I want them to do that, but you know, with the one-to-one laptop initiative, some of that's going to happen.

Lack of Professional Experience. Three of the seven participants articulated beliefs that students often do not engage in critical thinking simply because they still lack the substantive, professional experiences that demand this type of thinking. In particular, the absence of classroom teaching time and reflection upon these experiences was a recurring theme, and participants indicated that this is to be expected of pre-service teachers. Angela described students' preference for "quick fixes" early during their teacher training programs here, when she said:

At the beginning of the semester, they're just looking for things to do because they think they would be cool things to do. Here's what they're thinking: 'In a year I'm going to be a teacher.' Or 'In less than a year, I'm going to be a teacher.' So what do I do on Monday morning? And as a teacher, that's sort of the proverbial...you know, what to do on Monday morning? And so they're just looking for quick fixes. And they're just looking for what would be cool. You don't *do* writing groups the first week of class. But because it would seem like a cool activity to them, they might.

She also shared her concerns that students tend to use the Internet and non-reputable websites in particular for research purposes. She shared:

And one of the things that really worries me is when they turn in an assignment, and it's clear that they're only doing their research online. You know, I'll tell them that it's fine to find things that come from the campus library, or from reputable sites. But I'll also tell them...don't think that everything that's important to know, or everything reputable that's been said, has been represented on the Internet. It's not. It's just not! (laughs)

In agreement with Angela, Melissa also felt as though pre-service teachers lack the professional experience required to think through logistical issues that inherently arise in the classroom.

For example, when they're writing lesson plans using technology, when I'm grading them they have an idea of how things are going to play out, but they haven't thought through some of the things I know they're going to be faced with. They haven't thought through what to do with a student who comes in who's been absent for a week. They haven't thought through how they're going to give technology directions to the students. They just say 'Open this', but they haven't built in time for instruction.

Julia indicated that pre-service teachers still lack a professional repertoire, particularly self-questioning strategies, which can lead to a lack of critical thinking. She also mentioned that undergraduate students are expected to read and accurately interpret professional research literature, but that their academic training doesn't adequately prepare them to assume this responsibility, perhaps because it is believed they are not ready to undertake such tasks. She said:

Sometimes I wish they would think a little more critically about their pedagogy. But that's something that takes time. They're not very comfortable questioning themselves yet because they haven't developed a repertoire and they haven't experienced enough to know yet which questions to ask themselves...And in your definition of critical thinking, you mentioned going to the research. And that's one of the things we struggle with in dealing with undergrads. We can't take them to the research. They're just not yet ready to read it and understand it yet. But at the same time, you *do* want them to make research-based decisions. You do want them to realize that there's research underlying a lot of what we're trying to help them understand and put into practice. And that's one of the

things I think we constantly struggle with...is how do we get them to be aware of and be good consumers of research when they're not quite ready to go and conduct it themselves and understand what they're reading if you were to toss an actual research article at them. Some can, but some still can't write paragraphs well, so they're not going to read that and consume it in a very meaningful way. So that's one of the things I struggle with, honestly, is how *do* we get research into practice? Because it's so important! How do we bring it to them? How do we help them think critically about it and be good consumers of it? That's a tricky one.

Educational Unpreparedness. Participants also blamed what the author calls "educational unpreparedness" for preventing students from engaging in critical thinking. What this term means is that students have not been appropriately prepared to think in terms of understanding during their previous academic years, and once they reach the college level this type of understanding becomes the expected norm in certain classes. The two mathematics educators explicitly addressed this issue in their interviews, and data from other participants as well indicate their beliefs that many students lack the necessary training to engage in this type of systematic, critical thinking once they have graduated from high school.

Julia voiced her concerns that many mathematics education students arrive at college without adequate training in how to think critically about mathematics. She said:

Many have come to us as students and have never had an experience with the kind of teacher that we want them to become. Many students are not familiar with that (critical thinking) and it gets them out of their comfort zones. For many of them, this is the first time in their lives where they're being asked *why* something works the way it does in mathematics...And that's something that is throughout, and is probably one of our biggest challenges...as I mentioned before, these are good math students, and they are often quite shocked to see, especially in this course that I taught this semester, to see how much they don't know. Because they can *do* it...but when you start asking the right kinds of

questions, you find out that they don't actually know it very well. And they get very uncomfortable...For many of them, especially many of them in math education, it's the first time many of them have been asked to think critically about math. They've done math a lot, but many of them have not been asked to question what they were doing.

Melissa described how many of her students lack even the declarative background knowledge needed to think in this way. She shared:

They talk about how they never learned content. They never learned the Least Squares or Box Plots. They're talking about how they never learned those representations or ideas at all sometimes. And many of our students haven't touched anything beyond a graphing calculator, so that's one where we've got to not only introduce them to new technology, but how to understanding how it can help us teach math in a different way?

Performance Orientation. As Todd mentioned in his discussion on observing and not observing critical thinking in his elementary science education classrooms, many students are overly concerned with having the "right" answer or providing the answer that they believe the teacher wants them to have. This concern with getting the grade was echoed across multiple participants, and was believed to hinder critical thinking because it discourages the student from seeing beyond only that which is necessary for maintaining their grade-point averages. Melanie voiced concerns that students have had been trained to see the world in terms of black and white, with little consideration for gray areas. She stated:

I think by the time they get to college and are new in college, we've kind of stifled that somewhat and we have to teach them about thinking critically. A lot of these students have gone through school and they're so...trained on having the right 'yes or no' answer and the black and white of the world...There is a sense of frustration that there is an overemphasis of the grade in learning and how we engage them in the material as opposed to getting the grade. And I think that's a result of their school experience up to this point. And our students

are, except for our sophomores, they've had two years of core classes that have inhibited critical thinking skills.

Todd described his students' hesitation to engage in certain inquiry-based activities because these activities do not always have a "right" or "wrong" answer. He felt many students often prefer definitive "rights" and "wrongs" by which they can judge their performance. He said:

So we in class were saying how can we convert or modify that and make it so it's *not* so cookbook-like and IS more open where students have some more freedom to choose their materials, how they're going to test something, determine what data is important to collect. So when I give this to the students, they are often hampered or crippled sometimes because they don't trust their own professional judgment, or they think I have some right or model answer. And there could be 20 ways to correctly answer or do this modification that would be fine. So I feel like a lot of them have come up so used to finding the right answer. A lot of what we do...there isn't one right answer. One of our big projects is a field-based science inquiry, and that's the only requirement: that it has to do with science education. But here we're trying to mirror the inquiry process we want them to teach. So we're having them come up with their own question, how they would answer this question, or find out what kind of data they're going to collect.

Jody related her experiences with performance-driven students and indicated that their previous school experiences were largely seen as responsible for having shaped them into the type of students they are today. She said:

Sometimes it's judging by their hesitance to give an answer because they're not sure whether it's 'right'. Many times, my students are very concerned with what their grade is. Not that critical thinkers don't made A+'s, because they do. But students who chase grades...many times there is a risk in their minds to think critically because you might not be right. Many of the current seniors in the elementary ed program are like that. They're very bright, but they often don't want to think about something in a deep way because they want to know what *you* want them to know...and that's where they're going to stop thinking. And we try to move them, but that particular cohort was kind of hard to push. But they're so good at schooling! And I think when I push them the most, they're not the most happy with me. Most of the time they come around, but

sometimes they'll say 'Just tell me what you want me to do!' And sometimes those students are very difficult to make think critically...because they're such good students by the external measures' standards, and that's what they're used to and that's what they're comfortable with. Because they haven't had to. What's been rewarded is just giving back the status quo...and they're really good at that! They like it. And they know how to play that game, and they win. And with our seniors who will graduate in May, it was a hard time to get them to think. They're very bright, and they're capable. But they just didn't want to. They'd rather just stay there in their zone.

Lack of Initiative. The final theme that informed the sub-category of hindrances to classroom critical thinking relates to the students' lack of the affective disposition or initiative to regularly engage in critical thought. Students were often perceived to want someone else to think for them, or they seemed to simply choose not to care enough to give careful consideration to what they see or hear. This is different than being disengaged in that students can still be engaged while also having no initiative to think deeply or critically for themselves. Thus, while engagement is important to attain and maintain, it does not imply that critical thinking will follow. Erica addressed this lack of student initiative by indicating that some students would rather have the teacher think for them, and thus are seen to over-rely on the thoughts and decisions of others. She shared:

I was very frustrated that the students weren't using the rubric in order to make their own work better. They were relying on me for their own feedback.

Julia indicated that students might not carry the critical thinking skills they may develop in one class into another class, or into the real world. She stated, "I really don't know if it sticks with them once they leave."

Finally, and perhaps most discouraging of all, Angela shared her beliefs that, often, people do not seem to care enough about certain topics to engage in the critical thinking necessary to adequately inform a decision. She shared that this is the result of a conscious personal choice to avoid having to think through an issue.

I think people choose what they want to put their time and energy and critical thinking into. Some of us choose...if I'm a registered Republican, that's the way I vote. Or, 'I kind of like that candidate...the way he looks, the way he talks...I think I'll vote for him, whereas they may be *very* critical in their thinking about purchasing an automobile, or a refrigerator, or making a decision about a kid's college. I just think that, with as complex as our lives are, people choose whether they engage their critical thinking or not. I mean, they might not want to! (laughs) You know, why should I? I just don't care that much!

While the previous barriers to critical thinking were largely described in terms of being centered around the student, the next hindrances to be presented here were described as being more controllable by the teacher. That is, the teacher possesses the ability to address these particular hindrances to promote greater opportunity for students to practice and hone their critical thinking skills.

Teacher Hindrances

This section will describe particular hindrances that participants believed were the results of their own failures to address aspects of classroom management or instructional practices that may otherwise have been able to promote critical thinking. The two teacher-dependent themes have been labeled as Failure to Use Explicit Terminology, and Emotional Context of the Classroom. At the end of this section, a hindrance labeled Logistics has also been included, but this particular hindrance was

not perceived to be the direct result of anything over which the teacher exerted any control.

Failure to Use Explicit Terminology. Although all seven participants in the study described their beliefs that they incorporate critical thinking into their pre-service teacher training classrooms and utilize various strategies to promote the cognitive skills necessary to engage in critical thought, some stated that they do not use the term “critical thinking” explicitly during instructional contact time. Thus, it was indicated that while they may be providing students with the formal opportunities to think critically about the content being covered, students might not acknowledge that what they are being asked to do is, in fact, critical thinking, since the term does not always accompany its practice. Todd shared that:

I mean, I don't actually teach critical thinking skills, really. I mean, we do some...like evaluation of sources, application of material...So, without being explicit, I think a lot of what we do is in my mind, touching on critical thinking.

Angela also indicated that while critical thinking is expected of her students, she does not refer to it by name. She said:

And so I question, and we try to figure out and explore. And those are the kinds of things that I do that I think encourages critical thinking without my saying ‘This is a critical thinking exercise.’ I'm not sure you can teach critical thinking itself. You have to embed it within the content that you're teaching...I think I have a lot of activities where students are putting into place some strategies that require critical thinking. But I don't call it that.

Melanie indicated that she believed critical thinking and creative thinking were synonymous. She stated:

And it's been part of our discussions, maybe not with the words ‘critical thinking’, but ‘creative thinking.’

When I followed up on this response and asked her to describe how critical thinking and creative thinking might be similar or different, Melanie answered with the following:

I guess creative is...yeah, I'm kind of using those synonymously in a way, aren't I? That they're accepting the grays of the world and that they're not...making a decision unilaterally but that they're seeing the different sides and are maybe suspending a decision.

Emotional Context of the Classroom. The next factor that participants perceived to often hinder critical thinking involved not having a classroom environment where students felt comfortable sharing sensitive beliefs and ideas with one another. Jody spoke about the importance of creating an inclusive, respectful environment in which students can learn, and provided the following examples of what she has observed in her classrooms when this type of atmosphere has not been successfully cultivated.

Sometimes the students are so quiet. I had that two years ago, where that entire cohort was just *so* quiet, and it was hard to figure out how to draw things out of them....I had two cohorts last year. Each cohort had one male in them. In one of the cohorts, the male took on the 'dumb jock' role. He's probably one of the brightest students in there, or is at least as bright as everyone else. And it didn't take me very long to realize he had just decided to assume that persona. And I know it's some kind of gender thing going on, because in a group of all females, he felt safe in that role...like he never would say anything that I *knew* he was thinking. He'd write them beautifully in his essays on exams. He'd write them beautifully in his questions he might ask me outside of class. But he just didn't say it in class. And we'd had conversations...and he was one of the most wonderful of our teachers, but he didn't want anybody to know it. And I think that it reduced his ability to probably want to participate in conversations where he would have added a lot.

Jody then shared that students may not want to divulge sensitive information about themselves to their classmates, which can result in their unwillingness to openly

share and discuss ideas due to the lack of a safe environment in which to do so. She said:

That might have been an ethnic difference. And I think that did hinder their ability to think critically, because they didn't want to go there. So they didn't. They just stayed in their level of safety. And so I have them the same opportunities. I used some similar strategies. But many of them still didn't feel safe to go there. So I think that, at least for this diversity class, there are some risks associated with thinking about things deeply and sharing them. One, they might uncover something that they don't like about themselves. And two, they might share something about themselves that they don't want other people to know. Not so much in social studies. But they do have to do a little more work, so if they're a little bit lazy, critical thinking might be difficult.

Logistics. The final factors described as potential barriers to critical thinking involved logistical aspects of teaching that are largely perceived as uncontrollable in general. Class size, class length, and time were the common complaints, and have been articulated here. Todd indicated that classes often have too many students for his personal preference, and Jody shared a similar belief. Todd indicated:

My ideal university classroom would have fewer than 30 students...I'd say 20 at most. You know, 5 groups of 4. More manageable that way. Otherwise, it's really difficult.

Jody agreed with this assessment, and provided her belief that having too many students makes certain aspects of learning inaccessible. She said:

It's just hard with this class, because there are so many of them, and the setup makes it difficult.

Jody then described her preference for having fewer but longer class sessions, and stated that her ideal class would meet once a week for three hours. However, she acknowledged that this is too much time for undergraduates to sit and think about the

same topic, and shared that she is thus forced to “cram” her lessons into shorter allotments of time. She indicated:

And that’s how we used to do it, but the students need the change. It’s hard for them to sit and think about one given topic all at once. And it’s not that they’re always sitting...it’s just hard for them to process it for that long.

Julia also shared her belief that time is a factor that can limit opportunities for critical thinking. To begin, she shared that the academic semester is not long enough to sufficiently convey content and have students think deeply about it as well. Next, she described her perceptions that the breadth of content she is expected to teach sometimes requires that she simply cover the material, and is therefore not able to grant much time for students to engage in higher-order thinking about what has to be covered. She said:

I can’t teach you everything in high school math in that deep way right now. But there was just so much I was needing to cover...and that’s all I was really doing – just *covering* this history...instead of thinking critically about this history and *why* things were playing out the way they were, and why and how that impacted the way we use mathematics now.

The previously discussed major categories have been ordered sequentially in the model to illustrate the flow of TCTPM events the seven participants followed while attempting to teach critical thinking skills to their students. In sum, the TCTPM depicts a flow of teaching critical thinking skills that originated from personal conceptualizations of critical thinking. These understandings of what it means to be a critical thinker and how this type of thinking is developed served to influence personal efficacy beliefs and evaluations of critical thinking outcomes. Given that participants articulated the common and overarching goal of desiring to promote reflective

classroom practitioners, they discussed a variety of strategies commonly used to produce these outcomes within their students. Based upon outcomes described as perceived changes in student learning behavior, participants then described what they felt to be factors that either contributed to or hindered the acquisition of new critical thinking skills. These outcomes and influencing factors are capable of reshaping conceptualizations of critical thinking, whereby the TCTPM then begins again.

Thus, with the creation of the TCTPM, we now have a theoretical model that visually represents personal critical thinking beliefs and motivations and their influence on how critical thinking skills training is implemented within undergraduate teacher education courses. The overarching emergent goal of the process was to provide students with opportunities to develop the thinking skills necessary to prepare effective, reflective practitioners within the K-12 classroom.

CHAPTER FOUR: DISCUSSION

The findings of the current study, as presented in the previous chapter, contribute to the literature on critical thinking, specifically in regard to understanding beliefs about critical thinking and how they influence the teaching of critical thinking skills within pre-service teacher education classrooms. This chapter will begin by synthesizing the relevant literatures with the significance of this study's findings. Research to be discussed will be major conceptualizations of critical thinking, student perceptions of critical thinking, and theories of cognitive development and decision-making in adolescents and adults. I will then assess the explanatory power of the Expectancy-Value Theory of Achievement Motivation as it relates to the present findings. This chapter will also include a discussion of study limitations and conclude with a presentation of the theoretical and practical implications of the study findings.

Review of Relevant Literature

Major Conceptualizations of Critical Thinking

Findings from this study agree with the literature in that critical thinking has commonly been described throughout the 20th century as a broad construct that includes many higher-order cognitive skills, such as application, analysis, synthesis, evaluation, and creation, all of which are found on various iterations of the Taxonomy of Educational Objectives (Bloom, et al., 1956). More recent definitions emphasize a general reflective component that centers around deciding what to believe or do (Ennis,

1989). This reflective element requires particular dispositions or “requisite tendencies” (Ennis, in Siegel, 1988, p. 6) that include a tolerance for ambiguity, suspending judgment until all facts are known, and maintaining an open-mindedness that promotes sensitivity to the ideas of others (McBride, et al., 2002).

Given that critical thinking is a broad construct that encompasses multiple cognitive abilities, defining the term can be quite problematic, which can prevent an individual from fully crystallizing their interpretations and conceptualizations of the construct (Paul, Elder, and Bartell, 1997). Although the participants reached no consensus in regard to how they define critical thinking, they did articulate many shared aspects of critical thinking in their interviews. These components of critical thinking included higher-order skills such as application of new material, analysis of ideas, evaluation, questioning oneself, and assuming multiple perspectives. The commonly defined theme of perspective taking often related to placing oneself in the mindset of a learner within a specific developmental period in order to better identify and understand the thought processes of younger learners. Another common theme that emerged was that critical thinking inherently involves a process of engaging these skills and growing as a thinker. This does not occur naturally and requires scaffolding and feedback if one is to become a sound critical thinker.

Historically, differing conceptualizations of the teaching of critical thinking have lead researchers and educational theorists to adopt one of four main approaches. These emerged due to the beliefs held about the degree to which critical thinking skills can stand alone as well as how easily they can be transferred to outside contexts. In

general, critical thinking has been understood to be either a generic skill (Ennis, 1962; 1989), an embedded skill (McPeck, 1990), a component of the skills necessary for lifelong learning (Candy, 1991), or a vehicle through which one becomes a critical being (Barnett, 1997).

When conceptualized as a generic skill free of context, critical thinking involves the use of certain cognitive skills or strategies which increase the likelihood of an outcome deemed desirable. This conceptualization agrees with the cognitive psychology paradigm which indicates that critical thinking is a construct that is consciously purposeful, reasoned, and directed by the setting and achievement of goals (West, Toplak, and Stanovich, 2008). The “critical” aspect of this type of thinking implies a metacognitive component, which leads the individual to self-evaluate the outcomes of his or her thinking processes.

The dispositional component of critical thinking is highly stressed in this general-skill conceptualization of critical thinking. Through the use of cognitive skills that allow one to do such things as assess the logical soundness of conclusions and detect ambiguity and bias, the individual becomes better prepared to know what to believe or do as a result. According to this view of critical thinking, teaching should focus on “imparting to students the requisite skills, ability, or proficiencies” (Siegel, 1988, p. 6) necessary to promote sound thinkers. The goal of such education would thus be that students would recognize how, when, where, and why to transfer this learning and autonomously use their critical thinking abilities in a variety of outside situations. Currently, this approach is used in informal logic courses, or in other

courses where knowledge tends to be “understood as ‘constant’, ‘unambiguous, noncontroversial, and conceptually simple’” (McPeck, 1990, p. 27).

Another way of conceptualizing critical thinking is the one that was commonly described in the current study, and dismisses the notion that critical thinking is a general skill. In this view, critical thinking is understood as a knowledge-based or context-based skill, and must therefore be taught within the context of a particular academic discipline. This view comes from McPeck (1990), who argued that thinking itself, let alone critical thinking, is always done in regard to a particular thing or a particular subject. He believed that the transfer of thinking skills is much more probable when discipline knowledge acts as the vehicle through which critical thinking occurs. This view is referred to as the “Immersion” approach and indicates that knowledge of a discipline must be used in combination with thinking skills training to promote critical evaluation of the patterns of reasoning specific to the discipline. Various knowledge-based skills would therefore include a thorough mastery of the discipline, which would subsequently enable the individual to reflect upon the subject knowledge, question it, and suspend personal beliefs or judgments when insufficient relevant knowledge has been obtained. Essentially, this approach revolves around preparing students to understand how knowledge works within a particular discipline. Therefore, knowledge must be viewed as discipline-specific, complex, ever-changing, and subject to reinterpretation and critical assessment from a multitude of differing perspectives. Fundamentally, this conception of critical thinking is concerned with

promoting competence to function and participate successfully within a given discipline.

All seven participants in the current study shared this conceptualization and stressed the importance of preparing reflective practitioners within the classroom. Melanie, Todd, and Erica all indicated that their goals included preparing future teachers who understood the inquiry process and how to successfully teach and model these scientific method-based skills to their students. Angela described throughout her interview that her objective is to create critical thinkers through writing, critical responders to writing, and critical evaluators of language arts and literacy instructional design and curriculum. Julia and Melissa indicated that they design and implement particular learning and problem-solving activities that enhance the students' understandings of mathematical concepts, how learners understand and experience mathematics, and how to identify and evaluate effective teaching strategies for diverse learners of mathematics.

In addition, Jody also described her efforts to produce competent teachers of social studies, and regularly seeks to achieve this by immersing students in various roles that professionals in the field hold. Over time, she indicated that students gradually begin to adopt these responsibilities and begin to think as professionals in the field think. Thus, it was demonstrated that the Immersion approach to critical thinking is widely adopted and embraced by the seven participants in the current study, and that the methods by which they promote reflective classroom practitioners center around this discipline-specific approach to teaching critical thinking skills.

A third conceptualization describes critical thinking to be a skill possessed by the autonomous lifelong learner (Boud, 1988). In this conception, a cluster of characteristics come together to promote self-directed, autonomous learning, and critical thinking is one of the key characteristics necessary to promote this type of learner. Other requisite characteristics include being logical and analytical, reflective and self-aware, creative, evaluative, and interpersonally competent. In fact, the skills articulated in Schon's reflective practitioner model (1987) are included in this cluster of characteristics, many of which include components of personal attitude and general criticality.

It should be noted, however, that in this particular conception, teaching focuses on promoting criticality in general, and incorporates critical thinking training as part of a larger, more holistic design in which criticality becomes an integral component. Thus, it is believed that students are better prepared to engage the problems and demands of the real world based on this type of learning (Barnett, 1997). Social constructivism (Vygotsky, 1962; 1978) is at the heart of this approach, in which knowledge is integral to learning, and where learning is enhanced by instructional techniques such as scaffolding and cognitive apprenticeship. Though this lifelong learning approach was embraced by Julia during follow-up emergent questioning, she indicated that although she thinks this type of training would be quite helpful for students, it is not a type of formal training she has ever done in her mathematics classrooms. She and I had the following discussion:

Researcher: “You mentioned that critical thinking skills are useful outside of the classroom. Can you tell me about how you teach those skills to be generalized or transferred from within the classroom to outside of the classroom when dealing with things such as voting or buying a new car?”

Julia: “Hmmm...It’s probably something I don’t do enough. It would probably be very helpful for those who are hesitant to ask themselves questions...such as asking yourself, ‘Would you just walk into a place to vote without having asked yourself these types of questions? So-and-so says that, so why does he say that? Does that make sense? And how does that compare to this over here?’ Would you ever walk into that situation without having ever asked yourself those questions? So that would probably be something that’s very helpful, but it’s not something that I’ve ever done. But that would probably be quite helpful!”

When asked to respond to the same question, Angela indicated that she expects her students to transfer their critical thinking skills about literacy and language arts education into their future classrooms, and to future scenarios they are likely to encounter as teachers. She provided a specific example of how she encouraged her students to watch a film shown by the college of education, and to critically analyze and evaluate it for its messages and implications. It can be inferred from her quote that critical thinking skills are expected to naturally transfer to contexts outside of the classroom. Angela shared that:

I just sent to my students an urging about the *Waiting for Superman* showing that’s being sponsored by the college of education. And I’ve never seen it, but they need to be aware of certain ideologies as future educators that may be present, and they need to know how to respond to that kind of film. And I mentioned how I not only hoped that they could go see the film, but could also go to the discussion so they could get a sense of ‘let’s widen this up a little bit’. So what is the message here? What do we know about education as a whole? So I sent them this long little diatribe about this. Not my opinion of it, because I’ve never seen it myself. But it’s really important that they know how to do this.

The final of the four major conceptions is the critical thinking for critical being approach (Barnett, 1997). This approach is described as being much broader than the previous three approaches, and stresses the importance of replacing critical thinking with a more inclusive (thereby more complete) concept that allows the individual to engage in and with the world. This conception includes the placement of criticality along two axes. The first axis includes four levels of criticality that range from narrow, operationally defined critical thinking skills, to actual critical thought, which includes personal reflexivity. The second axis includes three separate domains. These focus on knowledge, the self, and the world; Barnett aligned these respectively with three articulated forms of criticality, which are defined as critical reason, critical self-reflection, and critical action. Based on this model, teaching and learning ought to be integrated such that the university is a “critical space” (Barnett, 1997, p. 12), in which criticality is, or should be, the norm.

These differing conceptualizations of critical thinking that define the construct as either a generic skill or embedded skill “represent the fiercely defended poles of an argument about pedagogy” (Phillips & Bond, 2004, p. 280) that has lasted several decades and is still, in fact, ongoing. As such, there is concern that critical thinking has been defined narrowly, which in turn has caused those in higher education to perceive critical thinking skills as being relevant to only formal knowledge (Barnett, 1997). The findings of the current study are in agreement with this claim, in that all seven participants indicated that critical thinking—regardless of their personal definition of it—is promoted through the interweaving of pedagogy with content knowledge.

However, McPeck (1990) stated that this approach toward promoting critical thinking ability does not respond to the purpose of higher education. Furthermore, Barnett contended that “We have no proper account of it” (1997, p. 2). Despite the abundance of literature on techniques and strategies used to teach critical thinking skills, there is still little empirical evidence that describes how college and university students experience these skills.

The previous section relates the findings that although all participants in the current study placed high importance on outcomes associated with critical thinking and articulated their beliefs that they feel able to successfully teach and model these skills, none of them indicated that they use the term “critical thinking” in their daily lessons. Furthermore, in none of the classroom observations was the term “critical thinking” spoken by the instructor, and in none of the course artifacts was the term “critical thinking” found. However, the explicit lack of this term did not indicate that critical thinking was not encouraged or expected in these classrooms. Document analysis indicated that the instructors expected critical thinking skills to be further developed over the course of the semester, and that the semester’s final culminating projects would expect students to demonstrate many of the higher-order thinking skills found on the Taxonomy of Educational Objectives (Bloom, et al., 1956). Thus, although the term “critical thinking” is not widely spoken or otherwise articulated for students, it is still expected that these skills will be used and promoted in pre-service teacher education classrooms.

Such lack of explicit terminology may be an obstacle to some students who fail to realize the nature of certain expectations placed upon them in the classroom. Often, teachers will include the ability to think critically as an intended outcome of a course, yet students are not always able to identifying ways in which this type of thinking is achieved because they do not perceive the necessary opportunities are provided to them by their teachers (Tapper, 2004). Thus, I believe it is important to understand students' perceptions of critical thinking, and how they perceive it to be incorporated, if at all, into their classrooms. If educators claim that critical thinking is an intended course outcome, yet students are not certain that they are benefiting from coursework to become better critical thinkers, a discrepancy exists that can only be identified and addressed if the perceptions of critical thinking held by both teachers as well as students are first understood.

Student Perceptions of Critical Thinking

Qualitative research by Tapper (2004) explored how undergraduate students believe critical thinking is embedded as an educational outcome in their degree programs. The piece began with a review of literature on critical thinking expectancies in university mission statements and the lack of critical thinking skill development among such institutions. Its purpose was to investigate what students from all four years of undergraduate study think about critical thinking within the context of a particular degree program (agriculture). She wanted to see what students believed constituted "critical thinking" in their degree program, and if these perceptions changed as a function of time spent at the university. Two research questions were included:

“What do students in a specific degree program think about the instruction they receive in critical thinking?” and “What do students think or understand about critical thinking at different stages of their degree studies”. No hypotheses were provided.

Results from semi-structured interviews indicated that students possessed little recognition of critical thinking opportunities within their degree program, particularly among the first-year students. First-year students believed that critical thinking was only incorporated into essay assignments they were required to complete during year one; no other assignments, in their minds, included aspects of critical thinking. In the event essays were not assigned in a first-year subject, students reported that critical thinking played no role in that particular subject. According to them, supporting claims and positions and making arguments in written assignments constituted critical thinking. Anything that was not similar in nature was not critical thinking. Despite presenting their arguments orally in class conferences, they still maintained that critical thinking was only embedded in written assignments. Findings also revealed that students knew critical thinking was expected in class, though their instructors never mentioned the term explicitly.

A fourth-year student in the study did make the claim that students must think, since simply knowing facts is not enough. During their later years, students remembered back to their introductory courses and were reminded of how they chose not to think critically about content. These were courses the students were forced to take, so they admitted to having blindly accepted the “facts” as such without feeling the need to critically evaluate them.

Phillips and Bond (2004) reported similar findings in another qualitative study on students' perceptions of critical thinking. They indicated that the ways in which undergraduates in Management conceptualized critical thinking was disappointing. Data analysis resulted in four qualitatively different experiences of critical thinking and reflection that were articulated by the 13 second-year college students. These four experiences comprised 1) 'weighing up', 2) 'looking at it from all the angles', 3) 'looking back on', and 4) 'looking beyond what is there' (Phillips & Bond, 2004; p. 283). However, the authors concluded that only in "a very simple way could the students be said to be engaging in critical thinking as a disciplinary competence" (p. 283). Students were not able to clearly articulate their conceptions of critical thinking or declare, with much certainty, that they had experienced a recent critical incident that required this type of thinking to help solve a problem.

In her discussion section, Tapper (2004) stressed the need for teachers to explicitly address and emphasize critical thinking skills in the classroom, because students are not discovering them on their own. Even when they do learn how to critically judge and evaluate arguments, explicit guidance is required in order for them to transfer this new ability to other subjects, and especially to non-academic domains. Tapper also offered support for the idea that, upon graduation, students do not have any idea how they will attempt to be critical thinkers in the workplace. She argued that educators are not doing a satisfactory job at preparing students how to attain and maintain levels of critical thinking ability they will necessarily need to address real-world problems and issues. To address this, educators need to be much clearer and

more direct, and students need to know *what* is being taught to them, as well as *why* it is being taught to them.

Finally, Tapper (2004) noted that many college and university educators in North America insist that there is a single teachable critical thinking skill, and that this skill cuts across all domains and disciplines. Once this skill is mastered, it is “hands off” from the instructor, as further formal teaching of it is perceived as unnecessary. Although findings from the present study do not agree with this assertion that critical thinking is a singular teachable skill, findings do align with the notion that formal teaching of how to transfer critical thinking ability to outside contexts does not seem to regularly occur in pre-service teacher education courses. Instead, the focus described in the current study is on “immersing” critical thinking skills training within the discipline’s content knowledge in order to promote successful and reflective classroom practitioners who are thus well-suited to think reflectively and critically about the content, instructional design, and curricular practices within their area of expertise.

Despite the current findings that indicate critical thinking skills training within pre-service teacher education courses follows this “immersion” approach, it was articulated that students may not automatically engage these skills when they are not reminded to do so. Participants also voiced concerns that new critical thinking skills do not always follow the students into later courses, and that there is no guarantee that students will successfully identify situations that require critical analysis to occur. Thus, students may possess the skills necessary for critical thought, but unless they are reminded to engage these skills or are otherwise cognizant of contexts in which they

may be used, critical thinking does not occur. As such, critical thinking is more than a set of cognitive skills; it also must include a tendency or critical disposition that informs the thinker of when to employ these skills (Jacobs & Klaczynski, 2002). The absence of this critical disposition among many adolescents and adults has been addressed in the literature, and may help to explain why some participants—despite efforts to promote critical thinking skills among their students—still possessed doubts that critical thinking is a teachable skill that students will then transfer and use in outside contexts.

Critical Thinking Disposition: The Absent Component

Cognitive psychology theories have supported the notion that cognitive development typically occurs in a unidirectional progression and moves from initial states of either intuitive thinking to more logical and scientific reasoning capabilities, or from inefficiency to a state of greater cognitive efficiency. As an individual ages, cognitive development tends to move from a state of relatively simple understanding and complexity to higher-level understanding and complexity, making cognitive processing more efficient and sound decision-making theoretically more likely based on this greater cognitive prowess (Jacobs & Klaczynski, 2002). As such, children are typically viewed as having inferior cognitive decision-making abilities to adolescents, whose own decision-making is viewed as inferior to that of adults (Jacobs & Klaczynski, 2002; Klaczynski, 2001). However, until recently, theories informing cognition and decision making in adults have differed significantly from those on cognitive development.

Ideal, efficient decision-making in adults has generally be characterized by examples of the superlative economist, who is capable of quickly performing the necessary calculations to a cost-benefit analysis and successfully engaging in probability and problem-solving tasks that at least somewhat resemble complex statistics. However, it has been demonstrated while adults are indeed quite proficient on some decision-making tasks, they often succumb to judgment biases and inefficient cognitive shortcuts which result in poor decision-making across a variety of situations (Jacobs & Klaczynski, 2002).

Over the past two decades, a growing body of literature has emerged that indicates theories on adult decision-making do not follow the same unidirectional progression or trend that is seen in theories of cognitive development. That is, the prediction that adult decision-making continues to develop and become more efficient over time, as does cognitive development, has not been supported in the research. This is not to say that adults are generally poor or irrational decision-makers. Rather, it has been documented that with life experience comes not only declarative knowledge, but also judgment biases and assumptions about how things normally work, or should work if executed properly. It is this aspect of decision-making that can often lead to poor outcomes—when personal beliefs, biases, stereotypes, and assumptions largely guide the problem-solving and decision-making process. Thus, instead of relying on analytical reasoning ability (an ability possessed by most adults) to critically think and evaluate the scenario, adults often over-rely on these cognitive shortcuts or heuristics and thus often make unsound decisions. Furthermore, according to Jacobs &

Klaczynski (2002), with more experience comes greater likelihood that these faulty shortcuts may be used, particularly when the disposition to keep them constantly “in check” has not been developed. Given the tendency to rely on unsound cognitive shortcuts, the growth of decision-making in adults cannot be characterized as a linear, unidirectional progression, even though memory and other cognitive competencies generally increase with age. This tendency is attributed to an acquisition of experience-based reasoning strategies that accrue with age, which make available to the individual a host of varying approaches to be used when faced with judgment or decision-making tasks.

Research has indicated that two approaches to information processing help to drive decision-making. The first, known as the analytic system, is based upon the acquisition of utilization of cognitive abilities that are important for making sound, normative decisions. These abilities include systematic skills such as reasoning, statistical calculating, and maintaining objectivity. Due to its reliance on facts, statistics, and other data, the analytic processing system is highly deliberate, and thus relatively slow due to the cognitive effort expended while reaching a conclusion or making a judgment. Therefore, it is not very cognitively economical, since the underlying structure of the problem must be separated from superficial aspects that are conducive to cognitive shortcuts. However, it often leads to sound or otherwise normative judgments due to the lack of personal biases that inform the decision-making process.

The second information-processing model of decision-making is known as the experiential system (Epstein, 1994), and leads to much quicker judgments given its roots in personal experience. This model of decision-making is rooted in implicit memory, which is the memory system that allows us to remember information without consciously or deliberately attempting to remember it. Information processing of the experiential nature takes place with little to no conscious awareness, leading to the need for minimal cognitive effort to be expended prior to reaching a decision. Therefore, the experiential information-processing model is much more cognitively efficient than the analytic model due to the speed at which information can be retrieved and considered. However, this consideration is done on a very superficial level, and often leads to unsound judgments. It is theorized that experiences with the world serve to inform the experiential system by creating instances in which these unconscious shortcuts are created as well as reaffirmed. With development comes a tendency to rely on these inefficient shortcuts, which may eventually become mistaken as sound decision-making strategies given the ease at which they come to mind. Therefore, it becomes easier and more comfortable to rely on them over time, which helps to explain the discrepancy between the trajectories of theories that inform adult cognitive development theories and adult decision-making.

Angela described her beliefs about making quick and inefficient judgments based on experiential decision-making habits and stressed the importance of attaining and maintaining a disposition to systematically evaluate real-world situations that require that decisions be made. She discussed her belief that, often times, a failure to

care enough to think about something deeply is what typically prevents an individual from thinking critically in a given situation, which prevents the disposition required to engage these cognitive skills. To relate her beliefs about this potential tendency to rely on experiential decision-making, Angela shared:

For instance, if I'm going to buy a car, there are a lot of things I have to consider. Not only information, but I gather experiences about driving the car, I gather information about insurance, mileage, and I make comparisons across those things. And I think qualitatively and quantitatively...like which is the most comfortable seat? Or do I trade off this because I can get 10 miles per gallon more? And so for me, my personality, I could very easily go by 'I love the way this looks, it drives great, it gets very good mileage, and it's comfortable.' So I have to push myself past that and think about things I'm not already thinking about. So like, what's my payment going to be? Do I want to lease or purchase? What's the difference, the advantage and disadvantage of that, there? How's this going to change my insurance so I'm not blindsided by that in six months? So for me and my personality, I start thinking about important things that might have otherwise been seen as 'sideline' type of things. So that requires me to push back against myself and talk back to myself.

To re-emphasize her belief that people often choose what they do or don't want to critically examine and evaluate, and how this failure to maintain a critical disposition aligns with the prevalence of the experiential decision-making within a variety of real-world contexts, I have chosen to provide a previously presented quotation here. Angela indicated:

I think people choose what they want to put their time and energy and critical thinking into. Some of us choose...I'm a registered Republican, and that's the way I vote. Or, "I kind of like that candidate...the way he looks, the way he talks...I think I'll vote for him", whereas they may be *very* critical in their thinking about purchasing an automobile, or a refrigerator, or making a decision about a kid's college. I just think that, with as complex as our lives are, people choose whether they engage their critical thinking or not. I mean, they might not want to! (laughs) You know, why should I? I just don't care that much!

These data, along with the frustrations voiced by other participants that students often appear to lack critical thinking skills, suggest that the ability to think critically may be present; however, the disposition required to consciously *choose* to put these skills to work is what is missing. As Julia indicated earlier—“I really don’t know if it sticks with them once they leave.”—students can be taught the skills necessary to critically assess, analyze, and evaluate a given idea or situation. However, there is no guarantee that these new skills will be used later, or in different contexts. If the skills are present but the inclination to want to use them is not there, then critical thinking via the analytic decision-making system will not occur. Instead, inefficient judgment biases and other cognitive shortcuts will be used, which prevent a critical, objective judgment from being made.

I often provide the following analogy to allow students to grasp the practicality and relevance of the previous notions: “A man wants a hot tub on his back deck so he can invite his friends over for a Memorial Day cookout in a few weeks. Luckily for him, he is an excellent carpenter, contractor, electrician, plumber, and installer. He is even licensed, bonded, and insured in all of the technical skills he possesses. Therefore, he himself is fully *capable* of picking out a design, locating the necessary parts and equipment, and building this hot tub on his deck so that he can invite his friends over for a party on Memorial Day. However, the man really just wants to relax and lay on his couch all afternoon each day, and doesn’t much care to do the necessary work required to have a functional and safe hot tub. Given this work ethic, or lack thereof, how likely is it that the man is going to have a hot tub on his back deck any

time soon?” This analogy accurately depicts the research findings that adults often do possess the necessary cognitive skills that are required for making sound decisions (or, in this case, for building a hot tub). However, they often fail to cultivate the requisite disposition or cognitive work ethic which is necessary for choosing to engage these skills in order to arrive at sound, normative judgments and decisions. Thus, while simply possessing the cognitive skills to engage in critical thinking is a necessary requirement, it is not a *sufficient* requirement for systematic, objective critical thought, free from the biases of personal judgments or assumptions. As such, while Julia and Erica expressly declared that they are able to teach and model these thinking skills for their students, they did not possess as much confidence that their students will *choose* to engage these skills at later times or in other contexts. Thus, in order to promote effective reflective classroom practitioners, it is not sufficient to simply train students to use critical thinking skills within the context of the classroom. Rather, teachers must also train students to attain and maintain a disposition for inquiry and critical thought that occurs deliberately, whether in the classroom, at the grocery store, in the movie theater, at the voting polls, or any number of other scenarios where emotions and personal biases often guide our thinking.

Prior to expecting teachers to teach and model the skills and dispositions required for critical thinking to their students, it must first be demonstrated that those responsible for preparing future teachers are able to successfully engage in these tasks as well. Furthermore, as was discussed earlier, educators must not only possess the abilities to teach and model these skills, but must also hold personal beliefs that they

are able to do so effectively. In the current study, personal beliefs particularly relevant to task choice and persistence included efficacy beliefs and values. These beliefs provided the guiding framework used to explain the motivations participants articulated for choosing to incorporate critical thinking skills training within their teacher education classrooms.

Expectancy-Value Theory of Achievement Motivation: Implications for Current Findings

According to the Expectancy-Value Theory framework (Wigfield & Eccles, 2000), personal efficacy beliefs and personal evaluations of a task's outcomes combine to help explain an individual's motivations for choosing whether to engage in a task as well as persisting once the task is initiated. These two components of motivation were largely similar among all seven participants and did not demonstrate much variance in regard to specific confidence in personal abilities to explicitly teach pre-service teachers critical thinking skills as related to the participant's area of expertise. As was demonstrated in Chapter 3, each participant articulated his or her beliefs that critical thinking skills were being taught to the students. Thus, all participants' efficacies and evaluations aligned well with being able to teach and model these thinking skills, and data were obtained to support these claims. However, some participants described their concerns that even though these skills can be directly taught within the classroom, there is no guarantee that they will be used without support or scaffolding later after the semester has ended, or in outside contexts free from the environment in which they were learned and practiced.

Furthermore, there were indications and even specific data to suggest that while pre-service teachers are provided with the critical thinking opportunities and experiences deemed necessary to become reflective classroom practitioners of a particular discipline, there is no widespread formal critical thinking classroom training to prepare them for problem-solving and decision-making in areas outside their chosen academic major. Contributing to this lack of emphasis on promoting generalizable critical thinking skills may be the present findings that many participants articulated their beliefs that these skills will automatically transfer without explicit instruction on how this may be done.

Over the course of the study, the seven participants collectively articulated eighty-one discrete ideas about what they perceive to be hindrances to critical thinking ability. Given that only eleven total factors were articulated as contributors in this document, I decided to have participants describe their perceptions of this phenomenon during the member check meetings. This list of raw data, which was shared with participants during the member checks, can be seen in Appendix F. Todd and Erica succinctly summed up their feelings with the following statements. Todd began by indicating:

Being able to identify eighty-one things that hinder critical thinking but only eleven that enhance it means that we as educators are not owning this 'critical thinking' business. I mean, really, how can we say that we're effective at helping our kids become critical thinkers when we're probably not very certain ourselves what causes it?

Erica also expressed concern by saying:

Wow. That many, huh? (laughs) I guess it's sort of like asking someone to identify what makes a car work. It's really easy to spot the things that would make it *not* work, but we're not really so sure of what it takes to make it function smoothly.

Limitations of the Current Study

In this type of study there inherently exists the possibility for limitations to arise that require consideration when applying the present findings. The results of this study will help inform future inquiry into educators' beliefs about critical thinking in both quantitative and mixed-methods designs. Results will also inform what is currently known about the beliefs educators hold about critical thinking and the ways in which they perceive it to be presented in the classroom as an attainable educational outcome in general. However, despite its contributions to the literatures on critical thinking, motivation, and teacher beliefs, the current study has various potential limitations that warrant discussion.

These limitations stem from two main areas: the chosen methodology and the study population. Although the grounded theory method was the most appropriate method of inquiry for the current study, its use inherently presents certain limitations. This is true for any type of inquiry, regardless of methodology used. Some limitations of this study revolve around the central role the grounded theorist takes in the recruitment, data collection, and analysis processes during the course of the study. Grounded theory inquiry necessitates data collection in an environment constructed by the researcher and the participant. While various measures were put in place to maximize credibility and dependability, it is possible that a different investigator with

different participants would have resulted in different findings—the way in which the emergent theory was rendered, in particular. Additionally, the data collection and analyses processes were highly dependent on the background, skills, and abilities of the grounded theorist. Although multiple techniques to ensure confirmability were built into the study design and took place throughout the inquiry process, it is also possible that the findings could be dependent on the personal role of the researcher. Finally, the results of this study were meant to describe the experience of the participants sampled and as such are most pertinent to educators who fit these characteristics. Other college and university educators, especially those from different academic disciplines and institutions, should be considered different from the educators sampled in the current study. Thus, they could provide opportunity for an extension of this theory to broadened populations in future studies.

Another limitation is based on the study population. While theoretical sufficiency was reached for each category, the sample size was small, thus limiting the types of educators to which the findings can be applied. Further, the sample did not include faculty members from other colleges of education in order to more thoroughly elucidate those factors related to teaching critical thinking skills at a large public university and how they may be similar or different than the scope of education at perhaps smaller institutions. Initially, it was proposed that educators representing the same four departments at a small, private liberal-arts women's college would be utilized as a second sample group, and this sample group would serve as a second case study to determine what similarities and differences exist between the two institutions.

Unfortunately, despite repeated attempts to establish communication with a “gatekeeper” at the private college who could assist in the identification of potential participants to screen, these attempts did not prove successful. I discovered at the end of the spring 2011 semester that this second institution’s college of education had been undergoing significant changes, so the added duties of meeting with an unfamiliar graduate student throughout the semester may have presented an unreasonable obligation to which the faculty could not commit. The participating school in this study was selected based on prior relationships that I had developed with faculty members over the previous four years. This level of personal familiarity proved invaluable during the recruitment and data collection stages, and the lack thereof at the private institution may have contributed to a lack of willingness to engage an unfamiliar researcher in the inquiry process.

Further, selection bias should be considered. Once a participant was screened and confirmed according to the selection criteria, a meeting was set up to begin the data collection process. It is possible that faculty members who desired to participate were somehow different than those who elected not to return contact or those that decided not to participate after screening. Furthermore, each participant articulated a strong interest in wanting to better understand critical thinking and how it could be made more accessible for future teachers. Such personal investment may have led to selection bias as well.

Although each of these limitations warrants consideration when designing future studies, many elements present in the study design were intentionally included to

ensure that the study and its findings were not weakened by these issues elaborated on in the previous chapters. For example, peer debriefing and member checking of categories and themes were both utilized to ensure that the conclusions arrived at by the grounded theorist were indeed grounded in the data and were not subjective interpretations that arose from his own perspective or biases. I employed thorough and precise documentation of each data collection and analysis phase throughout the study. These methods represent only a few of the techniques used to ensure that the high quality data were obtained, and that the inferences from conclusions were grounded in the unique experiences of the educators. Of noteworthy mention is the fact that I recorded in the field notes on multiple occasions an apparent advantage to not being a current tenure-track or tenured professor. Due to my lack of personal experience in this role, I perceived that many participants further elaborated on their particular duties and responsibilities as tenure-seeking educators who are thus privy to insights and contextual details that are not shared by doctoral candidates. Thus, my “outsider” perspective may have been an additional advantage when working with the current sample in that it allowed me to gather additional data that may have been taken for granted by someone who shares this same experience.

During the member check stage of data analysis, all participants indicated that the emergent theory model fit well with their experiences. They reiterated several of the important concepts that emerged from the interviews and observations and verified that the process model was grounded in the data. Todd commented on the common theme that critical thinking is perceived as a current educational “buzzword” or “buzz

phrase” and stated:

I mean I guess in trying to talk with you and clearly I haven't thought critically enough (laughs) about critical thinking. I'm not...it's not clear in my mind...I don't have a real clear conception maybe about what it is. And I'm hoping that will be a product of this work...some more clear guidelines as to what the heck we mean about critical thinking, and what we as teachers can do to promote it. I hear us talking about how important it is, but how do we operationalize it? And how do we teach it to our teacher candidates? That's something we might profit from.

Implications of the Current Study

The grounded theory investigation undertaken in this study resulted in a process theory explaining the influence that personal beliefs about critical thinking can have on the ways in which it is defined, conceptualized, and taught to pre-service teachers at the undergraduate level. A Beliefs Phase, Strategy Adoption Phase, Assessment Phase, Reflection Phase, and Reconceptualization Phase characterized this process. Each phase helps inform the overall process of how pre-service teacher educators' beliefs impact the ways in which critical thinking is ultimately taught at the undergraduate level. Conditions and factors that helped educators progress through the process were also articulated and included the perceived evidence of critical thinking or lack thereof, as well as factors believed to promote or hinder student engagement and the necessary disposition for critical thought.

The current study's implications have been discussed throughout this chapter. For purposes of clarity and practical relevance, important implications are summarized below. These have been categorized in two sections: 1) as those most efficacious in further theory development explaining beliefs about critical thinking among educators,

and 2) those that are most useful in explaining pragmatic conditions or efforts to assist educators as they strive to enable students to become better critical thinkers through classroom instruction.

Theoretical Implications

This study provides important insight into how college of education faculty members at a large Research 1 institution define and conceptualize critical thinking, and also helps elucidate the process by which they provide formal classroom experiences for pre-service teachers to grow as critical thinkers. No other known published theories incorporate motivations for including critical thinking skills training in pre-service teacher education courses. The Teaching of Critical Thinking Process Model presents an account of this dynamic process and serves to bridge some of the important constructs in critical thinking and cognitive development theories to substantive, process-oriented theories focused on pedagogy and relevant contextual factors. The emergent theory explains why pre-service teacher educators provide critical thinking skills training to their future teacher but also moves beyond this to describe specific ways in which they endeavor to accomplish these educational goals. Although findings from the current study move the understanding of this process forward, they also generate questions for future study. These include:

1. How might this process differ among educators of other academic disciplines within teacher training programs?
2. What implications might tenure status have on the process of teaching and modeling critical thinking?

3. How might this process differ among professors outside the field of education?
4. How might this process differ among educators at smaller institutions that are specifically teacher training institutions that do not place such a heavy emphasis on research and publishing?
5. How do students perceive critical thinking training to be incorporated within their undergraduate experiences?

Future studies of both quantitative and mixed-methods designs aimed at answering these questions would allow for the further development of a broad, rich theory capable of explaining how beliefs about critical thinking influence the ways in which it is defined, conceptualized, and taught among an array of contexts and across a wide variety of professional educators. A more fully developed theory could subsequently be tested via either path analysis or structural equation modeling to verify and validate the relationships that are perceived to contribute to movement through the process. Such efforts would expand current literature base and provide a new important theoretical basis for the development of effective educational practices to improve critical thinking skills and the requisite critical dispositions among undergraduate students as well as provide information to assist educators who may be struggling with defining, interpreting, or carrying out critical thinking practices in their own classrooms.

Practical Implications

Although the process theory proposed in this study is a new framework for understanding how beliefs about critical thinking influence how this construct is understood and taught within the undergraduate classroom, some important lessons can be used to inform both current classroom obstacles and future efforts at further elucidating problems articulated in the current study.

1. It was confirmed that although educators agree critical thinking should be a goal of education, not all educators possess a thorough crystallized understanding of what critical thinking is or how to promote it within the classroom so that it becomes accessible to future teachers.
2. It was confirmed that educators often believe their students lack the disposition to engage the cognitive skills necessary to become sound critical thinkers. However, it remains to be determined whether students lack this disposition in reality, or whether educators merely perceive this lack.
3. There is evidence that the Immersion conceptualization of and approach to critical thinking dominates pre-service teacher education, in which critical thinking is embedded within particular content areas. However, it is not believed that this approach indicates critical thinking will be automatically transferred to other contexts.
4. More universalized language should be used to standardized constructs and terms relevant to critical thinking to combat current misunderstandings.
5. Educational standards, whether at the local, state, or national level, need to

clearly articulate what academic abilities should be cultivated through the use of critical thinking in the classroom so that evidence of these desired outcomes can be objectively recognized and assessed by those responsible for ensuring they are taught.

As these ideas become further developed through future studies, they will be refined and incorporated into both the practical and theoretical literature in this area.

Recommendations for Future Research

The undergraduate years represent an important critical period for research on critical thinking skills development because this may be the final opportunity in which formal thinking skills training may occur for many individuals (King, Wood, & Mines, 1990). Because many among this population are undergoing a transition in their lives by moving away from parents or other primary caregivers and are thus granted more autonomy over their own decisions (Arnett, 2004), decision-making during this time represents an important sensitive window when opportunities to grow and develop as a critical thinker may be explored. Additionally, with the advent of the Internet and newer technologies that allow for the constant transmission of often unsubstantiated information, it is crucial that individuals are capable of knowing how to make sense of what which they see and hear (Angeli & Valanides, 2009). Thus, it is important to understand how those responsible for helping to transmit these cognitive skills and dispositions necessary for autonomous, critical thought navigate their pedagogy,

particularly within the pre-service teacher education classrooms. Given that teachers are those whom society holds responsible for ensuring our children are taught to become sound thinkers, it is important to ensure that teachers themselves are provided with the necessary and sufficient experiences to bring about the required critical thinking abilities to subsequently teach and model these very skills and dispositions. There are three suggestions for future research that extend specifically from this study.

First, additional samples should be studied in order to further validate and extend the emergent theory. Faculty members within other academic departments and at other institutions should be studied so that their beliefs about critical thinking and experiences teaching it can add additional variance to the categories and themes developed in the current study. Additional variance would serve to make the emergent theory more generalizable to other groups via greater explanatory power.

Second, mixed-methods and quantitative designs should be employed to further test and validate the relationships between and among constructs relevant to the teaching of critical thinking. This would allow the emergent theory to be honed and become more precise as statistical data large enough to promote statistical power are obtained. Specifically, future studies should investigate a possible relationship between factors that influence the teaching of critical thinking skills and classroom strategies. Though the data in the current study did not explicitly indicate whether this link was present, it is theoretically possible that classroom strategies used to teach critical thinking skills may be more directly affected by influencing factors than the current model suggests.

Third, there is a need for research involving students and their perceptions of critical thinking that would allow educators to understand what students perceive to be opportunities to develop the skills necessary to become sound thinkers. Often, students indicate that critical thinking is an intended educational outcome in their courses, but they do not believe their teachers provide them with sufficient preparation to engage and develop these skills to any appreciable degree (Tapper, 2004). Thus, the existing research literature on student perceptions of critical thinking and current findings agree that, if critical thinking is truly to become a standard and realized outcome of higher education, faculty must take greater care to not only provide students with the opportunities necessary to promote growth as a critical thinker, but must make it very obvious for the students that these are being provided for them. Otherwise, students may miss out on these aspects of their academic preparation since the cognitive skills necessary for critical thinking are not acquired by class attendance alone and are also not automatically bestowed upon degree completion.

Conclusion

This study has made an important contribution to the knowledge base on the effects teacher beliefs have on the teaching of critical thinking skills within pre-service teacher education courses. It informs various aspects within the critical thinking, motivation, and teacher beliefs literatures that have thus far not been addressed. Future studies seeking to expand the emergent theory can use the new knowledge obtained to further theory development in this research area and begin to expand theory

development to educators within different academic departments. Present findings can also be used to inform professional development as well as promote further investigation into important practical implications to ensure critical thinking is an accessible educational outcome for all students. Continued investigation of the process of teaching critical thinking skills within the undergraduate classroom will lead to the development of more refined and validated models. These models can then be used to make critical thinking less of a buzzword and instead allow it to become a more easily accessible outcome for both educators and their students.

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APPENDICES

Appendix A. Electronic Participant Recruitment Communication

“Hi, Professor. My name is Brad Gregory, and I am currently a fourth-year doctoral candidate in Educational Psychology in the department of Curriculum, Instruction, and Counselor Education. I am collecting data for my dissertation and would like to know if you would be willing to meet with me, as I would be interested in hearing your professional experiences as an educator of pre-service teachers regarding the topic of critical thinking. Through my research, I seek to develop a theory that addresses pre-service teacher educators’ beliefs about critical thinking. My research will rely on semi-structured interviews and classroom observations of pre-service teacher educators, and the data I collect from these participants will serve to inform the theory I am seeking to create. Please let me know if you would be interested in a brief meeting with me so I can answer any questions you may have and when a convenient time for me to come by your office might be. Thank you so much for your time and consideration, and I look forward to hearing from you soon.”

Appendix B: Classroom Observation Form

<u>Classroom Observation Form</u>

Background Information

Pseudonym _____ Date _____

Class size _____ Observation 1 / 2

Start time _____ End time _____

Contextual Background and Activities

Brief description of the lesson observed, the classroom setting (space, seating arrangements, etc.) and any details about the students (number, gender, ethnicity, etc.) and instructor deemed relevant. Diagram the classroom.

Time	Description of Events

Lesson Design and Implementation

1. How does the lesson encourage students to seek out and value alternative modes of investigation or problem solving?

0 _____ 1 _____ 2

2. How is the focus/direction of the lesson determined? (By ideas originating with the students? By teacher-led instruction?)

0 _____ 1 _____ 2

Connecting Content

1. How are connections with other content disciplines and/or real-world phenomena explored or valued?

0 _____ 1 _____ 2

2. How are connections made with student goals, life experiences, and career aspirations?

0 _____ 1 _____ 2

Classroom Culture

1. What evidence demonstrates student consideration of ideas other than their own? (What evidence demonstrates perspective taking?)

0 _____ 1 _____ 2

2. In what ways are students allowed to share their ideas with others?

0 _____ 1 _____ 2

3. What evidence demonstrates a climate of fairness and respect for what others have to say?

0 _____ 1 _____ 2

4. What is the nature of the instructor's questioning? (Is it to lead students to a predetermined answer? Is it open ended? Is it to facilitate discourse among students?)

0 _____ 1 _____ 2 _____

5. What evidence demonstrates that all students are engaged? (Is this active engagement? Passive?)

0 _____ 1 _____ 2 _____

Critical Engagement with Content

1. What evidence demonstrates students are making predictions, estimations, and/or hypotheses and are devising ways in which these might be tested?

0 _____ 1 _____ 2 _____

2. In what ways are students are encouraged to generate conjectures, alternative solutions, and new ways of interpreting evidence?

0 _____ 1 _____ 2 _____

3. In what ways are students encouraged to examine their own assumptions about knowledge and the world?

0 _____ 1 _____ 2 _____

4. In what ways are students expected to validate their perspectives and arguments with evidence or reason?

0 _____ 1 _____ 2 _____

5. In what ways are students encouraged or expected to challenge new information?

0 _____ 1 _____ 2 _____

6. What evidence demonstrates that constructive criticism and the challenging of ideas is valued?

0 _____ 1 _____ 2 _____

7. In what ways does the instructor promote autonomy and choice?

0 _____ 1 _____ 2

8. What evidence demonstrates that students are metacognitive/reflective about their learning?

0 _____ 1 _____ 2

Appendix C: Informed Consent**North Carolina State University
INFORMED CONSENT FORM for RESEARCH**

Title of Study: Beliefs about Critical Thinking and Motivations for Implementing Thinking Skills Training in Pre-Service Teacher Education Courses

Principal Investigator: Bradley B. Gregory Sponsor: Jessica DeCuir-Gunby, PhD

What are some general things you should know about research studies?

You are being asked to take part in a research study. Your participation in this study is voluntary and is not a part of your job requirements. You have the right to be a part of this study, to choose not to participate, or to stop participating at any time without penalty. The purpose of research studies is to gain a better understanding of a certain topic or issue. You are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those that participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researcher(s) named above.

What is the purpose of this study?

The purpose of this study is to gather and understand the beliefs that pre-service teacher educators hold about critical thinking. No known published research has examined the beliefs this population holds about critical thinking, and since it is known that teacher beliefs can and do influence teaching practices, data collected in this study will help contribute to the development of a theory which will inform our understanding of pre-service teacher educators' beliefs about critical thinking.

What will happen if you take part in the study?

If you agree to participate in this study, you will be asked to participate in a recorded semi-structured interview, and to allow the principal investigator to observe your classroom on a date most convenient for you. Interviews will be recorded with a digital voice recorder are expected to last 30-45 minutes, and can be done in your office during your regular office hours. Additionally, the principal investigator may request a copy of the syllabus for the class, and a description of any signature artifacts you assign for your students.

Risks

There are no known risks associated with participation in this study.

Benefits

During the data collection and analyses procedures of this study, you may not directly benefit from participation in this study.

However, given that the primary goal of this study is to develop a theory that informs our understanding beliefs pre-service teacher educators hold about critical thinking, you will play an active and vital role in the construction of this theory. Furthermore, this theory will be shared with all research participants once the inquiry process is complete.

The data collected will be analyzed and coded for common categories and general themes. Direct quotes may be used from some participants. In these cases, all quotes will be attributed to a pseudonym to protect anonymity and confidentiality.

Confidentiality

The information in the study records will be kept confidential to the full extent allowed by law. Data will be stored securely in a password-protected laptop only accessible by the principal investigator. No reference will be made in oral or written reports which could link you to the study. You will NOT be asked to write your name on any study materials so that no one can match your identity to the answers that you provide. Rather, pseudonyms will be used to ensure confidentiality for all participants.

Compensation

You will not receive any compensation for participating in this study.

What if you are a NCSU employee?

Participation in this study is not a requirement of your employment at NCSU, and your participation, or lack thereof, will not affect your job.

What if you have questions about this study?

If you have questions at any time about the study or the procedures, you may contact the researcher, Brad Gregory, at 919-818-6080, or at bbgregor@ncsu.edu.

What if you have questions about your rights as a research participant?

If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the

course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus (919/515-4514).

Consent To Participate

“I have read and understand the above information. I have received a copy of this form. I agree to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled. I also understand that participation is voluntary and is not a requirement for my job.”

Subject's signature _____ **Date** _____
Investigator's signature _____ **Date** _____

Appendix D: Semi-Structured Interview Guide

Background

1. Please tell me a little bit about yourself, and about your teaching experience (i.e., what courses you regularly teach, how long have you taught, tenure status, etc.).
2. What influences what you choose to include in your curricula?
3. Please describe a typical day in your classroom.
4. Please describe for me your ideal classroom and what outcomes it would produce.

Defining Critical Thinking

5. What comes to mind when you hear the term “critical thinking?”
Probe: How do you define critical thinking?
6. How do you promote critical thinking in your classroom (e.g. activities, assignments, nature of discussion, etc.)?
7. Specifically, from your career, can you provide examples of when students have demonstrated critical thinking? Can you provide examples of instances in which students were not thinking critically?

Personal Efficacy Beliefs

8. Please talk about a time in which you were aware you were teaching critical thinking well.
9. Please talk about a time in which you were aware you may not have been teaching it well.

Personal Evaluations

10. Describe instances in which critical thinking might be used in the classroom.
11. Describe instances in which critical thinking might be used outside the classroom.

Motivations

12. What is the role of critical thinking at the undergraduate level?
13. Describe how you see critical thinking being addressed at the undergraduate level. What specific examples can you give?
14. Is there anything that you would like to add regarding critical thinking that we did not discuss?

Appendix E: Emergent Interview Questions

1. Please describe any experiences that have demonstrated or evidenced growth in students' critical thinking.
2. What barriers, if any, do you think may prevent students from regularly engaging in critical thinking?
3. What do you perceive as capable of enhancing opportunities for critical thinking engagement?
4. How are critical thinking skills encouraged to be transferred to external, real-life situations that require the individual to engage in critical thought?

Appendix F: Initial Codes for Contributors and Hindrances

11. Contributing factors	11.1 Active engagement 11.2 Being reminded 11.3 Thinking critically about critical thinking 11.4 Interaction 11.5 Class discussion 11.6 Trusting environment (students have to trust each other as well as instructor) 11.7 Making it clear that it's okay to disagree with what you read 11.8 Practitioner journals 11.9 Metacognitive awareness of your own strengths and weaknesses 11.10 Explicit use of terms 11.11 Smaller class size
12. Hindering factors	12.1 Emotional investment 12.2 Personal interest/investment 12.3 Placating students (due to emotionality) 12.4 Wanting to appear sensitive to students 12.5 Inability to see more than one perspective 12.6 Failure to see how future students may see/learn things differently from one another 12.7 Over-reliance on lecture 12.8 Focus on providing correct answers 12.9 Focus on avoiding incorrect answers 12.10 Too focused on grades (performance orientation) 12.11 "The School Game" 12.12 Wrong interpretations by instructor of what CT actually is 12.13 Over-generalizing CT to mean something else 12.14 Quick fixes 12.15 Short-sightedness 12.16 Logistical issues 12.17 Inability to differentiate between what you COULD do and what you SHOULD do 12.18 Simply providing information

	<p>(declarative knowledge)</p> <p>12.19 Failing to engage students</p> <p>12.20 Lack of personal desire to think critically</p> <p>12.21 Laziness</p> <p>12.22 Lack of caring</p> <p>12.23 Perception that CT can't be taught outside of content</p> <p>12.24 Online-only research</p> <p>12.25 Over-reliance on internet</p> <p>12.26 Class size too large (too many students)</p> <p>12.27 Failing to teach CT skills</p> <p>12.28 Failure to use CT terminology</p> <p>12.29 Overly structured activities</p> <p>12.30 Failure to trust your own judgment (as students)</p> <p>12.31 Not having one "right" answer to gauge student learning (may be more than one right answer)</p> <p>12.32 Students aren't used to thinking critically</p> <p>12.33 Over-reliance on instructor to tell them what to do</p> <p>12.34 Losing sight of the learning process</p> <p>12.35 Too focused on finding the right answer</p> <p>12.36 Instructors fail to think critically about critical thinking</p> <p>12.37 No clear conception about what CT is</p> <p>12.38 No clear conception about how CT is operationalized</p> <p>12.39 No clear conception on how to teach CT to teacher candidates</p> <p>12.40 Asking low-level questions</p> <p>12.41 Boredom</p> <p>12.42 Failure to follow rubric</p> <p>12.43 Not accustomed to asking "why" or understanding "why"</p> <p>12.44 Surface-level understanding</p> <p>12.45 Desire to remain comfortable</p> <p>12.46 Lack of time</p>
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	<p>12.47 Failure to see connections</p> <p>12.48 Can't keep up with technology (prevents the use of 'reorganizers')</p> <p>12.49 Haven't yet developed a repertoire of questions they need to ask themselves as teachers</p> <p>12.50 Failing to see the efficacy/benefit in diverse learning strategies</p> <p>12.51 Over-reliance on personal learning strategies</p> <p>12.52 Uncertainty if disposition to think critically "sticks" once class is over</p> <p>12.53 Having to "cover" material without thinking about it critically</p> <p>12.54 Not wanting to give up control</p> <p>12.55 Lack of knowledge base</p> <p>12.56 Lack of experience in questioning yourself</p> <p>12.57 Not teaching the TRANSFER of CT skills</p> <p>12.58 Lack of familiarity interpreting research, but being told to follow research findings</p> <p>12.59 Failing to bridge theory and practice</p> <p>12.60 Failing to budget time</p> <p>12.61 Failure to plan for unexpected events</p> <p>12.62 Assuming all students will learn the same way you did/do</p> <p>12.63 Instructor not being familiar with content (outside area of expertise)</p> <p>12.64 Quiet students</p> <p>12.65 Lack of comfort speaking in front of others</p> <p>12.66 Using laptop during class to access Facebook</p> <p>12.67 Classroom size is too big or too tricky to navigate</p> <p>12.68 Class periods too long (unable to focus for long periods of time)</p> <p>12.69 Focus on needing to have all the answers for students</p> <p>12.70 Failure to draw correct inferences</p>
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	<p>12.71 Fear of answering because you're afraid it's wrong</p> <p>12.72 Instructor fails to make cross-curricular conversations</p> <p>12.73 Re-teaching what students already know</p> <p>12.74 Underestimating student potential</p> <p>12.75 Self-consciousness</p> <p>12.76 Not wanting to discuss sensitive/taboo topics</p> <p>12.77 Poor work ethic</p> <p>12.78 Not wanting to divulge details about yourself to others</p> <p>12.79 Remaining too focused on thinking that strictly applies to pedagogy</p> <p>12.80 Failing to expand/generalize CT to outside circumstances and events</p> <p>12.81 Wanting students to like you and your teaching methods</p>
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