

Relationship between instructors' beliefs and teaching practices for critical
thinking in higher education

Hope Seidman

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| Dr. W. Reimer | External to Program |
| Dr. R. Bernard | Examiner |
| Dr. P. Abrami | Examiner |
| Dr. S. Shaw | Thesis Supervisor |

Approved by _____
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April 20, 2004

Dean, Faculty of Arts and Science

ABSTRACT

Relationship between instructors' beliefs and teaching practices for critical thinking in higher education

Hope Seidman, Ph.D.
Concordia University, 2004

Concerns about the lack of students' critical thinking (CT) skills and instructors' inability to foster them were the driving force behind this study. The purpose of this multiple case study was to examine instructors' beliefs about CT and how they related to teaching practices. An American private college was used as the context for investigation due to the institution's efforts to improve the quality of teaching and learning as well as its commitment to CT outcomes. Three "exemplary" instructors teaching business, education and computer courses were selected for in-depth investigation along with one instructor teaching a stand-alone course in CT.

Qualitative measures were used to collect data about instructional practices of each participant in the context of one course through interviews, classroom observations and course document reviews. Particular attention was paid to course design, instructional strategies and assessment measures intended to stimulate student thinking. Students were also surveyed to elicit their perceptions of the course related to CT. Instructors' beliefs were explored through interview methods and standardized measurement tools.

Findings suggested overall that each participant's espoused teaching practices were consistent with their actual teaching practices. Beliefs about CT and related topics also appeared to be compatible with their instructional

methods. Across disciplines, findings suggested there were both similarities and differences in beliefs and practices. Specifically, instructors conceptualized CT in different ways and focused on various CT skills required for their respective disciplines. In practice, courses included active learning strategies, ongoing writing assignments and essay exams. The instructor teaching CT explicitly held the narrowest perspective on CT and represented the largest departure in teaching methods.

Some of the common beliefs held by the four participants teaching for CT were the following: a) CT develops over time with practice and experience; b) in-class discussion is essential to developing CT; c) fostering thinking skills is as important as content coverage; and d) personal discipline is highly conducive to fostering CT. Implications for faculty development and future research are discussed.

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love, support and encouragement in every aspect of my life. This dissertation is dedicated to them.

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CHAPTER 1

Introduction

With degrees in psychology and curriculum & instruction, I entered the doctoral programme in educational technology intending to solve problems in the field of early childhood education. Specifically, I was interested in contributing to the literature on professional development of daycare workers since many of them enter the field without appropriate education and experience. Research suggests that opportunities to develop children's problem-solving abilities are often missed when teachers do not understand how children learn and when they are unaware of how to design developmentally appropriate environments. As I reflect upon my initial intentions and the direction of the current research, I realize the long and winding road ultimately led to the place where it all began--- thinking skills and professional development.

In my first semester of the programme, I was required to work on a collaborative research project. Since others did not share my interests, I joined a group that was researching the impact of instructional strategies and course design on post-secondary students' critical thinking (CT) skills. We soon realized there were no valid and reliable measures available with which to assess CT in student coursework. Consequently, we attempted to develop our own. The topic piqued my interest and over the next few years I immersed myself in the theory and practice of CT instruction and assessment.

At the same time, I was working in industry as an instructional designer developing computer-based training programs. My work experience and

academic interests were worlds apart but eventually came together in my final year of study. I was hired by Lakenorth College (the context of this study) to help faculty design their courses for CT outcomes. While working individually with faculty, it occurred to me that some of them held beliefs that were inconsistent with CT instruction. For example, some faculty stated they did not have time to focus on thinking skills because they had too much content to cover. Others seemed to have little confidence in their students' ability to think critically and did not appear to foster the skills in their courses. I began to wonder about the relationship between faculty beliefs and their teaching practices. Did some beliefs prevent them from teaching for CT outcomes? Were there common beliefs held by those who were teaching for higher-level thinking? These questions lay the foundation for the current investigation.

Rationale

The development of CT skills and dispositions has been identified as an essential educational goal by governmental organizations, business leaders and institutions of higher education. For example, the American National Education Goals declared that college graduates must demonstrate an increased "ability to think critically, communicate effectively, and solve problems" (United States Congress, 1994). It is believed that these skills are necessary to progress in the workplace, to compete in a global economy, and to exercise the rights and responsibilities of citizenship in a rapidly changing and complex world (Conference Board of Canada, 2000; Ministers of Education, 1999; Paul, 1990; United States Congress, 1994). CT skills are becoming even more essential as a

result of the information explosion and rapid advances in technology. Students must wade through massive amounts of information and endure greater pressure to evaluate the information they encounter (Halpern, 1997).

Despite a large body of literature outlining the importance of CT and various instructional strategies to promote it, institutions are far from developing students' CT skills (Browne & Keeley, 1988; Kuhn, 1999; McMillan, 1987; Pascarella & Terenzini, 1991; Ramsden, 1992). Many students possess inadequate skills to solve problems or apply knowledge to real-world problems, to reflect critically on their learning and are overly dependent on instructors to provide information (Ramsden, 1992). Why are educational institutions failing to develop students' CT abilities and dispositions?

In general, efforts to improve teaching and learning in the past 20 years have not been fruitful due to modest institutional support for deep reform (Lazerson, Wagener, & Shumanis, 2000). There still appears to be a major gap between what institutions say they want for higher education and what they are doing to support a learner-centered paradigm deemed necessary to promote CT (American Psychological Association, 1995; Barr & Tagg, 1995; Chickering & Gamson, 1987). For example, most institutions offer few ongoing professional development opportunities related to CT (Haas & Keeley, 1998; Pratt, 1998) and do not provide rewards for innovative teaching that would foster it (Haas & Keeley, 1998; Ramsden, 1992; Samuelowicz & Bain, 1992; Tsui, 2000). While institutional factors play a role in limiting progress, beliefs and expectations of *individual* instructors also pose major obstacles to educational improvement

(Cuban 1990; Prawat, 1992; Scheurman, 1998; Yero, 2002). In a review of the literature, Pajares (1992) commented: "Few would argue that the beliefs teachers hold, influence their perceptions and judgments, which in turn, affect their behaviour in the classroom..." (p. 307).

The problem is that instructors' attitudes and beliefs about teaching are not always translated into teaching strategies (Murray & MacDonald, 1997; Samuelowicz & Bain, 1992). Specifically, many faculty claim CT to be a primary objective of their teaching, but few teach for it in a typical class or can articulate how they are doing it (Paul, Elder, & Bartell, 1997). The conceptions of teaching literature has attempted to shed some light on the relationship between instructors' beliefs and actions (e.g., Murray & MacDonald, 1997; Samuelowicz & Bain, 1992), but this relationship among post-secondary instructors is not well understood.

While beliefs are considered to be a necessary and valuable avenue for educational research, the area has remained "lightly travelled" (Pajares, 1992), especially in higher education. A more recent review of the existing literature on teacher beliefs has also concluded the research is problematic due to inconsistent definitions, poor measurements and lack of understanding of which beliefs actually influence instructional decisions. In particular, most studies have relied on self-reported practices without examining actual teaching behaviour (Kane, Sandretto & Heath, 2002).

In sum, teaching quality has become an important issue in higher education worldwide due to the rapid expansion of postsecondary education and rising

emphasis on accountability (Council for Higher Education Accreditation, 2004; Gibbs, 1995; Gow & Kember, 1993; Ramsden, 1992). Colleges and universities agree that CT is a necessary outcome but are not yet successful in changing teaching practices that lead to better student thinking. Teaching is often viewed as a set of generic skills to be mastered in a neutral environment, while beliefs and values are assumed to play a minor role (Pratt, 1998). Consequently, existing professional development initiatives in higher education are typically delivered as one-shot workshops that focus on providing instructors with appropriate teaching techniques for the desired outcome. The conceptions of teaching literature, however, suggests that instructors' beliefs and values are fundamental to teaching and that genuine improvements will not occur unless instructors examine the values and beliefs behind their actions (Pratt, 1998). From a practical perspective, a better understanding of beliefs and values is expected to have an impact on professional development programs and hiring practices in higher education (Kane et al., 2002).

Statement of Problem/Research Questions

Despite a large body of literature outlining the importance of CT and various teaching strategies to support it, institutions as a whole are failing to promote CT skills in their students. There is also considerable evidence to suggest that teachers' conceptions of teaching and beliefs at the primary, secondary and tertiary levels greatly influence classroom practice (Kane et al., 2002; Pajares, 1992). There is, however, limited research on how these two bodies of literature converge to explain how faculty conceptualize CT and how these beliefs are

reflected in teaching practices. Additionally, research to date on beliefs and practices of university teachers is incomplete, given that most studies in tertiary settings have relied on self-reported survey methods.

Therefore, the purposes of this collective case study were to describe faculty beliefs and to explore the relationship between beliefs and teaching practices, using a variety of data gathering and analytical techniques. Consequently, the overarching question in this study was: *What is the relationship between instructors' beliefs and teaching practices for CT?* Related questions were:

1. How do instructors teach for CT? (e.g., course design, instructional strategies, assessment)
2. What are instructors' beliefs about CT? (e.g., definition, skills, dispositions, how it develops)
3. What related beliefs do instructors hold? (e.g., epistemology, self-efficacy, perception of students)
4. What is the relationship between instructors' espoused teaching practices and actual teaching practices for CT?
5. What are the common teaching practices and beliefs among instructors teaching for CT?

Overview of the Dissertation

There are six chapters in this dissertation. Chapter 1 introduces the researcher's motivation for the study, rationale and research questions. Chapter 2 is a review of the literature relevant to the purposes of this study. It focuses on

current CT research as well the literature on teacher beliefs. Chapter 3 is a detailed outline of the methodology used in this study. Chapter 4 describes four case studies of instructors' beliefs and teaching practices. Chapter 5 presents a cross-case analysis, which compares participants' practices and beliefs related to CT. Finally, Chapter 6 provides a summary of results, discussion of the findings, conclusions and implications for future research.

CHAPTER 2

Review of the Literature

Two distinct literatures are relevant to the current study. The first section explores theory and research related to teacher beliefs and conceptions of teaching. Specifically, the review defines terms, summarizes research to date and identifies deficiencies in current research. The second part is a review of the critical thinking (CT) literature. The aim is to summarize various philosophical and psychological perspectives of CT and to discuss how it is defined and conceptualized in this study. Based on theory and research, the review also outlines instructional strategies recommended for CT. Finally, this chapter concludes by linking the two literatures and defining a theoretical framework for the study.

Definitions of Beliefs

Rokeach (1968) has provided the most oft-cited theory of beliefs in the educational literature. He defined beliefs as “any simple proposition, conscious or unconscious, inferred from what a person says or does, capable of being preceded by the phrase, ‘I believe that’...” (p. 113). He viewed beliefs as an interwoven hierarchal system of beliefs, attitudes and values. According to his theory, beliefs are the building blocks of attitudes (several beliefs) and many attitudes merge to create a value. Beliefs vary along a continuum of central to peripheral; the more central a belief, the more resistant it is to change.

Researchers examining beliefs of primary and secondary teachers (e.g., Kagan, 1992; Murphy, 2000; Schoenfeld, 1998; Yero, 2002) have operationalized

the concept in a variety of ways and have focused on entirely separate research agendas (Kagan, 1992). In particular, Pajares (1992) stated that teacher beliefs are a messy construct that:

travel in disguise and often under alias— attitudes, values, judgments, axioms, opinions, ideology, perceptions, conceptions, conceptual systems, preconceptions, dispositions, implicit theories, personal theories, internal mental processes, action strategies, rules of practice, practical principles, perspectives, repertoires of understanding, and social strategy, to name but a few that can be found in the literature (p. 309).

Similar difficulties with definitions have been found in the higher education literature (Kane et al., 2002). For example, Samuelowicz and Bain (1992) reviewed the conceptions of teaching literature in higher education which essentially referred to them as a broad set of explicit and implicit educational theories. Specifically, Pratt (1998) used the term “teaching perspectives” which refer to an instructor’s intentions, beliefs and actions. Table 1 summarizes several definitions that have been applied to all levels of education.

The various terms and definitions, however, are essentially referring to the same things (Clandinin & Connelly, 1987) and the construct of beliefs is conceptually clearer than it first may appear (Pajares, 1992). Accordingly, there are several common research findings summarized in integrative reviews of the literature which suggest the following: a) Beliefs play a central role in defining behaviour and organizing knowledge; b) beliefs serve as mediators for experiencing and responding to the environment; c) beliefs are robust and

Table 1

Definitions of Beliefs

| Source | Definition |
|----------------------|--|
| Kagan (1990) | "beliefs are highly personal ways in which a teacher understands classrooms, students, the nature of learning, the teacher's role in the classroom and goals of education". |
| Murphy (2000) | "A complex and inter-related system of personal and professional knowledge that serves as implicit theories and cognitive maps for experiencing and responding to reality. Beliefs rely on cognitive and affective components and are often tacitly held". |
| Pratt (1998) | "Beliefs are the third aspect of commitment in teaching and, along with actions and intentions, another defining attribute of [teaching] perspectives. They are the most abstract and the most important aspect because they represent underlying values". |
| Rokeach (1968) | "any simple proposition, conscious or unconscious, inferred from what a person says or does, capable of being preceded by the phrase, 'I believe that'..." |
| Schoenfeld (1998) | "People's beliefs shape what they perceive in any set of circumstances, what they consider to be possible or appropriate in those circumstances, the goals they might establish in those circumstances, and the knowledge they might bring to bear in them". |

resistant to change; d) beliefs act as filters of new knowledge that is either compatible or incompatible with current beliefs; e) beliefs are often implicit and difficult to articulate; f) beliefs are prioritized according to their connections or relationship to other beliefs; and g) beliefs are inextricably intertwined with knowledge (Kane et al., 2002; Pajares, 1992).

Drawing on the conceptualizations from the literature, the definition of beliefs guiding this study was:

Instructors' beliefs represent a complex and inter-related system of personal knowledge that serve as implicit theories and cognitive maps for experiencing and responding to the environment. Beliefs are generalizations about the meaning of specific actions and play a central role in defining behaviour and organizing knowledge.

Beliefs Research

The majority of studies to date have investigated the beliefs and practices of schoolteachers with the aim of improving teacher preparation and staff development programs. Studies have mainly focused on disciplinary beliefs such as instructors' beliefs about teaching math and reading or on the change process of student teacher beliefs. Research related to teaching practice in higher education is limited (Biggs, 1989; Kane et al., 2002; Murray and McDonald, 1997; Samuelowicz & Bain, 1992).

It should be noted that while there may be similarities in beliefs among schoolteachers and academics, there are differences between these two populations. First, universities operate under different value systems than

schools (Kember, 1997). For example, many tertiary institutions reward research activity rather than teaching (Haas & Keeley, 1998). Second, university teachers often view themselves as part of a discipline, rather than as “teachers” (Kember, 1997). Finally, most faculty have not been formally trained to teach; they have not experienced CT approaches as part of their own education and their models of teaching have primarily been “dispensers of information” (Haas & Keeley, 1998). In addition, they often manufacture beliefs and knowledge about good pedagogy through trial and error, reflection on student feedback and self-evaluation. This unsystematic process typically leads to fragmented pedagogical knowledge and to unfounded beliefs about what constitutes effective teaching (Hativa, Barak & Simhi, 2001). Therefore, we cannot simply assume that beliefs and practices of tertiary instructors are the same as primary and secondary teacher beliefs.

Existing studies in higher education have primarily focused on identifying, describing and comparing various educational beliefs and conceptions which fall along a continuum from information presentation to facilitation of student learning (Fox, 1983; Gow & Kember, 1993; Kember, 1997; Kember & Kwan, 2000; Pratt, 1992, 1998; Prosser, Trigwell, & Taylor, 1994; Samuelowicz & Bain, 1992, 2001). Although a sufficient number of conceptions have been identified (Kember, 1997), there has been no general agreement about what conceptions are, whether they overlap or if they are context-dependent (Murray and McDonald, 1997). Furthermore, several studies have been cited repeatedly despite their methodological flaws. For instance, Fox’s (1983) study is referenced in much of

the teaching conceptions literature, even though it failed to report how participants were selected and how interview data were gathered and analyzed (Kane et al., 2002). There is also a lack of research on the relationship between these broad conceptions of teaching and instructor practices (Kane et al., 2002; Samuelowicz & Bain, 1992).

A small number of studies have investigated the relationship between instructors' conceptions of teaching and instructional practice at the university level. For example, Murray and McDonald (1997) surveyed thirty-nine business faculty at one institution to examine beliefs about their role as lecturer and the purpose of lectures, tutorials, and assessment. Most faculty members viewed their function as imparting knowledge, supporting students, motivating students, facilitating learning or combinations of all roles. Overall, the study found discrepancies between existing belief structures and espoused behaviour in the classroom.

Conversely, Hativa, Barak and Simhi (2001) used qualitative methods to study teacher thinking and knowledge of four exemplary teachers in Israel. They found instructors in Hebrew literature and psychology departments to have "a good, but far from perfect" fit between their beliefs and knowledge about effective strategies and classroom practice. Similarly, Martin, Prosser, Trigwell, Ramsden and Benjamin (2000) interviewed and observed 26 instructors teaching large classes in four different disciplines. They too found consistency between instructors' intentions and observed actions in a number of disciplines, and concluded that approaches to teaching were directly related to the object of

study. Additionally, a recent survey of first and second-year teaching and research assistants (Buelens, Clement, & Clarebout, 2002) also suggested there was a relationship between beliefs about knowledge, learning and instruction. Those who favoured reproduction-oriented learning also viewed knowledge as “absolute” and engaged in teacher-centered instructional practices. Participants who viewed knowledge as “relative”, also believed that good educational practice was meaning-centered and espoused student-oriented teaching practices (Buelens et al., 2002). (For a complete review of the literature, see Kane et al., 2002).

In sum, researchers have been pleading for the closer examination of teacher beliefs for decades because they are assumed to drive behaviour in the classroom and explain why teachers behave the way they do (Pajares, 1992). They have also called for better methodologies and conceptual frameworks that directly observe teacher behaviour (Kane et al., 2002; Pajares, 1992). Yet, research to date has been not been sufficiently rigorous to draw definitive conclusions about the theories and practices of post-secondary teachers (Kane et al., 2002). Even less is known about the relationship between beliefs and teaching practices for CT.

Definitions of Critical Thinking

In general, the educational ideal is to move students away from memorization and rote recall of facts to creating environments that facilitate deep and meaningful learning. Students should be able to actively, flexibly, reflectively and purposefully think about course materials and out-of-class experiences. They

need to communicate those ideas clearly, concern themselves with the complexity of issues or problems, and make well-reasoned decisions based on relevant information and evidence. Students should also assess their own thinking and biases, generate ideas, consider multiple perspectives and develop multiple solutions to ill-structured or complex problems (Facione, 1990; Newsome, 2000; Paul, 1990; Pithers & Soden, 2002; Ramsden, 1992). Consequences for not fostering CT are that students soon forget the information acquired, they cannot use information in a meaningful way, they operate on erroneous assumptions and they remain unaware of what they already know (Ramsden, 1992).

While CT has been touted as an educational ideal, there is still widespread debate surrounding issues such as: a) The conceptualization of CT; b) the degree to which it is generalizable versus subject-specific; c) the relationship between CT and other types of thinking; d) how to measure CT; and e) how CT develops or is acquired (Bullen, 1998; Jones & Ratcliff, 1993; Norris, 1985). The following section will review the relevant CT literature and explain how CT was defined in this study.

According to The Foundation for Critical Thinking (2003), the intellectual roots of critical thinking can be traced back to Socrates 2,500 years ago. Throughout history those principles have been refined by thinkers such Plato, Aristotle, Aquinas, Copernicus, Machiavelli, Galileo and Dewey. As a consequence of its philosophical underpinnings, the CT movement in the 20th century has focused on argumentation and logical reasoning. For example, Ennis

(1962) initially defined CT as “the correct assessing of statements” (p. 6). He later revised the definition to include “reasonable and reflective thinking about what to believe or do” (Ennis, 1987, p. 1). The latter definition is consistent with contemporary theories that are broader, denounce the notion of “correctness” and are more inclusive of skills such as problem-solving and creative thinking (e.g., Facione, 1990, Halpern, 1996; Norris, 1985; Paul, 1990).

In addition, most current theories share a focus on reflection and self-motivated evaluation of one's own thinking (Table 2). For example, Paul (1990) asserted that CT is “disciplined, self-directed thinking which exemplifies the perfection of thinking appropriate to a particular mode or domain of thinking” (p. 526). In addition to skills, Paul (1990) maintained that thinking cannot achieve excellence without intellectual standards or criteria to guide it. These standards include: Clarity, accuracy, relevance, precision, breadth, depth and logic.

Similarly, the American Philosophical Association (APA) defined CT as the “process of purposeful, self-regulatory judgment. This process gives reasoned consideration to evidence, contexts, conceptualization, methods, and criteria” (Facione, 1990, p. 3). The APA further identified a core set of cognitive skills used to form judgments and to monitor the quality of thinking (analysis, interpretation, inference, evaluation, self-regulation, explanation). They are considered to be non-linear and recursive which implies for example, that one can explain an analysis, analyze an interpretation or evaluate an inference (Facione, 1990).

Table 2

Definitions of Critical Thinking

| Source | Definition |
|--------------------------------|--|
| Ennis (1987) | "reasonable and reflective thinking about what to believe or do" |
| Facione (1990) | "process of purposeful, self-regulatory judgment. This process gives reasoned consideration to evidence, contexts, conceptualization, methods, and criteria" |
| Halpern (1996) | "... the use of those cognitive skills or strategies that increase the probability of a desirable outcome... thinking that is purposeful, reasoned and goal directed...when the thinker is using skills that are thoughtful and effective for the particular context and type of thinking task" |
| Lakenorth College (2002) | "Critical thinking is the general term given to a wide range of cognitive skills and intellectual dispositions needed to identify, analyze, and evaluate arguments and truth claims, to discover and overcome personal prejudices and biases, to formulate and present convincing reasons in support of conclusions, and to make reasonable, intelligent decisions about what to do and what to believe" |
| Paul (1990) | "disciplined, self-directed thinking which exemplifies the perfection of thinking appropriate to a particular mode or domain of thinking" |

In contrast to the philosophical perspective, psychologists in recent years have focused on problem-solving skills and the internal private processes they produce. Historically, psychologists and philosophers have not worked together despite parallel concerns about developing higher-order thinking skills (Resnick, 1987). Lewis and Smith (1993) argued that both perspectives are critical and the broader term “higher-order thinking” encompasses all skills needed to develop higher-level thinking in the classroom.

Consequently, Lakenorth College, the site of my research, assembled a “Critical Thinking Committee” made up of instructors teaching courses in CT as well as professors infusing CT in their courses across disciplines. Based on several sources, they created the following definition of “higher-order/CT”:

Critical thinking is the general term given to a wide range of cognitive skills and intellectual dispositions needed to identify, analyze, and evaluate arguments and truth claims, to discover and overcome personal prejudices and biases, to formulate and present convincing reasons in support of conclusions, and to make reasonable, intelligent decisions about what to do and what to believe. Good critical thinkers treat their own ideas with at least as much scrutiny as they bring to the opinions of others, and they employ these skills as they develop their own beliefs.

While the committee may have intended for the definition to be appropriate to the various disciplines at the college, the complete definition (Appendix A) appears to focus on argumentation skills and the methods by which to apply them.

Anecdotal evidence suggested that many faculty members believed the definition

was too narrow and perhaps irrelevant to their courses. Despite faculty pleas for revision, the college did not broaden its definition. Instead, the committee presented it to faculty at a professional development workshop in the spring of 2002 (attended by the researcher) and emphasized the idea that CT involves a variety of cognitive skills relevant to all disciplines.

Therefore, this study was guided by Lakenorth's definition as well as the APA's definition since it is broader in scope, includes dispositions, and provides detailed examples of CT skills and subskills (Appendix B). Furthermore, it is consistent with the intended framework provided by the college and was also used by Lakenorth's Instructional Design (ID) consultant to assist faculty in course design for CT. Moreover, the APA report on CT was the consensus of 46 experts in a variety of disciplines for the purpose of developing valid assessment tools and effective CT instructional programs. It has been used as a theoretical framework in various empirical studies and has also been used to create rubrics and standardized assessment measures of CT skills and dispositions (e.g., California Critical Thinking Skills Inventory, California Critical Thinking Dispositions Inventory).

It should be noted, however, that the college added creative thinking skills to the definition in the spring of 2003. They also supplemented it with specific competency levels for students completing their second and final year of study (Appendix C). This investigation was based on the initial definition (Appendix A) that was available during the data collection phase but a discussion of the current version is presented in Chapter 6.

Critical Thinking Research

Instructional Variables

What do we know about the impact of instructional strategies and the acquisition of CT skills? Meta-analyses and integrative reviews (Adams, Stover & Whitlow, 1999; Bangert-Drowns & Bankert, 1990; Gibbs, 1985; McMillan, 1987) of empirical studies from the philosophical perspective have explored the influences of various factors on CT. However, the results are inconsistent and few studies have attempted to explain the mechanisms or processes behind the acquisition of CT skills.

For example, Gibbs (1985) conducted a review of the CT literature in order to evaluate the effectiveness of conventional curriculum on CT, effectiveness of curriculum designed specifically to teach CT and factors associated with student characteristics and successful thinking at the university level. Findings suggested that curricula not specifically designed to teach CT produced weak positive effects, no effects or even harmful effects on CT outcomes. In addition, courses specifically designed to teach CT yielded some positive results but none of the studies examined long-term impacts or transfer to other disciplines. Gibbs (1985) concluded that findings were difficult to interpret due to lack of sufficient control in the studies reviewed. Specifically, he noted that small improvements in CT might have been due to, among other factors, maturation during the college years.

McMillan (1987) conducted a 25-year review of studies that investigated the effects of instructional variables, courses and general college programs on students' CT. Half of the studies examined instructional variables, the majority of

which failed to support the notion that implementing changes in one course had an effect on students' general CT abilities. Studies involving specific courses in CT showed similar results. Those investigating the impact of student participation over one or more years in a specific program on CT found that seniors were better at thinking critically than freshmen.

In addition to integrative reviews, Bangert-Drowns and Bankert (1990) conducted a meta-analysis in order to synthesize results of explicit instruction on CT. The analysis included 20 studies, 19 of which were doctoral dissertations. The study concluded that findings were favourable for explicit instruction but may not be generalizable or transferable to the every day use of CT. The authors also suggested that CT tests used to assess students in these studies might have been problematic due to their focus on CT as a general skill.

A more recent integrative review of CT studies examined students enrolled in accredited nursing programs (Adams et al., 1999). Similar to general reports, the authors concluded there was no consistent evidence to suggest that nursing education contributes to CT. The authors cited similar problems in operational definitions, research designs and lack of explanation as to which teaching strategies may have caused improvements in CT. It was further hypothesized that CT is more likely to be encouraged in real-life situations and that standardized measurement tools used in the studies were not able to detect context-related improvements in CT.

In sum, "there is little, if any, evidence on the long-term impact of instruction in CT, despite the fact that the vision of such impact is central to the justification

of CT instruction...we do not learn what specifically makes these students better thinkers and in what specific ways they can still improve” (Norris, 1985, p. 44). In general, research is lacking in solid theoretical frameworks and clear operational definitions, suffers from weak methodological designs and does not consider CT dispositions or out-of class experiences (Bangert-Drowns & Bankert, 1990; Gibbs, 1985; McMillan, 1987; Terenzini, Springer, Pascarella & Nora, 1995). To complicate matters further, tests designed to measure CT (i.e., Watson-Glaser CT Appraisal, Cornell CT Test, New Jersey Test of Reasoning Skills, California Critical Thinking Skills Test), do not appear to consistently detect changes over time (Gibbs, 1985; McMillan, 1987). This could be due to the nature of CT tests which might be measuring a general aptitude, rather than students’ ability to apply skills in real-world situations. Additionally, semester-long interventions might be too short to produce measurable changes in CT (Pascarella and Terenzini, 1991; Smith, 1977). We must therefore rely on theory and research from the cognitive sciences for recommendations on CT instruction.

Cognitive Principles

Psychologists generally assume that CT is a higher-order cognitive skill (Lewis & Smith, 1993) that is acquired in a similar manner as other general cognitive skills. With the exception of McPeck (1981), most CT scholars (e.g., Ennis, Paul, Norris) also view CT as general and transferable skills that can be learned within various subjects and contexts. It should be noted that Lakenorth College shares the same assumption, given that all instructors are expected to infuse CT into their courses. The college also incorporates the notion that direct

instruction is an important component of CT acquisition by requiring students in several majors to take a general CT course.

A review of the psychological literature on learning and thinking suggests that we need to teach for understanding so that students can make meaningful connections and think at higher levels (Bransford, Brown, & Cocking, 2000; Resnick, 1997). In addition, expert-novice research suggests that experts are not necessarily expert general problem solvers. Rather they have knowledge stored and structured in ways that make problem-solving faster and less effortful (Chase & Simon, 1973; Chi, Feltovitch & Glaser, 1981; Glaser, 1989). Consequently, learning environments need to focus on depth of knowledge instead of breadth. In the context of CT, this implies that students need time to learn in order to gain a sufficient understanding and a rich knowledge base (Bransford et al, 2000). But can these skills transfer to other domains or to out-of-classroom experiences?

According to cognitive theories such as schema theory, transfer involves the activation of previously acquired schema when one encounters a new learning situation (Baldwin & Ford, 1988). A review of the research suggests there are several ways to promote transfer (Bransford et al., 2000). The first step is the initial learning of information since the ability to think critically about a subject requires some foundational knowledge (Resnick, 1997). Furthermore, students must comprehend the information rather than memorize it so they can remember and store it in a meaningful way. They need time to learn material in depth and must be motivated to do so. In particular, students need to see and understand

the relevance of information and view potential for transfer in various situations (Bransford et al., 2000).

Another factor that affects transfer is context. Proponents of situated learning assert that conceptual change occurs when individuals are engaged in authentic, meaningful, situated, communities of practice (Brown, Collins & Newman, 1989). Activity is not separated from content, from real-life contexts or group interactions. A criticism of this approach is that over-contextualized learning situations can make transfer difficult to achieve. One solution is to present students with many cases and examples so they can transfer knowledge to new situations. Cognitive flexibility theory further recommends that students revisit material at different times, in rearranged contexts, for different purposes and from different conceptual perspectives in order to solve complex problems in ill-structured domains (Spiro, Feltovich, Jacobson & Coulson, 1991). Finally, metacognition plays an important role in transfer. If students are aware of their learning strategies and progress toward understanding, they will be better equipped to transfer knowledge to new situations without explicit prompts (Bransford et al., 2000).

Experts in psychology and CT, however, acknowledge that teaching students to think critically or designing learning environments to encourage these skills are not enough to produce long-lasting transferable effects (e.g., Halpern, 1998). A complementarity of approaches where learning involves domain-specific knowledge and general cognitive skills is needed as well (Anderson, Greeno, Reder & Simon, 2000; Bransford et al., 2000; Perkins & Solomon, 1989).

Dispositions

Experts on thinking also believe that it is not sufficient to possess good thinking skills and domain-specific knowledge. Motivations, attitudes, dispositions, values and habits play an equally important role (e.g., Facione, 1997; Paul, 1990; Ritchhart, 2002; Tishman, Kay & Perkins, 1993). In other words, it is of no practical benefit to possess CT skills unless an individual is disposed to use them. While scholars insist that a “critical spirit” is required for good thinking, various conceptions and traits have been identified. The APA’s dispositions, for example, include the following: Truthseeking, openmindedness, analyticity, systematicity, CT self-confidence, inquisitiveness and cognitive maturity. Can we teach the dispositions?

There is some evidence in the field of nursing to suggest that students’ overall dispositions increase during the college years (Facione, 1997) but the cause of these gains is not well understood. More recently, Miller (2003) examined the impact of instructional practices on college students’ CT skills and dispositions in the field of radiography. An in-depth examination of three American programmes revealed that best practices for CT instruction, as outlined in the literature, appeared to have a greater impact on students’ CT dispositions than on the development of CT skills. Results were reported with a cautionary note, due to the small number of students and uneven sample size across sites. Miller, however, recommended that future research investigate questions related to dispositional development and supportive classroom cultures for CT.

Despite a lack of solid empirical evidence, it is suggested that we teach the dispositions through enculturation (Halpern, 1998; Ritchhart, 2002; Tishman et al., 1993). Specifically, educators should provide a culture of good thinking by offering examples and models, encouraging student-student and teacher-student interactions and directly teaching the dispositions. Instructors themselves should also possess good attitudes toward thinking.

Epistemology and Intellectual Development

In addition to learning theory and research on skills and dispositions, developmental theories of intellectual development also provide some guidance on how to teach for CT. The major assumption behind this research is that an individual's attempt to interpret events is highly affected by epistemological assumptions or views about the nature of knowledge. For example, Perry (1970) found that most college students believed that education was an accumulation of knowledge and consequently did not challenge assumptions, suggest alternatives or test new ideas.

More recently, King and Kitchener (1994) developed the "reflective judgment model" building upon Dewey's (1933) notion of reflective thinking, Perry's (1970) model of intellectual and ethical development, as well as Piaget and Kohlberg's work on cognitive and moral development. Supported by 15 years of research, the model describes a progression of epistemic cognition as seven successive stages for solving ill-structured problems: Pre-reflective (stages 1 and 2), quasi-reflective (stages 3, 4, 5) and reflective thinking (stages 6 and 7). Findings from longitudinal and cross-sectional studies, using diverse samples across various

American institutions, suggested that reflective judgment is a slow but steady pattern of development. For example, college seniors scored higher than college students at earlier academic levels, but as a whole their thinking was mostly "quasi-reflective". Advanced graduate students showed the greatest use of reflective thinking and scored higher than graduate students in earlier stages of their academic careers (King & Kitchener, 1994).

The implication of King and Kitchener's (1994) developmental model and other theories of epistemic cognition (Baxter-Magolda, 1992; Belenky, Clinchy, Goldberger, & Tarule, 1986; Schraw, Bendixen & Dunkle, 2002; Kuhn & Weinstock, 2002; Schommer, 1990) is that teaching skills, knowledge and dispositions may not be enough to improve students' CT abilities. Students at the lower levels of intellectual development may have difficulty learning from inquiry-based or reflective activities, since an instructor's knowledge is perceived as absolute. As a consequence, students will not see the need to think reflectively and will not attempt to do it. It is recommended that instructors familiarize students with ill-structured problems in their domain, create multiple opportunities for students to examine different points of view, provide challenges for students to engage in new ways of thinking and offer cognitive and emotional support in these activities (King & Kitchener, 1994).

Research Implications

Theory suggests that designing instruction that is meaningful and builds on prior knowledge is the first step in developing students who can think reflectively about course material (Resnick, 1997). In addition, students need to test out

ideas and receive feedback on their thinking in order to clarify their ideas and correct misconceptions (Bransford et al., 2000). There are many ways to design instruction for meaningful learning and higher-level thinking that depend upon the context of the learning environment, subject matter and student characteristics. Based on the literature, instructors teaching for CT outcomes should engage students with course material and use the following strategies:

- Explicitly state expectations for CT and design tasks that require it (e.g., Halpern, 1998).
- Give students time to learn and to think, while focusing on depth of knowledge rather than superficial teaching of many topics (e.g., Bransford et al., 2000).
- Present knowledge within their domains in a variety of ways (e.g., Bransford et al., 2000; King and Kitchener, 1994).
- Provide direct instruction such as defining CT skills, dispositions, standards of quality as well as methods for presenting or evaluating an argument (e.g., Paul, 1990; Halpern, 1998).
- Model good thinking and create a culture of CT (e.g., Tisman et al., 1993).
- Provide opportunities to practice CT and revise work (e.g., Bransford et al., 2000; Lazerson et al., 2000).
- Encourage self-assessment and reflection (e.g., Pithers & Soden, 2000).
- Provide feedback to students on their thinking as well as provide specific grading criteria for students to assess the quality of their thinking (e.g., Angelo, 1995; Paul, 1990).

- Motivate and encourage students to question and challenge assumptions (e.g., King & Kitchener, 1994).
- Provide opportunities for students to collaborate with others to seek multiple answers to complex problems (e.g., Cooper, 1995; Halpern, 1998).

Examples of specific approaches designed for CT include ongoing self-assessment (Angelo, 1995), case study methods (McDade, 1995), problem-based learning (Pithers & Soden, 2000), use of writing assignments (Tsui, 1999; Wade, 1995), student presentations or conference style learning (Underwood & Wald, 1995), use of prompts and open-ended questions (Marzano, 1993; Paul, 1990) and group learning activities (Faust & Paulson, 1998; Cooper, 1995) that encourage students to build on each other's knowledge and view multiple perspectives (e.g., peer evaluations, debates, jigsaw). In sum, active learning strategies that engage students are recommended for CT (e.g., American Psychological Association, 1995; Faust & Paulson, 1998; Kurfiss, 1989), while lecture-driven teaching methods and "academic bulimia" (Chaffee, 1988) are considered to be ineffective ways to teach for it (Kember, 1997; Ramsden, 1992).

Relationship Between Beliefs and Teaching Practice

We know very little about the beliefs of faculty related to CT since few studies have attempted to examine them. One study, however, assessed the teaching practices and knowledge of CT among 140 faculty members in teacher preparation programs in California. In their interviews, participants espoused that teaching for CT was an important objective of their courses, but 89% of faculty were unable to provide an elaborated articulation of their concept of CT and

could not provide plausible examples of how they fostered CT in the classroom. They were also unable to name specific CT skills they thought were important for students to learn, nor could they name a particular theory or theorist that has shaped their concept of CT. It should be noted that the study used self-reported data only.

There is also some preliminary evidence to suggest that faculty perceptions of students' CT may be related to their teaching practices (Tsui, 1999; Scheurman, 1996). For example, Scheurman (1996) found that college professors underestimated student ability and dispositions toward CT and tended to assume that students possessed epistemic beliefs consistent with the least mature levels of King and Kitchener's (1994) reflective judgment model. Similarly, Tsui (1999) found that university teachers who believed in student ability had students with higher rates of self-reported growth in CT. The implication of this research is that instructors will not challenge students nor teach for CT if they lack confidence in students' ability and dispositions (Scheurman, 1996; Tsui, 1999).

Tsui (1999) also found increases in students' self-reported CT in courses taught by instructors who believed that teaching involved "mutual learning" between teacher and student. This is consistent with Sternberg's (1997) position that teachers who believe they have nothing to learn from students will obstruct the teaching and learning of students' thinking skills. While the studies described earlier relied upon self-reported data, they provide good starting points for further exploration on instructor beliefs.

In addition to faculty perceptions of students, faculty often hold epistemic beliefs that are inconsistent with teaching for CT (e.g., King and Kitchener, 1994; Pratt, 1998). For example, if faculty believe that knowledge is absolute and must be transmitted to students, they will not provide students with opportunities to challenge ideas or to think critically about course material.

Finally, the literature has identified a number of specific beliefs that may inhibit faculty use of strategies that support CT or “effective teaching” practices. While they have not been empirically tested in higher education, these beliefs are promising avenues for further research. For example, instructors who do not value CT are not likely to teach for it (e.g., Ramsden, 1992). Similar outcomes are expected for those who view CT pedagogy as too time-consuming (Gibbs, 1988; Haas and Keeley, 1998), believe that their disciplines are not conducive to CT (Gibbs, 1988) or when faculty lack confidence in their ability to teach for CT (Haas & Keeley, 1998).

In sum, research on CT development has mainly been informed by the psychological literature. The main consensus is that active learning strategies and supportive learning environments are needed to foster CT skills and dispositions. In addition, students need feedback, opportunities for practice and to monitor their own learning. Faculty beliefs about CT, student capabilities, self-efficacy and epistemology might also impact their motivation to use recommended teaching strategies for CT.

Institutional, Faculty and Student Variables

The current study focused on exploring beliefs held by faculty and their relationship to practice. Worthy of mention are a number of additional variables that can impact an instructor's use of CT strategies or those associated with "effective teaching" in higher education: a) General teaching experience (Bransford et al., 2000); b) experience with, and training in, student-centered pedagogy (Haas and Keeley, 1998); c) opportunities to informally discuss ideas with colleagues (Amundsen, Saroyan, & Frankman, 1996; Bransford et al., 2000); d) occasions to plan programs with colleagues (Facione, 1997); e) smaller class sizes (Singer, 1996); and pedagogical knowledge (Shulman, 1986). Student variables that might affect CT outcomes are educational level and ability (Singer, 1996), deep approaches to learning, motivation and interest, task perception, prior experience, prior knowledge (Ramsden, 1992) and out-of class experiences (Terenzini et al., 1995).

In sum, this study was guided by the literature on strategies recommended for teaching CT, good teaching practices in higher education (e.g., Ramsden, 1992), the APA's conceptual framework of CT and findings from exploratory research on faculty beliefs in higher education. The current investigation is further influenced by a theoretical framework proposed by Argyris and Schon (1974) and recommended for research on teacher beliefs (Kane et al., 2002; Pajares, 1992).

Theoretical Framework

A theory of action framework (Argyris & Schön, 1974) provides a useful theoretical structure for gaining a greater understanding of the relationship between beliefs about CT and teaching practices for CT. It makes a clear distinction between espoused theories and the reality of practice. Argyris and Schön (1974) defined a theory of action as a “theory of deliberate human behavior, which is for the agent a theory of control but which, when attributed to the agent, also serves to explain or predict his behavior” (p. 6). In other words, humans act purposefully on their environment and create theories or models of how to behave in order to achieve intended outcomes. Argyris and Schön further asserted that there are two theories of action:

When someone is asked how he would behave under certain circumstances, the answer he usually gives is his espoused theory of action for that situation. This is the theory of action to which he gives allegiance, and which, upon request, he communicates to others. However, the theory that actually governs his actions is this theory-in-use (Argyris & Schön, 1974, p. 6).

This distinction is important given that individuals are often unaware of their theories-in-use and frequently there is a mismatch between theories-in-use and espoused theories. Additionally, most research in higher education has ignored the potential discrepancy between instructors’ two theories of action.

Investigators have also neglected to examine theories that guide actual behaviour, which are typically inferred and constructed through direct observation of teaching, instructors’ reflection of practices (Argyris & Schön; 1974; McAlpine

& Weston, 2000) and other course-related indicators such as instructors' choice of assessment measures (Pratt, 1998; Samuelowicz, 1999).

While the framework provides a helpful way to think about instructors' teaching practices, accurately inferring theories-in-use requires extended observations and interviews by a skilled individual (Argyris & Schön; 1974). To limit the focus and reduce time required for instructor participation, this study did not attempt to co-construct participants' detailed theories-in-use. Rather, it focused on identifying possible discrepancies between stated and actual practices and explored the relationships between various beliefs and observed teaching methods for CT.

CHAPTER 3

Methodology

This chapter details the research methods used in this study and is organized around the following main topics: a) Research questions; b) researcher perspective; c) research design; d) context for the study; e) participant selection; f) data sources and collection; g) pilot study description; h) data analysis procedures; i) trustworthiness of the study; and j) ethical considerations.

Research Questions

The purpose of this inquiry was to identify the beliefs of four faculty members and to describe their relationship to teaching practices for critical thinking (CT). Therefore, the main research question driving this study was: "What is the relationship between instructors' teaching practices for CT and beliefs about CT?". The study also sought to answer several supporting questions:

1. How do instructors teach for CT? (e.g., course design, instructional strategies, assessment)
2. What are instructors' beliefs about CT? (e.g., definition, skills, dispositions, how it develops)
3. What related beliefs do instructors hold? (e.g., epistemology, self-efficacy, perceptions of students?)
4. What is the relationship between instructors' espoused teaching practices and actual teaching practices for CT?
5. What are the common teaching practices and beliefs among instructors teaching for CT?

Researcher Perspective

In the same way that teachers bring their beliefs, values and attitudes into the classroom, researcher bias and subjectivity are inevitable. In qualitative inquiries, where the researcher is the instrument, personal perspectives are bound to shape the approach and interpretation of the study. Since researcher bias can never fully be removed, awareness of personal biases should be acknowledged and reported at the outset of the study (Merriam, 1998).

First, I would like to address my views about CT. From the literature, it is clear that there is no universally accepted definition and it means different things, to different people, in different contexts. I usually defer to the APA's conceptualization because it is broad, includes both skills and dispositions and recognizes the importance of monitoring one's own thinking. From my research on assessing student work for evidence of CT and assisting others on CT projects, I am also of the opinion that CT skills, however you choose to categorize them, are overlapping and recursive. It has also been my experience that classifying student thinking into neatly packaged categories of CT is a near impossible task because individuals use several skills simultaneously and because thinking is largely an internal process. Assessing the quality of thinking is easier to do and in most circumstances, is more important than trying to define its type. For example, many students are capable of merely summarizing information they find on the Internet, but can they critically evaluate those sources of information, demonstrate an understanding of multiple perspectives,

deal with the complexity of issues presented, recognize their own biases and clearly communicate those ideas?

With respect to the development of CT, as suggested in the previous chapter, CT takes a long time to develop and short-term strategies do not produce consistently detectable, transferable and long-term results. In the classroom, there is no correct way to teach CT and a number of approaches are beneficial. These strategies, however, converge along the overall theme of active or “student-centered” learning and suggest that CT cannot be developed solely through lecture methods.

Is a generic course on CT beneficial as well? While I do not believe it is harmful to students, I admit to being skeptical of students learning the skills of argumentation devoid of any context and wonder about its long-term transferability. That is not to say that direct instruction on CT is of little value, but learning the skills in context (explicitly and implicitly) appears to hold more promise than learning general skills on their own. I also agree with the literature that suggests dispositions toward thinking must be cultivated in addition to stimulating the skills.

The last few points I would like to address involve my role as the college’s Instructional Design (ID) consultant and its possible affect on the process and outcome of this study. As I mentioned in the introduction, conversations with faculty planted the seeds for this study. It also allowed me to become acquainted with the college’s culture and policies, familiarize myself with professional development initiatives and foster relationships with faculty. On the other hand, it

is possible that my earlier conversations with faculty could have affected their stated beliefs about CT and how they teach for it. I did, however, select participants in part because they already possessed firm views and had reflected a great deal upon them. Precautions were also taken to ensure the trustworthiness of data collected (i.e., repeated observations, student perceptions, member checks, audit review). Finally, it is important to note that I am not a permanent employee of the college and do not benefit from results pointing in any particular direction.

Research Design

To answer the study's research questions, a descriptive "collective" case study design (Stake, 1995) was employed within the context of an American college. Case study methodology, one of several approaches to qualitative inquiry, is particularly useful when a holistic, in-depth investigation of phenomena in its natural context is needed (Creswell, 1998; Merriam, 1998; Yin, 1994). Qualitative methods are particularly appropriate in situations where one needs to first identify variables (i.e., instructor beliefs about CT) that might later be tested quantitatively and when quantitative measures cannot adequately describe or interpret a situation (Hoepfl, 1997). Qualitative methods have also been touted as "relevant, appropriate and promising" for the study of teacher beliefs (Pajares, 1992) where the focus is on the viewpoint or perceptions of participants using multiple sources of data (Merriam, 1998; Yin, 1994). Moreover, "research that examines only what university teachers say about their practice and does not

directly observe what they do is at risk of telling half the story” (Kane et al., 2002, p.177).

Therefore, four instructors from different disciplines were studied extensively throughout one semester. Survey methods, interviews, inventories, document reviews and classroom observations were employed for the purpose of describing and explaining the relationship between instructors’ beliefs and practices within one course. In the final stages, a cross-case analysis was conducted to highlight themes and patterns related to participants’ beliefs and teaching practices.

Context

Lakenorth College is a private, career-oriented institution located in New England, U.S.A. The accredited, liberal arts college was established over 100 years ago and offers two-year and four-year degrees in a variety of majors to about 1500 full-time students. The college also has a Distance Learning program and several international campuses. There are approximately 60 full-time faculty members and 165 part-time and full-time adjunct instructors. The college also boasts a 97% employment rate for graduates with average class sizes of 18 students.

In the last few years, Lakenorth College began its systematic planning and evaluation of student learning outcomes and identified seven core competencies. Most majors have also identified discipline-related outcomes that supplement the core competencies and will soon begin specific planning for core competency development within each major. Individual courses are also being examined for their relation to the core competencies and consideration is being given to how each

course can contribute to competency development. While the College has laid the groundwork for outcomes-based assessment by establishing the desired outcomes, it is in the early stages of development with regard to assessment of those outcomes.

One of the initiatives toward outcomes-based assessment and improving the quality of teaching and learning, was a three-year agreement signed by the faculty in March 2001. The agreement required faculty to devote more time to increasing academic rigor and designing engaging courses that stress high-level thinking, oral and written communication, technology, and global awareness skills. In return, faculty were given a reduction in courseload and resources to assist in them in planning and design of their courses. It should be noted that two additional skills were identified after this study began: Ethical reasoning and quantitative literacy.

Specifically, the college was selected as the context of the study for three main reasons. First, contrary to the majority of colleges, faculty at Lakenorth College are required to teach for CT and to document how they incorporate it into their curricula. Faculty were also asked to provide explicit and detailed syllabi to their students. By May 2004, all faculty will have devised and submitted plans for each of their courses in the form of a "course packet" or portfolio. This college-wide initiative is referred to as the Course Enrichment process.

Second, the college was an ideal context for study because faculty are not required to conduct research and can therefore devote their energies to teaching. Third, the college has attempted to create an ideal environment for instructors to

improve their teaching by providing a favourable climate that includes: Small class sizes, administrative support and encouragement for CT, ongoing professional development, an institutional definition of CT, reduced workload as incentive for redesigning courses for CT, emphasis on teaching and opportunities for systematic program planning. Essentially the college has made an effort to remove institutional barriers that are typically associated with fostering students' thinking skills.

It should also be noted my role as the ID consultant in the spring of 2002 was part of the ongoing professional development offered by the college. Faculty were encouraged (but not obligated) to work with the consultant in order to develop their enhanced syllabi, reflect upon how they were incorporating the core competencies into their courses and to obtain additional suggestions for improving the quality of their courses.

Participant Selection

In order to obtain an in-depth understanding of the relationship between beliefs and actions related to CT, purposeful sampling techniques were employed (Patton, 1990). It was not designed to achieve population validity, but rather to select cases that were information-rich in order to generalize to theory or to generalize themes and patterns (Gall, Gall and Borg, 1996). In all, the purpose of the sampling strategy was to identify "exemplars" of teaching practices in a variety of disciplines in order to better understand the relationship between beliefs and practices related to CT. While non-exemplars could provide an additional perspective, practical considerations limited the in-depth

investigation to four instructors. The decision to exclude them from the study was made after careful consideration.

First, one of the goals of the study was to describe how instructors teach for CT and compare practices across disciplines. Unskilled instructors would not be able to provide rich data in order to meet this objective. Second, given the agreement signed by Lakenorth faculty, it would be difficult to recruit instructors who would admit to teaching courses that did not address CT. Finally, the purpose of a cross-case analysis is to seek patterns across cases and generalize to theory. If for example, I had sampled two exemplars and two non-exemplars, it is probable that patterns would emerge within each group. It would therefore be difficult to claim there were strong patterns in the data based on one or two instances of classroom behaviour or beliefs.

Consequently, volunteers were selected using a two-phase purposive sampling strategy designed to identify faculty who were teaching courses most likely to incorporate CT. In the first phase, criteria included faculty teaching sophomore, junior and senior level face-to-face courses in spring 2003 (i.e., no first-year courses) and at least one face-to-face course for which the instructor submitted a course packet (i.e., reflected and documented their plans to teach for CT). The second phase attempted to identify faculty who were willing to participate in the study and those who were teaching courses for which CT was an essential instructional goal.

A call for participation and a survey was sent out to all faculty at Lakenorth College via e-mail (Appendix D, E). The survey included background questions

(e.g., years teaching, professional development activity) and the Teaching Goals Inventory (TGI). The TGI, a 53-item questionnaire, asks faculty to rate their instructional goals for a single course. It covers six clusters of teaching goals: Higher-order thinking skills, basic academic success skills, discipline-specific knowledge and skills, liberal arts and academic values, work and career preparation, personal development (Angelo & Cross, 1993).

Due to the researcher's time constraints, faculty were given only one week to complete the survey which was sent out during the second week of classes- a particularly busy time for instructors. In addition, the site used to deliver the survey (www.surveymonkey.com) was experiencing technical difficulties which made the survey almost impossible to access at that time. Only four instructors completed the survey.

Once the server was functioning, faculty were given an additional week to complete the questionnaire. A total of nine instructors accessed it, three agreed to participate in the full study and three of them asked for more information but declined to participate further. A few instructors e-mailed me to explain why they could not participate, revealing that they did not meet the study's criteria (e.g., teaching first-year courses) or the study required too much of their time. Additionally, the TGI did not appear to be a useful selection tool because all respondents obtained similar scores on the "higher-order" dimension which indicated that CT was a primary goal of their courses.

As a consequence of the low response rate and similar TGI scores, I directly e-mailed four instructors with whom I had conversations as the ID consultant and

asked them to volunteer for the study. These instructors appeared to have a strong interest in teaching for CT, had reflected a great deal upon it and revised their syllabi to include detailed plans for implementing CT within their courses. I also contacted a fifth instructor who was explicitly teaching a course on CT within the philosophy department and had demonstrated an interest in improving upon his teaching practices.

Since the purpose of the study was to better understand the relationship between beliefs and practices related to CT, I selected three of seven eligible instructors who appeared to be “exemplars” of infusing CT within their content-specific courses. Additionally, I chose one instructor who taught CT explicitly to explore the differences in teaching approaches and beliefs (Table 3). Instructors were expressly chosen to represent a variety of academic levels and each of the four academic divisions within the college (Arts and Sciences, Community Services, Computer Networking, Business Administration).

While participants varied in terms of academic level and discipline, participants also shared similar characteristics. They were all teaching full-time, had at least one Master’s degree with a minimum of 12 years of teaching experience, all of them had voluntarily met with the ID consultant, voluntarily attended all or most of the college’s professional development workshops and were interested in learning more about teaching practices for CT. One of the participants (Krista) completed the initial survey and volunteered to participate from the outset.

Table 3

Summary of Instructor and Course Characteristics

| Characteristics | John | Carl | Krista | Gordon |
|----------------------------|-----------------------------------|-----------------------------------|---|----------------------------------|
| Division | Business Admin. | Arts & Sciences | Community Services | Computer Networking |
| Teaching status | Full-time | Full-time | Full-time | Full-time |
| Years Teaching | 18 | 10 | 12 | 28 |
| Highest level of education | MBA M.S. (Economics) | M.A. (Philosophy) | M.A. (Experiential Education) M. Ed. (Reading) | M.S. (Computer Science) |
| Course | Contemporary Business Issues | Critical Thinking | Integrated Primary Curriculum | Computer & Network Security |
| Academic level | Senior | Junior | Sophomore | Junior/ Continuing education |
| Class size | 19 | 12 | 24 | 19 |
| Class schedule | 1 hr. 15 min. twice a week | 1 hr. 15 min. twice a week | 2 hr. 45 min. once a week | 2 hr. 45 min. once a week |

Data Sources and Collection

Semi-structured interviews, classroom observations, students surveys, document reviews, inventories of CT dispositions and epistemological beliefs were used to create detailed descriptions of instructors' beliefs and practices (Table 4). Prior to data collection, participating instructors and their students were required to fill out a paper-based consent form that was distributed and collected prior to the first classroom observation (Appendix F, G).

Semi-structured Interviews

Two one-and-a-half hour, semi-structured interviews were conducted with each participant and used as the primary strategy for data collection. The purpose of the first interview was to collect information about the participant's espoused teaching practices for CT (Appendix H). It began, however, with the instructor's definition and conceptualization of CT (beliefs) in order to establish a common understanding prior to discussion of their teaching practices. The remaining questions were primarily based on strategies informed by the CT literature (Chapter 2) and from my classroom observations. Most of the questions were open-ended, but the interview also included some closed-ended questions about skills they were trying to foster and strategies they employed to accomplish their goals. For example, I first asked them to identify which CT skills they were trying to promote in their course and later asked them to rate how often they

Table 4

Summary of Data Sources

| Research Question / Purpose | Data Sources |
|--|--|
| Participant Selection | Instructor Survey (TGI, background) Personal communication |
| Teaching practices (design, implementation, assessment) | Interview Syllabus and course documents Classroom observations Student survey |
| Beliefs About CT | Interview California Critical Thinking Dispositions Inventory |
| Related beliefs (Epistemology, self-efficacy, perception of students) | Interview Epistemological Beliefs Inventory |

used particular skills identified by the American Philosophical Association (APA) (Appendix I). The purpose of the prompts was to stimulate discussion and to collect data that could be directly compared with their students' perceptions.

The second interview investigated faculty beliefs about CT and related beliefs such as self-efficacy, epistemological beliefs and perceptions about the students (Appendix J). The questions in the interview were mainly based on existing literature (Paul et al, 1997; Tsui, 1998) but I also asked follow-up questions from the previous interview, about specific events I observed in classroom observations and made further inquiries about inventory results.

The interviews were scheduled at the instructor's convenience during the last two weeks of the semester and took place on Lakenorth's campus. Specifically, the beliefs interview was conducted after all other data was collected to reduce any potential biases that could have affected the classroom observations. Prior to the first interview, I requested permission to audiotape it and also mentioned that I would be taking notes. I prepared for the first interview (teaching practices) by reviewing course documents and classroom observation notes to uncover additional topics not included in the interview protocol. For the second interview (beliefs), I reviewed audiotapes from the first interview in their entirety and noted additional follow-up questions. In the end, each interview was transcribed verbatim and participants were asked to review them for accuracy. In the case of John, the majority of the second interview did not record. Consequently, notes were typed immediately and sent to John for review. He

made some modifications and added missing information. Carl was the only participant who did not comment on the interview transcripts.

Classroom Observations

Observations were conducted throughout the semester in order to identify teaching strategies used to promote CT. They were intended to complement interview data and course documents in order to provide a more comprehensive view of teaching practices. Specifically, the observations were guided by the literature on strategies recommended to promote CT skills and dispositions (Appendix K).

Dates for classroom observations were negotiated with the instructors. In particular, instructors were asked to select four classes throughout the semester that would provide a comprehensive view of their teaching practices. Due to a last-minute scheduling conflict with Gordon's course, I was only able to observe three of his classes.

My role was that of a non-participant observer (Creswell, 2002). Sessions were audio-taped and extensive field notes were taken from the back of the classroom. The students were informed they did not have to participate and assured that any data collected during classroom observations would remain confidential and would in no way affect their course grades. Most or all of the students in each class provided their consent.

Student Survey

Since limited resources did not allow multiple observers in the classroom or observations of every class, a survey was distributed to students in order to elicit

their perceptions of instructors' teaching practices (Appendix L). On a three-point scale (Never = 0, Sometimes = 1, Often = 2) students were asked to rate how often their instructor asked them to participate in various in-class activities (e.g. case studies) and how often their instructor used various strategies (e.g., provided students with feedback on thinking). Based on the Critical Thinking Dispositions Inventory subscales, students were also asked to rate how often their instructor encouraged dispositions of CT. In addition, students were asked to rate how often the course addressed various CT skills. These items were derived from the APA's set of 16 subskills along with two additional questions relating to the college's definition ("Distinguish between evaluating the validity and soundness of arguments", "Distinguish between deductive and inductive arguments"). In addition, students were asked to verify whether or not they were required to complete various types of homework assignments or projects (e.g., research paper, journal). These responses would later be compared to their instructor's closed-ended responses to the same questions.

The student survey was distributed during the last two weeks of class. Students were again reminded of the study's purpose, that their responses would remain anonymous, and that their course grades would not be affected by their responses or willingness to participate. No personal data was collected from the students.

Due to scheduling circumstances, the students in John and Gordon's courses were not able to take the survey in class and were instead permitted to take the surveys home. Most of John's students returned the survey the following

class, but only three of Gordon's students completed it. Therefore, the survey was made available online and an additional four students filled it out.

Course Documents

Syllabi, grading rubrics and exams were collected for the purpose of confirming instructors' espoused teaching practices. For example, syllabi were obtained for the purpose of examining course goals and instructional plans related to CT. Most of the documents were collected at the beginning of the study (electronically and in paper format), and others were submitted as they became available (i.e., exams).

California Critical Thinking Dispositions Inventory

The purpose of the California Critical Thinking Dispositions Inventory (CCTDI) is to measure one's disposition toward CT and to create a profile of attitudes or habits of mind. Scales of CCTDI include: Truthseeking, openmindedness, analyticity, systematicity, CT self-confidence, inquisitiveness, and cognitive maturity (Appendix M). It takes approximately 20 minutes to complete and was used to provide additional information about faculty beliefs about CT.

The CCTDI is composed of 75 Likert-type items scored on a 6-point scale anchored by "agree strongly" and "disagree strongly." The possible overall score ranges from 70 to 420. Reliability of the overall instrument (Cronbach $\alpha = .90$) and the subscales (Cronbach $\alpha = .72$ to $.80$) was established using a sample of over 1000 college freshmen (Insight Assessment, 2003).

The inventory was given to each instructor in person. Participants were given instructions (Appendix N) and two weeks to complete the survey. Scores were tabulated by hand and e-mailed to the instructors when available.

Epistemological Beliefs Inventory

The Epistemological Beliefs Inventory (EBI) was used to identify faculty's epistemological beliefs and used as a starting point for interview discussion. The 32-item inventory is based on Schommer's (1990) Epistemological Questionnaire (EQ) using a 5-point Likert scale ranging from "strongly disagree" to "strongly agree". The EBI and the EQ are typically used to assess students' epistemological beliefs on five dimensions: a) Omniscient authority; b) Simple knowledge; c) Certain knowledge; d) Quick learning; and e) Innate ability (Appendix O). For the purposes of this study, the EBI was used instead of the EQ because it takes less time to complete, adequately measures the five epistemic dimensions hypothesized by Schommer (1990) and was found to have better test-retest reliability (Schraw, Bendixen & Dunkle, 2002). It also required fewer modifications with respect to the wording of items.

To adapt the survey for faculty use, modifications to three items were made. For example, "I like teachers who present several competing theories and let their students decide which is best", was changed to "I like presenting several competing theories and let my students decide which is best". Since the EBI was primarily intended to provoke reflection and there is no comparable data set with which to compare faculty scores, the 5-point scale was changed to a 6-point scale to avoid "middle of the road" responses.

Faculty were asked to take the EBI at the beginning of the second interview. Instructors took approximately 10 minutes to complete it. Follow up questions related to inventory responses were later asked in the interview. For example, "You strongly agreed that truth means different things to different people. Please explain your response".

Pilot Study

Self-made instruments used in this study were pilot tested in order to ensure clarity of questions and usability. First, the online instructor survey which included the TGI and background questions, was tested by one volunteer instructor from Concordia University's Child Studies department. In particular, she was asked to comment on navigation, font clarity and presentation, spelling and grammatical errors and report how much time the survey took to complete. The survey took about 10 minutes to complete, was clear and simple to navigate. One typographical error was detected and modified for the final version.

All remaining protocol and surveys were tested with one volunteer faculty member from Concordia University's educational technology programme. The instructor was selected because she was reflective of her practice and was teaching a small, graduate level course in Human Performance Technology (HPT) intended to promote CT. It also appeared to be an appropriate sample since the students were studying survey construction and formative evaluation and could provide useful feedback on the survey.

First, the four-page classroom observation protocol and audio recording equipment was tested in a class with 13 HPT students (similar number as

Lakenorth classes). The protocol appeared to be appropriate but one section was added to record approximate time spent on administrative tasks, lecture, students engaged in activity and total class time.

Second, the two interview protocols (i.e., beliefs and teaching practices) were then tested with the same volunteer instructor. For the instructional practices interview, she provided positive feedback on the flow, sequence and clarity of questions. In addition, the instructor felt that probes and examples of CT were helpful in reflecting upon her teaching practices. The total interview time was one hour and ten minutes. The beliefs interview yielded similar results, with the exception of one open-ended question about epistemological beliefs. It was difficult to answer on the spot, despite the instructor's previous reflections on the topic. As a result, a decision was made to administer the EBI to participants in the final study in order to stimulate discussion about epistemological beliefs.

Finally, the student survey intended to elicit student feedback about the course was pilot tested near the end of semester. Verbal and written feedback from the 13 participants suggested that the four-point scale was too confusing (Never, Seldom, Occasionally, Frequently) and some of the language was difficult to interpret. The instrument took a maximum of 10 minutes to complete, but some students complained the survey was too long. In addition to direct student feedback, student responses on the survey suggested that some questions were not clear. While the results were not formally tabulated, it was obvious that responses to most questions varied greatly and that the instrument required modification and an additional pilot test.

Accordingly, the four-point scale was modified to include a three-point scale: Never, sometimes and often. The revised instrument was tested in a graduate-level Methods course in Concordia University's educational technology programme (n=18). Direct feedback from the students suggested on the whole that questions were clear and the sequence was appropriate. A few students mentioned that it was difficult to decide how often something occurred. Precisely quantifying "sometimes" or "often", however, would require each item to have its own scale. For instance, if students have to present two formal presentations in one semester, it could be considered "often", but contributing to class discussion two times in one semester is not often at all. Given that the survey was to be used as a complement to instructor and researcher perceptions and not intended to be a precise instrument, additional changes were not made to the rating scale.

In addition to issues with the scale, some examples and definitions were added for clarification. For instance, several students responded they debated in class when it was not in fact a planned instructional strategy. The item was therefore re-worded: "prepare and participate in a *formal* debate in class". Similarly, internships and field experience was defined as "a supervised activity in a professional setting".

In sum, self-made instruments were tested and most required minor modifications. On the other hand, the student survey was tested, revised and tested again with a second group of students. It should be noted that similar issues with the survey resurfaced in the final study, making it an untrustworthy source of data.

Data Analysis

The principal analytical strategies used in this study were based on the grounded theory approach (Strauss & Corbin, 1998). In general, the ongoing, inductive and interpretive analyses examined both within-case and cross-case themes of instructors' teaching practices for CT and beliefs driving their practices. Analysis began with "open coding" and identification of tentative conceptual categories and emergent themes from the raw data. The next task was to re-examine the categories and determine relationships among them. In the process of "axial coding", discrete categories identified in open coding were combined in new ways to describe the big picture of each participants' teaching practices and beliefs. Finally, during "selective coding", the categories were refined and integrated in order to present a rich account of the phenomena under study. The following paragraphs describe procedures in greater detail.

Stage 1:

In the first stage, data analysis occurred simultaneously with data collection (Strauss & Corbin, 1998; Miles & Huberman, 1994). Course documents were reviewed, interviews were transcribed, inventories were hand-scored and descriptive statistics for student surveys were tabulated as soon as they became available. Detailed descriptions of each classroom observation were constructed from protocol data, personal notes and audiotapes of the sessions. Examples of instructor and student statements were included verbatim.

Stage 2:

The second stage involved organizing the data and inputting it into an MS Access database. Each case was then examined holistically. For example, interview transcripts were read several times, and course documents, observation descriptions and inventory scores were revisited.

Stage 3:

In the third stage, an attempt was made to conduct a detailed content analysis of each participant's interviews but resulted in a broad overview and summary of instructor data. Several concerns emerged during this phase which resulted in the change of plans. First, discussions about beliefs and practices were included in both interviews and could not be coded separately. Second, the overall picture or story was lost in the detailed content analysis because it was difficult to concisely tag the instructors' stated intentions, beliefs and practices in one or two words. Finally, I attempted to map the instructors' open-ended responses about CT skills fostered in the course onto the APA's categorization scheme. The open-ended responses, however, did not appear to fit the APA's model. In several cases instructors were using APA terms to describe entirely different cognitive skills. It therefore made sense to assemble the two interviews for each participant, organize them according to major themes (Appendix P), paraphrase ideas and use direct quotes to create their case descriptions (Stake, 1995). Cases were organized in Microsoft Word using the cut and paste feature. The goal was to create a comprehensive picture and to recount participants' stories using their own words and ideas.

Once the interview data were organized into major categories, additional data was introduced to confirm or disconfirm their perspectives. For instance, if an instructor espoused the use of open-ended questions to stimulate student thinking, I looked for examples from the classroom observations and inserted them into the case description. Likewise, I commented if I did not observe the participant use the strategy. If the instructor talked about integrative essay exams and written homework assignments, I referred to the course documents to validate those accounts and included specific examples from those documents. Student perceptions were included for the sake of completeness but high standard deviations on most items suggested the data were unreliable. In sum, this phase assembled the raw data into “case descriptions” which included participants’ conceptions of CT, teaching practices for CT, inventory scores and beliefs about related issues (e.g., perceptions of students).

The second major difficulty in this phase was separating the category of “teaching practices” into distinct subcategories. Specifically, I tried to separate elements of planning/design, instructional strategies (e.g., case studies) implementation strategies (providing feedback, discussion, modeling CT) and assessment strategies (e.g., open-ended exams). While assessment strategies were fairly straightforward, the rest of the category contained a great deal of overlap. Separating them did not allow for a holistic description of their courses, therefore participants’ practices were divided into two main themes: a) Course structure and instructional strategies; and b) assessment.

Each case was then sent to participants for validation. They were asked to comment on the accuracy of their stories and to make necessary modifications. Participants believed the narratives were accurate and few changes were made. In particular, John commented:

I have read twice the synthesis you compiled of my teaching practices and beliefs based on your observations and interviews. I think you have done an amazing job of pulling it together. Your description is very accurate and reflects exactly what I try to do and how I feel about the issues you raised. You even capture my occasional confusions and contradictions, which is an accurate portrayal of how I am feeling my way through this whole CT challenge and learning as I go... Well done!

Stage 4:

The fourth stage involved a qualitative analysis of the relationship between instructors' espoused teaching practices and actual teaching practices as well as the relationship between instructors' beliefs and teaching practices for CT. Since participants validated the accuracy of their case descriptions, these data became the foundation for further analyses. There were two steps in this process: a) Detailed content analysis of their beliefs and practices; and b) search for both consistencies and inconsistencies in their beliefs and practices.

For example, qualitative comparisons addressed whether or not the instructor employed instructional strategies that were consistent with how they believe CT develops and the skills he/she was trying to promote. In addition, CCTDI scores, which reflect their attitudes toward CT, were compared with how

often their students believed the dispositions were being fostered in the course. In a similar manner, other beliefs (self-efficacy, epistemology, student ability) were examined for consistency with teaching practices. While case descriptions were used as the basis for content analyses, raw interview data was revisited.

Stage 5:

The final stage was a cross-case analysis of teaching practices and beliefs held by the four participants. Comparisons were made to highlight important similarities and differences among them and later compared to findings from current theory and research. Codeminer/QDA Miner, a qualitative software program, was used to assist in the final two phases of analysis. In the end, a common profile of instructors' beliefs, teaching practices, and general characteristics was generated.

Validity and Reliability/Trustworthiness

Internal validity in research is generally considered to be the "trustworthiness of inferences drawn from data" (Eisenhart & Howe, 1992, p. 644). In other words, how congruent are one's findings with reality? (Merriam, 2002). Potential problems of internal validity were addressed in this study by collecting multiple sources of evidence to measure the same phenomena (Merriam, 1998; Merriam, 2002; Yin, 1994). For example, instructors' teaching practices were examined through interviews and checked against observational data, student surveys and document reviews.

In addition, suggestions in the literature for improving validity were employed (Lincoln & Guba, 1985; Merriam, 1998; Miles & Huberman, 1994; Yin, 1994).

First, member-checking was used to increase the validity of findings. With the exception of Carl, participants reviewed their interview transcripts for accuracy and later assessed their case descriptions. Since he participated in all other aspects of the investigation and chose not to withdraw from the study, his data was included in the final analysis.

Second, prolonged engagement provided additional credibility. While working at Lakenorth, I first became acquainted with the “culture” and context of the college and then observed classrooms throughout the semester. Third, peer examination by the researcher’s advisor occurred throughout the study and an “outside” evaluator conducted an audit review. The auditor was a doctoral candidate in Concordia’s educational technology programme with expertise in faculty development. Fourth, researcher biases were clarified at the outset of the study and described in this chapter. Finally, validity was further established through the cross-case analysis.

External validity refers to the generalizations of the study’s findings beyond the immediate case study (Yin, 1994). It cannot be defined in the same way as in correlational or experimental research designs where external validity is addressed, for example, through random sampling techniques (Lincoln & Guba, 1985; Merriam, 1998; Yin, 1994). In case study research, results rely on analytical generalizations or generalizations to a broader theory. External validity was addressed in this study through the use of multiple cases and by providing rich descriptions of the context and its cases. Readers are expected to determine the extent to which results from thick descriptions can be applied to their context.

Reliability refers to the extent to which findings can be replicated in order to arrive at the same conclusions. Suggestions to increase reliability include clearly documenting procedures, using case study protocols and making steps as operational as possible (Yin, 1994). These procedures as well as peer examination and an audit review were used as well.

Ethical Considerations

Consent to conduct the study at Lakenorth College was first approved by the Assistant Provost. Prior to data collection, Concordia's Human Research Ethics Committee granted ethical approval. In brief, this study did not include any formal intervention or "treatment" nor did it include deception. It therefore posed minimal risk to participants.

Instructors and their students were informed about the purposes of the study and asked to sign a consent form. If students of participating instructors chose not to participate, none of their statements made in class were included in the study. Furthermore, student surveys were anonymous and confidential.

Due to the study's design, (instructor) data was not anonymous but all references to participants and the college have been replaced by pseudonyms. Instructors were also given the opportunity to approve interview transcripts, their case study descriptions and the researcher's interpretations of their data. One instructor chose not to review reports of his data, but was given several opportunities to do so. He was also reminded of his option to withdraw from the study.

CHAPTER 4

Case Descriptions

The following chapter includes case study descriptions of each participant. The aim was to create meaningful and vivid accounts of participants' teaching practices and beliefs by summarizing available data sources. At the core of these stories are participant perspectives of practices and beliefs revealed through semi-structured interviews. Additionally, they are supplemented by corroborating or contradictory evidence exhibited through classroom observations, course documents and the instructors' inventory data.

Each story begins with a brief introduction to the context with background information on the instructor, the course and the students. The remainder of each case includes the following elements: a) Teaching practices (e.g., CT skills fostered in the course, instructional strategies and assessment); b) beliefs (e.g., conception of CT, development of CT, barriers to CT); c) relationship between the instructors' espoused teaching practices and actual practices; and d) relationship between espoused beliefs and actual teaching practices.

Given the high variability in student survey data, student perceptions were not used as a main source of corroborating evidence of teaching practices but are discussed at the end of each case description.

In the Business of Thinking: John's Story

Background

John began his teaching career at Lakenorth College 18 years ago in the Business Administration division. He eventually became Chair of his division but resigned in order to return to the classroom. He currently teaches courses such as Problem Analysis & Decision Making, Human Resource Management and the Senior Seminar in Contemporary Business Issues.

He has worked as a business consultant, holds an MBA, an M.S. in Economics and recently earned his re-certification as a Senior Professional in Human Resources. Over the past five years, he has attended a variety of in-house professional development workshops and voluntarily met with the Instructional Design consultant in the spring of 2002 for assistance with the Course Enrichment process.

After requesting John's participation in the study, he selected the Senior Seminar in Contemporary Business Issues as the context for his teaching practices. Nineteen senior-level (fourth-year) students were enrolled in the required seminar-style course which met twice a week. An average of 16 students were present at each of the four classroom observations.

Teaching Practices

Classroom Overview

In John's classroom, the desks were arranged in a full circle in order to facilitate discussion. John sat among the students positioning himself near the

blackboard. At home, students were expected to read the assigned material and to prepare questions for full-class discussion.

A typical one-hour and fifteen-minute class began with John reviewing upcoming readings and making connections among them as well as articles covered in previous classes. For the remainder of the seminar period, John used many open-ended questions, probes and prompts to get students to discuss the readings in depth. When discussing case studies, one or two students were also asked to research “the big picture” of the selected industry and briefly present it to the class. On a few occasions, he used the blackboard to write down main concepts and once I observed John use an overhead projector to illustrate concrete examples of quality issues in business.

Critical Thinking Skills

I asked John which critical thinking (CT) skills he was trying to promote in his course and he mainly discussed critical reading, communication and analytical skills. With respect to reading skills, John believes that many students are not critical or “aggressive readers” and do not take the time to think about what they do not understand. Therefore, John mentioned that he tells students at the start of the course that he expects them to mark up their books up, write in the margins, underline, circle, write down questions and note things they do not comprehend. The expectation for critical reading, which includes marking up the texts and writing down questions, were clearly outlined in his syllabus.

In addition, he talked about analytical skills which he tries to encourage through discussion of case studies and articles in class. Specifically, John

reported that he does not ask students to analyze the structure of arguments but does require them to interpret articles, support their opinions, find relevant suggestions in the articles and relate the readings to their prior experience and knowledge. He said that students were also required to evaluate the readings in terms of whether or not they agreed or disagreed with the author's conclusions. He reasoned that it was important to evaluate conclusions in the readings because "there is much that happens situationally that does not adhere to theory in the management side of business". Another analytical skill mentioned was getting the students to "think broadly" about business issues and to examine how companies fit into the bigger picture of the whole industry.

For example, one class they were discussing a case about a micro-brewery and one student was asked to present an overview of the beer industry. After she completed her summary, John probed further by asking, "What about the structure of the American beer industry? Do you have a sense of the major players, market shares and types of beer people are drinking? What does that tell you about the success of craft beers?". My classroom observations indicated that John was in fact promoting the skills he mentioned, primarily through the use of questions about the material and by requiring students to research and present industry overviews. It should be noted that his syllabus explicitly stated these expectations by advising students, for example, that they should be "reflecting on how the articles relate to what you learned in previous classes and to your own work experiences and existing knowledge...".

Finally, John said that he was trying to promote communication skills such as critical listening, critical writing and oral communication. He hoped to develop critical writing skills through two major writing assignments which included a book review as well as writing letters to the editor of Fortune Magazine. In order to develop oral communication skills, John required students to participate in class discussion, present industry research and to make one formal presentation on their book reviews. In the formal presentation, John remarked that he was looking for clarity of ideas, the ability to present two or three of the most important ideas from the book, answer questions from their classmates and lead discussion. In the interview and in the syllabus, John discussed his expectation for students to listen attentively to their classmates' comments and to respond to them in a thoughtful way that connected ideas and created something new.

Course Design and Instructional Strategies

When I asked John how he designed his course for CT, he spoke at length about his selection of reading materials for the course which included a book of case studies, an edited management book and Fortune Magazine. He noted that the articles and cases were often open to interpretation with no right or wrong answers, demonstrated multiple perspectives on management issues and often challenged standard beliefs. Specifically, he talked about an article written by Henry Mintzberg which challenges the standard teaching practice of management and therefore "contributes to the development of critical thinking". He reflected that the students were a bit intimidated by the difficult writing style and length of the article at first, but once they began to peel back the layers the

students started to see “there are multiple perspectives and get excited about it... they can make connections to their own work experience as well”. In particular, he wanted students to understand from this article that teachers do not have all the answers and that challenging opinions opens doors for questions and for improvement. Additionally, he believes that Fortune Magazine is one of the best-written business magazines in terms of the content, presentation style and writing. He added, “Fortune is written for a well-educated, thoughtful audience... that contributes as well to supporting the idea of them thinking critically about it”.

Next, John described two writing assignments. The first “real critical thinking exercise” required students to write a letter to the editor when they covered Fortune Magazine in class. He reported that students were supposed to reflect on one of the articles that impressed them and to write a response to it. In the interview, John asserted that he advised students to go beyond the surface of the article to either support and extend the argument that the article presented, challenge or contradict it, present counter examples, offer elaboration or simply ask pertinent questions. Every year, he proudly informed me that one or two of these letters get published in the magazine. Again, the syllabus clearly outlined his expectations for the Letter to the Editor assignment.

The students also had to write a five to six-page review of a business-related book and present the summary in class. In this writing assignment, he expected students to work in pairs and to assimilate ideas presented in the book, condense them, filter them out and rank what was most important. He provided students with a handout that defined an “executive summary”, explained the

value of the assignment, described how to select a book and prepare the summary and provided a list of suggested books. He hoped the students would gain better insight from the book in pairs because if they would likely have different ideas about what was important and would “hammer that out”. He also used the team approach because he suspects that sitting down and discussing a book is something students “probably don’t do on their own”. Furthermore, he thinks the quality of the final written report will be higher if both have input and edit each other’s work. He is therefore disappointed when he finds that in some pairs, students read half of the book and split the writing.

When I asked John how he developed his students’ CT skills in the classroom, he discussed at length the notion of setting expectations. In particular, John told me that he spent the entire first week of the semester going over the format of the course, trying to get the students comfortable with the idea that they have a lot of assimilated knowledge and experience and the seminar format is a forum where they should start exchanging that information and knowledge. He clarified very specific responsibilities for himself and for the students and emphasized that everybody has a responsibility for the success of the class on a given day. He believes he had to change the students’ attitudes and practices about pre-class preparation, because a lot of them are used to waiting for the instructor to present the main ideas in class. He explained:

What I’m trying to do there is give them the permission, the license, the courage, whatever it might be to recognize their own expertise, their own

knowledge and encourage them to share with the others in the class, so I tell right up front that this is not going to be a lecture class. I'm not going to be standing here delivering to you each day, it's going to be shared by all of us... so they know on the first day of class that this is different than all of the other classes that they've taken.

While I did not observe the first week of classes, these expectations were in fact reflected in his lengthy course syllabus. In addition to standard features of a syllabus (i.e., learning outcomes, grading policies), he clearly expressed his expectations for "Preparation, Presence, Participation and Professionalism". The syllabus also described the concept of a seminar and compared it to a lecture class, outlined student and instructor roles in the seminar and even provided detailed guidelines for pre-class preparation (e.g., identify the big picture, make note of unclear concepts, identify positive and negative implications, make connections and integrations among previous articles, cases and other information). Moreover, John conveyed clear expectations for CT in his syllabus. In the course goals, he wrote, "students will enhance their critical thinking skills through analysis, reflection and discussion...". In the student learning outcome section he used words such as "read critically", "discern key ideas", "analyze organizational situations", "examine critically your own beliefs" and "formulate, present and defend positions".

Related to the expectations outlined, John said that when he covered articles in class, he constantly pushed the students with questions and tried to connect the articles to things they learned in the course, to other classes and to their

experience. As a capstone course, he believes the purpose is to integrate things that the students have learned in other classes. He said that he is familiar with the students' background and with other courses in the program which makes it easier for him to make those connections and to strategically call on students based on their experience and knowledge. During the four classroom observations, John repeatedly asked the students questions to help them advance their thinking of the reading materials. Some examples of questions I observed were:

- What do you think about that article? Is the judge acting beyond the boundaries of bias? What argument could you use here to defend the judge?
- What do you think of the methodology? Is it appropriate?
- I want to go a bit further with it. Neil, what do you think?
- Does somebody want to play devil's advocate?
- Do we accept this view?
- What is the argument here?

John also made comments and asked questions to help the students connect material to their experiences and prior knowledge. For example, when a case they were discussing dealt with the theme of "price signaling", he asked:

"Where'd that come up before this year? ". On many other occasions, he tried to get the students to relate the business topics to personal experience. In one instance, he read a quote from an article which identified the author's belief that individuals in the workplace need to feel like they belong and are supported as

the world becomes more uncertain. He posed the question: "Is it something you agree with? When you go to work, is that something you need?" and asked the students to think back to where they were when the World Trade Center was attacked and how their co-workers reacted. He then asked the students to define community, encouraged students to think about what they wanted in their own jobs and careers, to identify the benefits of communities in the workplace (i.e., job safety, support) and then tied in several other themes that were covered in previous classes. Other examples of connecting material were:

- Who else is doing that in terms of their vehicles? Any other service company that's doing the same thing?
- Last semester in the Problem Analysis class we talked about people who don't see problems until it's too late...
- What ideas or explanations of the author did you get from the article? This is a theme that's come up before. Who's in charge here?
- Where do your values come from? When you go to work every day do you consider it a place where you are learning values?

With respect to oral presentations on the student book reviews, John said that he was planning to ask the students evaluation-type questions that were not required in the written book review. I observed three pairs of student presentations in which John asked questions that probed for more detail, assessment of the author's credibility and to identify the target audience. For example, he asked, "Do you get the impression that the authors of Southwest were being objective in their analysis? What cautions or concerns do you have

about the book being an autobiography? Is [the book] aimed at young people, managers, entrepreneurs, women, men? What things work at Southwest that would not work some place else?". In addition, John made connections among themes presented in the books (e.g., "the golden rule") and asked if the concept still had a place in business today. Similarly, fellow students asked the presenters questions such as, "What did you get from the book? Do you think the company's success depended just on Jack Welsh [president] and his personality? How is the future of GE looking given that the US moving toward a more service industry?". The following statement sums up John's questioning strategies: "One of the things that I really encourage my students to do is to ask more questions about the things that they're being told as factual, and start challenging those assumptions". My observations indicated that every class John constantly posed questions that guided students into thinking critically about the readings.

In addition to questions, John said that he provided feedback on students' thinking in class but was careful not to dismiss student ideas because "you run the risk of making the student unwilling to participate in the future". Instead, he tried to "do some kind of stroking things". Specifically, he mentioned that students often do not have much experience in the world and are quick to use anecdotal evidence to support their opinions. Therefore, he asked students to think about those experiences and to decide whether or not they were universal or unique and to be careful not to generalize.

I observed this type of feedback in class as well as several other examples of positive feedback on thinking. He commented, "Good. I couldn't have said it better. That's exactly what he did" or "I appreciate the point you're making...". On other occasions, his feedback included probes for further evidence or justification for students' opinions by asking, "Can you give me an example of that?". In general, John said that he would rather "nurture along the ones who are not talking than whack them over the head. I'd rather be a diplomat than dictator".

John also mentioned that he provided written feedback on students' homework assignments. While I did not examine student work, in the interview he stated that he wrote comments on their papers such as: "Can you suggest something else the article could have done? Do you see any flaw in the article...? Do you see any connection between this article and some other company that we've talked about?".

Additionally, John tried to model CT in various ways. He said for example, that he exaggerated "confusion" about what the author's intentions were and tried to let students know that it is acceptable to not have all the answers. He also reported that he asked a lot of questions about the articles to show students by example how to attack a case or an article and purported to model critical listening by weaving together or contrasting different comments that students have made.

From my observations, it was clear that John was in fact modeling the behaviours he described by asking questions, identifying main themes, connecting ideas and interpreting graphs with the students on a regular basis.

For example, he said, "One of the things I flagged here", "... we have to challenge this with our own evidence and decide whether or not we accept this or not", "this is one of the more interesting articles I've read... I've been thinking about it since I read it and reflecting upon it. I hope you folks have been too". I pointed out that he also modeled "aggressive reading" by showing the students all the markings and notes in his own book.

Furthermore, John reported that he gave students time to structure their ideas and to reflect, but expected them to do most of the work at home, to spend time reading and preparing the articles because they do not have time in class for low-level or basic thinking (e.g., identify the purpose of the article). When they come to class, he informed me, they should share their insights, share what they have already assimilated and concluded and then discuss it back and forth. In class he added, "it's just a matter of finessing it and discussing it and seeing if other folks agree with them and offering their criticisms...". These requirements were clearly written in the syllabus as well.

John gave the students grading criteria for all of the assignments except for the book summaries. While he gave them an outline and provided them with models from previous students, he did not tell them how this assignment would be graded. In the interview he realized that perhaps his expectations could be clearer and wondered why he had not provided grading criteria to students for this one assignment. Generally speaking, intellectual standards to assess the quality of thinking, were embedded within the assignment descriptions. For instance, in the Letters to the Editor, John provided a detailed handout that

stated simple regurgitation, rehashing or superficial agreement with an author's statement was not sufficient. Instead he made suggestions like the following:

Your response can support and extend the observation or conclusion... You would do this by identifying further complementary evidence, or by citing other applications taken from your own experiences, observations, readings or expertise. Note: again, your personal opinion is worth very little. You have to offer more than simple agreement with the article.

There were two additional strategies I observed in John's classroom, despite the fact that John did not discuss them in the interviews. First, John said that he did not use brainstorming techniques in class but I but observed a great example of it one day when during John asked the students to define "quality" and what it means to them. As students voluntarily offered their definitions, he wrote them down on the blackboard. He then went around the room calling upon each student to ensure that everyone had a turn to contribute. When they were finished, he said, "I'm not looking for a perfect definition, because there isn't one... it can be many things to many people". Next, he asked students to relate their recent experiences with both good and bad quality of service or products and gave his own examples. In this instance, he elicited students' prior experience, called attention to multiple perspectives on quality and then related the discussion back to the article in the book. Finally, he made connections to previous articles and themes covered in the course as well as in other courses by asking questions like, "What about the role of measurement in terms of maintaining quality? Did you talk about this in your other business classes?".

John also articulated that he did not elicit prior knowledge because “whether they know something or not has no bearing on whether we discuss it in class”. Since I had witnessed several instances of eliciting prior knowledge, I probed further in the interview. For instance, related to the articles or cases discussed, John asked students if they knew about “Six Sigma”, if they remembered Leona Helmsley from the 80’s, if they remembered discussing paradigm shifts last semester and the “football metaphor from last week”. John finally realized that that he did in fact ask students if they knew about a topic and said that he spent a few extra minutes discussing the topic when necessary. In addition to prior knowledge, John often elicited students’ prior experiences in order to make the topic of discussion more relevant to the students.

By the end of the course, I noticed that students sometimes made their own connections without being prompted. When they were discussing the idea of community in the workplace, Joyce offered, “This sounds exactly like some stuff we talked about in sociology and comparative cultures which is *Gemeinschaft* and the sense of community...”. John admitted he was not familiar with the word and asked her to define it. She explained the concept and went on to relate it to what they were discussing:

It means societies that are close-knit and it seems like we’re making jobs like little communities...you don’t need outside forces, like laws to take care of your behaviour because you have a sense of duty from the group to do what you’re supposed to do. This sounds like exactly what we’re making,

these *Gemeinschafts*, these little communities. They have the same exact aspects.

Dawn interjected by comparing the *Gemeinschaft* to Asian communities and Joyce further added that it is respect for the community that keeps people from breaking the law. John paraphrased Joyce's statement, commented that it was a wonderful thought and probed further: "Translate that over to a workplace. What are the implications of that in a workplace?". A few students offered their insights about "expectations" based on their own work experience and John suggested that policy manuals and regulations might not be necessary in a *Gemeinschaft*. Jerry questioned this idea by suggesting there might be loopholes in the system and people might take advantage of it. Dawn disagreed: "Only if you're not part of that system... If you're part of the community, you wouldn't take advantage of it.". A lively discussion on this topic continued until the end of class. This incident which occurred at the end of the course, was an excellent demonstration of students spontaneously using their CT skills and discussing the material in depth.

Assessment

The final aspect of teaching I explored was assessment practices. I asked John how he determined if students were learning the course content. He said he could tell by the quality of their classroom discussion. For example, he looked to see if students were contributing valuable insights, responding to questions insightfully and identifying the big picture of the article or the case. John added he had more difficulty assessing those who were passive in class so the exams gave him a better sense of their learning.

Accordingly, students were given a mid-term exam and a final exam. The essay exams were open-book and “integrative”. The purpose, he said, was to get the students to think and to connect things they learned in other courses and in the Senior Seminar. He also hoped questions were phrased in a way that tested their CT skills. Some of the questions, he stated, connected things from the articles and the casebook or to get them to expand on an article they read in Fortune Magazine. They were given choices from a number of questions and were open book because “what is important is to make connections between things and to have gleaned stuff out of the articles but not necessarily to memorize them”. The following exam question illustrates this point:

The *post mortem* analysis of Enron’s collapse shows there were many contributing factors and causes that led up this sudden, shocking bankruptcy. Choose any one of these factors or causes and explain it fully with an emphasis on how it contributed to Enron’s collapse. Also offer a prescription (solution) that corporate America could adopt to reduce the possibility of this factor hurting another corporation in the future.

Additionally, John reported that he emphasized to students that they only have an hour and 15 minutes and that part of being a good student is being able to marshal thoughts, get them down on paper and to budget time.

Participation and discussion were also graded (35% of the total grade), as were the Letters to the Editor and book review (written and oral). At the end of the semester, he also asked the students to conduct a self-evaluation of their classroom participation and to do a peer evaluation as well. Before handing out

the assignment, he told the students they were there to learn from each other and that part of being a good learner is being able to evaluate the source of the knowledge. He reflected that he should probably do several of them during the semester to provide additional feedback to the students, which in turn might encourage more participation.

He also provided students with opportunities to revise or resubmit their work. For example, with the Letters to the Editor he said he gave them feedback and that students could re-write the letters. With the book summaries, he said he encouraged students to submit drafts but only one or two of them did so.

According to the students who wrote comments on the survey, it was a great class "in content and the way it was run". A few of them also commented that John is one of the better teachers at the college and the course contained more discussion and involvement than any other. Specifically, "the class hits on all aspects of business education...and really shows what students have learned up until now by digging deeper into cases and providing sound reasons and opinions". On a final note, one student said she liked the discussion aspect of the course because it forced her to put thoughts and opinions out there to be criticized by others. Lectures on the other hand, make students withdraw and learn very little as a consequence. The student added, "We know this after years of falling asleep in class".

As the interview on teaching practices came to a close, I asked John if he had anything else to add. He reflected that I had made him think about things he

has not thought about and that “some of this, these decisions, are just intuitive, and others are based on trial-and-error I guess”.

Summary of Teaching Practices

John’s lengthy and detailed syllabus clearly outlined his expectations which included preparation for class discussion (i.e., reading materials in advance, preparing questions and assertions) and the expectation that students read and think critically about the assigned readings. Specifically, he was hoping to stimulate students’ critical reading, communication and analytical skills.

The seminar-style course mainly involved in-class discussion of cases and articles, an ongoing writing assignment, a book review and related presentation. He carefully selected cases and articles that were open to interpretation, demonstrated multiple perspectives and challenged standard business practices and beliefs. Additionally, students had to research various business industries and briefly present their summaries to the class.

In class, John continuously asked students open-ended questions about the readings which probed students for more detail or to substantiate their opinions. His questions and comments also required students to make connections among course concepts and relate ideas to concepts discussed in previous courses and to their own experiences. He also provided positive feedback on student thinking, modeled CT and supplied students with clear grading criteria for all but one assignment. John elicited prior knowledge on a regular basis and occasionally used brainstorming techniques, but did not report using these strategies in the interview.

Students were assessed on the quality of their in-class participation and were asked to conduct self and peer assessments of in-class contributions as well. They were given two integrative essay exams, graded on written assignments and on oral presentations. In addition, students were given opportunities to revise and resubmit their work.

Beliefs About Critical Thinking

Conception of Critical Thinking

John used the onion metaphor to describe his conception of CT. He believes that students and people in general look at the surface of information and reach broad conclusions based on little evidence. Accordingly, he stated:

Critical thinking is peeling back the layers of things, like peeling back an onion and getting to see what's in the middle of it... What I see critical thinking as doing, is peeling back some of those early assumptions, those early beliefs about what they think they know and getting into the core, closer to what the true knowledge is, what the true facts are and in the process hopefully they're going to come up with new ideas, new ways of looking at old problems, new insights into what's going on around them in business and in the world in general.

In addition to mentioning skills needed in the workplace and in students' personal lives, he believes that students need CT skills to be good citizens and good voters because they are bombarded with messages, have to think for themselves and make decisions. Furthermore, he has come to realize that the ability to apply knowledge, to know which knowledge to use in a given situation, to define a

problem, to reflect upon what you do and do not know, and to identify what information is needed are the CT skills that make people successful in life. And, given that knowledge in every field changes so rapidly, he thinks that students need to constantly re-load themselves with new data, assimilate new information and think their way through problems using information they can find on their own. Consequently, he views the field of business as fertile ground for teaching CT.

Furthermore, his conceptualization includes dispositions to think critically. He believes that some people are naturally inquisitive and courageous. He also thinks that CT is about being skeptical like the Greek philosophers who wanted ideas to be proven before they were accepted. He made it a point to note that we often think of 'skeptical' in a negative way but he does not perceive it to be a negative trait. John also believes that CT requires honesty with yourself, and "knowing what you know and what you don't" as well as being willing to live with uncertainty and questions.

Finally, John's intellectual standards or criteria for assessing CT mainly revolve around support or justification of ideas. He tries to discern between fact and opinion. He said that if he has to follow up a statement with a question like "why?" or "how come?" or "how do we know?" that tells him that the original statement was probably not a critical thought. He added, "I guess the way I discern it is by my own reaction to it".

Development or Acquisition of Critical Thinking

When I asked John how he believes CT develops or is acquired, he laughed and stated that a lot of students never acquire CT skills and noted the “presumption” in my question. Overall, John views CT as a conscious process that is “unnatural” and “hard work”. He reasoned that many people are mentally lazy, unwilling, do not see the need for going beyond the superficiality of things or to ask a lot of questions. Despite his belief that CT is unnatural and that “many people avoid hard work”, he thinks that individuals can make dramatic improvements without a lot of effort. He further stated that CT comes easily to him.

He also considers CT to be developmental and that those who acquire it probably do so “by being exposed to the methods of it, by being challenged by someone to go beyond their first thought, to justify and explain”. He further explained the process:

It becomes natural that when you’re presented with an issue, instead of accepting it you suddenly start asking questions in your mind: Why? Who says? Where’d you get that information? Does this align with what I already know to be true? What established theories are being supported or refuted?...and it becomes a natural...but for a lot of people thinking critically is an unnatural act and you need to have some process to lead you into it and guide you through it until it becomes more automatic and comfortable... By mastering a couple of tools, even knowing a few good questions you can ask at a meeting or any time you’re in a situation, you can put the thought

process into a more critical mode. Having the tools may give them the courage to do it. So maybe there's the connection that I see. The tools are the empowerment or the enabling that allows the courage to come forward. Accordingly, John is a little skeptical of CT classes because he is not certain that we can teach people how to think. Presenting a set of rules to approach a problem is not as effective as modeling it, he purported. He believes that he can model thinking to students by setting an example or by demonstrating an attitude toward CT and hopes that students will remember these models when trying to approach a problem on their own.

At the same time, he believes there is room for both a CT course and learning thinking in context but "ideally they learn the tools to use and they get lots of different contexts outside of that class in which to apply them". He does not believe that students learn the tools by reading them in a book, but instead need to constantly practice them until they become natural. In class, he maintains that students cannot be passive and need to share ideas in order for CT to develop. In addition, he stated that the students' role in the process is to actively read the assigned material, to prepare questions and assertions and to connect ideas to other classes they have taken. He therefore told students on the first day of class that their contribution might also be to ask a question about something they do not understand.

When asked if he believed the skills learned in his course transfer to other courses or real-life situations he said, "I hope they transfer". Since the Senior Seminar is a last-semester course, there is less potential for transfer to other

courses. Anecdotally, he gets feedback from some graduates thanking him for giving them the tools to think in their current jobs. He loses track of most of them, however, and is not sure if the CT skills transfer to former students' workplaces.

In general, John perceives that it is his responsibility to set the tone and high expectations for CT at the beginning of the course, to provide a safe environment for the exchange of ideas, to model CT and to challenge and question the students. John also believes that it is important to find a balance between delivering content and fostering thinking skills in his class. He sometimes feels guilty about not transmitting knowledge because he knows that his students need business content (e.g., balance budgets, create a marketing plan) in order to get their first jobs. To compensate, John stated that he provides students with handouts and has put a lot more of the responsibility on the students to absorb content before they come to class.

What helps him teach for CT is knowing the students' names and backgrounds so that he can call on them in class. Familiarity with the students also "establishes trust", he reflected. He also thinks the natural shyness and fear of speaking are overcome more easily in small classes and there is nowhere for the students to hide in more intimate group settings. On the whole, the students have to understand that it is their "effort and their responsibility" in becoming better thinkers.

Obstacles to Critical Thinking

John mentioned several factors that may act as barriers to the development of CT. These issues were general, related to teaching, to the students and the

institution. As a general issue, John believes that CT is often viewed as a negative term, something that is difficult to achieve and is intimidating to students. He does not believe that we should make it into something that is intellectually imposing and intellectually out of reach for people.

In the classroom, accepting weak opinions as explanation of fact, not pushing the students hard enough to analyze their own positions and accepting anecdotal evidence as universal truth can lead to the failure of students' thinking skills. He also suspects that moving too fast, trying to quickly find an answer or reach a resolution can make it fail as well. Finally, he believes that beginning the class on the wrong foot has an impact on students. Specifically, if he cannot get them engaged on the first day, it can carry over to the end of the course. Sometimes it becomes a power struggle and the students think, "I will not participate and you can't make me".

With respect to the students, one of the main factors he believes limits CT is students' unwillingness to participate in class and their attitude toward thinking. Specifically, he asserted that students enter the business program with the idea that they are there to obtain facts, tools and techniques while employers expect the same. Because students view themselves as full vessels of business knowledge in order to be hired in a good paying job, he believes that "makes it harder to teach critical thinking". Instead, John wants the students to realize that it is the process of discussing ideas and "what we're going through that's important" and not necessarily "the right answer at the end". He believes that some of the students "get really hostile" when you start challenging assumptions

and tell them they have to be more critical about what they read and not believe everything that is in the textbook.

John acknowledges that the student quality has improved in the last couple of years but also mentioned several background issues that can impact CT development. For example, many of his students have not had tremendous academic success in high school, lack experience in the world, are first-time family members going to college, lack confidence to speak up in class and are extending themselves when presenting ideas in class.

Another big hurdle is that many students are working 35 hours a week. Taking classes therefore may be far down the priority list behind work, family, social activities and skiing. He also believes that students' lack of pride in their work is a serious problem and said: "Too many of our students are satisfied with doing mediocre work". For example, one student recently asked him if she could attend a wrestling match instead of taking the final exam. Others, he added, do not bother to check spelling and grammar on their written assignments.

John also believes there are several institutional factors that make it difficult to teach for CT. First, the college has acquiesced to students working fulltime and going to school fulltime. As an institution, he believes they have come to expect less from the students even though the college has raised their admissions standards. At the same time, he thinks the "student as customer" paradigm prevails, leading to student expectations of entitlement--- if they are angry by the workload, instructors hear about it through student evaluations each semester.

In addition, the classroom atmosphere and larger class sizes make it difficult to teach for CT. Loud ventilators in the classrooms stifle good conversation and the lack of seminar rooms lead to poor classroom seating arrangements. He also finds the larger classes to be more stressful, unpredictable and harder to get students to participate because he does not always know students' names or their backgrounds. In the bigger classes, they can hardly fit into a circle for discussion and students can hide behind each other leading to numerous side conversations among them. He has "bellyached about it over the years" and voiced his opinion that they have to make a concession to class size if they are going to offer seminar courses.

As an institution, John also perceives there to be a lack of culture or sense of community among the faculty. They do not have a faculty lounge, which makes it difficult to have discussions with colleagues about teaching. While they have regular Division meetings, they are mostly geared toward transmitting messages and discussing new curriculum. In addition, he shares an office with three other faculty members which makes it difficult to foster CT with students outside of class. He did suggest, however, that discussions about teaching with colleagues in his office are helpful.

Finally, this instructor believes that the institution is moving toward a low-cost method of delivery. Specifically, the college has more part-time faculty who do not know the students or the program. He worries about the Senior Seminar course being taught by part-time faculty who do not have the same history with the students or an awareness of previous classes students have taken. He is

concerned because “if it doesn’t come together at this point, it’s not going to come together at all. This is the end of their final semester, their final business course”.

John’s instructional strategies and beliefs will be reviewed in the following section. In addition, it will examine compatibility of his espoused and actual teaching practices. Finally, it will compare his beliefs about CT and other views (e.g., epistemology) with his teaching practices.

Beliefs and Teaching Practices

Espoused and Actual Teaching Practices

It should be evident from John’s story that his espoused practices were highly consistent with his actual teaching practices. First, the writing assignments, student presentations, full-class discussions and exams were implemented as planned. Second, my observations were able to capture several examples of John fostering CT skills he espoused in the interviews. For example, he talked a lot about skills of analysis and making connections between the readings and to the students’ work experience and other courses. John’s constant probing through questions and comments were directly aimed at getting students to analyze the material and to relate the course concepts. Third, his stated strategies such as setting high expectations, asking open-ended questions, providing a safe environment for higher-level thinking and modeling CT were carried out on a regular basis. He appeared, however, to underestimate his use of brainstorming techniques and eliciting prior knowledge.

The only area where I found a small discrepancy was in the area of “teamwork”. In his syllabus, John stated that students were to work in pairs for the “industry overview” presentation and for the “book reviews”. In my observations, the book reviews were completed in pairs but the industry overviews were carried out individually. I did not have an opportunity to ask John about the change of plans. He did, however, mention in the syllabus and in the interview that it was important for students to think of the entire class as a team, working together toward the common objectives of the course. In addition, he reported to use more group work in his larger classes.

In addition to John’s assertions and my own observations, his students were surveyed for their perceptions of the course. Overall, results from the survey suggested that students did not present a unified perspective and did not agree with their instructor’s views. Using a 3-point scale (0=never, 1=sometimes, often=2), the students (n = 16) and the instructor reported how often they thought specific CT skills were being fostered in the course (Table 5). The instructor stated that the course “sometimes” (1) addressed Interpretation and Drawing Inferences, while the students’ mean scores (with standard deviations in parentheses) were higher at 1.67 (0.52) and 1.46 (0.65), respectively. John reported that the course “often” (2) fostered Analysis, Evaluation and Explanation skills while the student means were lower at 1.43 (0.64), 1.30 (0.73) and 1.33 (0.72), respectively. The most consistent score was for Self-regulation skills

Table 5

Comparison of Student and Instructor (John) Perceptions of CT Skills

| CT Skill | Instructor Rating | Students (<u>n</u> = 16) | |
|--------------------|-------------------|---------------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Interpretation | 1 | 1.67 | 0.52 |
| Analysis | 2 | 1.43 | 0.64 |
| Evaluation | 2 | 1.30 | 0.73 |
| Drawing Inferences | 1 | 1.46 | 0.65 |
| Explanation | 2 | 1.33 | 0.72 |
| Self-Regulation | 1 | 0.97 | 0.70 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

which John said he “sometimes” (1) addressed. The student mean was 0.97 (.70). For CT skills, standard deviations on the student survey were high, reflecting large variability among the student perspective. Moreover, the instructor and student perceptions were not very consistent.

Students were also asked to rate how often they engaged in various classroom activities (Table 6). John said that he used whole-class discussion and problem-solving/cases “often” (2), while the student means were somewhat lower ($\bar{M} = 1.81$, $SD = 0.40$, $\bar{M} = 1.74$, $SD = 0.44$, respectively). John said that he “sometimes” (1) had students make presentations and the mean score for the students was 1.18 (0.54). On the other hand, John reported that he “never” (0) used in-class activities like formal debates, role playing, small group and writing activities, while the mean scores for students were higher at 1.13 (0.89), 0.60 (0.61), 0.69 (0.80) and 0.88 (0.81), respectively. Again, student responses varied and were not closely matched with the instructor’s view of in-class activities.

Using the same scale, I asked students how often their instructor used various strategies (Table 7). The most consistent scores were for making connections and asking open-ended questions. John said he used them “often” (2), while student mean scores were 1.94 (0.25) and 1.88 (0.35), respectively. John also asserted that he “sometimes” (1) provided students with time to reflect and with specific grading criteria for CT but “never” (0) elicited prior knowledge or gave direct instruction on CT. The student means were higher at 1.50 (0.52), 1.38 (0.89), 1.56 (0.63) and 1.00 (0.73), respectively. On the other hand, he said

Table 6

Comparison of Student and Instructor (John) Perceptions of In-class Activities

| Activities | Instructor Rating | Students ($n = 16$) | |
|-------------------------|-------------------|-----------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Student presentations | 1 | 1.18 | 0.54 |
| Problem-solving / cases | 2 | 1.74 | 0.44 |
| Formal debates | 0 | 1.13 | 0.89 |
| Writing activities | 0 | 0.88 | 0.81 |
| Whole-class Discussion | 2 | 1.81 | 0.40 |
| Brainstorming | 0 | 1.56 | 0.63 |
| Role-playing | 0 | 0.60 | 0.61 |
| Small group activities | 0 | 0.69 | 0.80 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

Table 7

Comparison of Student and Instructor (John) Perceptions of Instructional Strategies

| Strategies | Instructor Rating | Students ($n = 16$) | |
|-------------------------|-------------------|-----------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Feedback on thinking | 2 | 1.56 | 0.63 |
| Direct instruction (CT) | 0 | 1.00 | 0.73 |
| Model CT | 2 | 1.63 | 0.62 |
| Make connections | 2 | 1.94 | 0.25 |
| Elicit prior knowledge | 0 | 1.56 | 0.63 |
| Provide time to reflect | 1 | 1.50 | 0.52 |
| Grading criteria for CT | 1 | 1.38 | 0.89 |
| Expectations for CT | 2 | 1.40 | 0.72 |
| Open-ended questions | 2 | 1.88 | 0.35 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

that he “often” (2) provided feedback on thinking, modeled CT and stated his expectations for CT. In these categories, the student means were lower at 1.56 (0.63), 1.63 (0.62) and 1.40 (0.72), respectively.

Summary of Student Perceptions

High standard deviations in most categories suggest that students held different opinions about the course. Nonetheless, students reported they were asked to engage in course activities that required Interpretation and Drawing Inferences more often than their instructor perceived. Conversely, the student means suggested that Analysis, Evaluation and Explanation skills were fostered less often than John reported while student and instructor perceptions of Self-regulation skills were similar. Students showed the strongest agreement with respect to their instructor’s use of open-ended questions and connections among course concepts. Students also seemed clear that full-class discussion and case study analysis were required, but seemed to be unaware of other strategies implemented in the course. In all, the student perceptions varied and were not very consistent with John’s view of the course. With few exceptions, however, the researcher and instructor’s perspective were comparable.

Beliefs About Critical Thinking and Teaching Practices

John’s conceptualization of CT appears to be consistent with his teaching practices. Recall, John’s definition included the onion metaphor where CT involves peeling back the layers and getting closer to true knowledge. He hoped that in the process students would come up with new insights and solutions to problems in the business world. He further extended the value of these skills to

students' every day lives and to citizenship. As a result, John's course was entirely devoted to discussion and defense of ideas through open-ended questions and reading material intended to present multiple perspectives, challenge standard beliefs, provoke deep thought and solutions to ill-structured business problems.

John's course design and instructional strategies also supported his belief about how CT develops. In brief, John said that students do not really learn CT from a book or from explicit instruction. Instead, John suspects that CT is a conscious process that develops over time through practice and having a few tools at one's disposal (e.g., knowing good questions to ask). Students consequently build courage which in turn empowers them to share ideas and to think critically. Additionally, he believes that students learn to think by seeing good models of CT and by being challenged by others to go beyond their first thought. Accordingly, the course was organized in a seminar-style format, by constantly challenging and questioning students, making connections and by modeling good thinking behaviour. The essay exams, writing assignments and presentations also gave the students opportunities to practice their skills.

He also said that his role was to set high expectations, select material and to provide a safe environment. These responsibilities were indeed carried out. Similarly, he stated the students' role in developing their thinking skills was to challenge, question, make connections and participate in discussion--- activities which were highly encouraged throughout the course.

In addition to skills, he also talked about dispositions such as courage, inquisitiveness, skepticism and the ability to live with uncertainty. He seemed to foster these attitudes by being sensitive to students' perceived fear of speaking in class, by modeling inquisitive or skeptical behaviour and by emphasizing the process of thinking over "correct" answers.

According to the CCTDI, John's global disposition to think critically was very strong, with the highest scores on the subscales of *openmindedness* and *truthseeking* (Table 8). His lowest score was for *CT self-confidence*. His students were asked to rate how often their instructor fostered these dispositions in class (Table 9). On the same three-point scale, his students gave him the highest scores for fostering openmindedness ($\underline{M} = 1.94$, $\underline{SD} = 0.25$) but lowest for truthseeking ($\underline{M} = 1.50$, $\underline{SD} = 0.52$). With the exception of openmindedness, standard deviations were again fairly high. Nonetheless, the students reported overall that John fostered the dispositions in all categories somewhere between "sometimes" and "often".

Beliefs About Students and Teaching Practices

In addition to beliefs about CT and his instructional practices, there appears to be a strong relationship between John's beliefs about the students and his approach to teaching. While he made a few positive statements about the students (e.g., many do a great job on assignments, as fourth-year students they have grown intellectually) it was apparent from the interviews that John holds many negative beliefs about the students' ability and attitudes that are directly translated into his teaching practice (summarized in Table 10).

Table 8

John's CCTDI Scores

| Disposition | Score |
|--------------------|-------|
| Truthseeking | 57 |
| Openmindedness | 58 |
| Analyticity | 53 |
| Systematicity | 50 |
| CT self-confidence | 48 |
| Inquisitiveness | 52 |
| Cognitive maturity | 52 |
| Total | 370 |

Note. Total score ranges from 70 to 420. Recommended positive cut score is 40 for each subscale and 280 for the total score.

Table 9

Student Perceptions of Dispositions Fostered in Course (John)

| Dispositions | Students ($n = 16$) | |
|--------------------|-----------------------|-----------|
| | <u>M</u> | <u>SD</u> |
| Truthseeking | 1.50 | 0.52 |
| Openmindedness | 1.94 | 0.25 |
| Analyticity | 1.69 | 0.60 |
| Systematicity | 1.63 | 0.62 |
| CT self-confidence | 1.69 | 0.60 |
| Inquisitiveness | 1.69 | 0.48 |
| Cognitive maturity | 1.56 | 0.51 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

Table 10

John's Overall Perception of Students

| Category | Comments |
|----------------------------------|---|
| Behaviour/ Abilities | Examine issues superficially (G) |
| | Answer-givers and not questions-askers (MY) |
| | Do not stop to think about what they do not know (MY) |
| | Not aggressive or critical readers (AT) |
| Attitudes/ Motivation | Short attention spans (G) |
| | Mentally lazy (AT) |
| | Not risk-takers (S) |
| | Unwilling to question or think critically (AT) |
| | Hostile when assumptions challenged or told to be more critical (S) |
| | Expect to be passive, expect instructor to deliver content (MT) |
| | Lack confidence (MY) |
| | View themselves as "vessels", coming out with knowledge (S) |
| | Students attend this college to get a job (AT) |
| | View "correct" answer as more important than the process (MY) |
| | Intimidated by difficult texts (WC) |
| | Reluctant to participate in class (S) |
| | Lack pride in their work (MY) |

Note. Comments are generalizations. Table includes additional information about prevalence using John's own words: MY= many, MT= most, AT= a lot, WC= whole class, S= some, G= general comment, no indicator of how many.

In general, he talked a great deal about the students' lack of confidence, unwillingness to question and to think critically, expectations to be passive in class and lack of prior academic success. Accordingly, he feels that he has to be much more sensitive and in touch with his students and needs to create a safe environment for them to explore ideas. In practice, he gives them positive feedback on their thinking ("stroking"), is careful not to "shoot them down" or "scare them away" and exaggerates confusion about issues or "intimidating" articles. He also allows students to re-submit their work because he wants them to be proud of it and because they will be sharing it with other students and does not "want them to be embarrassed in front of their colleagues".

Related to his perception of the students, he also discussed the notion of paying attention to student cues. For instance, he said that he can usually tell by their body language (e.g., the avoidance of eye contact) when students do not understand the material. As a consequence he spends more time reviewing it. He can also tell by "the twitch" or "a look" that a student has something to contribute and he tries to "catch that and call on them". And, since he knows most of the students' backgrounds from previous classes, he strategically calls upon them if he knows they have something to contribute rather than embarrass a student who does not know the answer. "In fact I have one student who came and asked me specifically to not call on her in class because she couldn't deal with it, so I don't", he said. I did notice in my observations that John paid close attention to students' body language and was very careful to not criticize student ideas. On paper, it is difficult to convey John's sensitivity, nurturing personality

and effort he put into this course, but they were highly evident in my interviews and through classroom observations. In all, John thoughtfully reflected upon his teaching practices and underlying beliefs and revealed few discrepancies between them.

Beliefs About Self-efficacy and Teaching Practices

John believes he is probably not prepared to teach CT because his education and work experience is in the field of business. Despite his lack of confidence, John fostered CT skills in his course. Where did he learn how to teach?

He has never taken “an education class” but does get teaching ideas from the *Teaching Professor* magazine and from colleagues with whom he shares an office. In addition, he attended workshops provided by the college on CT but did not perceive them to be very helpful. He stated that there needs to be more discussion and conversation revolving about how to do it, rather than focusing on the definition of CT.

When reflecting upon his models for teaching, he stated that he models after teachers who had a big impact on him as a student and those who made him think. His positive models were those who gave engaging lectures, related the content to newspaper articles and current events, those who were good speakers (organized, illustrated with examples), kept up with current events and were engaged in the class. His father, a retired college professor, also had an impact on John’s career since his father always valued the teaching profession.

Beliefs About Epistemology and Teaching Practices

John's scores on the Epistemological Beliefs Inventory (EBI) for *simple knowledge, omniscient authority, certain knowledge, innate ability* and *quick learning* were 46, 22, 39, 21, and 30, respectively. His scores suggest that he believes knowledge is complex and uncertain. He also has a strong belief that learning occurs gradually and that learning is both an acquired and an innate ability. Scores for omniscient authority indicated that John believes some knowledge is handed down by authority and some is derived through reason.

In the follow-up interview, John stated that knowledge is complex and there is rarely one correct answer to a question. When probed about the nature of knowledge, he added that the world is complex, "only fools think it is simple" and believes there is much more gray than black and white. He also differentiates between truth and knowledge (or fact). He stated that truth is based upon individual perceptions and opinions (e.g., religion, backgrounds) therefore people can have a different view of truth. Facts are harder to establish and based on the weight of empirical evidence assessed by a critical thinker. As an example, John offered that he teaches students to seek the best evidence and to ask the following questions: How much weight do we give each side of an argument? How durable is the idea? How does it connect to what we already know? Is it an extension of what we already know? How long has the new theory existed? How logical, plausible and consistent is it? These examples are consistent with questions I observed in class which.

In terms of omniscient authority, John believes in both questioning authority and obeying the rules established by authorities. For example, he said that it is appropriate to question authority and that people who question really make things happen. He offered the example of Gary Hamel, a management strategist who asks the tough questions, challenges companies with new ways of thinking and makes change come about. He liked the idea of an outsider coming into a new industry because the visitor will ask smart or “dumb” questions which lead to new insights. Insiders, on the other hand, are too afraid to ask the “dumb” questions for fear of being laughed at by their peers. At the same time, his inventory responses indicated that he agrees people should obey the law and when someone in authority tells him what to do, he usually does it. Overall, statements in both interviews and classroom behaviours suggested that questioning authority and challenging assumptions are an integral part of his teaching practices.

John’s responses to EBI to questions about innate ability were also consistent with the answers he provided to my open-ended questions in the interviews. For example, he believes that some students have a “natural” or innate inclination to ask questions, but that learning to think critically requires practice and good models of thinking. His scores for “quick learning” strongly suggest that learning does not necessarily happen immediately and that sometimes there are no quick solutions to problems. Accordingly, John spent a lot of time in class working through business problems and did not rush the students to find solutions.

Summary

John's espoused practices were consistent with his actual teaching practices for CT. His teaching methods were also compatible with his conception of CT and how it develops. In addition, his CCTDI score revealed a positive attitude toward CT which was clearly evident in his statements of espoused beliefs. There were also few surprises in his EBI scores. They corroborated previous interview statements and follow-up questions and closely matched his actual teaching practices. Finally, his lack of confidence in student ability and motivation are inconsistent with theories presented in the literature (e.g., Scheurman, 1996) but consistent with his own teaching practices (i.e., sensitivity toward students). Similarly, theory predicts that a lack of confidence to teach CT will lead to an avoidance of teaching for it (Bandura, 1982). Instead, John demonstrated a commitment to fostering CT skills in his course. A detailed discussion of these findings will be presented in Chapter 6.

The Craft of Teaching: Krista's Story

Background

Krista has been a “full-time temp” instructor in the Community Services Division at Lakenorth College for five years and has 12 years of teaching experience at the post-secondary level. She currently offers courses such as Integrated Primary Curriculum, Reading and Language Development, Children's Literature, Art and Music, Math and Science and Primary Field Experience. In addition, she instructs graduate-level education courses during the summer at another local college.

She holds an M.A. in Experiential Education as well as an M.Ed. in Reading and Children's Literature. She has served two years on the Professional Development committee at Lakenorth College in order to plan and coordinate activities for faculty. She has attended most of the college's professional development workshops, serves on regional Executive Boards, plans and attends conferences for state and regional “Reading” organizations and is a member of international and national professional organizations.

Krista voluntarily met with the Instructional Design consultant in the spring of 2002 for assistance with the Course Enrichment process. She responded to the study's call for participation by filling out the initial faculty questionnaire and subsequently volunteered to participate in the study.

The course she selected for the context of this study was Integrated Primary Curriculum. In this required course, students learn to plan curriculum and develop environments for teaching. The course also provides a bridge between

course content and what students are observing and practicing in their field placements. There were 24 Early Childhood Education sophomores (second-year students) enrolled in the course, with only one male student. There was an average daily attendance of 19 students per classroom observation.

Teaching Practices

Classroom Overview

The class met once a week for two hours and 45 minutes. The students sat in two-person desks facing the blackboard. A typical class began with the *field experience supervisor* arranging meetings with students, clarifying expectations of their fieldwork and related assignments. Then Krista reviewed the daily class schedule which was noted on the blackboard. Every class period, students participated in one or two full-class meetings ("morning meeting") while seated in a circle on the floor. The remainder of class time included a wide variety of instructional methods such as lecture and discussion, case study analysis, small group activities and student presentations. Most activities lasted no longer than 20 minutes and students were given one or two breaks during the class period.

Critical Thinking Skills

Krista declared that she uses Bloom's Taxonomy of educational objectives as her framework for developing CT skills. Consequently, she said that she tries to promote summary, application and synthesis skills in all of her courses. She also wants students to evaluate course materials, websites for children, their own lesson plans and children's work. Additionally, students need to develop their own rubrics or criteria for the evaluation of children's work, which she considers

to be a “high level skill”. Students also have to apply the course content to their field experiences, provide very clear and detailed descriptions of their fieldwork and thoughtfully explain their decision-making processes.

Most importantly, she wants her students to be reflective. She believes that self-regulation skills are a “big piece” of the course and therefore requires students to constantly reflect on their practices as well as their learning and growth. Moreover, Krista asserted that she often asks students to propose multiple alternatives when reflecting on their classroom experiences and to think of different ways to approach problems in their field placements.

Course Design and Instructional Strategies

The approach to this course is best summarized by Krista’s statement in her syllabus:

My philosophy of teaching and learning includes the belief that students learn best when they can make connections between course content and their personal lives and experiences and when they can engage in focused discussions about new concepts and approaches. Students will actively reflect on course concepts and field experiences through reflective journal writing, class discussions, role-playing and case-study analysis. I believe in taking on the role of facilitator in a classroom and allowing students to take increasing responsibility for presenting course content in a variety of collaborative, small group discussion and presentation formats.

Consistent with this statement, Krista’s course involved a great deal of discussion, many writing assignments, student presentations, role playing,

analysis of children's work, case studies and fieldwork. Specifically, students spent two full days a week in a primary school classroom and were asked to write daily reflections on their practice. Additionally, her students had to observe a child in their field placement and assess them over the course of the semester. For example, they were required to obtain background information (e.g., family, education, health, interests), interview the child and his/her teacher, observe the learner using anecdotal records and checklists, and collect samples of the children's work. In the end, students had to analyze the data from interviews, observations and children's work in order to write a three to four-page narrative with recommendations for instructional plans.

Another major assignment included the research, design, and presentation of a ten-day, standards-based, integrated social studies unit for children. I did not have the opportunity to see the students' projects or informal presentations but I did observe part of the planning process in class when students were encouraged to borrow laptops to concept map their lessons using Kidspiration software. Krista circled the class and helped students with their projects by asking and answering questions.

For the journal writing assignment, students had to compose four reflective papers related to the readings. According to the interview and the syllabus, Krista gave students prompts in order to get them thinking about the content and how it might apply to their practice. For example, the first journal assignment asked students to describe the basic elements of building classroom community as well as to explain what they were seeing in their field placement that supported and

nurtured these communities. In class, Krista said that she asks questions to guide students' thinking about the texts and wants them to know they do not have to agree with the author because it is written in print. I only observed one class where Krista briefly talked about the textbook material. In this instance, she tried to elicit prior knowledge on the topic of assessment, asked the students what the textbook author meant by "authentic assessment", asked them to provide their own examples from experience, probed for clarification ("When you say 'to meet our objectives', what do you mean by that?") and provided her own real-life examples related to the material.

Krista also had the students analyze case studies and solve problems in class. Informally, she asserted, that they used case studies and problem-solving "almost weekly in terms of whatever topic they were covering". For instance, I observed Krista on several occasions ask the students to discuss examples from their placement and then to critique them as a group. Formally, she reported that students sometimes worked in small groups to discuss a written case scenario. In the interview, she described the purpose and the process which was identical to the situation I observed in class. For example, during my first class visit, students were given ten minutes to read and discuss a case scenario in small groups. Krista gave them explicit instructions to summarize the case, identify the problem and to come up with solutions. Later in the class, as a whole group, students presented their case studies while seated in a circle on the floor. Krista followed up with questions that related the cases to the students' fieldwork ("Can anyone relate to this scenario?") or elicited additional solutions to the problems

identified. It is important to note that each student in the group presented a piece of the work, while the rest of the class participated by providing examples from their classroom placements.

Another ongoing classroom activity was the “morning meetings”. Students collaborated with a partner to develop a plan for the ten-minute meeting by applying the format outlined their textbook: Greeting, sharing, activity, and news. Krista explained that the local elementary schools were using this strategy as a model of classroom management and for building classroom community. For her students, she stated the purpose was twofold. First, she wants her students to practice planning and teaching a morning meeting, which includes both social and academic components. Second, the purpose is to build community in her own classroom because it allows students to practice getting up in front of the class and share their experiences as a group. While it did not occur to me prior to the interview, Krista identified the strategy as a weekly role-playing activity.

I was fortunate to observe several meetings, the first of which was planned by the instructor. The class formed a circle on the floor and began by playing a children's greeting game. After the activity, Krista discussed the purpose and variations on the game. Each student then reflected and shared one special element from their placement setting that they might bring to their own classrooms in the future. The instructor asked follow up questions to get students to connect their statements to theory from the textbook and to encourage students to think about why they liked the identified classroom strategies. For example, she asked, “What kind of play is that? What do children gain from that?”

How else would you do that?”. In a few instances, students interjected by relating their own situations to their classmates' experiences and by posing questions like, “Do you find that disruptive?”. Similarly, I watched students direct the meetings in subsequent observations which followed the same format. An example of a student-planned self-reflective activity was to describe in two-words how they have grown as teachers throughout their placements. Responses included, “More experience”, “More confidence”, and “Time management”.

Additionally, students had to create a web-based, inquiry-oriented activity for children and to formally present their projects in class using technology. In class, I observed Krista clarify the purpose and expectations of the “WebQuests”, which were outlined in the syllabus as well. In brief, they had to write clear instructions for the children’s “high-level” activity, evaluate appropriate websites or resources that children could use to complete the activity, provide reminders for children about what they have learned as well as a rubric to indicate the criteria for evaluation. In the end, students had to submit a detailed plan and rationale as well as present the WebQuests in class. I had the opportunity to observe all of the presentations which consisted of a wide-variety of well-planned and creative activities for children.

Finally, students had to submit a two-year portfolio. Students were required to write a teaching philosophy statement, include a piece of their work from each of their courses, reflect on what they have learned in their courses over the last two years and incorporate reflections from their field experiences. They were also encouraged to include children’s work and photographs from their placements. In

the end, all of the portfolios were displayed in a public area on campus for Lakenorth faculty and students to view. It is worthy to note that during the last class, I observed a few students proudly exhibit and discuss their portfolios with each other during the break.

With respect to classroom strategies, Krista reported that she does not frequently teach students the CT skills explicitly but often models them and talks about them pertaining to the design of children's educational environments. I noticed in my observations that Krista often reminded students to set clear expectations, promote reflection, design high-level activities and provide feedback in order to promote children's skills. For example, she made comments like:

When I read your journals or lesson plans I don't just give you a check mark, I give you questions and comments. You need to be specific and set goals. Just like when I give you an assignment, you know exactly what I'm asking for in the criteria sheets. They are very valuable. Let them know exactly what the expectations are. We're going to work on creating the different kinds of rubrics.

To promote discussion and critical thought of course material and experiences, Krista said that she tries to break up the class as often as possible into small groups to brainstorm ideas and share experiences. She also assigns roles and provides a structure for group work so that everyone participates. In this course, she added that she does not often call on "quiet" students to participate because most students are comfortable speaking in this class.

From my observations, students were constantly being asked to participate in discussion and to share their experiences during the morning meetings, through case studies and other small group activities. Krista frequently used open-ended questions and prompts to further student thinking. For example, during my second observation, Krista first spent ten minutes presenting criteria on assessing children's work using an overhead projector. Students brought in examples of children's work from their fieldwork experience and were asked to share their assessment and interpretations in small groups. Krista walked around the classroom facilitating discussion and asked the students open-ended questions to stimulate thinking about the children's work and their own teaching practice.

Subsequently, students were invited to share as a whole class what they learned from the process of assessing student work and if they gained any insights from sharing those experiences with their peers. For instance, Krista asked, "What is something you would do differently next time? Did anyone in your group struggle with the assignment?". At the end of the discussion, Krista provided students with general feedback. She told the students that those were the kinds of evaluations she wants to hear, to continue thinking about how they would do things differently next time, to think about how the children's work is reflected in their teaching practice and reminded them to constantly get feedback from their peers. Lastly, she encouraged students to bring in more children's work for next class.

In addition to providing feedback in class, Krista said that she often provides “genuine” as well as “prompt and immediate” feedback on student thinking in their homework assignments. While laughing, she stated that she is always sick because she stays up late every night reading papers in bed and writing comments. She thinks feedback is valuable to students and as a result, she believes she can see evidence of growth in their work. She then went on to explain that she is always trying to get students to go further in their assertions but they need a lot of support:

They say: “Yes, the children got all the problems right”, and so I’m trying to ask them questions to dig deeper: “So if they got all the questions right, that was your product. What happened? What really happened? What was the process? Were all the children really engaged?”. So I’m always trying to dig deeper... and in the written work I really do a lot with dialog. I consider my journals dialog journals. So I just don’t read them and assess them, I prompt with lots of questions back and forth.

She does not however, expect students to respond to her questions but hopes that students will incorporate the feedback in their next assignments. Likewise, Krista commented that she is always explicit about her expectations. In her syllabus she provides a detailed rubric for every assignment which includes for example, grading standards for clarity, organization, content, completeness and presentation style. In particular, the WebQuest assignment required students to design activities that “elicit thinking that goes beyond rote comprehension” and scaffold children “from basic knowledge to higher-level thinking”.

In addition to rubrics and criteria for assessment, she also makes it clear that CT is an expected outcome of her course. For example, the learning outcomes listed in her syllabus include terms such as plan, evaluate, conduct, and describe. A portion of the syllabus also states how CT in particular will be fostered in the course (i.e., case study, journal reflections). In general, Krista remarked that she is explicit because she believes that it is important for students to think in those terms and to be explicit about their own pedagogy as well.

Other strategies she reported using to promote CT in the course were eliciting prior knowledge and making relevant connections. Krista said that she is always trying to model the behaviours she wants her students to implement in their classrooms. Specifically, she said that she begins her courses by asking the students about their prior knowledge and what they hope to learn in the course. She explained the process was not only for her, but for students to reflect upon their learning as well. While I was not present on the first day of class, I did observe Krista elicit prior knowledge on a few occasions before discussing a particular topic. For example, she asked, "Remember we talked about metacognition? It's important because it helps to bring learning to a higher level for children".

Krista also said she is able to make connections among all of the courses because she teaches several courses within the small education program. All of the faculty in her division, she added, "really collaborate as a team" and know what is occurring in other courses and in the field. I noted she did this a few times in the semester by bringing up information students learned in previous courses

like, "What do you know about assessment? We have been talking about it for four semesters".

Assessment

What is a good indicator that her students have learned the essential aspects of course content? In general, she said that students are graded on their in-class work and reading reflections, projects, presentations and on a mid-term exam. With respect to CT specifically, she said, "I think it's embedded within the assessments" of each assignment.

For example, in the portfolios, she looks for CT in their "reflective statements". She articulated that students have to examine their work and describe how they have grown as a student and teacher, how they have been able to apply what they have learned and how the course has helped them change as a teacher. "It's the reflective piece" and their philosophy statement that tells her how much they have learned. Krista added that when she is evaluating their other work, she assesses students on how well they have provided concrete examples and explanations of their ideas.

For the morning meetings, students write the plan as a pair. They can either submit separate plans or one paper because she said that students do not always like to share a grade. She mainly assesses how well the plan was written and if the plan included both academic and social components. Krista noted that the assessment of group work is always tricky, especially "when you have students say they did all the work". She deals with the issue by assigning specific roles to students and by having them conduct self-assessments. Students do,

however, get the same grade for the implementation portion of the morning meeting in which they are evaluated on the ability to express themselves clearly, accurately and respond to audience questions “with exceptional skill and ease”.

For all assignments, her students always have the opportunity to revise their work and to submit drafts. Not all of the students take advantage of the opportunity but she encourages them to do it. Krista remarked that she does not like to spend a lot of time on grammar and proofing but asks them questions to identify missing pieces in the assignment, reminds them to look at the rubric and to self-assess. If she thinks their writing needs significant improvement, she will recommend that the student visit the writing center for further assistance. Krista added, “There’s only so much you can do, but they do have an opportunity, I mean I want people to do better”.

Finally, she assessed students by giving them a mid-term essay exam. She wrote ten pairs of questions and students had to select one from each set. She explained that one was specific to theory and the other was an application question. For example, students had to answer one of the following questions:

- a. Describe the purposes and highlights of each of the 4 basic components of the Morning Meeting (as described in Kriete).
- b. What do you think is the value of building classroom community and what are some of the ways that a teacher can build classroom community both at the *start* of the year and *throughout* the school year?

Once again, she was evaluating students on how well they substantiated their answers with concrete examples but was also looking to see if they “got the

information”. She commented that students usually selected the application questions.

Overall, students in this course were graded on all of their work and on a mid-term exam, which included expectations for CT skills such as reflection, application, evaluation, synthesis and analysis. She provided students with opportunities to revise their work and gave them specific criteria to complete all of the assignments. She does not grade participation because it is difficult to quantify and most students participate in class. On the other hand, she sometimes regrets the grading decision because some students are getting A’s in a few of her courses but “do not say a word in class”.

Summary of Teaching Practices

Krista uses Bloom’s Taxonomy as a guideline for the CT skills she is trying to foster in her courses. Full-class discussion, small group activities, role playing, case studies, assessing children’s work, reflective journal writing and child assessments are a few of the activities she incorporated into this course to stimulate students’ skills. The course included several major and minor projects, formal and informal presentations and a great deal writing activity.

Most importantly, she wants her students to self-assess, to share and to reflect on their fieldwork experiences. Her syllabus also detailed the expectation for students to think critically and how that would be accomplished through course activities.

Krista provided her students with prompt and immediate feedback on all of their work and tried to get them to “dig deeper” in their analyses and decision-

making processes. She also provided them with prompts and scaffolds, elicited prior knowledge, asked open-ended questions, modeled CT skills, explicitly discussed CT skills and how to foster them in children and used group work to give all her students “a voice”. Additionally, Krista made it a point to connect the textbook theory to her students’ fieldwork experiences in the primary classroom.

While students were not graded on participation, she said that most of the students contributed in class. Students were assessed on all other assignments, given detailed rubrics for each assignment and encouraged to revise and resubmit their work. The mid-term essay exam was aimed at testing student’s knowledge of theory and their ability to apply theory to practice. Instead of writing a final exam, students had to submit a two-year portfolio and display it publicly at the college. The following statement provided by one of her students on the survey accurately sums up the course: “Krista is a great teacher! She helps to make me see different strategies and ways of both learning and teaching. There was a good range of different activities and projects/papers to do throughout the class which kept us engaged”.

Krista’s beliefs will be reviewed in the following section. In addition, it will examine congruency between her espoused and actual teaching practices and discuss the compatibility of her beliefs and instructional practices.

Beliefs About Critical Thinking

Conception of Critical Thinking

Krista generally discussed CT in terms of the teaching profession and what she expects her students to be able to on the job:

Especially with teaching professions, critical thinking is being able to make decisions based on context and the situation, being able to sort out information and then apply knowledge. Apply knowledge of theory, ascertain a situation and make decisions and be able to reflect in the field on their practice and decide: Did I apply it in a way that it was supposed to be applied and what were the results?. So taking it to an application level... I want teachers to be decision-makers. I want them to be able to make decisions. You can't do that unless you're being critical.

She further explained that she does not want her students to read manuals and teach based on step-by-step instructions. Future teachers need to read and critique current research and teaching materials in order to determine if they are valid, reliable, useful and practical. Furthermore, they should be able to identify an author's main points and evaluate the author's views in the readings.

Related, Krista thinks that developing education majors' CT skills will help to "elevate" the teaching profession. Historically, teachers have not been valued or given proper recognition, in part because teaching has been viewed as something anyone can do. Therefore, she wants her students to think of teaching as a craft and not simply as a set of skills that anyone can master. Moreover, she believes that CT is important because schools tend to reinforce the status quo

and society will not change and grow if people are not well-educated and creative, critical thinkers. People in general, “need to think on their own, think on their feet and make decisions based on their analysis”.

Krista’s conception of CT also consists of “habits of mind” which include things like feeling comfortable to discuss a topic and curiosity. She wants her students to realize that when the course is over they are not finished learning, they should always be seeking and remain curious. She summed up her views on attitudes by stating, “There’s no question about that. I think you can be brilliant and still need the habit of mind to think critically”.

In terms of intellectual criteria or standards for CT, Krista said that her students need to back up their statements or reasoning with evidence and concrete examples. She added, “That’s the logical reasoning piece”.

Development or Acquisition of Critical Thinking

Krista firmly believes that CT is developmental. She said that not everyone “starts at the same level” or attends schools where they have opportunities to think critically. She believes, however, that it is never too late and that everyone can learn and develop their skills. She also discussed at length the importance of high-level discourse in children’s homes and parent’s valuing what children have to say. As a consequence these individuals will come to college with more practice and experience as well as the habit of mind.

In general, she believes that CT (reflection in particular) develops through discussion and writing, practice and experience. If one is not presented with opportunities to practice reflective skills, reading texts critically or encouraged to

write and discuss, it is not necessarily going to happen. Specifically, Krista said that even practicing teachers do not have the opportunity or time to do it unless they are in discussion groups, take graduate courses or mentor student teachers. She noted that her “cooperating teachers” who are mentoring her students in the primary classrooms find the experience really helps them to think more about their teaching practices.

In addition to opportunities for practice, she believes that modeling CT for students, providing them with content that presents opposing viewpoints and giving students feedback help to foster their skills. Another aspect she mentioned was learning in context:

When everything connects to whatever we’re discussing, something meaningful for them, something relevant, something they’ve seen. It’s wonderful when our courses involve fieldwork because I know I connect it...but always starting with the personal because your experience is what you will always take to your classroom. Good and bad. Everything is connected. That helps them, that really helps.

Krista added that students require a range of experiences and have to talk about them for CT to develop. In particular, she mentioned that group work stimulates discussion and CT. Consequently, the students’ role in the development of CT is to practice it, to participate in classroom discussion and to be reflective of their learning and experiences. While she conceded that it is difficult to step back and to reflect objectively on practice, she believes that it can develop over time.

Related to discussion, Krista also asserted that college instructors need to provide a safe place and build community for people to take risks, to think outside the box and to feel free to express ideas and beliefs. While some individuals are comfortable speaking in a group, others require a collaborative and safe environment to do so. Likewise, she stated it is important for her to model it so her students will in turn provide safe spaces for children to take risks with their thinking and their learning.

When I asked Krista if CT should be taught in context or as a separate course she noted it was a controversial topic. Like all teaching she remarked, it should be as embedded in context as much as possible and there should always be a balance between fostering CT and teaching content in the classroom. She thinks the required CT class offered by the philosophy department is important but perhaps it should be major-specific. Specifically, she suggested teaching a CT course around topics in education, such as "Schools in Society".

In terms of transfer, she tentatively offered her view that the skills fostered in her course transfer to teaching in the classroom but said, "I don't know. I hope so. I see it sometimes. They have to. I don't know". Her sense from observing teachers in the field is that they are reflecting a little more critically but it is still developmental and takes years of experience and practice. She believes that her discipline provides fertile ground for the development of thinking skills and summed up her views on CT with the following statement: "The ability to think at higher levels is developmental and based on practice, experience, and I think life

experience too... You have to play with [knowledge], mould it and talk about it and look at it from different angles...".

Obstacles to Critical Thinking

Krista also mentioned several factors that may act as barriers to the development of CT. These issues were related to teaching, the students and the institution. In class, she said that over-lecturing could stifle the CT process because she believes that student discussion is critical to developing higher level thinking skills. She finds it challenging sometimes to keep quiet and to allow the discussion to happen but believes that over time instructors get better at it and overcome the mindset that teaching is based on lecture. While she believes that students learn through activity, she said that it would be easy for her to fall back into lecture mode because it is "hard to break what is expected in the classroom", lecturing is more familiar and also requires less planning. Other factors that possibly affect her teaching are her energy, creativity and experience.

With respect to the students, she talked about their expectations as limiting factors for CT development. Some of them, she said, have the expectation that she has all the knowledge and will deliver it while they can remain passive. She remarked that students get used to it over time but it is difficult in the beginning.

At Lakenorth College and in higher education in general, Krista asserted that institutions separate disciplines and skills which can limit CT. She recommended that schools do more interdisciplinary teaching and embed CT within all content courses. She further noted that discussion among faculty from all disciplines is important, but implied that more discussion is necessary at Lakenorth College to

make connections between the courses and the new competencies. In particular, she suggested that workshops offered by the college be more interactive and provide additional time for discussion on how to incorporate the skills. In the past, she commented that some of them focused on transmitting definitions and providing rationales and histories of the competencies.

Krista also mentioned that she views CT as broader than the definition offered by the college which focuses on argumentation skills. While the definition makes sense to her, perhaps more faculty would relate to it if it were “more inclusive”. On a final yet related note, she briefly alluded to the problem that some faculty were not entirely receptive to the Course Enrichment process but is aware that the reaction to change and innovation is simply part of the growing process.

The following section will review Krista’s instructional strategies and beliefs. It will also examine the consistency between her espoused and actual teaching practices. Finally, it will compare her beliefs about CT and other views (e.g., epistemology) with her teaching practices.

Beliefs and Teaching Practices

Espoused and Actual Teaching Practices

Krista’s case description reflects congruency between her espoused and actual teaching practices. First, all aspects of her planned course design were implemented (e.g., case studies, WebQuests). Second, my classroom observations revealed that she employed her stated strategies such as modeling CT, prompting student thinking through open-ended questions and making

connections between course content and students' fieldwork experiences. Finally, Krista said that she used Bloom's Taxonomy as a framework and focused on skills such as summary, application and synthesis. She further stated that she was trying to promote reflection on practice, evaluation of information (course readings, children's websites, student work), and encourage students to find multiple solutions to problems in the primary classroom. The examples revealed through Krista's story suggest that the skills identified in the interview were indeed fostered through careful planning of classroom discussion, small group work (i.e., case studies), written assignments (e.g., portfolio, child assessment) and fieldwork. Finally, her assessment strategies matched her overall goals of the course. The assignments with clear grading criteria as well as the mid-term exam, did in fact assess the skills she was trying to foster such as summary, application of theory and reflection on practice. Worthy of mention is that the "theory" questions on the exam appeared to elicit summarization skills while the "application" questions were more geared toward applying student knowledge and integrating course concepts.

I searched for inconsistencies between the interview data and other sources (syllabus, observational data) but the only discrepancy I could find was related to lecturing. When she talked about how easy it would be to slip back into a lecture-style of teaching, I commented that I observed over ten hours of class time and only witnessed one lecture and discussion period that lasted a total of 35 minutes (review for the mid-term exam). She responded by saying, "Oh. I actually do that more. You have been coming in for the fun stuff" and added that she usually

spends a half an hour lecturing during her three-hour classes. She also said that she lectures more in her Math and Reading classes. I could not verify her statements through observation or student survey because the course was over. Regardless of how much she actually lectured, the important point to remember is that her philosophy is to take on the role of facilitator and allow students to take more responsibility for their learning. Overall, her teaching approach to the course seemed to be consistent with this philosophy.

I also surveyed the students to corroborate Krista's stated practices related to CT skills fostered in the course and the use of instructional strategies. Twenty-one students responded to the questionnaire that used a three-point scale (0=never, 1=sometimes, often=2). For CT skills, Krista said that she "often" (2) promoted Interpretation, Inferences, Explanation and Self-regulation skills (Table 11). The students' mean scores for each skill (with standard deviations in parentheses) were lower at 1.32 (0.67), 1.16 (0.70), 1.25 (0.44) and 1.05 (0.60), respectively. Additionally, she reported fostering Evaluation and Analysis skills "sometimes" (1). The student means were lower but fairly consistent with Krista's perception at 0.90 (0.54) and 0.88 (0.70), respectively.

The instructor and students were also asked to judge how often specific in-class activities were used (Table 12). Krista said that she was using full-class discussion and small group activities "often" (2). The mean responses for the students were fairly consistent at 1.90 (0.30) and 1.86 (0.37), respectively.

Table 11

Comparison of Student and Instructor (Krista) Perceptions of CT Skills

| CT Skill | Instructor Rating | Students ($n = 21$) | |
|--------------------|-------------------|-----------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Interpretation | 2 | 1.32 | 0.67 |
| Analysis | 1 | 0.88 | 0.70 |
| Evaluation | 1 | 0.90 | 0.54 |
| Drawing Inferences | 2 | 1.16 | 0.70 |
| Explanation | 2 | 1.25 | 0.44 |
| Self-Regulation | 2 | 1.05 | 0.60 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

Table 12

Comparison of Student and Instructor (Krista) Perceptions of In-Class Activities

| Activities | Instructor Rating | Students ($n = 21$) | |
|-------------------------|-------------------|-----------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Student presentations | 2 | 1.33 | 0.58 |
| Problem-solving / cases | 1 | 1.15 | 0.68 |
| Formal debates | 0 | 0.45 | 0.59 |
| Writing activities | 1 | 1.90 | 0.30 |
| Whole-class Discussion | 2 | 1.90 | 0.30 |
| Brainstorming | 1 | 1.76 | 0.43 |
| Role-playing | 2 | 0.95 | 0.86 |
| Small group activities | 2 | 1.86 | 0.37 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

Similarly, she said they were using cases and problem-solving in class “sometimes” (1) and the mean score for students was 1.15 (0.68). In addition, Krista said that she was “sometimes” (1) using brainstorming techniques and writing activities in class while students reported using the techniques more often with means of 1.76 (0.43) and 1.90 (0.30), respectively. She said she never used formal debates but some students reported using them in class ($\underline{M} = 0.45$, $\underline{SD} = 0.59$). Krista espoused they role-played “often” (2) but the mean for students was lower ($\underline{M} = 0.95$, $\underline{SD} = 0.86$). Finally, she said students had to do presentations “often” (2) but the mean response for students was lower ($\underline{M} = 1.33$, $\underline{SD} = 0.58$).

In addition, students were asked to rate how often their instructor used various strategies (Table 13). Krista reported that she was “often” (2) providing feedback on thinking, modeling CT and providing clear expectations for CT. Her students perceived she used them less often with means of 1.76 (0.44), 1.57 (0.68), 1.48 (0.75) and 1.62 (0.67), respectively. With somewhat less discrepancy, Krista also said she was “often” (2) providing students with time to reflect, with specific grading criteria for CT and making connections. The student mean for all three strategies were slightly lower at 1.81 (0.40). Krista said that she “sometimes” (1) provided direct instruction for CT, but the student mean score was higher ($\underline{M} = 1.67$, $\underline{SD} = 0.48$). The most consistent category was related to the use of open-ended questions. Krista reported using them “often” (2), and the student mean was 1.90 (0.44).

Table 13

Comparison of Student and Instructor (Krista) Perceptions of Instructional Strategies

| Strategies | Instructor Rating | Students ($n = 21$) | |
|-------------------------|-------------------|-----------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Feedback on thinking | 2 | 1.76 | 0.44 |
| Direct instruction (CT) | 1 | 1.67 | 0.48 |
| Model CT | 2 | 1.57 | 0.68 |
| Make connections | 2 | 1.81 | 0.40 |
| Elicit prior knowledge | 2 | 1.48 | 0.75 |
| Provide time to reflect | 2 | 1.81 | 0.40 |
| Grading criteria for CT | 2 | 1.81 | 0.40 |
| Expectations for CT | 2 | 1.62 | 0.67 |
| Open-ended questions | 2 | 1.90 | 0.44 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

Summary of Student Perceptions

High standard deviations in many categories were obtained from the student surveys indicating variability in student perceptions. Nonetheless, Krista reported that she fostered each CT skill more often than her students reported. The student mean for the categories of Evaluation and Analysis, however, were the most consistent with Krista's perception.

With respect to instructional strategies, most of her students agreed with their instructor that there was a lot of full-class discussion and small group activities. The student means were somewhat consistent with Krista's view that she was often providing students with time to reflect, with specific grading criteria for CT and making connections. The most consistent category was related to Krista's frequent use of open-ended questions. Students also agreed that sometimes they were asked to do presentations and case studies in class. As a whole, students reported they were using brainstorming techniques and completing writing activities more often than Krista perceived. As well, they thought she provided direct instruction for CT more often than Krista reported. On the other hand, the student perspective was not very consistent with Krista's judgment of how often other instructional strategies were employed. In general, however, my classroom observations indicated that Krista's espoused practices were consistent with her actual teaching practices.

Beliefs About Critical Thinking and Teaching Practices

There also appears to be a strong relationship between Krista's beliefs about CT and her teaching practices. Her conceptualization and definition of CT mainly

revolve around reflection, analysis and decision-making as well as the application of theory to practice in the teaching profession. She believes that CT is developmental and mainly requires opportunities for practice and reflection, modeling, sharing ideas through discussion and writing, feedback, learning in context and making connections between theory and practice. A safe environment in which to explore ideas is another necessary component for CT development. Based on my observations and document reviews, Krista's course addressed the CT skills identified and overall she created a teaching environment that is consistent with how she believes CT develops.

There might however, be one potential discrepancy related to the development of CT. Krista briefly mentioned that it was important to use content with opposing viewpoints to promote CT but I did not witness the discussion of such texts. Furthermore, based on the titles of required readings, it appears as though the texts were mostly curriculum guides/standards for teaching, which would not likely present opposing viewpoints. I did not however have the opportunity to follow up with the instructor and did not have access to her course readings to verify this discrepancy.

In terms of intellectual standards, Krista espoused that students had to back up their statements with concrete examples, which she in fact encouraged by prompting students and providing feedback on their thinking. While justification of statements was the only standard Krista mentioned in the interview, the rubrics in her syllabus suggest that she had additional standards such as:

comprehensiveness, concise writing, clarity, accuracy, creativity and innovation, and multiple and perspectives.

Krista also listed dispositions as part of her conceptualization of CT such as curiosity, lifelong desire to learn and comfort. It is difficult to assess the culture of a classroom in a few observations, but they did indicate that her classroom environment was comfortable. Students constantly shared their experiences and reflections, they informally sat on the floor for many activities and students appeared comfortable to ask questions in class. In terms of lifelong learning, Krista said that in one of her other classes she recently told the students they had to continue learning and reflecting on their practice even though the course had terminated. She also said she reminded students that she is constantly doing so through professional reading and involvement in committees, for example. In the course I observed, however, she did not directly convey that message to the students. She did on the other hand, repeatedly remind students that they have to continuously reflect on practice and “dig deeper” in all situations. Finally, Krista appeared to model curiosity by asking many questions and encouraging the students to do the same.

In addition to open-ended responses about dispositions, Krista also took the CCTDI. Her scores suggested she had an overall positive disposition toward CT, except on the dimension of *truthseeking* (Table 14). On the survey, students were asked to rate how often she fostered CCTDI dispositions in the classroom (Table 15). On a three-point scale (0 = never, 1 = sometimes, 2 = often), her students gave her the lowest scores for truthseeking. They gave her the highest

Table 14

Krista's CCTDI Scores

| Disposition | Score |
|--------------------|-------|
| Truthseeking | 39 |
| Openmindedness | 60 |
| Analyticity | 58 |
| Systematicity | 44 |
| CT self-confidence | 50 |
| Inquisitiveness | 48 |
| Cognitive maturity | 44 |
| Total | 337 |

Note. Total score ranges from 70 to 420. Recommended positive cut score is 40 for each subscale and 280 for the total score.

Table 15

Student Perceptions of Dispositions Fostered in Course (Krista)

| Dispositions | Students ($n = 21$) | |
|--------------------|-----------------------|-----------|
| | <u>M</u> | <u>SD</u> |
| Truthseeking | 1.29 | 0.64 |
| Openmindedness | 1.81 | 0.40 |
| Analyticity | 1.33 | 0.73 |
| Systematicity | 1.81 | 0.40 |
| CT self-confidence | 1.76 | 0.54 |
| Inquisitiveness | 1.67 | 0.66 |
| Cognitive Maturity | 1.56 | 0.59 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

scores for fostering *openmindedness* and *systematicity* which involve tolerance of divergent views and self-monitoring for possible bias, as well as valuing organization, focus and diligence to approach problems of all levels of complexity. It should be noted that students' mean scores for all seven subscales ranged between 1.3 and 1.8 (between sometimes and often) with standard deviations ranging from .40 to .73. Overall, it is challenging to assess attitudes fostered in the classroom but my impression was that Krista mainly tried to cultivate the habit of reflection on practice and diligence in problem-solving related to teaching practices.

Other beliefs consistent with her practices were beliefs about revising work, social discourse and teaching content and thinking skills. Consequently, she encouraged students to revise their work in order to "do better", she allowed social discourse to continue in group work and her teaching addressed both content and thinking skills.

Beliefs About Students and Teaching Practices

Generally speaking, she finds that the students' ability to think critically prior to entering her class varies. She finds that in the last few years, the students are a little more prepared. She suspects it might be a consequence of the college's higher admission standards in recent years. She added, "It's a high level class for a second year class, but the students do really well and they work really hard and again, they are at different levels with it. I think it's good practice...".

On the whole, her comments about the students were positive and demonstrated some confidence that her students were up to the challenge of thinking critically. Furthermore, she believes that while student abilities differ, they can always improve. As a consequence, she provides “scaffolds” or support for student thinking in the form of feedback and prompts (i.e., guiding questions) that are removed over time.

Beliefs About Self-efficacy and Teaching Practices

In her interview, Krista said that she has adequate professional training to teach for CT but thinks she would benefit from more professional development and conversations around it. Specifically, she would like to see models of it and listen to how other teachers motivate students and encourage high-level discourse. When she reflected on her own models for teaching, she said that she learned to provide the opportunities for CT while attending graduate school. She noted that her program was taught collaboratively in a seminar-style where CT was “definitely modeled”. She added that she teaches in the same manner and also tries to model it for her students by not lecturing extensively and by “drawing out learning and co-creating knowledge with children”. Classroom observations indicated that her course included a variety of instructional strategies and opportunities for CT along with a supportive environment for it. Nonetheless, Krista mentioned she was curious as to whether or not she was addressing CT in her courses.

Beliefs About Epistemology and Teaching Practices

Krista's scores on the EBI for *simple knowledge*, *omniscient authority*, *certain knowledge*, *innate ability* and *quick learning* were 38, 28, 37, 26, 24, respectively. Her scores indicate a strong belief that knowledge is complex, tentative and derived from reason. Scores on the innate ability and quick learning subscales suggest more moderate beliefs.

Krista's EBI responses for simple knowledge mostly suggest strong disagreement with notion that knowledge is simple rather than complex. For example, Krista strongly disagreed with the view that instructors should focus on facts instead of theories. She explained by stating that students need to understand where the content comes from and then ideally frame it in an historical context. She claims that you cannot make decisions unless you understand the whole context. She further clarified this belief goes hand-in-hand with her view of the balance between teaching content and thinking skills. On the other hand, two responses (of eight) pointed toward beliefs consistent with simple knowledge. She agreed that the best ideas are often the most simple and that she is somewhat bothered when she does not know the answers to complicated problems. Overall, Krista's teaching practices reflected her belief that knowledge is complex by offering students opportunities and time to reflect on complex teaching problems and finding multiple solutions.

She also holds a strong belief that knowledge is tentative rather than certain. For example, on the EBI she strongly agreed with the notion that truth means different things to different people and the moral rules she lives by apply to

everyone. "I truly believe in non-violence and not killing and not an eye for an eye, then that's the truth for me", but mentioned that is not the truth for everyone. She recognizes that some people see truth as a static or given construct, while others are constantly seeking and do not view life as black and white. From our conversations it was clear that she sees truth as tentative and based on personal interpretation, which is mirrored in her emphasis on reflective practice and decision-making skills in her course.

In terms of omniscient authority, she firmly believes in questioning authority and that knowledge is derived through other means. "There is some truth based on facts and evidence and some truth is based on what is ultimately the right thing to do... and is socially determined". She does not think "the majority" is always right and provided an example of the current war in Iraq. She stated her belief that war is wrong and even if everyone decides it is a just war, she cannot agree with it if she believes that killing is never justified. On the other hand, she wonders how we will ever know if the war is right or wrong given that people in Iraq are suffering. "I don't know if you can ever define it. Some truths just can't be defined", she added. Statements she made about authority in general, are highly consistent with her views on teaching as a craft and not teaching according to prescriptions found in teaching manuals.

She knows when something is true based on intuition and life experience. She explained that it is like an ethical decision, where you do what you think is right. Similarly, Krista strongly agreed with the statement that sometimes there are no right answers to life's big problems. She referred back to her example of

the war in Iraq and said that, "Sometimes things are not black and white. Most things are not. Some things aren't and some things are".

Her scores on the EBI for innate ability, suggest that she mostly agrees with the notion that learning is acquired and to a lesser extent innate. For example, she disagreed that some people will never be smart no matter how hard they try. At the same time, she agreed the some people are born with special talents and moderately agreed that smart people are born that way. These statements are consistent with her open-ended interview responses where she declared that students begin at different levels but it is never too late to learn and develop thinking skills. She therefore provided students with multiple opportunities for reflection and discussion as well as "scaffolds" and support to foster her students' thinking skills.

For quick learning, Krista openly struggled with some of the questions but her responses mainly suggested that learning can occur even if it does not happen quickly. For example, because someone struggles to find an answer, she believes it does not necessarily make you more confused. She added her view that you may not necessarily find a solution if it is a complex one. Specifically, she related her statement to teaching by saying that if you are making a decision around a child and what is the best thing to do for that person, the issue is complex. "It's good to dig deeply into a question", she finally remarked.

Summary

There were few discrepancies between Krista's stated and actual teaching practices. Her approach to teaching also appeared to match her conception of

CT, beliefs about how CT develops, epistemological views, self-efficacy and perceptions of the students. Overall, Krista's course used a number of strategies to develop thinking skills and challenged students with a heavy workload. She said that she thought about CT "a bit" and wondered whether or not she was addressing it sufficiently. My interactions with her and observations clearly indicated that Krista thought a great deal about her teaching practices and she was indeed fostering CT in her course.

Networked Thinking: Gordon's Story

Background

Gordon is program director of the Computer Networking major and co-program director of the Digital Forensics Technology major at Lakenorth College. On a full-time basis, he teaches courses such as Computer and Network Security, Computer Forensics and TCP/IP. In addition, he is an adjunct faculty member at two other institutions and an instructor for a professional network security organization. He has been teaching in industry for over twenty-five years and at Lakenorth College for three years.

With an M.S. in Computer Science, Gordon has worked as a software engineer and application programmer. He continues to work as an independent consultant in his field, is active in advancing computer crime legislation at the state level, has written books and articles for industry publications and serves on several professional committees. Gordon also served on one of the college's committee that helped to identify student learning outcomes of four-year programs. Additionally, he participated in most of the professional development activities provided by Lakenorth College.

Gordon voluntarily met with the Instructional Design consultant in the spring of 2002 and was asked to volunteer for the study. The course he selected as the context for his teaching practices was the Computer and Network Security course. The purpose of this course was to provide students with an introduction to the aspects of computer and network security and to examine policies, best practices, testing and methodologies for implementing security. It should be

noted that students in this course were also required to work towards the SANS Security Essentials certificate (SysAdmin, Audit, Network, Security). Accordingly, students had to take SANS quizzes/exams and write a research paper for the institute.

Nineteen students were enrolled in the course which mainly consisted of Continuing Education and third-year students (Juniors). An average of 17 students were present during each of my three classroom observations.

Teaching Practices

Classroom Overview

The Network Security class was taught once a week for a period of two hours and 45 minutes. Students sat in two-person desks arranged in rows, facing the front of the classroom. A typical class began with one to three students presenting security-related topics from articles they had read in the news. The mini-presentations commonly generated twenty-minutes of additional full-class discussion. The instructor then gave a lecture on topics covered in the textbook, using well-organized PowerPoint slides. Specifically, Gordon provided many real-life examples during his lectures and often elicited students' prior knowledge before discussing the material. He also injected a great deal of humour into his lectures, which appeared to keep the students engaged. During the lecture, students were also encouraged to ask questions and to comment on the material.

Critical Thinking Skills

When I asked Gordon which CT abilities he was trying to foster in this course, he mainly discussed skills of analysis because he thinks it is important for students to be able to solve problems and to make decisions in their professional lives. After some probing, he also mentioned skills of evaluation, interpretation and explanation. For example, he stated that in the ongoing written assignments he tries to get students to interpret a news article in their own words and then explain or evaluate whether or not the content of the article was reasonable, unreasonable or just. Other written assignments require students to integrate material from the course and apply them to their own situations. In summing up the discussion on CT skills, he said the skills used by the students are dependent on them. Some of them will choose to identify their biases, for example, but he does not necessarily ask them to do it. Reflecting on the interview questions, he said, "I think I actually do more of these things, more than I thought without ever giving them those names".

Course Design and Instructional Strategies

How is Gordon's course structured? According to the syllabus, the course is "primarily a leader-led/lecture course" with a hands-on component. In the interview, Gordon followed up by stating that he gave students weekly writing assignments, one major research paper, required them to do one formal presentation and a mini-presentation in order to reinforce the course concepts. He also invited two guest lecturers to speak to students about relevant security-related topics such as computer-facilitated crime and the federal law.

With respect to CT in particular, Gordon asserted that he expects students to do most of their thinking outside of class, especially in their weekly writing assignments. He also said that he tries to make CT as well as ethics recurring themes that are interwoven throughout the course so that students will not perceive them to be “add-on skills”. Specifically, he reported that on a weekly basis he asks students to be reflective about a topic, while he sometimes provides them with prompts. He offered the following example:

We have a hacker in Argentina who believes that hacking is cool, hacking is fun and by the way there's no Argentinean law against, therefore he feels that everything he does is cool. Well, what do you think about that, considering he affects people not in Argentina?

When I referred to his syllabus, I noted that Gordon did indeed ask students to identify their initial reactions to a newspaper article on the Argentinean hacker and to offer their opinion in writing. I also noted in other homework assignments that he required students to read and comment on an article or story and he *always* included prompts to direct their thinking.

A particular assignment he chose to discuss at length was his open-ended questions revolving around the topic of ethics. The following written assignment was taken directly from the syllabus:

When someone says to you something about being "ethical," what do you think of? Does it suggest to you a way of life, religion, philosophy, law, culture, actions based upon whether someone is watching or not, etc.?

Are there universal truths? Are ethics situational? We are going to discuss

ethics as it applies to computers, networks, and security — I'd like you to think about a baseline context for how *you* approach this subject.

He commented on the outcomes by saying that he has given the assignment to four different classes and is he consistently impressed by the heartfelt nature of the responses and how seriously almost all of the students take it. He thinks it might be different from other questions because students know there is no correct answer and are therefore not threatened by it. The other reason he is surprised by some of their answers is because students open up and discuss their ethical, religious and cultural beliefs.

The second writing project he assigned was the "Topic of the Week", which required students on a weekly basis to find a topic of interest in the news, describe the issue, explain why it was of interest and to provide their opinions in writing. Moreover, students had to speak about their topic in class (mini-presentation) at least once during the semester.

For instance, during one classroom observation a student talked about an article related to the full disclosure of source codes which then developed into a 20-minute full-class discussion about topics such as civil liberty, open disclosure, software errors and overzealous governments. Several students related their own weekly topic or general knowledge to the discussion and the instructor provided additional examples related to the subject matter. Likewise, I observed three students in the following class present their topics. Gordon asked a few clarification questions (e.g., "What kind of attachments does it find? How do I find your machine?") and ensured that all students were familiar with the concepts

being discussed (e.g., "Does everybody know what SETI is?"). Once again, he added his own examples from his personal experience and encouraged students to ask questions and contribute to the discussion.

Finally, Gordon talked about the major paper which was required by the SANS Institute for the certification process. In brief, the students had to research and write an eight-page paper about a security-related topic using up-to-date references. He commented that CT is not necessarily a major element of the paper unless the student "elects to make it a piece". I suggested that the students might use skills of interpretation when completing the project. He agreed that students had to demonstrate understanding of the material but repeated that CT skills are not required in this paper. The second part of the research project was to present the paper to the class in 10-20 minutes. According to the syllabus, the presentation was graded upon style, effectiveness, understandability, completeness and uniqueness.

In general, the course was designed as an instructor-led course with full-class discussion of relevant topics and student presentations. Students were expected to complete weekly assignments and a final exam which were aimed at eliciting CT skills. They also had to write a research paper required for the certification process, but students were not necessarily expected to demonstrate CT in this assignment.

How are Gordon's course designs implemented in the classroom? Gordon stated that he mainly tries to foster discussion in class and always makes an effort to provide a comfortable atmosphere for students to discuss relevant

topics. Accordingly, he rarely calls on individual students to participate because he disliked that technique as a student. Instead, he said that he calls on students periodically if they have not yet presented their topic or if he knows a student has something valuable to contribute. He will always “give them an out” because he does not want to embarrass them. Other important strategies he used to promote CT in the classroom were modeling, providing feedback to students and making connections from course content to real-world situations.

When I asked Gordon how often he used open-ended questions in class, he said that he did it somewhere between sometimes and often. I noted in my observations that sometimes he did not wait for answers to questions and many of them were closed-ended. He explained his strategy by saying that sometimes these inquiries were intended to get students thinking about things they need to answer in their jobs and in their lives. He does not therefore expect an answer in class.

He then reflected upon one of his last classes where he did ask open-ended questions on the topic of ethics. He noted it was an interesting class since people have strong convictions and because but this class required them to pull all the course concepts together and to examine the big picture. However, when I returned to my classroom observation notes to find examples of open-ended questions, I found that Gordon only asked a few of them like, “What offends you about this [web] site?” and “What is the difference between ethics and the law?”.

Instead of open-ended questions, it appeared as though the energetic exchange was prompted by the controversial and open-ended topic in addition to

the extreme examples that Gordon provided. Specifically, Gordon began the discussion by introducing the topic of ethics, told students that he takes it very seriously and reminded them of the ethics agreement they signed at the beginning of the course. He further stated that he was not an ethicist and would not teach them the process of ethical reasoning. Instead, he emphasized the importance of ethics in making professional decisions and provided an example from his personal life.

Gordon then started his PowerPoint presentation and reminded students to bring up topics that “struck their fancy”. He pointed out a few ethical concepts and then demonstrated several “offensive” websites promoting White Pride, justification for discriminating against Aborigines in Australia and websites opposing homosexuality. Subsequently, the lively discussion focused on evaluating the credibility of authors, the issue of free speech, differing laws worldwide and identifying responsible parties for regulating the Internet. Specifically, one student shared his belief that websites should not be removed because he would like the opportunity to evaluate the material for himself. A few other students as well as the instructor agreed that we should not suppress unpopular ideas, restrict access to these sites or leave it to the Internet Service Providers to decide what they can read.

Furthermore, they talked about the difference between ethics and the law and discussed common illegal activities in which individuals frequently engage (i.e., stealing service from an ISP, sharing files on the Internet). Finally, the class ended with the instructor reminding students that these are ethical issues they

have to deal with every day. In sum, high-level discussion in class that day included multiple perspectives, well-supported arguments and dialogue revolving around evaluation of an author's credibility and source of information.

In addition to asking questions in class, Gordon reported that he often provides feedback and tries to reinforce good thinking. In their homework assignments, he said that he writes a lot of comments and asks questions to get them thinking. I did note several examples in class where he gave positive feedback, offered reasons for agreeing or disagreeing with the student or asked students to justify their reasoning. For instance, I observed him make statements such as, "Martin's point is well taken because...", "You raise an interesting question" and "Can you give an example of the kinds of lists that you're talking about?".

Gordon added that he tries to provide gentle feedback to students and not directly attack them. He asserted that if students are totally wrong in all aspects of what they are saying he will more or less thank them for their answer but then suggest an entirely different conclusion without ever saying they were wrong. I noted one example of this in class when he said, "I will agree with you that... It's a good point. But I think that when you....".

In addition to feedback, Gordon said that he often tries to model CT by getting students to challenge information they encounter and by demonstrating how they might think through a problem. He offered the following example from one of his classes to illustrate his point: "There's this new crypto system that uses 1 million bit keys. Sounds really strong doesn't it? Now let's talk about why

that's ridiculous. It just doesn't pass the test of what's reasonable based upon what we know about crypto". He explained that he tries to use these types of examples to show them it is acceptable to challenge information and to think about how the material relates to their work or personal situations. When relevant, Gordon also reported that he explicitly offers the students a slightly different view of the textbook material based on his own experience, encourages them to think about whether the information makes sense overall and then to decide if it makes sense in their particular work environments. Additionally, he allows students to see him struggle with a problem to let the students know that he labours over certain decisions as well.

From my visits to his classroom, I often observed Gordon challenge information and pose questions like, "Does this even make sense?". I also watched him remind students that they did not have to agree with his opinion. For instance, when they were discussing a specific piece of software, Gordon said, "This is purely personal. I do not expect you to all agree". He also allowed students to watch him struggle with problems, particularly as they related to ethical issues. I also pointed out that he models self-regulation skills by explicitly stating his own biases before stating an opinion. A few times, I heard him say, "I'm a White, Jewish, Liberal, Male, Democrat from California", prior to offering his view on a topic. While Gordon has always recognized that his own thinking is "coloured", it did not occur to him prior to the interview that his statement might help the students to identify their own biases as well.

With respect to making connections from course content to other disciplines or real-world contexts, he said that he often provides examples of his own and frequently discusses current events to make the subject matter more relevant to the students. I noted in my observations that Gordon frequently brought up topics in the news such as convicted hacker Kevin Mitnick's release from prison and a Visa Card scandal which involved a hacker breaking into a company's computer systems. In his lectures, he also related course concepts to real-world issues like credit card authentication on Amazon.com, made analogies (e.g., U.S. navy's traffic analysis in Granada to website traffic analysis), displayed actual websites and discussed several specific software programs. He also brought in examples from his extended experience in the field and had guest lecturers speak about security issues that students would encounter in their workplaces. Lastly, Gordon also connected content in his lectures to concepts previously covered in the course ("Remember when we talked about TCP/IP?") as well as to forthcoming topics (e.g., malware).

Related to connections, Gordon also noted that he often tries to elicit prior knowledge. For example, he asked if students knew the difference between HTML and HTTP, if they had experience with programming in Perl, and if they were familiar with terms like "honeypots" and "inference attacks". He frequently followed up by saying, "For those of you not nodding vigorously..." and went on to define or clarify the concepts when necessary. Gordon explained that he had a lot of material to cover and does not like to waste time in class discussing things students already know. Similarly, he said that he gives homework assignments

because there is little time in class for students to reflect and to structure their thinking. While laughing, he added, "In class, I tend to get them to react more than reflect".

In terms of specific grading criteria for CT, Gordon said he simply tells students what he wants them to do in the assignments but does not provide criteria. When I examined the syllabus for his instructions on the Topic of the Week for example, they articulated his expectations for CT and included some criteria:

Don't just give me an article to read or a URL; instead, tell me why you chose a particular subject and why you think it important. Think critically about these issues and involve yourself in your writing — e.g., a parallel government Internet sounds good at first blush but does it make sense; why or why not? The information for this assignment can come from anywhere: a mailing list that you monitor, some security-related site, a friend, the [local newspaper], an experience from your workplace, etc. If there's a story to follow over some weeks through the semester, feel free to report on it as it evolves. Use your imagination and get used to thinking about this... Each of you will be asked to present at least one of your "topics" to the class.

Gordon further mentioned that he often stated his expectations for CT. His requirements for CT were clear from the Topic of the Week instructions as well as in other parts of his syllabus. For example, in the course outline he mentioned

the college's core competencies and indicated how the course would address them. With respect to CT, he wrote:

While there are some well-defined processes and procedures for the design and implementation of secure systems, every environment is slightly different... By discussing and analyzing various real and hypothetical scenarios, students will learn how to create processes to build secure networks... The very nature of this business is critical thinking... there are several correct solutions... Critical thinking is reinforced by homework assignments and classroom discussions.... [which will] focus more on how the subject matter integrates with other things that students know and will learn in the future. We will also examine how students' attitudes change as their level of knowledge — and responsibility — changes.

Interestingly, the expectations for CT were stated in other parts of the syllabus, but the student outcomes of the course appeared to be lower-level thinking skills. For instance, the list of outcomes included verbs such as identify, explain and describe.

Assessment

What is a good indicator that his students have learned the essential aspects of the course content? He said that he knows what students have learned based upon his test, quizzes, paper and homework assignments. At the time of the interview, he said that he had only given one test because the SANS Institute requires students to take thirty-six multiple-choice quizzes online. He obtains

their pass-fail scores and can therefore assess if the students are learning the material throughout the semester.

He also gives students his own essay test which allows him to “gauge where they have moved during the semester”. The take-home test is aimed at getting the students to apply the course concepts to their own experience and knowledge. Essays in particular are helpful to him because he wants to know how students arrived at the answer and why. For example, he said that a question like “What is your own personal security policy?” requires students to know what a security policy is, identify its elements and then relate concepts to their own environments. Other questions for example, asked the students to review a website in order to answer several application questions and provide justification for their answers (e.g., “Common Vulnerabilities and Exploits site). Furthermore, he required students to formulate their own question relevant to the course material and answer it.

Similarly, with the Topic of the Week, Gordon said he can estimate student growth “based on the trends in the homework assignments”. For those who do not demonstrate CT early on, by the middle of the semester he provides feedback to improve their assignments (i.e., probes to justify opinions). He firmly believes that students should not be given opportunities to revise their work because he does not want to grade things twice and because he wants students to give it their best effort the first time around. He explained that students should be looking forward and can improve their work on the next assignments. Gordon also stated that in the real-world people do not get the chance to do things twice.

For example, “the judge for the search warrant... is not going say, I think you really need to re-do paragraph #2”.

With respect to the final paper and presentation he mentioned that a third of the grade revolved around this project but there is little room “for the critical element”. Some of the students do in fact demonstrate good CT skills by demonstrating a thorough understanding of the topic and by identifying and evaluating the sources of knowledge. Other students however, “do not look at things critically”. He mentioned the assignment for thoroughness but repeated that it is not aimed at fostering or assessing CT skills.

The final element of assessment is attendance and participation (15%). He laughed and admitted he has not provided a rubric or criteria for participation but it allows him the “fluffy room that I feel that I need as an instructor to push somebody’s grade one way or the other when I think it needs to be pushed”. Finally, Gordon told me he was surprised by some of the things he was saying about his teaching practices. He ended the discussion by stating that he was trying to cultivate something he hoped they have naturally because “I’m not teaching them the process. I don’t know that I know how to teach them the process”.

Summary of Teaching Practices

Gordon’s intention is mainly to foster analysis and problem-solving skills in his students. Toward that end, Gordon’s “instructor-led” course included weekly writing assignments meant to foster reflective activity about current events and security issues and to get students thinking critically outside of class. Students

were also required to informally present security-related topics found in the news, which frequently turned into full-class discussions about a number of relevant topics. Additionally, students had to write a major paper and present the main ideas in class, but the assignment was not aimed at fostering students' CT skills.

In class, Gordon presented well-organized and humorous lectures that were based on the assigned readings. He always encouraged students to question and comment on the material. He also incorporated many real-life examples from his extensive work experience and asked students to contribute their knowledge as well. Consequently, the connections between the course material and real-world applications were made explicit. Additionally, Gordon regularly elicited prior knowledge, modeled CT, reinforced good thinking and tried to create a class environment where students felt comfortable to freely discuss and share ideas.

The students in Gordon's class were assessed through multiple-choice quizzes required for the certification process but he also gave students his own essay exams that were aimed at evaluating students' ability to apply and integrate information. In addition, students were evaluated on their weekly writing assignments, presentations and major paper. Students were not permitted to revise and resubmit their work. Gordon allotted a portion of student grades to in-class participation but did not formally assess the quality or quantity of their contributions. While he did not provide grading rubrics for assignments, he did supply students with general guidelines and explicitly stated his expectations for critical thinking.

A review of Gordon's instructional strategies and beliefs will be presented in the following section. Additionally, it will examine congruency between his espoused and actual teaching practices. Finally, it will compare his beliefs about CT and other views (e.g., epistemology) with his teaching practices.

Beliefs About Critical Thinking

Conception of Critical Thinking

Gordon's conception of CT mainly revolves around seeking the truth and assessing the credibility of information:

When I think of critical thinking... in terms of either myself in daily life or what I'd like my students to accomplish, is when they read something or hear something or see something for that matter, they go beyond just taking it at face value and they go beyond just accepting it because, "I read in the newspaper and I know it's true. I read it in a book. The teacher said it..." and go beyond the credibility of the source and look at whether the thing that they've just read, heard or whatever is consistent with the things they believe to be true, know to be true... just if what they are hearing really actually makes sense and stands up to any sort of analysis.

Accordingly, he thinks CT is important for two main reasons. First, to be a good professional one has to be able to think things through on their own. People need to practice problem-solving skills so when they encounter a problem where they do not know the answer, they will have the thinking skills to drive them toward the best possible solution. Secondly, for the same reasons, he thinks citizenship in this society demands that we use the same skills.

Gordon's conception of CT involves dispositions such as open-mindedness, curiosity and inquisitiveness. Specifically, he wants students to be open-minded, not to be set in their ways or disturbed by anything they hear and not to allow facts they encounter to clutter what they believe to be true. He further explained that sometimes what you hear reaffirms what you know, sometimes it challenges you to think about something different, to learn about a new perspective or even a new fact. He also believes that people need to be willing to question their own perceptions of what they think is true and allow those perceptions and "faith systems" to be challenged by others as well. Finally, Gordon sees a connection between inquisitiveness and thinking critically because "when you stop asking questions, you cease to think critically".

When I asked Gordon if his conception of CT involved standards or criteria for assessment he laughed and said, "Sort of like art and pornography. I can't define it but I know it when I see it". He later followed up this statement by saying that he looks to see if students' reasoning is based upon emotion, experience, prior learning or from an expert. Is it based on the last person they heard speak? Do they listen to an expert merely because the expert is an authority? Are they choosing their expert wisely? He also added that he could assess the quality of students' reasoning by the volume of writing and intuitively, he can tell how seriously they have taken an assignment or how much a student has "thrown themselves into the task". With students he knows well or by the middle of the semester, he can determine if the students are being lazy or "where they are on these things in terms of their willingness, their desire, their ability".

Development or Acquisition of Critical Thinking

Gordon does not think that everybody is born equally when it comes to intelligence and the ability to use their brain. He stated: "Some people are naturally better at being analytical and thinking things through". In addition to innate ability, he believes that some students and people in general are simply not interested in thinking critically. Specifically, he stated that developmentally, the younger students are at an age where they are not going to think critically because the world is too black and white for them.

He believes the older, more mature and experienced students, "however those combinations came about", find it fun to challenge ideas and are more capable of doing so. The older "non-traditional" students, he asserted, are taking time out of life, paying for their education themselves and take their education more seriously. Additionally, their motivation is not to do the least amount of work to pass the class like many of the younger students.

In addition to age and motivation, he believes that with practice you get better at thinking critically. He supposes it becomes habitual where "you do it a little and then you start to do it more... and sometimes it just sort of dawns on them". He reflected on his many years of working in the field and said that he has made quantum leaps in his thinking and does not need to struggle with problems like he used to. Thinking critically is "like breathing" to him.

In the classroom, he thinks that students need a certain amount of permission to challenge or "push back", particularly at the beginning. For example, in the Network Security class, students need to first consider and

question whether or not the rules and policies presented in the textbook are good. They also need to be told when they are getting away from absolutes because sometimes they “might accidentally think it’s a fact”.

He noted that one of his primary roles is to teach the content of his course because he does not think you can “critically think about stuff if you don’t have any information”. He added that student’s ability to “think critically about something is almost more important than any individual piece of content...”. What also works best to make students think critically, he believes, is the mentoring approach. He thinks students learn by watching the instructor work through a problem and pick it up by being aware of their surroundings. They also learn by observing instructors struggle with a problem because it gives them permission to struggle as well. Parents and teachers are often put on a pedestal so he thinks it is helpful for the students to see that that they too are challenged by problems. He also said that he tries to give students the opportunity to practice but is not very good about providing a step-by step approach because admittedly, he does not know how to teach it that way.

On the other hand, the students’ role in the process is mainly to have a positive attitude toward thinking, a desire to learn and curiosity. He also thinks that students need to question authority and figure out the difference between obnoxious questioning and legitimate challenge of authority.

Do the CT skills fostered in this course transfer to other courses or real-life situations? He believes the skills he attempts to foster transfer to real-life circumstances because he tries to use authentic situations to explain the

concepts. He is not sure if the skills transfer to other courses and believes that it is dependent upon the individual. Furthermore, Gordon thinks his discipline lends itself very well to CT because "we have to be analytical in what we do. If we don't do things right, things fall down". With respect to subject-specificity, he thinks students benefit from a course in CT but it also needs it to be placed in context. He believes that he and others in his field can place it better in context but cannot necessarily teach students the rudimentary skills.

Obstacles to Critical Thinking

The issues Gordon discussed as barriers to developing CT were related to the class dynamic, students, training in CT and the institution. First, he thinks the class dynamic has an impact on his teaching. Gordon explained:

Every class I've ever taught has had its own distinct psychopathology and so sometimes I will find myself saying the same thing to two groups but it hits the group differently and the group dynamic frequently will take on a life of its own. This semester, in the Security class, there have been more conversations or more topics that I have started and not finished.

He reflected that this was the fourth time he taught the course but this year he was not always able to get through the day's planned agenda because of the interesting conversations that took place. He suspects the difference might be due to the fact that the current class had the highest population of non-traditional or older students. Despite a few detours, he concluded that he was able to accomplish everything he set out to do in the course.

In addition, he perceives that students' prior academic experience also limits CT. He explained that at a young age, many of the students are not given permission to think critically. Even worse, he believes, is that some professors explicitly give students the permission but in practice do not tolerate students who challenge their ideas. Consequently, he thinks these students will not trust that they can think critically or challenge material in his course.

In regards to his own abilities, he stated that he wants students to be able to think critically, but he is not a CT instructor. He believes he can teach it within the context of his courses but is not trained to teach the skills explicitly which can be a limiting factor.

Related to the institution, Gordon explained that the college's prerequisite structure and course sequence make it difficult to implement CT and other competencies effectively. For example, he said that for students enrolled in the two-year Networking program, "2/3 of the credits are Networking credits and the other 2/3 are supposed to be the competencies". He pointed out that it "doesn't add up". Furthermore, most students in four-year programs will not explicitly learn CT until the third or fourth year, while Networking majors are not required to take the CT course at all. Consequently, he wondered how students would benefit from explicitly learning the skill after most of their coursework was complete, since he would not have the opportunity to build upon it.

On a related note, Gordon believes the biggest hurdle facing the college right now is dealing with its transition from a two-year to a four-year college. He said that the administration is not as ready to flip a switch and declare the college

a four-year school as many of the faculty members are. While he is very sensitive to the fact that Associates degrees have a place and are beneficial, it is difficult to work the college's core competencies into programs that were designed to focus on programmatic or discipline-specific elements. He stated these were "competing goals and something's got to give". On a final note, he added that he hoped his responses about the institution came out positively. He enjoys teaching at Lakenorth College and he likes the administration. Gordon does not hold a Ph.D. and suspects the administration has given him more freedom and responsibility than he would get at other institutions.

Beliefs and Teaching Practices

Espoused and Actual Teaching Practices

Overall, Gordon's espoused teaching practices were consistent with his actual teaching practices. First, all of his planned instructional activities were implemented. Second, his assignments (e.g., weekly writing, mini-presentations), in-class discussion and final exam fostered the CT skills he mentioned in the interview and course syllabus. Third, my classroom observations indicated that his instructional strategies such as eliciting prior knowledge, making connections from the textbook content to real-world applications and modeling good thinking were carried out on a regular basis. On a positive yet somewhat discrepant note, he seemed to underestimate the extent to which he prompted student thinking on the homework assignments.

While I did not detect other discrepancies between his espoused practices from the interviews and his practices observed in the classroom, I noted two

misleading elements in the course syllabus. In the “Course Overview/Approach” section, Gordon mentioned that the course had a “hands-on” component. The term might be somewhat deceptive because the students only had one computer laboratory session where they “played” with software tools. Also, the syllabus listed low-level thinking skills in the “Student Outcomes” section (e.g., describe, explain). In reality, he required students to engage in more complex skills such as analysis and decision-making. In both cases, however, other parts of the syllabus more accurately described his expectations and approach to the course.

Finally, I elicited the students’ views about the course to corroborate instructor and researcher perspectives. Seven students responded to the questionnaire that used a three-point scale (0=never, 1=sometimes, often=2). With respect to CT skills, Gordon said he was “often” (2) trying to promote CT skills of Interpretation, Analysis, Evaluation, Drawing Inferences and Explanation (Table 16). The student means (with standard deviations in parentheses) obtained for these categories were lower ($\underline{M} = 1.19$, $\underline{SD} = 0.68$, $\underline{M} = 0.84$, $\underline{SD} = 0.76$, $\underline{M} = 1.00$, $\underline{SD} = 0.72$, $\underline{M} = 1.09$, $\underline{SD} = 0.54$, $\underline{M} = 1.24$, $\underline{SD} = 0.70$, respectively). Similarly, Gordon said he “sometimes” (1) fostered Self-regulation skills but the student mean (with standard deviation in parentheses) was 0.43 (0.51).

For in-class activities, Gordon said he “never” (0) used problem-solving/cases, formal debates, writing activities, role-playing or small group activities (Table 17). Student means were slightly higher because

Table 16

Comparison of Student and Instructor (Gordon) Perceptions of CT Skills

| CT Skill | Instructor Rating | Students ($n = 7$) | |
|--------------------|-------------------|----------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Interpretation | 2 | 1.19 | 0.68 |
| Analysis | 2 | 0.84 | 0.76 |
| Evaluation | 2 | 1.00 | 0.72 |
| Drawing Inferences | 2 | 1.09 | 0.54 |
| Explanation | 2 | 1.24 | 0.70 |
| Self-Regulation | 1 | 0.43 | 0.51 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

Table 17

Comparison of Student and Instructor (Gordon) Perceptions of In-Class Activities

| Activities | Instructor Rating | Students ($n = 7$) | |
|-------------------------|-------------------|----------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Student presentations | 1 | 1.00 | 0.00 |
| Problem-solving / cases | 0 | 0.86 | 0.77 |
| Formal debates | 0 | 0.71 | 0.95 |
| Writing activities | 0 | 0.71 | 0.95 |
| Whole-class Discussion | 2 | 1.57 | 0.79 |
| Brainstorming | 0 | 1.43 | 0.79 |
| Role-playing | 0 | 0.57 | 0.77 |
| Small group activities | 0 | 0.14 | 0.38 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

a few students indicated they were included in the course ($\underline{M} = 0.86$, $\underline{SD} = 0.77$, $\underline{M} = 0.71$, $\underline{SD} = 0.95$, $\underline{M} = 0.71$, $\underline{SD} = 0.95$, $\underline{M} = 0.57$, $\underline{SD} = 0.77$, $\underline{M} = 0.14$, $\underline{SD} = 0.38$, respectively). Gordon also maintained that he did not use brainstorming in class but the student mean score was higher at 1.43 (0.79). Finally, Gordon asserted he used full-class discussion “often” (2) but the student mean was lower ($\underline{M} = 1.57$, $\underline{SD} = 0.79$).

In regards to instructional strategies, Gordon said he “often” (2) gave students feedback on thinking, modeled CT, made connections, elicited prior knowledge, provided time to reflect and provided expectations for CT (Table 18). Student means for all categories were lower ($\underline{M} = 1.23$, $\underline{SD} = 0.76$, $\underline{M} = 1.57$, $\underline{SD} = 0.53$, $\underline{M} = 1.71$, $\underline{SD} = 0.49$, $\underline{M} = 1.14$, $\underline{SD} = 0.38$, $\underline{M} = 1.43$, $\underline{SD} = 0.53$, $\underline{M} = 1.29$, $\underline{SD} = 0.76$, respectively). Some students perceived that Gordon gave direct instruction on CT ($\underline{M} = 1.29$, $\underline{SD} = 0.76$) and supplied specific grading criteria for CT ($\underline{M} = 1.15$, $\underline{SD} = 0.69$), while Gordon asserted that he did not. Finally, the most consistent score related to asking open-ended questions. Gordon said he did it “somewhere between sometimes and often” (1.5), while the student mean was 1.71 (0.49).

Summary of Student Perceptions

Overall, standard deviations were high indicating variability in the student perspective. In addition, only seven of nineteen students completed the survey. Of those who did respond to the survey, they perceived that Gordon was fostering all of the CT skills less frequently than he declared. They also reported that Gordon employed many instructional strategies to a lesser extent than their

Table 18

Comparison of Student and Instructor (Gordon) Perceptions of Instructional Strategies

| Strategies | Instructor Rating | Students ($n = 7$) | |
|-------------------------|----------------------|----------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Feedback on thinking | 2 | 1.23 | 0.76 |
| Direct instruction (CT) | 0 | 1.29 | 0.76 |
| Model CT | 2 | 1.57 | 0.53 |
| Make connections | 2 | 1.71 | 0.49 |
| Elicit prior knowledge | 2 | 1.14 | 0.38 |
| Provide time to reflect | 2 | 1.43 | 0.53 |
| Grading criteria for CT | 0 | 1.15 | 0.69 |
| Expectations for CT | 2 | 1.29 | 0.76 |
| Open-ended questions | 1.5 | 1.71 | 0.49 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

instructor stated. On the other hand, a few students indicated that that in-class activities included problem-solving/cases, brainstorming, formal debates, writing activities, role-playing and small group activities while Gordon mentioned they were not part of the course. Similarly, the student means suggested that Gordon provided direct instruction for CT and gave them specific grading criteria for CT more often than Gordon indicated. For open-ended questions, the students seemed to agree that it happened “somewhere between sometimes and often” as Gordon suggested in his interview. Despite the student perspective, as indicated earlier, Gordon’s stated practices were generally consistent with his actual practices with respect to CT skills, instructional strategies and assessment methods.

Beliefs About Critical Thinking and Teaching Practices

Gordon’s conceptualization of CT and views about how it develops appear to be consistent with his practices as well. For example, in his definition he stated that students should be able to determine if information they encounter “actually makes sense and stands up to any sort of analysis”. The classroom discussion, homework assignments and final exam required students to assess the credibility of information and to judge their sensibility in context.

Furthermore, he asserted that mental ability is innate but that CT skills develop through practice until they become habitual. The homework assignments in particular, gave students opportunities to practice decision-making and analysis skills. He also said that the “mentoring approach” is important for CT development and often modeled behaviours such as good reasoning skills,

challenging information and paying attention to personal biases. His conceptualization also included the intellectual standard of justifying opinions and ideas which he clearly demanded in class discussion and in homework assignments. His criteria for assessment were also based on intuition and volume of writing.

Furthermore, he identified curiosity, inquisitiveness and openmindedness as important attitudes related to CT. On the CCTDI, Gordon demonstrated a strong positive disposition to think critically. His scores were highest for *truthseeking* and lowest for *CT Self-Confidence* (Table 19). Interestingly, his students perceived that Gordon was most often fostering *openmindedness* and *analyticity*. In contrast, they thought he was promoting attitudes of *CT self-confidence* and *cognitive maturity* least often in class (Table 20). From my observations, he appeared to foster curiosity, inquisitiveness and openmindedness by directly telling students they did not have to agree with his views, by encouraging multiple perspectives in classroom discussion and on homework assignments, and constantly asking questions about the course material.

Other espoused beliefs that were consistent with his practice were that students need positive feedback as well as permission in the classroom to challenge ideas. In addition, he did not allow students to revise their work because he believes that students should put forth their best effort the first time around.

Table 19

Gordon's CCTDI Scores

| Disposition | Score |
|--------------------|-------|
| Truthseeking | 62 |
| Openmindedness | 54 |
| Analyticity | 49 |
| Systematicity | 49 |
| CT self-confidence | 40 |
| Inquisitiveness | 57 |
| Cognitive Maturity | 51 |
| Total | 362 |

Note. Total score ranges from 70 to 420. Recommended positive cut score is 40 for each subscale and 280 for the total score.

Table 20

Student Perceptions of Dispositions Fostered in Course (Gordon)

| Dispositions | Students ($n = 7$) | |
|--------------------|----------------------|-----------|
| | <u>M</u> | <u>SD</u> |
| Truthseeking | 1.29 | 0.76 |
| Openmindedness | 1.71 | 0.49 |
| Analyticity | 1.71 | 0.49 |
| Systematicity | 1.43 | 0.54 |
| CT self-confidence | 1.14 | 0.70 |
| Inquisitiveness | 1.43 | 0.53 |
| Cognitive maturity | 1.14 | 0.38 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

Beliefs About Students and Teaching Practices

When I asked him if his students were prepared to think critically when they entered his course he said it was a difficult question to answer because it depends upon the individual student. In the end, he concluded that it varies. In particular, he believes the older students are typically better at it and more motivated than the younger students. He also asserted that many students are looking for answers, a good grade and are not used to exams where instructors ask to see their thinking processes. Regardless of any negative beliefs about his students, Gordon continued to provide opportunities for practice and modeled the skills he hoped his students would acquire.

Beliefs About Self-efficacy and Teaching Practices

Gordon does not believe he has training to teach for CT, even though he has taken advantage of most professional development opportunities provided by the college. He is, however, prepared to teach his students to think critically within the realm of the program based on his own experience and abilities. When I asked him what kind of support he would need to do so, he laughed and said he would love to have the students take the CT course before they enroll in his courses. He suspects the discussions would be very different with a "little more intellectual dueling". He made it a point to tell me that he is very supportive of the new competencies and thinks they are incredibly important but that he does not want to teach the skills explicitly.

As he reflected upon the way he was taught in college he said that he tries to avoid things that did not work for him as a student. He had several "bad"

instructors whose priority was research and most of his classes were taught through lecture only. His best teachers were the ones who liked being in the classroom, challenged students and fostered thinking skills. Likewise, he hopes he is challenging his students and believes that much of it based on personality. Specifically, he enjoyed being in the classroom and was interested in courses where the instructor “struck him personally”.

Beliefs About Epistemology and Teaching Practices

Gordon’s epistemological beliefs were examined for consistency with other espoused beliefs and to his practice. Gordon’s scores on the EBI for *simple knowledge*, *certain knowledge*, *innate ability*, *omniscient authority* and *quick learning* sub-scores were 38, 32.5, 22, 21, and 28, respectively. His scores suggest a strong belief that learning does not have to happen quickly and that knowledge is complex, tentative and mostly derived from reason. His scores further suggested that he holds moderate beliefs about innate or fixed ability.

After taking the survey, I asked Gordon to clarify some of his responses. Related to “certain knowledge”, his answers mostly indicated that he believes knowledge is tentative rather than certain. Gordon, however, struggled to answer the question, “What is true today will be true tomorrow” and in the end he circled the two middle responses¹. He explained that there are some things that are “reasonably factual as we understand them to be and a bunch of things that are well open to question... there are some real truths, whether we have discovered

¹ It should be noted that selecting two responses was not officially permitted. Because it best corresponded with his beliefs, I allowed it and entered his score as 3.5 on the 6-point scale.

them or not as well as truths that cannot be proven". For example, his faith in God is something that he has not really come to terms with nor has it been a priority in his life to decide whether or not one exists. Conversely, there are things that are true and reasonably everlasting, like the earth revolves around the sun.

He also agreed that absolute moral truth exists, indicating a belief that knowledge is certain rather than tentative. He thinks that there is a general moral force for good and a "correct" way to behave, although he may not see it in everyday life. He said that his own behaviour is guided by responsibility toward "community", rather than God sitting in judgment of him. How does he decide what to believe? "I think that what we have is interpretation...I pick and choose the interpretations that I go with", he said. He also mentioned that society to a certain extent sets the norms. He concluded the conversation about certain knowledge by stating that while some knowledge is constant, in most of the courses he teaches there is often more than one correct answer that may depend upon the situation or context. His teaching practices seemed compatible with his espoused beliefs because his methods emphasized the need for students to examine network security issues in context and make decisions based on personal interpretation.

With respect to simple knowledge, he agreed or strongly agreed with most of the statements, indicating a belief that knowledge is complex (e.g., "The more you know about a topic, the more there is to know"). He moderately agreed that he is bothered when he does not know the answers to complicated problems. All

in all, his course appeared to treat knowledge as complex by asking students for example, to think about multiple ways security can be applied to different contexts and by challenging students to justify their opinions.

Gordon's responses to omniscient authority questions suggested that challenging authority depends upon on the context. He agreed that it is acceptable to question authority and strongly disagreed with the notion that parents should teach their children all there is to know about life. He moderately agreed that people should always obey the law and that he usually does what he is told to do by an authority. When I asked him how he felt about students questioning something he believes to be true or factual, he responded that it would depend upon on the student, the context, relevance to the course and why they were challenging him but he tries to be open-minded. He also believes that everyone has an opinion that should not be rejected outright based on age, race, gender or place of origin. He said that he is willing to listen to anyone's opinion but they have to follow it up with relevant and "critically appropriate thought behind the idea". Earlier in the interview, he went off on a tangent illustrating this same point as it related to some of his colleagues. He said that he is disturbed by some faculty's belief that we have to "go beyond this idea that everybody's opinion is equal". He thinks the statement is callous and that everyone's opinion deserves to be heard before rejecting it. His classroom environment did in fact reflect an open-minded attitude toward various positions but students had to justify their positions with examples and good reasoning.

Gordon mainly agreed that intellectual ability is innate or fixed. At the same time, he disagreed with the notion that people cannot do much about how smart they are. These beliefs are consistent with his previously stated view that CT and intellectual abilities are innate but do get better with practice and age.

Finally, Gordon does not believe in quick learning. For example, he strongly disagreed with the idea that if you do not learn something quickly, you will never learn it. Similarly, he strongly disagreed that working on a problem with no quick solution is a waste of time. His belief that students need time to think through problems was evidenced in his course structure. The homework assignments and exams for instance were clearly intended to give students time to think through problems outside of class. Overall, there were few surprises in his EBI scores and follow-up interview responses since they were highly consistent with statements he made earlier about knowledge and student ability. Scores also appeared to be congruent with his actual teaching practices.

Summary

On the whole, Gordon's stated teaching practices were consistent with instructional approaches used in the course. His conceptualization about CT and how it develops were strongly reflected in his teaching practices as well. Additionally, his approach to teaching also appeared to match his epistemological views, self-efficacy and perception of the students. Overall, he used a number of strategies to develop thinking in the classroom (e.g. feedback, modeling) but mainly hoped to develop their skills through written homework assignments.

Thinking Critically About Critical Thinking: Carl's story

Background

Carl is a full-time adjunct instructor in the Arts and Sciences Division at Lakenorth College and teaches Philosophy, Western Civilization, Ethics and Critical Thinking (CT) courses. He is also the International Student Exchange Project (ISTEP) coordinator. With a Master's degree in Philosophy, he has been teaching at Lakenorth College for four years and has 10 years of college teaching experience.

Carl served on the college's Technology committee helping to identify core technological competencies and assessment standards for Lakenorth students. He has also participated in most of the professional development workshops offered by the college. He voluntarily visited with the Instructional Design consultant in the spring of 2002 and was asked to volunteer for the study.

The course selected for the study was Critical Thinking. Since CT has been defined as a core competency for graduating students, it is a required course for many majors at the college. The emphasis of the course is on critical reading, argument identification, structure, and evaluation. Twelve junior-level (third-year) students were enrolled in the course, with an average of 10 students present at each of the four classroom observations.

Teaching Practices

Classroom Overview

The students sat dispersed in two-person desks, facing the blackboard. Carl always stood at the front of the room making use of the blackboard by noting the

day's schedule, main topics and definitions. On occasion, he also worked through textbook exercises on the board.

Typically, the one-hour and fifteen-minute classes began with Carl briefly reviewing topics previously covered in the course, the current day's agenda and previewing upcoming material or quizzes. He then spent between 10-20 minutes lecturing and devoted the rest of the class period to reviewing CT exercises from the textbook.

Critical Thinking Skills

Carl reported that he is mainly trying to get students to identify, analyze and evaluate arguments in language form and in symbolic form. He also focuses on rhetorical skills and tries to get students to recognize the difference between persuasion and arguing. Specifically, he believes that assessing the structure of arguments helps students to understand how they fit together as well as to determine how to best attack or support them. In his class, Carl reported that students also have to refute arguments and defend their claims. In order to do so, he said that students have to analyze, evaluate, interpret and explain the steps they take to refute it. The goal, he stated, is to get students to see that refuting an argument is done by means of the structure of the argument and not by means of any preconceived notions they bring to it. Finally, students have to create arguments of their own based on the principles of CT.

Course Design and Instructional Strategies

In order to develop the CT skills identified, Carl's instructional strategies mainly consisted of lecture and practicing CT exercises as a whole class. Carl

articulated that he provides direct instruction or lectures on CT every class and exposes students to arguments, has them identify arguments, identify the components of arguments and analyze them. My observations indicated that he often lectured and reviewed CT exercises. In particular, I noted that he began each class by clearly stating the day's topics and writing the agenda on the blackboard. His lectures were well organized, fairly brief, and he provided many examples of his own and from the textbook to explain the concepts. Furthermore, he often noted the importance or value of the skills he was trying to teach by making comments like, "Inductive arguments by analogy. We encounter them all the time....". Finally, I noticed that he made good use of the blackboard by writing down definitions, main concepts and used it to complete some of the in-class exercises.

In addition to lecture, Carl asserted that he often asks students to participate by discussing the various qualities of the arguments (e.g., validity, soundness) and then has students diagram arguments which allows them to see how they are constructed. He also has them make arguments of their own by employing the techniques covered in class. In general, Carl emphasized that CT skills were practiced in class by having students work through the textbook exercises and sometimes by brainstorming ideas, solutions to a given problem or ways to create an argument.

Consistent with his espoused teaching strategies, during my first classroom observation, Carl gave the students a 20-minute lecture on ad hominem fallacies. He provided a definition and wrote it on the blackboard, provided his own real-life

examples of four different types of fallacies, distinguished ad hominem fallacies from valid arguments and then read through a courtroom example from the textbook. Subsequently, he asked the students to come up with their own examples of an ad hominem fallacy committed in a political campaign. The rest of the class period was devoted to students answering questions and solving exercises from the textbook as a group. A similar format followed during my next two observations which included topics such as creating truth tables and arguments by analogy. During my fourth classroom observation, Carl did not lecture but showed students a video in which panelists examined hypothetical case scenarios of ethical arguments. He reminded students, that as always they would identify arguments and assess them for validity, soundness, and legitimacy. He also repeated the goals of the course which were to identify, describe and assess arguments. Carl stopped the video at various intervals and asked the students to identify the arguments, evaluate and analyze them.

What strategies did Carl employ to develop students CT skills? As stated in the goals of the course, Carl posed many questions in class that required the students to identify the argument and type, identify the conclusions and premises, well as evaluate and analyze arguments. The following examples were extracted from the semester-long observations:

- Phrase the argument for me. What's the conclusion there?
- What do you think about that argument? Why is it so horrible?
- Why is it deductive?
- Does it commit the ad hominem fallacy?

- Can you tell me right now if it's valid or invalid?
- Is that a sound conclusion?
- Where do you see bias in the anti-war protesters? Have you heard any ad hominem fallacies used by anti-war protesters?
- Is there third way of thinking about this?

It appeared as though there was usually one possible correct answer to the questions he posed so I followed up on the topic of open-ended questions. Carl explained that when it comes informal fallacies, for example, there might be four or five different ways to characterize an argument and said, "That's why I would go with sometimes. It wouldn't be never, but it's not often". I noted one exception during my last classroom observation when Carl asked open-ended questions on the subject of ethics such as: "What do you think is the connection between ethics and critical thinking? Do you agree that your ethics colour the way you think? Should emotion have a role to play in CT?". For the most part, however, there was one correct answer or a small range of possible answers to questions posed in class.

In addition, Carl said that he provides feedback on student thinking "all the time". Moreover, he mentioned that students are encouraged to provide feedback to each other. He added they sometimes corrected each other without being prompted. I did notice that Carl often provided feedback on thinking but only noted one instance in which a student provided feedback to another classmate when she responded incorrectly.

Specifically, Carl often gave positive feedback to students with comments such as, "You are correct". Furthermore, he constantly provided feedback followed by a paraphrase of the student's response: "You anticipated the next thing I was going to write down. Very good. You need a certain amount of information here in order to judge the analogy....". On other occasions, his feedback on student thinking included probes for further information: "That's a good question. Well, let me ask you this: What role should persuasiveness play? When you say point to the truth, do you mean indicate, assume, reference? I don't see that working either. When you say it doesn't work, what doesn't work? Is it the conclusion?"

Another type of feedback he gave to students was to acknowledge their argument and then to model his own reasoning skills on the topic:

Well, I would want to see the whole argument before I made a decision but I'm willing to grant you that you're probably right. But I'd want to see the whole argument because you can make the argument that if the trial is really going bad, there should be a mistrial but I supposed if the prosecution really did something horrible then they would probably appeal.

Nonetheless, if Thomas is right or wrong he shows us the two ways of attacking a deductive argument by analogy.

On a related note, Carl stated that he models CT every day to the students by "giving them examples" and by creating arguments of his own. My observations confirmed his statement. For example, during my second visit, he showed students how to think through a problem using truth tables and then walked the

students through additional exercises on the blackboard. On other occasions, especially when students were having difficulty with the exercises, he modeled his own reasoning skills:

No principle is being made. It's deductive because it argues for a conclusion. It's not just illustrative and it is clearly not inductive so the second question is, what is the principle implied by analogy? We're saying there is no principle. It's a bad deductive analogy because the principle is not clear.

When I asked Carl if he made connections from the course content to other disciplines, courses and real-world contexts he first said that he does it often but changed his response to "sometimes". According to my observations and student perceptions, Carl provided a number of real-life examples of arguments in order to connect the concepts to what the students were learning in class. In particular, he mainly provided examples from politics (i.e., George Bush, war in Iraq) and from the courtroom. For example, when they were discussing valid arguments, he pointed out that a senator can make a valid deductive argument for a budget plan even if he is dishonest, cheats on his wife and on his taxes. Similarly, he talked about Richard Nixon and Hitler and reminded students they cannot reject an argument based upon their animosity or dislike for a person. Instead, he repeated that they need to evaluate the arguments based on the connection between the premises and conclusion and upon the structure of the argument. When discussing analogies, for instance, he provided students with a recent example from the New York Times where the author made an argument by

analogy between Iraq and Vietnam. He also explained how market research relies inductive analogies, pointed out bad illustrative analogies by discussing the familiar “life is like a bowl cherries” example and discussed language arguments presented in credit card statements. Additionally, he showed the students a video of panelists who were presenting real-world arguments.

Carl said that it is easy to incorporate real-world contexts when dealing with language arguments and the textbook makes it simpler for him by providing legal examples. With arguments in symbolic form, where letters stand for statements but are not statements themselves, it is more difficult to make those connections. Later in the interview Carl mentioned that he changed the course this year to focus more on informal fallacies because the symbolic material was more difficult to connect to the real-world and because “it might make them great logicians and they could have fun solving the problems but I didn’t think it would make them any better thinkers”.

I noticed that Carl also made connections to the students’ experiences by asking them to provide their own examples of arguments. Carl asked students to think of an example of an ad hominem fallacy, an illustrative analogy and an argument presented in the form of a picture. In one instance, a student commented that she recently witnessed anti-abortion protesters on the street with billboards depicting gruesome images of fetuses. Carl proceeded to help her break down the argument by asking her to identify it. She responded, “They were trying to show you what you what they were doing to these babies”. He agreed it was an argument and followed up by asking her to identify the conclusion.

“Abortion is bad”, she said. He accepted her statement but suggested the conclusion went further to suggest that you should not support abortion and it should be illegal. He then asked her to identify the premises and another student offered that “a fetus was a living thing”. Carl finally summed up the argument by restating the two students’ responses:

Could it be that the argument is a deductive argument by analogy? The principle being everybody agrees we shouldn’t do horrible things to children. This is a child therefore you shouldn’t do harmful things to children. The analogy is between the fetus in the picture and children you know, and people in general. Yeah, I’d say it’s an argument.

Related to making connections, I asked Carl if he tried to elicit information about what students already knew or believed prior to discussing a topic in class. Carl asserted that he does not ask for students’ prior opinions. He explained that the luxury of teaching a CT class is that you get to focus on the argument, even if it is a touchy argument, you can pull back from it and simply examine the structure of it. I did however, observe Carl elicit knowledge covered in previous classes. For example, he asked students, “Last class we talked about conjunction statements. What’s the only situation in which a conditional is false? We talked about this last class”. Other times he asked the students to define terms they already learned such as a “valid argument” or “ad hominem fallacy”.

In addition, Carl reported that he gives students time to reflect and to structure their thinking. He explained that when students work through exercises or present up at the board, “we’re never rushed. I’m willing to take the time I’d

say, often". He also added that students are supposed to read the chapters and prepare the exercises ahead of time, giving students more time to think about them. My own observations indicated overall that students were given time in class to structure their thinking, but I did note during one class observation that Carl provided little wait time for students to respond to questions such as, "How do I go about creating a truth table for this argument?". Instead, he filled out the tables on the blackboard with little help from the students. By the eighth exercise, however, he told students he would back off and allow them to do it. He called on one student to start them off and continued to let the students complete the exercise with enough wait time for them to respond. In relation to this particular class exercise, Carl later told me that in the following class (which I did not observe) the students got to the point where they liked truth tables, were completing them quickly and could do it better and faster than he could.

Related to student involvement in the exercises, I noticed on several occasions that Carl called on specific students to get them to participate. He reported that he also does "a round where they each have to answer a question, starting on one side of the room and working to the other". For example, after lecturing students on the different types of ad hominem fallacies and providing concrete examples, I watched Carl read situations presented in the textbook and call on each student to determine if the argument was appropriate and to identify its type. In the interview, he added that they were a good class and for the most part, all the students participate. In the subsequent interview, however, he said that sometimes in a small class, "it can really be miserable" because he has to

call on people all the time. In my observations, I witnessed most students participating as a result of him calling on them but only a few students each class volunteered responses to his questions or posed questions to the instructor.

Since some classes seemed to involve more student participation than others, I asked Carl for some possible explanations. He thought perhaps it had to do with the topic and said that students enjoy the topic of informal fallacies. In addition, Carl suggested that he gets better participation when students feel more comfortable with the exercises. He usually takes two days to complete a set and said that on the second day the students are more active. Related to comfort, Carl also stated that toward the end of the course as they make the connections to real arguments and they see the relevance of it, they feel freer to respond. He explained:

Because clearly when you're talking about identifying ad hominem arguments, doing exercises in the book, truth tables...there is a wrong answer and they're afraid of being wrong. I was asking for their opinions in the last class [ethics] and for them to make connections, which is really a higher-level skill, so there's really more at stake but I don't think they view it that way.

Finally, Carl said that he provides specific grading criteria or standards for CT "which makes it easy" and explicitly states expectations for CT. The expectation for students to think critically in this course were evident from classroom observations and from the goals of the course outlined in the syllabus (e.g., "The student will be able to identify arguments and their component parts"; "The

student will be able to evaluate the strength and validity of arguments, while identifying some of the most common argument flaws”).

Near the end of our second interview Carl commented on our discussions related to his teaching practices:

This has been really helpful for me, to try to figure out what it is I’m doing. And that’s odd, because you’d think I would know what I wanted to accomplish. I mean I write a syllabus, I have objectives and all that kind of stuff. This was really fun because it got me to think about what it is I’m trying to accomplish.

Assessment

Carl indicated that he knows students have learned the essential aspects of the course content by their scores on ten quizzes, a mid-term and final exam. He said the purpose of the quizzes and exams are to determine if the students can do the CT exercises without help from the book, the instructor or other classmates. The questions are the same as the exercises they practice in class such as symbolic logic questions, language questions, determining validity versus invalidity, deciding whether arguments are sound versus unsound, diagramming arguments or identifying informal fallacies. Some examples taken directly from his documents were:

- a. Construct an argument that commits the appeal to ignorance fallacy. Your argument need not be long.
- b. Construct a diagram for the following argument...

- c. Provide a definition for each of the following... (e.g., straw man fallacy, begging the question fallacy).
- d. The following are examples of the various sorts of arguments we have examined thus far. Some are fallacious; some are not. For each example, first tell what form the argument is (such as ad hominem); then determine whether the argument is or is not fallacious. So for each argument, you should write something like this: legitimate ad hominem, or appeal to ignorance fallacy.

The students were also required to write a three-page paper which is “just one among the many quizzes, but it’s different in type”. Students took an argument from real life that they discovered in a print source and had to evaluate it by explaining the strengths and weaknesses of the argument. Students diagrammed and informally presented these arguments in class as well. Carl graded the paper based on how well students were able to describe the argument according to various principles. For example, they had to explain whether the lines of argument that supported it were convergent or divergent, weak or strong, sound or unsound and identify any fallacies that might be presented in the argument. Finally, they had to defend those claims.

While exams counted for more and covered additional material, he said they were always in the same format as the quizzes and classroom exercises. Carl remarked that the questions generally have one correct answer or a range of appropriate answers. Therefore, if the students consistently get the right answers, he knows they are learning the material. It also helps him to know

overall what he is “not getting through” and what he needs to work on in the future.

I noticed in one of my classroom observations that Carl reviewed one of the quizzes in class. He told me that he reviews every quiz because he has always thought that testing is just another way of teaching. If he does not give them correct answers and explain why they got certain things wrong, students might think he is simply “giving them a number for the grade book”. Instead, he wants them to know that getting the right answer and learning the skills are what is important.

Finally, while Carl does not grade participation, he recalled that “every single day they have to answer exercises and that is probably what sticks in my mind the most...is how they did Thursday when I asked them all those questions”. In general, the exams, quizzes and classroom exercises are what helps him to determine if students are learning the material and capable of thinking critically.

Summary of Teaching Practices

With respect to CT skills, Carl asserted that he is trying to get students to identify, analyze and evaluate arguments in his course. His syllabus clearly outlined this expectation, which was also repeated in class. Carl mainly used lectures and in-class exercises to get students to learn the skills. In his lectures, Carl reviewed various CT terms and techniques defined in the textbook. He supplemented the presentations with several real-life examples of arguments and asked students to contribute examples of their own. In addition, he often

reminded students of the value of CT skills and how they could be applied to real-world contexts.

After the lectures, Carl reviewed CT exercises from the textbook which involved arguments from courtroom cases. Questions required one to several “correct” responses. He often went around the class systematically so that each student could answer at least one question. On other occasions, he called on specific students to elicit participation and on occasion, a few students volunteered responses. Carl often gave students detailed feedback on their thinking and positive reinforcement. While he was not aware that he was using the strategy, he sometimes elicited prior knowledge as well. In addition, Carl modeled CT skills and provided specific grading criteria for CT and standards for assessing CT.

Carl indicated that he knows students have learned the essential aspects of the course content by their scores on ten quizzes, a mid-term and final exam. Questions from the exams and quizzes replicated the types of questions students answered in class. He also reviewed the quizzes in class to reinforce the CT concepts. While he did not grade participation, he also gauged student learning based on their responses to in-class exercises.

Beliefs About Critical Thinking

Conception of Critical Thinking

Carl's concise definition of CT focuses on argumentation skills and reflects his training on the topic:

To me critical thinking is the ability to identify, analyze and evaluate arguments... Since it's a critical thinking class, we spend a lot of time precisely looking at arguments in their various forms...but I'm convinced that critical thinking has to be about arguments.

He further differentiates between problem-solving and CT and believes that CT always has to do with an argument that has an identifiable conclusion with inductive or deductive support for that argument. Problem-solving on the other hand, involves accomplishing a difficult task which might not involve CT at all. For example, he stated, "I might have a problem such that I need to move a large mound of dirt from one part of my yard to the other. It really doesn't involve a lot of CT, it just involves a lot of work".

Carl believes that CT skills are useful "not only in other classes and in education in general, but just in the world". He explained it is important because we are often faced with arguments, bombarded with informal fallacies and with people trying to persuade us of a given conclusion. In particular, these skills should be employed when reading a newspaper or participating in politics, because we should be able to identify, analyze and evaluate the arguments we encounter. In turn, it will help us make fewer errors and to understand why we formulate certain conclusions. With respect to civics, he smiled and added, "if a

large part of the electorate is incapable of doing this then democracy is a bad idea”.

When I asked Carl if his conception included dispositions to think critically, he said that he comes at CT from logic and that the key to thinking critically is interest in it as well as a frame of mind that allows you to solve a logic puzzle. Later in the interview, he spontaneously added that we all have a natural inclination to believe arguments we agree with and that CT requires a willingness to employ the skills and vigilance. He further explained that “you can learn the skills, ignore them and slip back into an attitude of bias”. While he does not think he can teach the dispositions, he does include motivation and attitude in his conception.

In terms of criteria or standards for CT assessment, Carl said that he looks for soundness and validity of arguments, weak or strong arguments as well as convergent and linked arguments. Students should be able to identify these qualities in arguments presented and develop sound and valid arguments of their own.

Development or Acquisition of Critical Thinking

In general, Carl believes that students develop CT skills by being made aware of what arguments are and how they occur in their normal lives. Once students become aware, they need to practice the skills. He explained:

They are exposed to arguments, whether they reflect on it or not. It's not as if they're practicing a new skill or something foreign. They really have to be made aware of the things they do all the time with regard to positions and

conclusions. Once they're made aware of that, if they care at all about why they conclude certain things, then they'll naturally understand the importance of it. So I think they acquire those skills by being made aware and then by constantly being vigilant. Because it's so easy to fall back into old patterns.

By the time they get through the course, what he wants them to realize is that "there are these things called arguments that are punctuated by a conclusion, that are supported by reasons or premises. A good argument is one in which there's a strong connection between the reasons and a conclusion". If he can get across that one central idea in the course, he thinks he has accomplished something. He believes that he is "pretty successful" in getting students to think critically because he chooses the things he really wants them to grasp and then repeats it over and over. My observations indicated that Carl did in fact repeat many of the concepts he described.

He also believes the best and easiest way for students to learn CT skills is by having them memorize the rules. At the same time, what can make critical CT fail is overemphasis on the rules and formulas. Consequently, he said that in class he tries to examine arguments "in their natural habitat" but cannot solely rely on that because students need to understand the elements of arguments as well. He therefore has students learn rules and also tries to make connections to the real-world. He also stated there is room for lecture in teaching CT "but if that's all you use... really any one method, if you just use it exclusively it will bore them to tears".

His role therefore is to make students aware of what CT is, to give them the tools they can use to evaluate arguments and to make them practice it.

Consequently, when students become familiar with arguments and can identify them in their own lives, he believes it gives them a certain level of confidence. He noted that when students gain confidence, it make it easier for him to teach CT.

On the other hand, he mentioned that he cannot teach students the dispositions to think critically and therefore focuses on the skills. He also believes that it is not his role to give students particular views of his own because CT should promote objectivity and the ability to recognize something on its merit. He then reflected upon a question posed by a student in class who asked if a Christian fundamentalist could be an objective critical thinker. Consistent with his interview response, I observed Carl respond to the student by telling the class that fundamentalists are capable of being great critical thinkers. It is up the individual to examine the arguments and treat them with all the principles of CT. He then reminded students they can attack the argument or disagree with it because they do not grant the premises but they need to explain their reasons for doing so.

In addition to his role, Carl believes the students' role in the process is to read and think about the material, answer questions in class on the material and to do the exercises at home. They also have to be willing to respond in class because if "they refuse to share it with the class, it doesn't help". In general, he believes that he can guide the students but they have to do the bulk of the work and "heavy lifting" to develop their skills.

While admitting that he had a vested interest in making the argument for a stand-alone course, he explained that CT should be taught as a separate course because it is the one class where arguments are looked at purely as arguments, not in an historical, philosophical or chemical context. He believes that students benefit by learning the skills implicitly and explicitly in all of their courses and “the fact that students have to take a course in CT, that the college has made it a core competency that is exercised across all the courses helps to foster it”.

Specifically, he thinks the college needs to identify a set of core skills, make them progressive across the curriculum and ensure that appropriate assignments are devised in each of the courses. He assumes that is where the college is headed and recognizes that CT has always been implicitly implemented in other courses, but explicit instruction will “keep students on their toes”. If it is implemented throughout the curriculum, the students will see that it connects with their other classes in an explicit way and will therefore be more receptive to the CT course when they do take it.

I also asked Carl if he thinks CT skills taught in his course transfer to other courses or real-life situations and he was very tentative in his response: “I don’t know. I think they can. I try to emphasize that but I don’t know. I hope so”. I reminded Carl that I asked him the same question a year earlier when he told me that the skills transferred. I wondered why he was less confident now. He said it had been a long time since he had taught a CT and he began to worry about it this year. He remembered back to all the classes he took and realized that you can take a class and get a grade and forget all the content and the skills. He

would therefore like to see evidence of transfer before he decides whether or not it occurs.

While the following student comments on the survey do not provide evidence of transfer, they do illustrate a belief that the course was a valuable learning experience. One student remarked: "He's a good teacher. I learned a great deal about critical thinking and I think it will be a great help to me in my career field of criminal justice". Another student wrote that the class "really made me think critically. I never knew there was so much in thinking. I think what helped me the most was doing all the exercises/cases in the book as well as our in-class discussions".

Obstacles to Critical Thinking

At first Carl could not identify anything that "gets in the way" of teaching CT, outside of the fact that perhaps not all faculty have thought about it as much as they should have until recently. Earlier, he also commented that when students do not understand the material (in his other courses) and do not participate, it can have a negative impact on CT development. He also mentioned that overemphasizing the rules in the class without making connections to the real-world could be impediments to CT. After some probing, Carl identified several issues related to the institution as well.

Carl discussed his belief that the CT course is valuable and is pleased that students are required to take it. On the other hand, he mentioned several times in the interviews that students would benefit from taking the course at the beginning of their college careers. He explained:

In the Critical Thinking course you get students who have been exposed to a lot of arguments which is one of the reasons I think it's silly to put it in the 3rd year... Because it's a core skill. It's something that would be great to have them to be exposed to at the beginning before they get all that content. Those sorts of skills could be introduced explicitly early on. And they are being introduced... everyone that I know who's a good teacher introduces them but it would be nice to have the class.

Specifically, he believes that students would get much more out of the Philosophy class if they learned the skills of argumentation first. He stated that it is impossible to teach Ethics to students who have not taken the CT course and wonders how students can identify an ethical stand in the text if they cannot identify the conclusion. He notices a difference in students who have taken the CT course from those who have not. At a minimum, he said, the students understand the terms and recognize an argument when they see it. He also noted that some students and faculty perceive the CT course as redundant when it comes at the end of the curriculum. In general, he thinks the sequence of required courses is problematic and that students would get more out of their courses if they took CT early on.

He also perceived that some faculty were ignoring the competencies, complaining about them and being "obstructionistic". Instead, he said, they should embrace the competencies and use it to their advantage. I offered my view that most faculty were implementing the competencies in their courses and

merely complaining about the top-down approach that forced them to do it. He agreed that was “a different story”.

In addition, he stated they could talk about CT and the other competencies more, especially with the students. It seems odd to him that the students were not involved in the process or on any of the committees. He added, “It would be nice for them to know that we didn’t just all get together and decide this over lunch some day”.

Finally, while Carl recognizes that others have a different conceptualization of CT, he perceives the college’s CT definition and skill set to be fairly accessible and clear. The problem, however, is there that there is no central office for new faculty to visit if the competencies are ambiguous. He recommended establishing a central person or office that would handle questions or put faculty in touch with those who could respond to inquiries. He further recommended they test the definitions by presenting them to a broad spectrum of faculty. If they are not clear, the institution should make appropriate modifications. The last comment he made on the subject was that “it doesn’t need to be scary”.

The next section will review Carl’s instructional strategies and beliefs. Furthermore, it will examine the consistency between his espoused and actual teaching practices. Finally, it will compare his beliefs about CT and other views (e.g., epistemology) with his teaching practices.

Beliefs And Teaching Practices

Espoused and Actual Teaching Practices

Overall, my observations confirmed that most of Carl's actions were consistent with his espoused practices for CT. Carl said that his main instructional activities included direct instruction on CT and practicing CT exercises in class, which were indeed implemented throughout the course. In addition, his instructional strategies such as modeling CT, providing feedback on student thinking and calling on individual students to elicit participation were employed. Finally, he reviewed each quiz in class because he views the tests as part of his teaching approach where students practice the CT skills covered in the course. From examples provided earlier, it is clear that Carl's quiz/exam questions are directly related to the skills he is trying to develop in his students.

On the other hand, Carl perceived that most of his students "participated well" but my four observations indicated that only a few students volunteered responses to the exercise questions or made inquiries in class. Moreover, we diverged on our perceptions of "full-class discussion". In his course, "discussion" mainly entailed students answering closed-ended questions, which did not stimulate the continuous exchange of ideas. On a more positive note, he appeared to underestimate his use of eliciting prior knowledge and drawing on real-word examples in class.

Students were also surveyed to determine their perceptions of the course as compared to their instructor's view. Using a 3-point scale (0=never, 1=sometimes, often=2), ten students responded to the survey in class. With

respect to CT skills, Carl said that he “often” (2) fostered Analysis and Evaluation skills (Table 21). The mean of student scores (with standard deviations in parentheses) were fairly consistent with 1.87 (0.43), 1.95 (0.22), respectively. Similarly, the student mean was consistent with Carl’s assertion that he “sometimes” (1) promoted self-regulation skills ($\underline{M} = 0.90$, $\underline{SD} = 0.79$). Carl also said that he “sometimes” provided opportunities in the categories of Interpretation and Explanation, but the student means were higher at 1.60 (0.56) and 1.54 (0.68), respectively. For Drawing Inferences, Carl said he did it “often” (2) while the student mean was lower ($\underline{M} = 1.63$, $\underline{SD} = 0.56$). With the exception Drawing Inferences, students believed the course emphasized CT skills more often than Carl perceived or to the same extent.

The students and instructor also rated the degree to which the course included various in-class activities (Table 22). Carl said he “never” (0) asked the students to engage in small group activities, role-playing, presentations, formal debates and writing activities in class. A few students indicated they were asked to engage in these activities which resulted in the following: $\underline{M} = 0.40$, $\underline{SD} = 0.85$, $\underline{M} = 0.50$, $\underline{SD} = 0.84$, $\underline{M} = 0.40$, $\underline{SD} = 0.52$, $\underline{M} = 0.70$, $\underline{SD} = 0.82$, $\underline{M} = 1.10$, $\underline{SD} = 0.73$, respectively. Similarly, Carl reported that he “sometimes” (1) used brainstorming techniques and the student mean was higher ($\underline{M} = 1.56$, $\underline{SD} = 0.83$). On the other hand, Carl said that he “often” (2) had students engage in problem-solving exercises/cases as well as whole-class discussion, while the

Table 21

Comparison of Student and Instructor (Carl) Perceptions of CT Skills

| CT Skill | Instructor Rating | Students ($n = 10$) | |
|--------------------|-------------------|-----------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Interpretation | 1 | 1.60 | 0.56 |
| Analysis | 2 | 1.87 | 0.43 |
| Evaluation | 2 | 1.95 | 0.22 |
| Drawing Inferences | 2 | 1.63 | 0.56 |
| Explanation | 1 | 1.54 | 0.68 |
| Self-Regulation | 1 | 0.90 | 0.79 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

Table 22

Comparison of Student and Instructor (Carl) Perceptions of In-class Activities

| Activities | Instructor Rating | Students ($n = 10$) | |
|-------------------------|-------------------|-----------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Student presentations | 0 | 0.40 | 0.52 |
| Problem-solving / cases | 2 | 1.55 | 0.69 |
| Formal debates | 0 | 0.70 | 0.82 |
| Writing activities | 0 | 1.10 | 0.73 |
| Whole-class Discussion | 2 | 1.80 | 0.42 |
| Brainstorming | 1 | 1.56 | 0.83 |
| Role-playing | 0 | 0.50 | 0.84 |
| Small group activities | 0 | 0.40 | 0.85 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

student mean scores were somewhat lower at 1.55 (0.67) and 1.80 (0.42), respectively. Finally, the students and the instructor were asked to report on how often Carl used various strategies (Table 23). The students generally agreed with Carl that he “often” (2) gave them feedback on thinking, provided direct instruction and modeled CT ($\underline{M} = 1.90$, $\underline{SD} = 0.32$, $\underline{M} = 2.00$, $\underline{SD} = 0$, $\underline{M} = 2.00$, $\underline{SD} = 0$, respectively). Similarly, Carl reported that he “sometimes” (1) made connections and the student mean was consistent at 1.90 (0.32). Carl said he “never” (0) elicited prior knowledge and “sometimes” (1) asked open-ended questions but his student means were higher ($\underline{M} = 1.11$, $\underline{SD} = 0.57$, $\underline{M} = 2.00$, $\underline{SD} = 0$). With respect to providing time to reflect, specific grading criteria and expectations for CT, Carl said he did it “often” (2), while the student means were lower ($\underline{M} = 1.70$, $\underline{SD} = 0.48$, $\underline{M} = 1.00$, $\underline{SD} = 0.82$, $\underline{M} = 1.50$, $\underline{SD} = 0.71$, respectively).

Summary of Student Perceptions

In sum, the student perspective is difficult to summarize and compare to the instructors’ perspective because standard deviations for many of the categories were high. Nonetheless, students reported using almost all of the CT skills more often or to the same extent as their instructor. They were particularly aware that they were being asked to use evaluation skills, as evidenced by the mean and low standard deviation. Students also appeared to be clear about their instructor’s frequent use of direct instruction, feedback, modeling, real-world connections and use of open-ended questions. Additionally, the student means

Table 23

Comparison of Student and Instructor (Carl) Perceptions of Instructional Strategies

| Strategies | Instructor Rating | Students ($n = 10$) | |
|-------------------------|-------------------|-----------------------|-----------|
| | | <u>M</u> | <u>SD</u> |
| Feedback on thinking | 2 | 1.90 | 0.32 |
| Direct instruction (CT) | 2 | 2.00 | 0.00 |
| Model CT | 2 | 2.00 | 0.00 |
| Make connections | 1 | 1.90 | 0.32 |
| Elicit prior knowledge | 0 | 1.11 | 0.57 |
| Provide time to reflect | 2 | 1.70 | 0.48 |
| Grading criteria for CT | 2 | 1.00 | 0.82 |
| Expectations for CT | 2 | 1.50 | 0.71 |
| Open-ended questions | 1 | 2.00 | 0.00 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

suggested their instructor was eliciting prior knowledge and asking open-ended questions more often than their instructor reported. While Carl declared the course did not include in-class activities such as small group activities, role-playing, presentations, formal debates and writing activities, some students reported their use. For expectations and grading criteria for CT, however, the student mean suggested he did it less often than Carl asserted. On the whole, Carl did in fact implement the strategies and skills he espoused but seemed to have a different perspective on the level of student participation than the researcher.

Beliefs About Critical Thinking and Teaching Practices

In general, Carl's beliefs about CT were consistent with his practice. His definition included the identification, analysis and evaluation of arguments and his instruction directly focused on those skills. He mainly believes that CT develops by making students aware of arguments they encounter in their lives and by practicing the skills. He also thinks that students have to memorize the rules and make connections between the rules and arguments they encounter on a regular basis. Consequently, he lectured on the rules and skills of CT and made the students practice the skills in class, in homework assignments on exams and quizzes. He also presented several examples from politics and the courtroom and asked the students to provide their own examples as well.

Intellectual standards he considers to be important are the typical criteria associated with the philosophical perspective of CT such as validity, soundness and strength of arguments. Carl's direct instruction, exercises and exams indeed

focused on these standards for CT. The attitudes or dispositions he included in his conception of CT were a “logical frame of mind”, interest, vigilance and willingness. He clearly stated that he was not able to teach the dispositions and therefore focused on the skills. From my observations it was evident that Carl was focusing on the skills but he also worked on getting the students to remain “vigilant” or aware of arguments by directly telling them to do so. When I surveyed his students about dispositions or attitudes fostered in the course, the students gave him the highest scores for *openmindedness* and lowest on *cognitive maturity* (Table 24). According to the CCTDI, Carl demonstrated a strong overall disposition toward CT with highest scores on *truthseeking* and lowest scores on *cognitive maturity* (Table 25).

Beliefs About Students and Teaching Practices

It should be noted that the relationship between Carl’s perception of the students and his motivation to teach CT is not particularly significant, because his primary responsibility in this course was to teach those skills to his students. His beliefs about the students, however, are included for completeness of his case.

Overall, Carl’s comments about the students were positive. He thinks the students are ready to start learning the skills when they enter his course. Formally, they are completely unprepared but informally, they have been exposed to arguments their whole lives, making them and responding to them. He also stated his belief that most students do prepare the readings and exercises before class, attain the skills and see the importance of them by the end of the course.

Table 24

Student Perceptions of Dispositions Fostered in Course (Carl)

| Dispositions | Students ($n = 10$) | |
|--------------------|-----------------------|-----------|
| | <u>M</u> | <u>SD</u> |
| Truthseeking | 1.50 | 0.71 |
| Openmindedness | 1.78 | 0.42 |
| Analyticity | 1.70 | 0.48 |
| Systematicity | 1.56 | 0.50 |
| CT self-confidence | 1.50 | 0.71 |
| Inquisitiveness | 1.50 | 0.53 |
| Cognitive Maturity | 1.44 | 0.68 |

Note. Judgments were made on a three-point scale (0= never, 1 = sometimes, 2= often).

Table 25

Carl's CCTDI Scores

| Disposition | Score |
|--------------------|-------|
| Truthseeking | 63 |
| Openmindedness | 44 |
| Analyticity | 50 |
| Systematicity | 56 |
| CT self-confidence | 42 |
| Inquisitiveness | 48 |
| Cognitive Maturity | 48 |
| Total | 351 |

Note. Total score ranges from 70 to 420. Recommended positive cut score is 40 for each subscale and 280 for the total score

Beliefs About Self-efficacy and Teaching Practices

Carl believes he has adequate professional training to teach for CT because it is “one of [his] fields” but thinks it is probably not the case for most instructors. When reflecting upon his own models of teaching, he mentioned that almost all of his college classes were seminar-style but CT was taught via lecture and from the textbook. He said that he tries to avoid that by involving the students more, asking questions and getting them to come up with examples.

Beliefs About Epistemology and Teaching Practices

Carl’s EBI scores for *simple knowledge*, *certain knowledge*, *innate ability*, *omniscient authority* and *quick learning* were 37, 21, 24, 20 and 26, respectively. Overall, Carl’s scores suggest that he believes knowledge is complex and certain. His responses further indicate that learning can occur even if it does not happen immediately and that individuals can generally improve upon their thinking and learning abilities. Finally, his scores for omniscient authority yielded mixed results.

First, Carl believes that knowledge is certain rather than tentative. Specifically, he thinks there is such a thing called truth (i.e., things that can be determined) but that life’s big questions probably do not have a true or false answer. He is not sure it would be helpful if they did and explained: “Struggling through to get an adequate conclusion that you can accept...you identify the criteria, why you accept them, but still being open to a better argument is probably more valuable than getting the right answer”. He added that it makes sense to say there are “truths but we just can’t comprehend them fully”. He is

firmly convinced that absolute moral truths also exist, but he has not discovered them and is not sure we can ever identify them. He then went on at length to discuss the concept of God and philosophical truths which lead him to believe that there are absolute rules but as a finite being, he can only grasp a tiny portion of them. While there is a "right and wrong", he does not believe that everyone agrees with it which is why tolerance is absolutely important. Carl's beliefs on this dimension and their relationship to practice require extensive examination and will therefore be covered in the final chapter.

Second, his responses overall indicate a belief that knowledge is complex. For example, he strongly agreed with the notion that the more you know about a topic, the more there is to know. He explained that the less simple a topic is the more questions you can ask about it and the less sure you will be. He also described the connection between the complexity of ideas and moral absolutes: "I think there are moral absolutes but the more you try to find them, the less absolute they become by definition... the less absolute you become in your position because you recognize that they are more and more complex".

For Carl, avoiding contradictions and being consistent are important in determining what to believe. He stated that something is true when there is a logical connection between the premises and the conclusion. He can believe the premises when "not accepting it would involve you in a contradiction... the lights cannot both be on and off at the same time". Similarly, he thinks a Fascist and a Nazi arguing over which is the best form of government, could both be wrong if

you point out the inconsistencies in their arguments². He is, however, bothered when he does not know answers to complicated problems and moderately agreed that the best ideas are often the most simple. With respect to his teaching, his course undeniably encouraged students to examine arguments for their logical connection between the premises and conclusion.

Third, Carl's scores suggest that he believes abilities are both innate and acquired. For example, he thinks that smart students do not have to try that hard in school and that people are born with special gifts and talents. At the same time, Carl disagreed with the notion that people cannot do much about how smart they are. He explained the inconsistency by saying that not everybody desires to know the same things or has the same talent for the same kinds of knowledge but he does believe that all people want to know something. "That's part of being...and breathing", he asserted. He believes that people can improve upon their thinking skills and does not subscribe to the notion of thinking as a fixed ability. His statements in this interview were consistent with views stated earlier that students do eventually learn CT skills by memorizing the rules and applying them.

Fourth, in terms of quick learning, he disagrees that if you do not learn something quickly, you will never learn it. Accordingly, Carl taught the skills and repeated the rules in his course in the hopes that students would learn to apply

² In a valid argument, if the premises are true, then the conclusion must also be true.

Alternatively, it is impossible for the premises of a valid argument to be true while its conclusion is false (Suppes, 1999).

them. He also mentioned in the previous interview that students need to learn the skills explicitly but also benefit from learning and applying them in other classes over the course of their academic careers.

Finally, with respect to omniscient authority, Carl's responses were mixed. On one hand, he disagreed that people should always obey the law and that he usually does what he is told to do by an authority. He somewhat disagreed that people who question authority are "trouble-makers". On the other hand, he disagreed that children should be allowed to question their parent's authority.

Summary

Carl's espoused practices were generally consistent with his actual teaching practices for CT. His teaching methods were also compatible with his conception of CT and how it develops. In particular, he believes that students learn CT by memorizing the rules and practicing the skills. Consequently, he regularly presented lectures on the skills and made his students practice them in class, in homework assignments, on quizzes and exams. The most obvious discrepancy was related to his views about student participation. They differed from my own perceptions of both quantity and quality of classroom "discussion". Additionally, his CCTDI scores revealed that he has a positive disposition toward CT. Even though his intentions were not aimed at nurturing students' dispositions, his students agreed that Carl was fostering them between sometimes and often. Finally, his EBI scores were consistent with open-ended responses about epistemology and revealed some interesting findings that will be discussed further in Chapter 6.

This concludes the case study descriptions of the four instructors. The following chapter will review similarities and differences among instructors' conceptions of CT and how it develops. It will also compare teaching practices, inventory scores, student survey data, and perceptions of self and the students.

CHAPTER 5

Cross-Case Analysis

The purpose of the cross-case analysis is to make comparisons among participants and to identify common themes or patterns in the following areas: a) Teaching practices in observed courses; b) espoused teaching practices in other contexts; c) conceptions of critical thinking (CT); d) beliefs about development or acquisition of CT; e) perceived obstacles to CT development; f) epistemological beliefs; g) self-efficacy; h) CCTDI scores; and i) perception of students. Chapter 6 will summarize findings, discuss observed patterns in more detail and relate them to current research and theory.

Teaching Practices

On the whole, each course was structured differently with an emphasis on particular teaching methods. For example, Carl's main classroom strategies were direct instruction on CT and reviewing practice exercises in class. Krista asked students to engage in a wide variety of full-class and small group activities primarily designed to elicit reflection on fieldwork experiences and discussion of teaching-related issues. Gordon's primary methods were lecture and discussion with weekly student presentations intended to provoke thought about security-related topics. John's seminar-style course mainly involved full-class discussion of business articles and cases while he constantly probed the students with questions. Table 26 summarizes instructors' interview responses to closed-ended questions about their teaching practices and reveals complete agreement on only three items: Full-class discussion, modeling CT and formal debates.

Table 26

Cross-case Comparison of Instructors' Espoused Teaching Practices

| Strategies | Carl | John | Krista | Gordon |
|---------------------------------------|-------------|-------------|---------------|---------------------|
| Brainstorming | Sometimes | Never | Sometimes | Never |
| Direct instruction (CT) | Often | Never | Sometimes | Never |
| Elicit prior knowledge | Never | Never | Often | Often |
| Feedback on thinking | Often | Often | Often | Sometimes |
| Formal debates | Never | Never | Never | Never |
| Make connections | Sometimes | Often | Often | Often |
| Model CT | Often | Often | Often | Often |
| Open-ended questions (in class) | Sometimes | Often | Often | Sometimes- Often |
| Problem-solving / cases (in class) | Often | Sometimes | Sometimes | Never |
| Role-playing | Never | Never | Often | Never |
| Small group activities (in class) | Never | Never | Often | Never |
| Grading criteria for CT | Often | Sometimes | Often | Never |
| Student presentations | Never | Sometimes | Often | Sometimes |
| Time to reflect | Often | Sometimes | Often | Often |
| Whole-class discussion | Often | Often | Often | Often |
| Writing activities (in class) | Never | Never | Sometimes | Never |

While their courses were structured differently, there were also some common elements. In particular, the subject matter instructors' (SMI's) actively engaged their students with course material in class and in homework assignments. Essentially they were trying to develop students' ability to solve ill-structured problems within their domains. They did so by presenting good models of thinking in their fields and examples from professional experience / real-life situations that students might encounter in their future careers as teachers, business professionals and computer security specialists. Additionally, they asked students to share their own experiences or examples related to the subject matter, while Gordon and John strategically called upon individual students to share expertise with the group. SMI's courses also included students' formal and informal presentations, regular writing activities and a great deal of classroom discussion. Similarly, they provided feedback on student thinking, elicited prior knowledge, explicitly stated expectations for CT and for class participation, and gave students time to reflect and structure their thinking (mostly outside of class).

Participants also used questioning strategies to foster thinking skills but there were differences among them. Table 27 presents a sample of questions from each course. Note that Krista and John's use of open-ended questions demonstrate variety in the types of questions they asked and also included prompts for self-monitoring. Gordon's questions were open-ended but half of them were aimed at probing for further explanation or making sure that students understood the concepts. The explanation he provided was that questions

Table 27

Cross-case Comparison of Instructors' Use of Questioning Strategies

| Participant | Questions |
|-------------|---|
| John | <ul style="list-style-type: none"> • What ideas / explanations of the author did you get from the article? • Where do your values come from? • What argument could you use here to defend the judge? • What do you think of the methodology? Is it appropriate? • Does somebody want to play devil's advocate? • What cautions or concerns do you have about the book being an autobiography? |
| Krista | <ul style="list-style-type: none"> • What do children gain from that? • How else would you do that? • Did it help to get feedback from your peers? • What is something you would do differently next time? • Did anyone in your group struggle with the assignment? • What do you know about assessment? |
| Gordon | <ul style="list-style-type: none"> • What kind of attachments does it find? • Does everybody know what SETI is? • How do I find your machine? • What offends you about this [web] site? • What is the difference between ethics and the law? • Does this even make sense? |
| Carl | <ul style="list-style-type: none"> • Why is it deductive? • Does it commit the ad hominem fallacy? • Can you tell me right now if it's valid or invalid? • Is that a sound conclusion? • What do you think is the connection between ethics and CT? • Do you agree that your ethics colour the way you think? |

Note. The items above are a sample of instructors' questions posed in class.

posed in class were intended to get students to “react rather than to reflect”.

Finally, Carl’s questions mainly called for one or several correct responses.

Similarly, all four instructors modeled CT but intended to emphasize various aspects of thinking (Table 28). John and Gordon were primarily trying to model good thinking skills within their domains, like how to analyze business cases or abnormal security situations. Krista was attempting to model behaviours she wanted her students to use in order to promote children’s CT. Carl’s emphasis was on providing good examples of CT and by modeling reasoning skills using the philosophical principles of CT.

All participants clearly stated their expectations for CT and for class participation in their syllabi. To varying degrees the SMI’s provided criteria to assess CT that were generally embedded within the course assignments and expectations. Krista in particular included specific criteria in the form of grading rubrics for every assignment. Within the rubrics, she outlined criteria such as “clear” “comprehensive” and “thorough”. The SMI’s also provided students with lengthy syllabi that detailed every expectation, course objectives and how all of the college’s core competencies would be addressed in the course. Their “enhanced” syllabi also demonstrated connections between the course’s objectives, instructional strategies and assessment measures. Carl’s syllabus, on the other hand, barely filled two pages and did not illustrate clear associations between course goals, instructional strategies and evaluation methods.

Table 28

Cross-case Comparison of Instructors' Espoused Modeling Strategies

| John | Krista | Gordon | Carl |
|------------------------------|--|---------------------------------------|------------------------------------|
| Aggressive reading | Build community & safe learning spaces | Analysis of context to make decisions | Examples of CT Reasoning skills |
| Ask questions | Co-create knowledge with students | Challenge information | |
| Attack cases | Design high-level activities | Identify personal biases | |
| Attitude toward CT | Elicit prior knowledge | Problem-solving | |
| Challenge info. /assumptions | Promote reflection | "Struggle" with problems | |
| Critical listening | Provide feedback | | |
| Exaggerate "confusion" | Set clear expectations/ criteria | | |
| Reflect on material | | | |

Overall, there was minimal use of brainstorming techniques among all participants and only Krista incorporated role-plays, fieldwork and small group activities in her course. While they all believe that participation is important, John was the only instructor who assigned a significant portion of student grades to classroom involvement. Gordon was the sole instructor to bring in guest lecturers to discuss real-world issues related to the course. None of the SMI's used formal debates or explicit instruction for CT, although Krista did talk about CT in relation to developing children's learning environments.

Of the four participants, Carl's classroom strategies seemed to be the most teacher-centered. While Gordon's class also involved lectures and organized presentations, there were qualitative differences between them. In particular, Gordon began each class with student presentations and open-ended discussion of course-related topics. He also made it a point to include students in the lectures by directly telling them to ask questions and to raise topics that "struck their fancy". Gordon used humour, brought in guest lecturers and incorporated demonstrations of web sites that appeared to interest his students. Although both courses primarily included lecturing strategies, Gordon was able to engage his students in discussion about subject matter. In contrast, Carl's students were exposed to the methods of CT but there was limited discussion and student participation.

Assessment Strategies

With respect to assessment, the SMI's regularly evaluated students on open-ended, written homework assignments and on formal presentations. They also

gave students essay examinations that were generally aimed at evaluating students' ability to integrate course concepts and apply theory to practice. They provided written feedback on all assignments and with the exception of Gordon, all of them encouraged students to revise and re-submit their work. Krista and John also required students to complete self and peer assessments. Carl, however, mainly evaluated his students on quizzes and exams that tested students' ability to identify, analyze and evaluate arguments in short-answer format.

Student Perceptions of Teaching Practices

Survey data collected for each course did not appear to capture a unified student perspective in order to corroborate instructors' stories. In general, standard deviations were high reflecting large variability among student perceptions.

There are several possible explanations for this finding. First, it may be that the scale (never, sometimes, often) was too broad. For example, two student presentations in a course may be viewed as "often" to one student and "sometimes" to another. Second, it may be that some items on the survey were unclear to students. For instance, a few of them indicated that role-playing or formal debates took place in their courses when these activities were not planned or implemented by their instructors. Similarly, the students did not agree on CT skills emphasized in the course. It may be that the students did not comprehend the items or they were unaware they were being asked to use them in course activities. Third, some students may have provided socially desirable responses.

In other words, it is possible that some students wanted to give their instructors positive evaluations and responded accordingly. Finally, only 37% of Gordon's students completed the survey. In contrast, response rates for Carl, John, and Krista's class were 83%, 84% and 88%, respectively.

Despite problems with the survey, they do reveal some interesting patterns with respect to CT skills and instructional strategies. Compared to the SMI's courses, Carl's students reported more frequent use of Analysis, Evaluation, Inference and Explanation skills. Likewise, they reported similar or higher usage of Self-regulation and Interpretation skills than students in content courses. Additionally, Carl's student opinions of skills fostered in the course were higher or fairly consistent with his own perception in each CT category. In Gordon and Krista's case, the mean of student responses for each CT skill were lower than those reported by their instructors. Similar results were found in John's class except in the categories Interpretation and Inference.

In addition to CT skills, Carl's students were consistent in their belief that their instructor provided them with feedback on thinking, provided direct instruction for CT, made real-world connections and modeled CT. In the SMI's courses, student perceptions on most items revealed major inconsistencies. On a final note, it is interesting to point out that Carl's students completely agreed that he often asked open-ended questions even though my observations indicated that most of them called for a range of "correct" responses.

In general, it is difficult to compare data across courses due to the high variability in student perceptions within each course and because each course

was intended to focus on different CT skills. There is some evidence, however, to suggest that Carl's students were better able to identify CT skills and instructional strategies than students in courses where CT instruction was implicit.

Use of Technology

While the use of technology was not systematically examined in each course, I observed that technology did not appear to play a large role in any of the four courses under investigation. For example, the SMI's required students to use technology in their formal presentations and for research purposes. They sometimes used it to present information to students (overhead transparencies, PowerPoint slides, web-based syllabus, video, live websites). None of them however, discussed the impact of technology on developing students' CT skills. In fact, Krista was the only one who mentioned technology in the interview when she discussed the importance of embedding it within her course, much like she does with CT. Although Gordon's subject matter was computer networking, technology did not otherwise appear to be an integral factor in developing students' thinking skills. Implications of this finding will be discussed in Chapter 6.

In sum, instructors' ways of fostering CT were similar in some respects but differed in others. Krista and John's courses were structured in various ways but they both engaged the students with the course material and included self-assessment strategies. While Gordon's in-class approach was mostly "instructor-led", he also involved the students in class and frequently required them to use their CT skills in homework assignments. The SMI's also incorporated several writing assignments in their course designs and gave essay examinations that

were aimed at eliciting students' CT skills. Carl's course diverged significantly with his direct approach to teaching CT, minimal class discussion and short-answer exams.

Teaching Practices in Other Contexts

While I did not have an opportunity to observe other courses, all of the instructors said they taught courses differently depending on the context. Krista stated that she teaches differently depending on the students' academic level, class size and content of the course but noted that planning for her courses is similar across the board. For instance, she said that she provides her first-year students with more prompt-type questions on the readings and requires them to hand in weekly journals. Over time, Krista added, that she removes some of the structure and does not collect the homework on weekly basis. With older students in her graduate classes, she allows the class to be more collaborative and believes she has more opportunity to facilitate discussion. In her "content" courses like Math and Reading, she said that she spends more time lecturing because there is additional material to cover. In other classes, she also uses different activities such as formal debates and "alternative" modes of expression based on Gardener's theory of multiple intelligences (e.g., poems, songs, plays).

In his Philosophy and Ethics courses, Carl asserted that he provides direct instruction on CT but also has students write papers where he asks an open-ended question or requires them to choose from various interpretations of texts. He assesses students on how well they present a clear thesis statement and defend their positions rather than on producing a correct answer. The focus

however, is always on arguments. In the Philosophy class they are also dealing with content which is difficult for students to comprehend. As a result, he reported that he spends half of his time in other courses explaining the texts and trying to get students excited about the ideas. He also requires students to write a paper at the end of the course because he believes they cannot evaluate, compare and contrast philosophical and ethical ideas at the beginning of the semester. The CT course which lacks content, is different than the others because they only look at the structure of arguments.

John said that in his non-seminar classes, he spends more time at the front of the room lecturing. He called them “participative lecture” classes where he tells the students he will present some of the main ideas but expects students to actively participate by responding to questions, asking questions themselves, sharing experiences and relating concepts to material in other classes. He remarked that he is “much more in control” in the other classes especially since he teaches to second or third-year students. Due to basic maturity issues, he would not teach the seminar class to younger students because it would take too much time to get them meeting his expectations. In addition, his other classes have more students and he cannot do full-class discussion. Instead, he uses more small group work but still feels like he needs to “herd them around”.

Gordon did not offer much information about how he might teach other classes differently but he did mention that he does not do the Topic of the Week assignment in his TCP/IP class because the subject matter does not lend itself to “newsy kinds of things”. He also said that he used to teach training courses

where the content might be the same as his college courses but his role was to teach the skills and not to teach to the academic competencies like CT. His style of teaching therefore has evolved from a focus on the content to developing students' understanding of the material. In sum, it appears as though all of the participants modify their teaching practices to some extent to accommodate all or some of the following contextual differences: Class size, student ability, student motivation and content of their courses.

Beliefs

Conceptions of Critical Thinking

The four participants espoused assorted views about the definition of CT and its importance, as well as the skills, standards and dispositions involved. First, John and Gordon's central definitions primarily involve truthseeking and challenging information and assumptions, while Krista's definition focuses on decision-making and application in the teaching profession. Carl's concise definition, on the other hand, focuses on identifying, analyzing and evaluating arguments. His perspective is also more narrow and consistent with the philosophical tradition of CT and Lakenorth College's definition (Table 29). Carl was also the only instructor to make the distinction between CT and problem-solving skills. Second, all of the instructors believe that CT skills are extremely valuable while each instructor listed at two applications in the following categories: Citizenship, personal, professional applications and education in general (Table 30). Specifically, all four instructors remarked that CT skills are

Table 29

Cross-case Comparison of Instructors' CT Definitions

| Instructor | Definition |
|------------|---|
| Carl | To me critical thinking is the ability to identify, analyze and evaluate arguments... Since it's a critical thinking class, we spend a lot of time precisely looking at arguments in their various forms...but I'm convinced that critical thinking has to be about arguments. |
| Krista | Especially with teaching professions, critical thinking is being able to make decisions based on context and the situation, being able to sort out information and then apply knowledge. Apply knowledge of theory, ascertain a situation and make decisions and be able to reflect in the field on their practice and decide: Did I apply it in a way that it was supposed to be applied and what were the results? So taking it to an application level... I want teachers to be decision-makers. I want them to be able to make decisions. You can't do that unless you're being critical. |
| Gordon | When I think of critical thinking... in terms of either myself in daily life or what I'd like my students to accomplish, is when they read something or hear something or see something for that matter, they go beyond just taking it at face value and they go beyond just accepting it because, "I read in the newspaper and I know it's true. I read it in a book. The teacher said it", and go beyond the credibility of the source and look at whether the thing that they've just read, heard or whatever is consistent with the things they believe to be true, know to be true... just if what they are hearing really actually makes sense and stands up to any sort of analysis. |
| John | Critical thinking is peeling back the layers of things, like peeling back an onion and getting to see what's in the middle of it... What I see critical thinking as doing, is peeling back some of those early assumptions, those early beliefs about what they think they know and getting into the core, closer to what the true knowledge is, what the true facts are and in the process hopefully they're going to come up with new ideas, new ways of looking at old problems, new insights into what's going on around them in business and in the world in general. |

Table 30

Cross-case Comparisons of Dispositions, Intellectual Standards and Value of CT

| | Carl | Krista | Gordon | John |
|--------------------|-----------------------|--------------------|-------------------|-----------------------|
| Standards | Convergent | Justification | Intuitive | Intuitive |
| | Linked | | Justification | Justification |
| | Soundness | | Volume of writing | |
| | Validity | | | |
| | Weakness/ Strength | | | |
| Value | Citizenship | Citizenship | Citizenship | Citizenship |
| | Educational | Elevate profession | Professional | Personal |
| | Personal | Personal | | Professional |
| | | Professional | | |
| Disposition | Interest | Comfort | Curiosity | Courage |
| | Logical frame of mind | Curiosity | Inquisitiveness | Honesty w/ self |
| | Vigilance | General attitude | Open- | Inquisitiveness |
| | Willingness | Lifelong learning | mindedness | Live with uncertainty |
| | | | | Skepticism |

needed to be good citizens (e.g. voting) or for societal change. Additionally, the SMI's stated the skills are important to be good professionals in their respective fields. Carl was the only instructor who explicitly identified the importance of applying CT skills in students' other courses.

Third, the language they used to describe CT skills they were trying to foster was similar in some respects yet differed in others (Table 31). What the inventory does not convey, however, are the various ways in which each instructor defined those skills and the contexts in which they should be applied. For example, all four participants used the term "analyze" when discussing skills they wanted to promote in their courses but they signified different things to each instructor. Carl talked about analyzing arguments and their structure. Krista discussed analyzing children's work and classroom situations in order to make appropriate teaching decisions. Gordon referred to analysis skills as evaluating the credibility of information within the context of analyzing abnormal network events. Finally, John talked a great deal about analyzing or "attacking" business cases in order to find relevant suggestions or to relate concepts to other material. He also spoke of analysis skills as "thinking broadly" about the business industry and its issues. On the whole, the CT terms used by the participants demonstrated some overlap but there was also a great deal of divergence in the use of terminology and the interpretation of those terms.

Fourth, there were also similarities and differences with respect to the dispositions and intellectual criteria discussed by all participants (Table 30). The SMI's said they judged student thinking based on justification of statements in the

Table 31

Cross-case Comparison of Instructors' Language of CT

| Joe | Gordon | Krista | Carl |
|------------------------------|-------------------|-----------------------|-------------------|
| Analyze | Analyze | Analyze | Analyze |
| Apply | Apply | Apply | Create |
| Assimilate | Beyond face value | Assess | Defend claims |
| Beyond surface | Challenge | Beyond rote | Evaluate |
| Challenge | Evaluate | Critique | Identify |
| Condense | Explain | Dig deeper | Interpret |
| Define problem | Implement | Make decisions | Make connections |
| Discern key ideas | Interpret | Evaluate | Refute |
| Evaluate | Make decisions | Explain/Describe | Rhetorical skills |
| Identify | Question | Identify | |
| Make connections | Reflect | Logical reasoning | |
| Make decisions | Several solutions | Make connections | |
| Multiple perspectives | Solve problems | Multi. alternatives | |
| | | Plan | |
| Question | | Reflect | |
| Rank | | Sort | |
| Re-load | | Summarize | |
| Sort | | Synthesize | |
| Summarize | | Think outside the box | |
| Think broadly | | | |
| Write/Listen/Read critically | | | |

Note. The list above is selective and does not include every term used.

form of good reasoning, evidence or examples. John and Gordon admitted that some of their assessment was based on intuition. Overall, the SMI's intellectual standards or criteria for assessment of CT were not well articulated in the interviews but were implicitly incorporated in their syllabi to varying extents. In contrast, Carl's criteria revolved around clear philosophical standards such as validity and soundness of arguments which were frequently conveyed to students in class. Finally, with respect to dispositions, instructor responses varied considerably but they all agreed that dispositions and motivation were an important part of thinking critically.

On the whole, each instructor conceptualized CT in his or her own way. Moreover, the SMI's descriptions differed from the college's definition that focuses on argumentation skills. Carl was the only one who shared the college's view of CT and articulated clear criteria with which to assess it in the interview. Participants also captured pieces of the American Philosophical Association's (APA) model of CT, but none of their conceptualizations were as comprehensive (a more detailed analysis is presented in Chapter 6). It is interesting to note that despite their differences, participants designed and implemented courses that were consistent with their personal interpretations of CT.

Development or Acquisition of Critical Thinking

Similar to teaching practices and definitions, their core theories about CT development differ but there are many common elements. John's theory, for example, mainly revolves around the idea that students should be exposed to CT tools in order to develop their confidence. These tools empower the students and

give them courage to employ them. Gordon's theory focuses on a few strategies to develop students' innate ability and motivation. He further asserted that sometimes "it just sort of dawns on them".

Krista's theory of CT begins in the children's homes where there is high-level discourse as well as opportunities to think in primary and secondary classrooms. "Even children who can't read, who can't even do the basic decoding can think critically around text...", she said. In college, she espoused several factors related to thinking skills such as opportunities for discussion, reflection, range of teaching experiences and writing. Her theory of CT development also extends beyond the college years into the professional lives of teachers who need life experience and professional development opportunities to further their growth (e.g., mentoring students, discussion groups, graduate courses). Finally, Carl thinks that students learn to think critically by memorizing the rules of CT, applying the rules or practicing them, being aware of how arguments occur in everyday situations and by remaining "vigilant".

Despite differing core theories, their views converge around issues of innate ability, the developmental nature of CT and student characteristics. First, all of the instructors mentioned the word "natural" or alluded to some innate aspects of CT or learning abilities. In the interviews, Carl said that we all have a "natural inclination to believe arguments we agree with", while Gordon stated that "some people are naturally better at being analytical and thinking things through". Gordon is therefore trying to cultivate skills he hopes students "have naturally". John stated that "some people are naturally inquisitive and courageous" and also

made reference to the students' "natural shyness and fear of speaking" in class. Krista was the only participant who did not use the term "natural", but her Epistemological Beliefs Inventory (EBI) responses indicated that the ability to learn, to a minor extent, is genetically determined.

Second, all of the instructors view CT as developmental or skills that improve over time with practice and experience. Specifically, the SMI's talked about older and more experienced students as being more capable and motivated to think critically. With regard to practice, they also espoused that class participation or discussion is an essential component of CT development. In addition, the SMI's share the opinion that not all students or people in general develop CT skills. While Carl briefly mentioned student motivation and sharing ideas in class, they did not seem to be integral components of his view on CT development. His perceptions also differ from the others in that he did not discuss age as having an affect on CT, nor did he suggest that some individuals never acquire the skills.

Third, the SMI's communicated the importance of classroom culture or environment. Specifically, they all remarked that providing good models of CT and a safe atmosphere were necessary factors in the development of CT. For example, John said that he was careful not to dismiss student ideas because "you run the risk of making the student unwilling to participate in the future". He also talked about "stroking" students with positive feedback and giving them permission or the license to challenge and share ideas. Similarly, Gordon's first comment about his teaching practices was about providing a comfortable atmosphere for students to discuss relevant topics. He also said that he tries to

provide “gentle” feedback to students, not “directly attack them” and mentioned the importance of affording them permission to challenge ideas in class.

Likewise, Krista talked at length about building community for people to take risks and to share ideas. Additionally, they think that modeling good thinking skills and positive attitudes toward thinking are critical to students’ CT development. Carl, on the other hand did not mention a safe environment, “permission” or modeling CT as important factors but did indeed model good thinking skills and provided a great deal of encouraging feedback to students.

Fourth, all participants believe their respective disciplines are highly conducive to fostering CT skills but think a stand-alone course can also be advantageous. John is the most skeptical of the CT course but conceded there is room for it in the curriculum. Similarly, Krista believes that the CT course is beneficial but explicit instruction might have more impact if it were taught within the students’ discipline. Gordon perceives the course is valuable because he is not trained to teach the skills explicitly. Not surprisingly, Carl is the strongest advocate of the stand-alone course but agrees that it should be offered in the students’ first year of college. At the same time, Carl recognizes the importance of fostering the skills implicitly across the curriculum. In sum, they all agree that general CT courses as well as the integration of skills across courses are important to CT development.

Fifth, they all believe that promoting thinking skills in the classroom is as important as teaching the content of their courses. Gordon for example, said that “to think critically about something is almost more important than any individual

piece of content...there is no content piece that is more important than that". He further explained that if the class conversation veered in an interesting direction where the students were learning something that was not in the textbook, he would prefer to continue the discussions. He added that he has never told the students they cannot "talk about something interesting because there's something mundane to do". John and Krista made similar comments about content coverage as well. While Carl's CT course did not contain content, he teaches other courses with subject matter and explained that in all courses (even in the hard sciences), "there's room for fostering critical thinking...even in a flood of content you would think that students would have to do some evaluating of that content".

Related to content coverage, all four remarked that the ability to think critically is dependent upon the context or on students' comprehension of the content. Even Carl, who teaches CT as a general skill, asserted that students need to see the relevance of these skills in order to apply them in everyday situations. He also said that in his Philosophy class the content is so foreign that "it's probably hard for them to think critically about something if they're being exposed to it for the first time". Similarly, Gordon said that students need to learn "facts" because they cannot think critically about situations in which they do not have information.

Sixth, they were all uncertain if the skills learned in their respective courses transferred to other courses or real-world applications. Despite the uncertainty, the SMI's were all hopeful that their students' skills would be applied to real-world

or professional situations. Carl was equally optimistic that the CT skills taught in his course would transfer to other courses or everyday situations but would like to see evidence of it before making definitive conclusions. Gordon was the only one who commented that the transfer of skills is dependant upon the individual student. Their views about content coverage, importance of context and conduciveness of disciplines suggest they consider CT to be subject-specific and context bound. Even Carl who espouses the importance of students learning the generic skills independent of disciplinary contexts, also believes that students should have opportunities to apply the skills across the curriculum.

Finally, with respect to the student role, they all believe the students have a major responsibility in developing their own thinking skills. Specifically, John said that students have to actively read the assigned material prior to class and prepare assertions, ask questions and challenge ideas in class and make connections among the course concepts and to other courses. Krista's perception of the students' role mainly include reflection on learning and experience as well as classroom discussion. Carl agreed that students have to think about the material and complete the exercises at home, practice using the skills and respond in class. Gordon mentioned that the student's responsibility is to have a positive attitude toward learning and to challenge "authority" when appropriate. As a consequence, participants expected their students to do a lot of work outside of class such as reading assigned material, preparing exercises, presentations or writing assignments. Having students prepare for class and take

responsibility for learning content on their own, was also used to reconcile their beliefs about content coverage and developing thinking skills in their courses.

Overall, the four participants' theories differ in many respects, but consensus was reached on the following issues: a) CT develops over time with practice and experience; b) fostering thinking skills is as important as teaching content; c) the ability to think critically is dependent upon the context or knowledge of subject-matter; d) their respective disciplines are highly conducive to fostering CT; e) students have a major responsibility in developing their own thinking skills; and f) CT skills are probably transferable. In addition, they all agreed that intellectual ability and attitudes toward thinking were to some extent innate but differed in their views about the extent to which genetics play a role. The SMI's also concurred that a safe environment for CT and a positive classroom culture are important to developing the skills. Krista, however, seemed to have the most comprehensive knowledge of various instructional strategies, while her personal theories were based on educational theory and research.

Perceived Obstacles to Critical Thinking Development

Table 32 summarizes participants' beliefs about perceived obstacles to CT development. John mentioned one general issue related to the term of CT, but the remaining obstacles were related to classroom strategies, instructor characteristics, student characteristics and institutional variables. When broken down into sub-categories, the table illustrates little agreement among participants. Factors mentioned by at least two participants were: Lack of permission to challenge ideas in the classroom, lack of student participation, lack

Table 32

Cross-case Comparison of Instructors' Perceived Obstacles to CT Development

| Obstacle | Carl | Krista | Gordon | John |
|-----------------------------|---|--|---|--|
| General | | | | CT intimidating |
| Classroom Strategies | Over-emphasis on rules | Over-lecturing | Lack of permission | Lack of permission Not challenging students Rapid pace |
| Instructors | | Creativity Energy Experience | Lack of training (CT) | |
| Students | Lack of content knowledge Participation | Backgrounds Expectations of passivity Participation | Experience in other courses Group dynamic Innate ability Lack of content knowledge Motivation | Backgrounds Participation Motivation Pride in work Prior academic success Expectations /entitlement |
| Institutional | Prerequisite structure Faculty resistance No central office for inquiries | Faculty resistance College definition Separate Disciplines | Administrative resistance Prerequisite structure | Lowered expectation of students Large classes No faculty "community" Physical environment Use of adjuncts |

of student motivation to think critically, faculty resistance to the Course Enrichment process and prerequisite structure of the college curriculum. Finally, they all concurred that more discussion among faculty about how to implement the competencies or creating a faculty “community” would benefit their practice.

Epistemological Beliefs

Table 33 summarizes participants’ scores on the Epistemological Beliefs Inventory (EBI). Total scores obtained by Carl, Krista, John and Gordon were 128, 153, 158, 141.5, respectively. In addition to his overall score, John scored the highest on simple knowledge, certain knowledge, and quick learning indicating stronger beliefs that knowledge is complex and tentative and that learning occurs gradually. Krista scored the highest on omniscient authority and innate learning, indicating the strongest beliefs that knowledge is derived through reason and that learning is mostly acquired instead of determined at birth. In general, all four participants believe that knowledge is complex. They also think that intellectual abilities are both innate and acquired but align themselves at different ends of the continuum. For example, Krista’s beliefs are more consistent with the developmental perspective while Gordon asserts that mental abilities are mostly determined at birth. None of them believe that “learning happens quickly or not at all”.

The SMI’s EBI scores and open-ended responses also indicated that knowledge is tentative. For example, Krista said that “sometimes things are not black and white...but some things are”, while John and Gordon made similar statements. Conversely, Carl believes that knowledge is certain and there is such

Table 33

Cross-case Comparison of Instructors' Epistemological Beliefs Inventory Scores

| Instructor | Scores | | | | | |
|----------------|--------|------|------|------|------|--------|
| | SK | OA | CK | IA | QL | Total |
| Carl | 37 | 23 | 21 | 24 | 26 | 128 |
| Krista | 38 | 28 | 37 | 26 | 24 | 153 |
| John | 46 | 19 | 39 | 21 | 30 | 158 |
| Gordon | 38 | 20 | 32.5 | 22 | 28 | 141.5 |
| Possible range | 8-48 | 5-30 | 7-42 | 7-42 | 5-30 | 32-192 |

Note. SK= simple knowledge, OA=omniscient authority, CK= certain knowledge, IA= innate ability, QL = quick learning. Highest scores on each subscale are most consistent with good teaching practices for CT.

a thing called truth even if we cannot fully identify or comprehend it.

How do they decide what is “true”? In the open-ended responses, the SMI's demonstrated a great deal of consensus on how they determine what to believe. They all agree that some knowledge is based upon reasoning while some is more subjective. For example, Krista asserted that some truth is based upon evidence, while some is “socially determined” and based upon the “right thing to do”. Likewise, Gordon believes that truth is determined to some extent by “community” and personal interpretation but some knowledge is based on “critical reasoning” of evidence presented. John also believes that some truth is based upon “individual perceptions” (e.g., religion, background) and others on the weight of empirical evidence. Overall, they believe there are multiple solutions to problems or various ways of examining information based on context. Seeking the “truth” is based upon reasoning as well as interpretation. On the other hand, Carl determines if something is true when there is a logical connection between the premises and the conclusion. He recognizes that two opposing positions can both be “right” or “wrong” but examines inconsistencies in the arguments to determine which one is better.

Finally, their views of omniscient authority suggest that the appropriateness of challenging authority is dependent upon the context. Krista believes that questioning authority in all situations is important. John and Gordon believe in questioning authority such as “experts” or parents but generally obey the law. Carl does not think we should always obey the law but he does not believe that children should challenge parental authority. Overall, the biggest differences in

epistemology lie in the extent to which they think CT is innate, the context in which challenging authority is appropriate and Carl's view that knowledge is certain.

Self-Efficacy

Carl, who holds a Master's degree in Philosophy and teaches CT explicitly, believes that he is sufficiently prepared to do so. On the other hand, none of the SMI's believe they are well-equipped to explicitly teach their students the skills. Krista, who teaches her students to foster CT skills in children's classrooms, feels comfortable with her ability but thinks she could use more support to enhance her performance. John believes he is probably "not prepared" because his education and work experience is in the field of business. Gordon does not think he can teach the skills explicitly but, similar to John, thinks he is adequately prepared to teach students to think critically within his discipline. All of the instructors said their teaching had evolved over the years from content-centered, lecture-style approaches to more active learning methods. Finally, they all said they modeled their teaching after professors who had a positive impact on them in graduate school. Gordon was the only participant who was primarily exposed to transmission or lecture approaches as a student.

Perceptions of Students

The SMI's agreed that student ability to think critically when they entered their course varied from student to student. In contrast, Carl asserted that informally all students were prepared to think critically because they have been

“exposed to arguments their whole lives, making them and responding to them”. Formally, however, he thinks they are completely unprepared.

Other issues about the students emerged through the interviews indicating both positive and negative beliefs about student ability and motivation. Krista and Carl’s perception of the students were mostly positive, while John and Gordon’s views were mixed.

CCTDI Scores

Eight scores were measured on the CCTDI including a total score and seven subscales: Truthseeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and cognitive maturity. Total scores on the CCTDI for Carl, Krista, John and Gordon were 351, 337, 370 and 362, respectively (Table 34). An overall CCTDI score of 350 or more is seen as a solid indication of a positive global disposition toward CT, while an overall total score of less than 280 shows an overall deficiency. Krista was the only participant who scored below 350.

For the subscales, scores below 30 are considered weak, scores under 40 demonstrate “ambivalence toward the disposition”, and scores above 50 are deemed to be strong. All participants’ scores were 40 and above for each disposition, except for Krista who scored one point below the positive cut score on truthseeking. Overall, their total scores and most subscale scores suggest they have positive attitudes toward CT.

Table 34

Cross-case Comparison of Instructors' Disposition Inventory Scores (CCTDI)

| Instructor | Scores | | | | | | | Total |
|------------|--------|----|----|----|----|----|----|-------|
| | T | O | A | S | C | I | M | |
| Carl | 63 | 44 | 50 | 56 | 42 | 48 | 48 | 351 |
| Krista | 39 | 60 | 58 | 44 | 50 | 48 | 44 | 337 |
| John | 57 | 58 | 53 | 50 | 48 | 52 | 52 | 370 |
| Gordon | 62 | 54 | 49 | 49 | 40 | 57 | 51 | 362 |

Note. Scales of the CCTDI: T= truthseeking, O=openmindedness, A=analyticity, S=systematicity, C=self-confidence, I=inquisitiveness, M=maturity. Possible Total score ranges from 70 to 420. Recommended positive cut score is 40 for each subscale and 280 for the total score.

Summary

While there was some overlap among them, the four participating instructors have different conceptualizations of CT and different ways of teaching for it. With the exception Carl, their definitions differed from the college's definition and focused on the skills they believe to be important for good professionals in their disciplines. In addition, there appeared to be more similarities in the beliefs and practices of the SMI's as compared to Carl.

The cross-case analyses also found many similarities in how they think CT develops but they did not reach consensus on which factors impede the development of CT. They all demonstrated positive dispositions toward CT and asserted they used different strategies to accommodate contextual variables in other courses. Additionally, the SMI's were more or less confident in their ability to teach CT within their disciplines, but Carl was the only one who was confident in his ability to teach it directly. Despite differences across cases, the instructors' teaching strategies were generally consistent with their own models of CT and beliefs on various dimensions. A more thorough review of the findings and an in-depth discussion will follow in Chapter 6.

CHAPTER 6

Summary and Conclusions

The following chapter will outline findings from the present study and compare it to current research and theory. It will also identify the study's limitations and describe methodological, theoretical and practical implications of the research. Finally, it will present recommendations for future research.

Summary of Findings

The main question posed in this study was: "What is the relationship between instructors' beliefs and teaching practices for critical thinking (CT)?" In order to answer the question, this study first described the teaching practices and beliefs of instructors in the fields of business, education and information technology. It also examined beliefs and practices of an instructor explicitly teaching CT. Individual case descriptions covered issues such as course structure, CT skills fostered, instructional strategies and assessment. Participants' conceptions of CT, dispositions toward CT and beliefs about its development were also explored. Additionally, this study inquired about instructors' epistemological beliefs, beliefs about self-efficacy and perceptions of student ability and preparedness for CT (Chapter 4).

Second, the study examined the relationship between participants' stated and actual teaching practices and found that instructors were generally practicing what they espoused. Additionally, there were few inconsistencies between espoused beliefs and observed actions (Chapter 4). Third, the study compared beliefs and teaching practices across cases and found both similarities and

differences among them (Chapter 5). Specifically, they conceptualized CT in different ways, focused on various CT skills and used a range of overlapping instructional strategies. Carl, in particular, holds the narrowest perspective on CT and represented the largest departure in teaching practices.

Finally, the study sought to create a profile of common beliefs and practices which are summarized in Tables 35 and 36, along with a review of instructors' common characteristics (Table 37). Since Carl's case significantly deviated from the others, profiles only include information about instructors teaching specific subject matter.

Discussion

Trustworthiness of the Data

Prior to discussing the results of this study in depth, it is important to explore several questions revolving around the trustworthiness of the data. For example, would others arrive at the same conclusions based on the data gathered from this study? In an attempt to ensure the credibility of data, every effort was made to follow the recommendations offered by qualitative research experts such as multiple sources of data, repeated observations, protocols, thick descriptions, member checks and statement of biases (Merriam, 2002; Yin, 1994). In addition, an outside auditor reviewed raw data to ensure the accuracy of this report. She also checked to see if there was sufficient evidence to support my conclusions. Overall, she agreed that the SMI's were indeed exemplars of CT instruction. In particular, she was impressed by the number and quality of questions that John posed in class. Additionally, the reviewer was enthusiastic about Krista's

Table 35

Summary of Exemplars' Common Beliefs

| Theme | Beliefs |
|-------------------------|---|
| Critical Thinking | <p>CT skills are valuable (e.g., citizenship, every day use, professional)</p> <p>CT dispositions are important (e.g., willingness, courage, curiosity)</p> <p>Innate ability & motivation play a role in CT development</p> <p>CT develops over time with practice and experience</p> <p>Discussion and sharing multiple perspectives are essential to CT</p> <p>Safe environment is necessary for CT (e.g., permission to challenge)</p> <p>Fostering thinking skills is as important as content coverage</p> <p>Ability to think critically is dependent upon prior knowledge</p> <p>Discipline is highly conducive to fostering CT</p> <p>CT course in addition to infusion are beneficial</p> <p>Students have a major responsibility in developing thinking skills</p> <p>Optimistic beliefs about the transferability of CT skills to other contexts</p> |
| Student preparedness | CT ability and motivation varies when they enter the course |
| Self-efficacy | Comfort in ability to teach students to think critically within the realm of discipline (but not directly) |
| Epistemological beliefs | <p>Knowledge is complex</p> <p>Knowledge is tentative</p> <p>Knowledge is derived through reason and subjective interpretation</p> |

Table 36

Summary of Exemplars' Common Teaching Practices

| | Characteristics |
|-----------------------|--|
| Planning | <p>Detailed syllabi (e.g., objectives, expectations, grading)</p> <p>Carefully planned lessons/classes</p> <p>Ongoing writing activities</p> <p>Major projects (i.e., research papers, portfolios, book reviews)</p> <p>Formal and informal student presentations</p> |
| Implementation | <p>Clear expectations for CT</p> <p>Clear expectations for students to prepare for class and to participate</p> <p>Actively involve students in learning process through questions/activity</p> <p>Provide students with feedback (i.e., detailed, prompt, positive)</p> <p>Elicit prior knowledge and experience</p> <p>Make course content relevant to students' lives/work experience</p> <p>Present examples of ill-structured problems within the domain</p> <p>Incorporate student examples and experiences into class discussion</p> <p>Model good thinking skills and positive attitudes toward thinking</p> <p>Create a positive classroom environment (i.e., safe, supportive)</p> <p>Provide time to reflect/structure thinking (mostly outside of class)</p> |
| Assessment | <p>Ongoing assessment throughout semester</p> <p>Open-ended essay exams</p> <p>Open-book/take-home exams or choices among exam questions</p> <p>Assessment for understanding of material (i.e., integration, application)</p> |

Table 37

Summary of Exemplars' Common Characteristics

| Variables | Characteristics |
|-----------------------------------|---|
| Education and Experience | Full-time teaching status |
| | At least one Master's degree |
| | At least 3 years teaching experience at college level |
| | At least 12 years total teaching experience |
| | Experience as a student with positive role models for CT instruction |
| | Evolved from content to student-focused teaching |
| Attitudes and Dispositions | Reflective of teaching practice |
| | Positive global disposition toward CT (CCTDI) |
| | Enthusiasm for teaching |
| | Dedication toward improving teaching and disciplinary skills through professional development |
| | Willingness to learn from students |

emphasis on community building as well as self assessment in the form of portfolios. She also noted that Gordon's weekly homework assignments and ethics as a recurring theme were indeed examples of stimulating student CT.

How do we know if instructors were in fact teaching for CT? This question is more difficult to answer, given that the study did not include a comparison group or assess student outcomes. Nonetheless, this study was guided by the CT, psychological and "teaching excellence" literatures (Chapter 2) which provide guidelines for how to stimulate students' thinking skills and dispositions. For example, the SMI's used a number of strategies such as writing assignments, use of open-ended questions, instructor modeling of CT and case studies. While there is no clear set of rules or coherent theory of CT development, this study relied on what is currently available. In addition, the outside auditor agreed that instructors appeared to be fostering CT by following the guidelines presented. Finally, the purpose of presenting thick description was to provide the reader with sufficient information to draw his or her own conclusions. In sum, judgments about teaching practices are open to challenge but connections to the literature, external auditor agreement and thick description enhance the integrity of research findings.

Another issue that requires further consideration is the student perspective. Recall, the students in the SMI's courses overall did not present a unified perspective nor did they corroborate the instructor and researcher perspectives. Small student samples, low response rates in one course, unclear items, crude (3-point) rating scale, social desirability were previously discussed as causes for

the large variability on most items. It is also possible that students were not a credible source of data in this particular context. For example, they may not have been sufficiently aware of what was occurring in their courses or they may have had different interpretations of instruction. This explanation is plausible, given that students appeared to be more cognizant of the strategies implemented and the skills being fostered in the course with explicit CT instruction. While research on student evaluations of teaching (SET) suggests that students are a valid source of data (d'Apollonia & Abrami, 1997), questions on SET surveys are more general and in no way resemble questions posed to students in this study. At this time, I can only speculate as to why the students did not agree with instructor and researcher perspectives and believe it is likely due to a combination of factors mentioned above. Future investigations would need to carefully consider these issues before relying on students as an additional source of data. The remaining portion of the discussion will be dedicated to examining findings from this study and relating it to theory and research.

Theories of Action

According to Argyris and Schon (1974), individuals often hold one theory consistent with what they say (espoused theories) and another that is consistent with what they actually do (theories-in-use). Accordingly, they suggest that disparities between these two theories of action be resolved through reflective practice. While the present study was not aimed at constructing a comprehensive picture of participant's theories-in-use or an attempt to change teacher practices through reflection, the notion of potential discrepancies between instructors'

theories of action was central to the research design of this study. For example, I selected participants that had demonstrated reflective activity related to CT instruction prior to the study (i.e., submission of course packet and prior conversations with faculty) in the hopes that espoused theories and actions would be consistent with actual teaching practices. I also observed their courses to ensure that espoused theories were aligned with their behaviour.

As Argyris and Schon's theory would predict, participants showed few inconsistencies between their espoused and actual practices and between their beliefs and actions. Participants were generally reflective of their practices and were able to explain what they were doing and their reasons for doing so. Specifically, in the first interview related to teaching practices, I asked participants about their instructional methods. In many instances, instructors explained the reasoning behind their decisions without additional prompts. They often detailed their reasons for incorporating various assignments into the course, explained why they did or did not allow students to revise their work and offered explanations for their classroom behaviours.

Consistent with the present study, Hativa, Barak & Simhi (2001) interviewed and observed four exemplary instructors at the university level and found a good fit between teacher thinking and instruction. In addition, Martin, Prosser, Trigwell, Ramsden and Benjamin (2000) interviewed and observed 26 instructors and found "no observed inconsistencies" between instructors' intentions and observed actions in various disciplines.

In contrast, several researchers reporting evidence gathered through survey methods or anecdotal accounts have noted that instructors' practices are inconsistent with their espoused goals (Murray & McDonald, 1997; Paul, Elder & Bartell, 1997; Ramsden, 1992; Samuelowicz and Bain, 1992). With respect to CT in particular, Pratt (1998) asserted that faculty in higher education often intend to teach for CT outcomes "yet many of them teach in ways that discourage these noble aims; their actions are inconsistent with their espoused intentions and beliefs" (p. 31).

Conflicting results are likely due to differences in purposive sampling strategies (Patton, 1990). As mentioned earlier, the current study selected instructors who had reflected upon their course designs for CT, were teaching courses beyond the freshman level, had several years of teaching experience and were involved in professional development for teaching and learning. In addition to individual characteristics, Lakenorth College has attempted to provide a supportive environment for improving students' CT outcomes through the Course Enrichment process. Likewise, Hativa et al. (2001) limited their investigation to exemplary instructors and reported comparable findings to this study. It is encouraging to find consistency between stated and actual practices as well as a relationship between practices and beliefs because "if it doesn't happen here, it won't happen anywhere" (Patton, 1990, p. 174). It should be noted that Martin et al. (2000) did not report participant selection procedures.

It is also possible that differences in research methodology are a contributing factor to inconsistent results reported in the literature. Specifically, the current

study and other qualitative investigations (Hativa et al., 2001; Martin et al., 2000) observed teacher behavior and conducted interviews with instructors. Intuitively, one might expect to find less consistency between beliefs and practices when conducting classroom observations since a researcher's perspective might reveal discrepancies that would not otherwise be uncovered through self-reported survey methods. Alternatively, it is possible that holistic approaches to studying the relationship between thought and behaviour provide a more accurate picture of teaching practices and espoused goals. As suggested by Kane et al. (2002), additional studies that observe teacher behaviour are needed to better understand this relationship. Nonetheless, the present study provides evidence to suggest that participants' goals and actions aimed at CT instruction were consistent and adds to the scarcity of qualitative research on the topic.

Conceptions of Critical Thinking

With respect to conceptions of CT, there were three major research findings worthy of further discussion. First, results from this study suggest that participants generally had well-defined conceptions of CT and were able to provide numerous examples of how they fostered it in their courses. Second, case descriptions and cross-case analyses indicated that instructors emphasized different CT skills in their courses and fostered them using various instructional strategies. These differences appear to be discipline-specific. Finally, findings suggest that the SMI's definitions did not closely match Lakenorth College's definition of CT and also differed from the APA's conceptualization. How do these findings compare to current research?

Related to the adequacy of instructors' conceptions, this investigation did not confirm results from one study that examined a sample of faculty beliefs related to CT and their espoused practices (Paul, Elder & Bartell, 1997). Specifically, Paul et al. found the majority of faculty in teacher preparation programs in various disciplines were not able give a clear definition of CT, provide a coherent description of skills and traits they were trying to develop in their courses or offer plausible examples of how they fostered it in their courses. In addition, they found that faculty could not clearly define the importance of CT, reconcile content coverage with teaching CT skills and they were not promoting CT skills in a typical class period. The study concluded, "We are very far from a state of affairs in which critical thinking is a hallmark of instruction..." (p. 18).

Conversely, the present study found that instructors were able to provide sufficient definitions of CT, explain why the skills are important and describe their theories of CT development. Moreover, they demonstrated that CT was an essential aspect of their courses, could explain how they were fostering it and "covered" their content by requiring students to take more responsibility for their own learning (e.g., pre-class preparation, individual or group projects, student presentations). Again, possible explanations for discrepant results might be due to differences in sample selection and data collection methods. Specifically, Paul et al.'s sample was not limited to exemplary instructors and methods did not include teacher observations.

There was, however, one consistent finding between the current study and Paul et al.'s (1997) investigation. Specifically, participants in the present study

also had some difficulty defining precise intellectual standards or criteria for CT assessment even though a number of standards were embedded within their expectations of the course and related assignments. With the exception of Carl, instructors did not elaborate much on the standards they used to evaluate CT. In particular, Gordon and John mentioned that students had to back up their statements with appropriate reasoning but also maintained that much of their assessment was intuitive. This observation is similar to Resnick's (1987) assertion that most teachers claim to know good thinking when they see it. According to Paul (1990), however, individuals cannot achieve excellence in their thinking without clear standards or criteria to guide it (e.g., clarity, breadth, depth). The implication of this finding is that faculty development, even for exemplary teachers, should include support to help faculty define intellectual standards for thinking and appropriate assessment strategies for their courses.

In terms of disciplinary differences, the SMI's focused on skills they deemed necessary for students to succeed in their professional careers and used a number of approaches to engage students in classroom discussion and activity. Donald (2002) also noted variation across eight academic disciplines among faculty models of thinking and instructional methods. Her conclusions were drawn from 25 years of research involving interviews with faculty and students as well as classroom observations, ethnographic studies and surveys. Overall, Donald found that logic structures and truth criteria were more rigid in the sciences while social science instructors tended to favor abstractness of concepts. In addition, faculty in various disciplines focused on different thinking

skills. For example, engineering faculty focused on the development of problem-solving skills while education and psychology instructors emphasized a larger number of thinking abilities. In addition, Eljamal, Sharp, Stark, Arnold and Lowther (1998) reviewed goal statements among hundreds of faculty members teaching introductory courses across nine academic fields. They too discovered disciplinary differences in the way instructors viewed the goal of “effective thinking” in their courses and found that instructors used a variety of terms including critical thinking, higher-order thinking, logical reasoning, problem-solving, deductive and inductive logic and creative thinking. For example, problem-solving was most often used by mathematics instructors and only a modest number of instructors in fine arts mentioned logical reasoning as a course goal. While critical thinking was cited extensively as a course objective in most disciplines, interpretation of the term varied according to subject matter. These results are consistent with the present study’s findings which once more suggest that perspectives on CT are highly dependent on the field of study. Results also indicate that regardless of differences in CT conceptualizations, the SMI’s used a number of common strategies to promote CT in their courses (Table 36). Specific types, quantity and quality of methods varied among participants (Chapter 4) but strategies converged along the themes of student engagement with course material, clear expectations and supportive learning environments.

The final point in this section relates to participants’ conceptualizations of CT and how they compare with those established by Lakenorth College and with the

APA. With respect to the APA definition and related skills, findings suggest that participants' primary definitions (Table 29) included some, but not all of the skills identified by the APA. In practice, however, they all stated that their courses sometimes or often addressed each of the APA's CT categories (e.g., analysis, interpretation). And while the SMI's suggested that student thinking had to be well-reasoned and backed up with examples or supporting arguments, none of them used terms similar to the APA such as purposeful, self-regulatory or goal directed in their initial statements. Krista and John, however, did stress the importance of self-assessment and reflection and all of them alluded to the notion of purposeful thinking of discipline-related issues. Finally, none of the participants spontaneously discussed attitudes toward thinking in their initial definition but did mention several dispositions and explained why they were important later in the interviews. In sum, when probed, participants were able to define several skills and dispositions that were included in the APA's conceptualization but none of them addressed a large number of the identified skills and attitudes or used similar language to the APA to define CT.

Were their courses addressing the college's core skills of argumentation, methodology and evaluation of materials? (Appendix A). Based on interview data, the SMI's generally agree with the college definition that CT includes "a wide range of cognitive skills and intellectual dispositions...". While they did not use philosophical terms such as "truth claims", their conceptualizations loosely matched Lakenorth's assertion that CT includes the "skilled, rational assessment of arguments and truth claims, especially as these are presented in everyday

situations”. Their general views also suggest that students need to “formulate and present convincing reasons in support of their conclusions and to make reasonable, intelligent decisions about what to do and what to believe”. Their teaching practices, however, may not address the college’s *specific* core skills.

For example, the college’s statement about argumentation skills suggests that students should be able to formulate the *exact* conclusion of an argument, be able to specify the major premises (or reasons) presented in support of that conclusion, distinguish between evaluating the validity and soundness of arguments, understand the broad distinction between deductive and inductive arguments and how to criticize each appropriately. While Carl’s course addressed these competencies, the SMI’s courses did not. It should be noted that the revised definition and competencies (Appendix C) modified the language and removed some of argumentation skills such as the ability to distinguish between deductive and inductive arguments. General conclusions, however, remain unchanged with respect to how well instructors were addressing these competencies.

In regards to methodological skills, the college definition implies that instructors should focus on the various ways in which their disciplines justify the claims they make and promote consideration of the “methodological assumptions at work behind various claims and theories”. From my observations and discussions with participants, it did appear as though the SMI’s modeled good reasoning skills and tried to get students to evaluate information and/or theories within their disciplines. Conversely, Carl’s course presented a generic model for

identifying, analyzing and evaluating arguments. The more current model, however, specifies that students must be able to “distinguish between scientific and un-scientific research methods” which was not explicitly addressed by any of the participants.

Another skill identified by the college was the evaluation of source materials. Specifically, students should be able to use information (e.g., broadcast, electronic, print media) to “inform themselves on both familiar and unfamiliar subjects...and evaluate the quality of a source of information based on relevant facts about the context, authorship, intent, and media of that information...”. I would argue that the SMI’s generally encouraged these skills as well as additional competencies specified in the modified competencies (e.g., “Cite and document source materials appropriately”). They did not, however, address one element included in both versions which was to “distinguish between controversial and non-controversial ideas/claims from sources”.

Finally, creativity was added to the current definition as well as specific outcomes such as the ability to “Recognize problems where traditional ideas and techniques fail” and “Solve problems in ways that vary or go beyond established techniques”. The case descriptions offer a number of examples where the SMI’s encouraged students to find creative or multiple ways to examine problems in their respective fields and they also discussed the importance of multiple perspectives in their interviews. I did not, however, observe many instances where participants directly asked their students to “identify an assumption in a problem solving technique”.

Based on the in-depth examination of three discipline-specific courses and one CT course, it seems possible for students at Lakenorth College to obtain experience with most of the college's core CT skills--- but only if they take the CT course. Instructors in this study did not address several elements of the college's core CT skills and it is not likely that other SMI's would teach their students, for example, to distinguish between evaluating the validity and soundness of arguments. While the college has provided faculty with a definition of CT and related competencies, four instructors at the college hold their own views on what it is and how to teach for it. On the whole, the SMI's appear to be paying little attention to the college's definition and are addressing CT in ways they find most appropriate.

For Lakenorth College in particular, variations in CT conceptions and how it is addressed should be cause for concern. If the college genuinely wants students to graduate with the intended skills, they will have to take additional steps to ensure its objectives are met. First, the college might consider requiring the CT course for all majors and hope these generic skills transfer to other contexts. With an explicit course and CT infused across the curriculum, students will have a better chance at achieving the college's goals. Second, Lakenorth should consider offering additional professional development for faculty to incorporate the identified CT skills within their disciplinary courses. They will likely encounter resistance of faculty members like Gordon who believe the competencies are essential but do not want the responsibility of teaching them directly. Third, Lakenorth could implement Krista's recommendation of offering

courses with explicit CT instruction within the students' disciplines. This solution would address the issue of discipline-specific differences and perhaps make the skills more relevant to students. It would, however, necessitate additional planning at the departmental level and would also require the college to re-visit their definition to ensure that it is inclusive of skills being fostered across the curriculum. A final and less constructive solution would be to reconsider the core CT competencies and rewrite them to match the actual teaching abilities of instructors.

It has recently come to my attention that the college is working on developing additional professional development for faculty. Based on this study's findings, I recommend that the college sincerely pursue these efforts and begin the initiative by discussing faculty conceptions of CT and related teaching methods. In the process, Lakenorth might find that further revisions to the college definition are needed to ensure that instructors meet the college's expectations.

On a more general level, what are the implications of such wide variation in conceptions of CT? For starters, it is difficult to conduct research without a clear vision of the phenomena under study. Integrative reviews and meta-analyses discussed in Chapter 2, draw attention to these challenges for CT research in particular. In practice, wide variation in conceptions among faculty makes it difficult to focus on developing students' CT skills and dispositions. Specifically, this study as well as prior research (Donald, 2002; Eljamal et al., 1998) demonstrated that faculty speak in different languages and attempt to stimulate a subset of skills they believe to "critical thinking". While there is widespread

agreement that institutions of higher education should be fostering CT skills, researchers and faculty alike do not seem to agree on what it is, how it develops, how to teach for it or how to evaluate it.

As a consequence of this research experience as well as conclusions drawn from other studies, I have started to question the viability of CT as a construct. Fortunately, Lakenorth College had already identified it as an expected outcome for students, which absolved me from the responsibility of selecting an appropriate term and from personally defining CT. While I have not come to any definitive conclusions, I do believe that a narrow definition focused on argumentation skills is insufficient because I think that institutions and individual instructors are referring to a broader set of outcomes. On the other hand, the all-encompassing conceptualizations that capture every cognitive skill are equally impractical for research and instructional purposes.

Of central importance as well, is the apparent overlap in the CT, psychological and teaching excellence literatures. What are we really talking about? For example, the American Psychological Association's (1995) set of 14 learner-centered principles suggests that successful learners are active, goal-directed, self-regulating and should take responsibility for their own learning. Chickering and Gamson's (1987) seven principles of good practice include recommendations for teachers to encourage self-assessment. The American Philosophical Association emphasizes the importance of purposeful and self-regulatory thinking. Moreover, these three sources in addition to Ramsden's (1992) characteristics of good university teaching, suggest that active learning

and integrating new information with existing knowledge are essential to developing students' higher order thinking skills. In other words, the common thread is the promotion of active learning and self-assessment strategies in order to develop "deep" and "meaningful learning" of course material. "Deep" and "meaningful learning" implies that students go beyond rote memorization and recall of facts which I believe are ultimately expressed in the form of CT outcomes such as analysis, integration and evaluation of course content. Regardless of specific skills emphasized, it appears as though strategies recommended in the literature are general enough to be applied to the variety of skills instructors are trying to develop. For instance, participating SMI's used writing assignments, class discussion, student presentations, major projects and essay exams to get students actively involved with course material. They also gave feedback on thinking, made connections among concepts and prior experience, provided a supportive environment for risk-taking and communicated expectations for CT.

Overall, the intersection among various literatures underlines the importance of defining terms in order to better understand how to develop the skills we are trying to foster. It also highlights the complex nature of thinking skills and intricacies of teaching. Despite the research findings from this study, the general state of the literature and concerns about CT as a viable construct, I firmly believe that further research need not be abandoned and that efforts should continue to develop guidelines for developing and assessing higher-level thinking skills in post-secondary students.

Beliefs that Inhibit / Facilitate Critical Thinking Instruction

Predominant factors in the literature assumed to limit faculty use of CT strategies are views about its importance, beliefs about content coverage, self-efficacy, perception of students, disciplinary beliefs and instructors' personal experience with CT instruction. Specifically, faculty who do not value CT or view it as an important goal will not likely teach for it (Ramsden, 1992). The belief that CT pedagogy is too time-consuming and content coverage is more important can limit it as well (Gibbs, 1988; Haas and Keeley, 1998). In addition, instructors will not attempt to foster CT if they do not believe their disciplines are conducive to CT development (Gibbs, 1988; Singer, 1996), if they perceive that students are not capable and willing to do it (Haas and Keeley, 1998; Tsui, 1999) and if they lack confidence in their ability to teach for higher-level thinking skills (Haas & Keeley, 1998). Instructors' epistemological beliefs are also considered to impact teaching practices for CT but will be addressed separately.

This study found that participants representing four disciplines, teaching to different academic levels, have positive overall attitudes toward CT, believe that CT is an important goal of their courses and that fostering thinking skills is as important if not more essential than teaching content. They also believe their own disciplines are favorable for fostering CT.

In addition, participant beliefs about self-efficacy (Bandura, 1982) for CT instruction also appeared to be related to their teaching approaches. Initial data analysis revealed that the SMI's were incorporating CT into their courses despite a lack of confidence in their ability. After examining the data on a finer level, it

became apparent that their lack of self-confidence was based on their ability to teach the skills explicitly. Their levels of self-efficacy to teach it directly, however, indeed corresponded with their behavior.

For example, Carl is confident in his capabilities and directly taught the skills in each class period. Krista believes she is adequately prepared and sometimes discussed the skills explicitly in her course. John and Gordon do not believe they can teach the skills explicitly and do not attempt to do it. Gordon, in particular, does not believe it is his responsibility to teach them explicitly and admits that he does not know how to teach the step-by-step approach. On the other hand, the SMI's believe they are capable of modeling the skills and fostering high-level thinking about their subject matter; their case descriptions revealed they were stimulating thinking skills in their courses. While evidence is far from conclusive, many theorists (e.g., Halpern, 1998; Norris, 1995; Paul, 1990; Paul et al., 1997) recommend explicit instruction as well as infusion of CT across the curriculum. Institutions hoping to develop students' skills might consider offering a stand-alone course in CT and/or develop disciplinary instructors' knowledge of how to teach it directly within their disciplines.

On the other hand, this study did not corroborate the finding that faculty avoid teaching for CT unless they are confident their students are ready and willing to undertake coursework that involves higher-order thinking skills (Haas & Keeley, 1998; Scheurman, 1996; Tsui 1998). Reasoning behind the assumption is that devising instructional techniques to foster CT is an overwhelming task that demands additional time and energy with no guarantee of success for one's

efforts (Tsui, 1998). Despite negative views about their students, the SMI's planned and implemented courses that promoted CT skills. John and Gordon in particular view many of their students as either resistant to CT, incapable of higher-level thinking or unmotivated to think critically while Krista thinks that her students in second-year are not as capable as those in her graduate courses. In addition to the work required by students, all of the instructors mentioned they used to be more content-driven in their teaching practices but evolved over the years. Krista and John added that it is much easier to teach content than it is to foster CT skills. In sum, this study supported previous findings related to faculty beliefs with the exception of instructors' perceptions of students. Why do instructors persist?

Attitudes Toward Teaching

It may be that teachers' attitudes about teaching and learning override negative beliefs about the students and provide faculty with additional motivation to incorporate CT into their subject-specific courses. In addition to the beliefs mentioned earlier, the SMI's also demonstrated an intense enthusiasm for teaching which is often associated with "teaching excellence" (McKeachie, 1994; Ramsden, 1992; Sherman, Armistead, Fowler, Barksdale & Reif, 1987) and stimulating students' CT in higher education (Tsui, 2001). Specifically, John mentioned that his passion for teaching, intrinsic motivation, belief that his work is important and sense of obligation toward the students is what keeps him going. Krista also spoke passionately about the importance of elevating the teaching profession and making sure her students are well-prepared to teach young

children to think at higher levels. From his personal experience, Gordon recognizes that a good teacher is one that enjoys being in the classroom and he tries to follow in the footsteps of his teaching role models. While it is difficult to capture on paper, my observations and discussions with the SMI's indicated that all of them think a great deal about their teaching and thoroughly enjoy what they do.

Tsui (2001) also suggested that instructors dedicated to honing their teaching skills are more likely to incorporate CT into their courses. The SMI's in the current investigation participated in most workshops offered by the college, volunteered to meet with the Instructional Design consultant to enhance their course design and continue to take advantage of professional development opportunities in their fields. Moreover, they participated in this study because they believed their instruction would benefit from it.

Finally, the view of teaching as "mutual learning process" has been linked to instructors' willingness to practice CT skills in class (Tsui, 2001). Krista was the only one who talked about "moulding" ideas and learning as "co-construction of knowledge" but John and Gordon were constantly asking their students to share their business and computer expertise in class. Their classroom behaviour seemed to indicate a desire to learn from students and suggested they believe that students can also learn from each other.

To summarize the discussion on the relationship between instructor beliefs about CT and teaching practices, there appears to be a direct link between how instructors believe CT develops and what they do to foster it. For example, if they

espoused beliefs that discussion is important, they stimulated it in the classroom. If they stated CT develops over time with practice, they provided opportunities for rehearsal. If memorizing the skills was deemed essential, lecture and drills were presented. For institutions devoted to developing students' CT skills, faculty development opportunities should focus on identifying instructors' misconceptions of how CT develops and work toward changing those conceptions. Specifically, efforts might emphasize the importance of striking a balance between content coverage and thinking skills and discuss techniques to achieve it. They might also try to increase instructors' self-efficacy by giving them the appropriate tools to teach for CT, while highlighting the value of it for all disciplines. On the other hand, negative beliefs about student ability and motivation were not found to be inhibiting factors for CT instruction as previously assumed. Perhaps participants' attitudes towards teaching and intrinsic motivation are what drive them to invest the extra effort it takes to stimulate students' thinking skills. Mckeachie (1994) recommends improving conditions for enhancing intrinsic rewards since faculty members are less motivated by external rewards than in other professions.

Epistemological Beliefs

In recent years, there has been an increased interest in epistemological beliefs and how they affect student learning (Hofer and Pintrich, 1997). To a lesser extent they have been considered in the teaching conceptions literature. For example, Pratt (1998) argued that "assumptions about the nature of knowledge significantly shape, define, and limit a given perspective on teaching"

(p. 72). However, there is no empirical evidence to date that specifically examines instructors' epistemological paradigms and their relationship to teaching practice. Instead, researchers have described general teaching orientations which represent a range of beliefs such as instructors' perceived role, student roles and theories of learning. Implicitly, teaching orientations include instructors' theories about knowledge, but these beliefs are not clearly articulated or examined in depth. Furthermore, the connection between epistemological theories and observed teaching practice has largely been ignored.

Instead, the literature has made assumptions about teaching perspectives and general epistemological beliefs. For example, "transmission" or teacher-centered perspectives have been linked to objectivist epistemologies where instructors view knowledge as absolute and residing "outside of the learner". Instructors will therefore transmit information to students and offer few opportunities to construct personal interpretations and will not elicit multiple perspectives on material presented. This viewpoint is of course misaligned with approaches recommended for stimulating CT. On the other hand, constructivist epistemologies have been linked to teaching practices that foster "deep understanding" or "conceptual change" in students. The belief that learners construct and create meaning as opposed to acquiring transmitted knowledge are assumed to result in approaches that promote more open-ended learning experiences and foster higher-order thinking skills (Ertmer & Newby, 1993; Hannafin & Hill, 2002).

The current study examined three core dimensions (omniscient authority, certain knowledge, simple knowledge) of epistemological beliefs (Schommer; 1990; Schraw, Bendixen & Dunkle, 2002). Schommer (1990, 1994) was the first to characterize epistemological beliefs as a multidimensional set of more or less independent beliefs. She also conceptualized them as a frequency distribution of sophisticated and naïve beliefs where "for example, sophisticated learners may believe a vast amount of knowledge is evolving, some knowledge is yet to be discovered, and a very small amount of knowledge is unchanging" (Schommer, 1994, p. 302). Although beliefs about the speed of learning and innate ability may be related to beliefs about knowledge, Hofer and Pintrich (1997) consider these to be "peripheral" dimensions and will therefore not be considered in the following discussion.

Results from this study suggest overall that the SMI's view knowledge as complex, tentative and derived from reason. For example, John said the world is complex and believes there is much more gray than black and white. Krista and Gordon made similar statements in their interviews. Additionally, they believe that knowledge is determined in part through reason but also constructed through individual and/or group interpretation. How do these beliefs translate into teaching practices?

The answer is complex. The SMI's fostered a great deal of student discussion, constantly elicited multiple perspectives from students and encouraged learners to challenge ideas and assumptions. In addition, their assessment methods were consistent with their views of knowledge. Their essay examinations, for instance,

did not require students to simply recall information and regurgitate “correct answers”. As Pratt (1998) and Samuelowicz (1999) pointed out, assessment practices are the best indicators of epistemic cognition. In general, teachers who believe that knowledge is simple, certain and obtained by authority, would not likely teach and assess students in the manner described above. For that reason, their epistemological beliefs appear to be consistent with their instructional practices.

Carl’s case, however, is multifaceted and requires more thorough examination. In general, he views knowledge as certain even though it is complex and derived through reason (i.e., logical connections). According to Schommer (1994) his views about knowledge would be considered both sophisticated and naïve. In practice, he exposed students to the rules of CT and made his learners practice the skills. His course mainly involved lecture, very little class discussion and focused on assessing students’ ability to obtain “correct answers”. While these approaches are considered to match his views of “absolute knowledge”, theory does not explain the impact of his particular set of interrelated beliefs on his teaching behaviours.

In particular, he believes in the existence of “absolute moral truth” and certain knowledge but also recognizes that people do not agree upon “right and wrong” and that remaining open to a better argument is more valuable than obtaining the correct answer. Additionally, he asserted that challenging an author’s view is acceptable and that ambiguity in the textbook exercises is beneficial to students learning the CT skills. His open-ended responses do not

conform to typical views of absolute knowledge because he is open to various arguments and to ambiguity. These results seem to confirm the notion that complementary qualitative measures “that delve into individuals’ nuances” (Schommer-Aikins, 2002, p. 115) are critical to understanding personal epistemologies. Moreover, they highlight the benefit of assessing beliefs along multiple dimensions since other models assume there is one dimension that develops over time.

For example, Perry (1970) was the first to develop a model of intellectual development and describe how college students make meaning of their educational experiences. He developed a one-dimensional, hierarchical stage model of nine positions that were collapsed into four main categories: Dualism, multiplicity, relativism and commitment to relativism. Expanding on his work, subsequent models have focused on the development of women’s ways of knowing (Belenky, Clinchy, Goldberger, & Tarule, 1986), gender patterns (Baxter-Magolda, 1992), reflective judgment (King & Kitchener, 1994) and skills of argumentation (Kuhn, 1991). The common thread among these theories is that “absolute knowledge” is situated in the earliest stages of development. Theoretically, individuals move through the various stages until they perceive knowledge to be contextual, relative and changing. Carl’s set of beliefs does not correspond with these models in a straightforward manner and requires a more complex measure to capture his perspective.

To summarize the topic of epistemological beliefs, paper-and-pencil tests have typically been employed to explore the links between students’ beliefs and

motivation, learning, cognition and academic performance (Hofer and Pintrich, 1997). This study was the first to use the EBI with faculty and compare results with interview data and classroom practices. Furthermore, the pilot study suggested that unfocussed discussions with faculty do not elicit coherent viewpoints, even when the individual has reflected a great deal about the nature of knowledge. From a methodological standpoint, the inventory was a useful starting point for discussions about epistemological beliefs. Additionally, as Pintrich (2002) suggested, a diversity of methodologies is important to provide data on the validity and reliability of available measures.

In particular, Carl's story would have been incomplete without explanations of his EBI responses. In the absence of further discussion, it would have been impossible to make sense of his personal theories and to detect possible limitations of existing models. Likewise, conversations with SMI's allowed me to probe further and to create more accurate pictures of their beliefs. The exploration of faculty beliefs along multiple dimensions seems promising but requires further investigation in order to examine associations between multiple dimensions of epistemology and actual teaching practices.

Instructor Dispositions to Think Critically

Participants' scores indicated positive overall dispositions to think critically with John scoring the highest on the CCTDI and Krista the lowest. How do they compare to scores of other professionals? The inventory has mainly been used with students while scores for professionals have not been widely published. Dissertation research (Claytor, 1997; Hawley, 1998; Lacey, 1996) using samples

of American registered nurses and nursing faculty, however, reported mean total CCTDI scores (with sample size in parentheses) of 315.9 (n=52), 311.39 (n=195), and 327.13 (n=30), respectively. Participants in the current study scored above those means. Regardless of how they scored on each subscale of the inventory, the key element to note is that teachers need to be good students of thinking themselves if they are to foster it in their students (Ritchhart, 2002). Specifically, "if teachers are not primarily inclined and motivated toward promoting thinking, they may find themselves trying to manage competing agendas" (p. 227).

Contextual Factors

Hativa (2001) noted that teaching is a complex relationship between instructors' beliefs and practices as well as many other influences. This study did not attempt to tease apart these influences or assess every aspect of teaching (i.e., pedagogical knowledge), but did provide a description of the context surrounding the instructors' courses (Chapter 4), reviewed instructors' perceived obstacles to fostering CT (Table 32), summarized instructors' espoused practices in other courses (Chapter 5) and discussed disciplinary differences among faculty (Chapter 6).

Other factors that "sometimes necessitate temporary paradigm shifts" in faculty perspectives are class size and academic level of students (Singer, 1996, p. 695). The following paragraphs will consider these issues, along with Carl's individual set of circumstances that might affect his approach to teaching. Lastly,

it will conclude with a discussion about institutional efforts to improve students' CT and how they are translated into practice.

With regard to class size, all participants perceived that full-class discussion, an essential component of CT development, was possible with the number of students in their courses. Krista was the only instructor to incorporate small group work but the decision was not influenced by class size alone. She said she also used group activities in smaller classes to give everyone "a voice" and to foster "rich discussion". John on the other hand, viewed his class of nineteen students as a "team" but remarked that he used small group activities in his larger classes. In general, class sizes in observed courses had twenty-four students or less and was not perceived to inhibit their teaching practices for CT.

In addition to class size, participants were also selected to include courses ranging from second to fourth-year students. While this study did not quantify CT or examine student outcomes, observations indicated there were few distinctions between the courses with respect to students' academic level. For example, Krista's course, with the youngest students, required a great deal of student participation and included a heavy workload with several major projects, fieldwork, reflective writing assignments, presentations and group work. When I commented on the complexity and quantity of work in her course, she explained:

I think with the younger students you need to provide more structure, scaffolding and support for that...opportunities for discussion that allows them to think critically. Oh, definitely. I'm assuming that I don't have to provide as much...and I still provide a few prompt-type questions but it's not

to the degree that we did freshman year...I think I'm tolerant of maturity levels. Some people say to a fault (laughter). But I know I believe in respecting people, where they're at and taking them as far as they can go. Regardless of academic level, Krista said she was always trying to get students to "dig deeper", to reflect on practice and to think critically about course material and fieldwork experiences. Similarly, John feels that he needs to exert less "control" over his senior-level courses but stimulates CT in lower-level courses as well. From within-case and cross-case analyses, it is apparent that participants were trying to foster CT at all levels. Krista and John explained they teach for CT in all of their courses but make adjustments to the level of support or scaffolds they provide depending on the level of students.

In Carl's case, several other factors may have led to his particular approach to the course. First, the goal of the course is to teach students to identify, analyze and evaluate arguments outside the context of any discipline. As Carl pointed out, it is "the one class where arguments are looked at purely as arguments, not in an historical, philosophical or chemical context". In his courses with content, he stated there was less emphasis on "correct" answers and that students had to write a major paper on an open-ended question. The CT course therefore, may not have been conducive to approaches like frequent use of open-ended questions, formal debates, ongoing discussion, writing assignments or essay exams. In order for him to use these methods, students would have to engage in discussions around subject matter. It is interesting to note that current theories of

CT denounce the notion of correctness while Carl's CT course largely assessed students on the accuracy of responses.

Second, the formal study of CT was completely unfamiliar to Carl's students even though were in their third year of study at the college. Perhaps students' lack of prior knowledge motivated Carl to teach in a more "traditional" manner. Third, CT is a required course for about half the majors at Lakenorth College. While the SMI's courses were mandatory as well, they were part of the students' disciplines and learners may have been more motivated and interested in participating. Finally, it may be that Carl is not aware of additional teaching strategies. He did however, attend most of the college's workshops in the spring of 2002 which involved colleagues' demonstrations of how they used various active learning strategies in their courses. Overall, Carl's approach to teaching was consistent with his beliefs about CT and how it develops but may also be a result of the course's overall purpose, students' lack of formal CT knowledge, students' disinterest in taking the required course and his own knowledge or comfort with active learning methods.

Finally, this study cannot conclude without considering the larger picture in which the participants teach. As suggested in the introductory chapter, institutions of higher education espouse the need for students to think critically but are not doing much to support institutional change for it to occur. Lakenorth College on the other hand, has taken the initial steps toward that goal and provided a unique context for this study.

Essentially, the college administration used a top-down approach for mandating change. They have required all faculty to think about how their courses address CT and to provide written evidence as to how they plan to foster it. Consequently, they supplied faculty with a definition of CT, a workshop about CT and other student-centered learning themes, an Instructional Design consultant to assist in the Course Enrichment process and gave faculty a permanent course reduction to provide additional time for planning and implementation of the core competencies. In addition to efforts required at the course level, internal committees were contracted to review two and four-year programs for systematic examination of how courses were addressing the competencies. Finally, students in about half the college's majors are required to take a stand-alone course on CT, class sizes at the college are small (generally under 30 students) and faculty are expected to focus on teaching rather than on scholarly research.

The educational change and innovation literature, however, suggests that mandating complex change without additional support and incentives is a recipe for failure (Ely, 1990, 1999; Fullan, 1994; Rogers, 1995). Anecdotal reports during my work at the college and echoed by participants in this study, suggested that several faculty members were resistant to the top-town approach employed by the college administration. It was also noted that professional development workshops were not beneficial, the definition of CT is perceived by some faculty to be irrelevant to their courses, and the course reduction as reward did not in reality represent a decrease in workload. In my role as ID consultant, one faculty

member explained that faculty had long been asking for a reduction in workload and the administration finally consented upon the condition that faculty re-design their courses and submit a course packet documenting those changes. Some faculty therefore, did not perceive release time offered for course planning as a substantial incentive. In addition, ongoing support of an ID consultant was discontinued although workshops are still being offered. It is my understanding that a small core group of faculty continue to participate on regular basis. In general, support and resources were offered to faculty but they might not be sufficient to promote meaningful change in teaching practices for CT.

In addition, results from this study suggest that faculty could benefit from more discussions revolving around the development and assessment of students' thinking skills. Findings also indicate that faculty define CT in their own manner and foster the skills they believe are important, regardless of a college-wide definition. Specifically, the skills outlined by the college appear to be addressed across courses but many of the identified skills are only taught in the CT course. What happens in situations where students are not required to take the CT course or if the skills learned in the course do not transfer to other situations? As suggested earlier, the college might want to examine the issue further and take steps to rectify this potential problem.

In sum, contextual factors such as class size and academic level did not appear to inhibit participants' willingness to teach for CT but Carl's case presented some additional possibilities that may have impacted his teaching approach. This study also considered institutional efforts aimed at developing CT

skills such defining it as a core competency, requiring individual instructors to infuse it in their courses and systematically planning programs for it as well. Lakenorth's next steps will be to examine how (and if) instructors are implementing their course plans for CT, to assess student outcomes for CT and to identify needs for continuing professional development.

Contributions to Knowledge

The present study made several contributions to our understanding of beliefs and practices in higher education. Specifically, it added to a growing body of literature on teacher beliefs which has focused on primary and secondary teachers and content-specific beliefs in the areas of science, math and reading. At the postsecondary level, research is scarce and centered around description and comparison of general teaching orientations. Attending to the methodological limitations of current research (Kane et al., 2002), this investigation examined teaching practices and beliefs in higher education using multiple sources of data. It also focused on beliefs about CT--- a skill that has been identified as an important goal of higher education. Furthermore, the researcher had the advantage of studying phenomena in the unusual context of an institution that is committed to improving students' CT skills and dispositions. While results obtained from participants cannot generalize to all faculty at the college or to instructors at other institutions, it does extend our understanding in several important ways.

First, thick description of instructor practices adds to the limited number of studies describing *how* college instructors incorporate CT into their courses or

teach it explicitly. While there are many possibilities, instructors' case descriptions provide several examples of course design, instructional strategies and approaches to assessment that can be applied to other contexts. Second, findings suggest that compatibility between espoused teaching practices and actual teaching practices as well as congruency between beliefs and practices for CT instruction are achievable. Research to date has yielded inconsistent results in the general teaching literature which has mainly relied on self-reported data. Furthermore, even fewer studies have examined instructor beliefs about CT and teaching practices for it. This study suggests that inconsistencies may not be as widespread as currently reported in the literature and offers some evidence to suggest that teaching practices for CT are related to instructors' beliefs. Third, this investigation adds to current evidence pointing to disciplinary differences in the way CT is defined and translated into teacher action. As a result, institutions defining and assessing CT outcomes might consider a generic framework for defining the skills and dispositions while bearing in mind the various disciplines at the institution. They should also consider working with faculty to identify misconceptions and help them to better understand what the institution is trying to achieve.

Finally, the goal of this study was based on the assumption that making explicit links between tertiary teachers' theories and practice will benefit novice teachers (Kane et al., 2002) as well as more experienced instructors who are not stimulating thinking skills in their courses. It was also predicated on the notion that professional development initiatives must consider faculty beliefs, since

workshops focusing on teaching strategies alone do not result in long-term improvements and general educational reform (Kane et al., 2002; McAlpine and Weston, 2000; Pratt, 1998).

Consequently, the current inquiry identified and described the common beliefs of three exemplary instructors fostering CT in their courses and presented one example of an instructor who explicitly teaches CT. On the whole, findings corroborate theoretical assertions from the literature and provide additional evidence to support those claims. For example, views about the value of CT, beliefs about CT development, content coverage, epistemology and self-efficacy appear to be related to the ways in which the participants approached CT in their courses. This finding highlights the importance of faculty beliefs and provides further support for the assertion that faculty development programs should take into account instructors' personal theories and possible misconceptions. It would be naïve to expect immediate results since beliefs are resistant to change and intimately connected to experiences (Kane et al., 2002; Pajares, 1992; Hofer & Pintrich, 1997). Current models of teacher development (e.g., McAlpine & Weston, 2002), however, have been attempting to link instructors' knowledge and experience to their actions through reflection, practice and feedback over time. It is difficult to do, yet not impossible. Other practical recommendations based on this study's findings were to increase instructors' self-efficacy by providing them with knowledge and tools for fostering CT, training faculty on assessment measures and intellectual standards for CT and promoting informal discussion among faculty on how to improve their performance for CT outcomes.

Finally, this study did not aim to break new ground in epistemological research, but ultimately led to a worthy contribution. To date, the impact of college instructors' epistemological beliefs on teaching practice has been given little consideration. This study used both survey and interview methods to elicit participants' views about the nature of knowledge and explored their relationship to observed practices. From a methodological standpoint, this study emphasizes the importance of triangulating survey data with interview questions in order to fully comprehend instructors' complex views. On a theoretical level, this study also suggests that one-dimensional models of epistemic cognition or intellectual development are unlikely to capture instructors' multidimensional sets of epistemological beliefs. On a more personal note, the exploration of epistemological beliefs started out as a small component of my study but spiraled into a worthy and satisfying part of this project. In a similar way, I was somewhat surprised to find that technology played such a small role in the eyes of participants given the current push toward using new technologies for teaching and learning. While various technologies have potential to enhance student learning and thinking, it is encouraging to find that instructors can foster student abilities using affordable and accessible methods (e.g., discussion, case studies, writing assignments) that can be implemented in various contexts.

Limitations and Future Research

While this study presents a good starting point for further exploration on many levels, it is not without its limitations. First, the student survey did not appear to be a valid and reliable measure for eliciting their perceptions of

instructional strategies and CT skills fostered in the course. In part, the explanation lies in the measurement tool which would require additional testing and modification for future use. Results across cases, however, provide some indication that students in the CT course were more aware of the CT skills emphasized than in courses where instruction was implicit. Since the literature suggests it is important for students to be cognizant of their thinking skills, this avenue of research is worthy of further exploration. For example, research might address the following questions in the context of discipline-specific courses: Are CT skills explicit in the course? Are students aware of the CT skills being fostered in the course? Does student awareness of CT skills impact its outcomes? Answers to these questions could lead to new insights on how to better prepare students for CT outcomes.

Second, self-made instruments in this study were guided by the APA's set of CT skills and subskills. While the APA's examples were helpful in getting faculty to reflect upon the skills they were trying to foster, they could not be used to precisely map the skills instructors described in their open-ended responses. Likewise, they were not particularly helpful in trying to categorize the skills instructors were emphasizing during the classroom observations. Previous experience assessing student coursework for CT with the APA's categorization scheme led to the same conclusion (Miller, Seidman & Bures, 2000). An explanation for this finding may be that the APA categories are too vague and contain a great deal of overlap. In response to inquiries about the APA system for student assessment purposes, CT expert Robert Ennis explained:

One possible explanation of the difficulty you are experiencing with the categories you mention is that they are vague and concurrently applicable in most cases of critical thinking. That is, considering the ones you mention, inference, evaluation, analysis are part of an integrated whole. They don't happen one at a time, and are vague.

(R. Ennis, personal communication, July 27, 2001).

Given the researcher's experience with the scheme and anecdotal accounts from colleagues attempting to use it in similar ways, the APA system is not recommended as a basis for research instrumentation akin to this study. It was however, helpful in providing instructors with additional prompts to support reflection about CT skills fostered in their courses. Despite its limitations, it is currently the most comprehensive CT conceptualization based on the consensus of 46 experts in a variety of disciplines. Other colleges seeking to develop and assess CT might consider using the APA scheme to help instructors define CT and design course activities around the identified skills. Future research might consider systematically comparing a larger number of faculty conceptions and other expert opinions to the APA categories in order to improve upon it. As mentioned earlier, there is still a great deal of work to be done in terms of defining CT and measuring it with a reasonable degree of reliability and validity.

The third limitation of this study is the small sample size and use of a single-institution. However, the exploratory nature of this research called for a more thorough and holistic investigation than a surface understanding of many instructors at various institutions. Lakenorth College also presented a unique

opportunity for study given its focus on teaching and its particular attention to CT outcomes. Accordingly, efforts were made to provide detailed descriptions of the context under study. It is now the reader's responsibility to determine the extent to which results apply or generalize to other situations. Future explorations might consider examining the beliefs of non-exemplars and compare them to exemplary instructors. We might find there are important differences in beliefs between these two populations. In addition, understanding beliefs that inhibit instructors' willingness to teach for CT are equally valuable, particularly for developing professional development programs that directly work on modifying teacher beliefs. It would also be beneficial to study a wider variety of disciplines and observe individual instructors across contexts. We might therefore be able to identify which beliefs are contextual and perhaps less resistant to change. Finally, investigations across organizational cultures at various types of post-secondary institutions (e.g., public institutions, research universities) are highly recommended to add to our understanding of faculty beliefs and how they relate to teaching practices.

Fourth, the exploratory and descriptive nature of this study was not conducive to examining the direct relationship between beliefs and practices. In addition to beliefs, the literature suggests there are many factors that contribute to an instructor's approaches to teaching. For example, class size, academic level, role models for teaching, engagement in professional development, perceptions of institutional constraints and course content were superficially explored in this study. Future inquiries might expand upon these themes as well

as attitudes toward teaching, pedagogical and content knowledge (Shulman, 1996) and student variables. A more comprehensive and systematic examination of the complexities of teaching is needed to better understand the relationship between beliefs and practice. Taken one step further, future research might address the following questions in order to inform directions for professional development: How do faculty develop specific beliefs? Which beliefs are consistent across contexts? Which beliefs are central and more resistant to change?

The final limitation of the study was its failure to examine differences in student outcomes as a result of faculty beliefs and practices. It is the researcher's ultimate goal to study teaching practice in relation to student outcomes, but limited resources and inadequate assessment tools for CT confined this study to the investigation of faculty beliefs and teaching practices. Our understanding of CT development in higher education would greatly benefit from examining the impact of teacher beliefs on practice and then linking instruction to student outcomes. At its core, this inquiry was aimed at getting students to think at higher levels and to apply those skills to all facets of their lives.

Concluding Remarks

While this study was focused on exploring the relationship between beliefs and practices, a much larger issue surfaced. Specifically, this investigation found that instructors hold a variety of beliefs and use a number of overlapping teaching methods to stimulate their students' CT skills. At first glance, this finding

does not appear to be a remarkable discovery. On the other hand, it is a significant finding because it closely parallels the literature on CT and illustrates one of the biggest problems in the field today. In particular, we have been discussing various aspects of critical thought for over 2500 years, yet it still remains an ill-defined concept. Experts cannot agree on a single definition, which skills and dispositions are involved or how to assess it. The literature also does not provide us with a coherent theory on how CT develops. Participants in the present investigation simply highlighted the lack of consensus in the field. If experts cannot agree on such matters, then how can we expect practitioners to reach consensus and effectively teach for CT?

Given the value placed on CT skills and dispositions in education, the workplace and in society in general, I conclude with the final recommendation for researchers and theorists to continue developing theories of CT, provide empirically-tested methods of CT instruction and uncover more appropriate ways to assess it. Such efforts would be instrumental in establishing a baseline for best practices that we could use to further explore the beliefs driving instructors' approaches to teaching for CT and ultimately improve our students' thinking at all levels of education.

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Appendix A

Lakenorth College Critical Thinking Competency Definition

Critical Thinking is the general term given to a wide range of cognitive skills and intellectual dispositions needed to identify, analyze, and evaluate arguments and truth claims; to discover and overcome personal prejudices and biases, to formulate and present convincing reasons in support of conclusions, and to make reasonable, intelligent decisions about what to do and what to believe. Good critical thinkers treat their own ideas with at least as much scrutiny as they bring to the opinions of others, and they employ these skills as they develop their own beliefs.

More briefly, critical thinking is the skilled, rational assessment of arguments and truth claims, especially as these are presented in everyday situations.

Our goal in building critical thinking into our teaching is to empower students to evaluate claims for themselves.

Our courses at Lakenorth College can foster critical thinking skills by helping students to recognize and analyse arguments in the various forms in which we encounter them, by making students aware of the strengths and limitations of the various methods employed by different academic and professional disciplines, and by requiring from them careful evaluation of the quality of sources of ideas and information.

Core Critical Thinking Skills:

1. Argumentation

Students should be adept at recognizing arguments when they encounter them in various media, and when they are developed in greater or lesser length and detail. They should be able to formulate the *exact* conclusion of an argument, and they should be able to specify the major premises (or reasons) presented in support of that conclusion. They should be able to distinguish between evaluating the validity and soundness of arguments. They should understand the broad distinction between deductive and inductive arguments, and how to criticize each appropriately.

2. Methodology

Various academic and professional disciplines rely on different methods of justifying the claims they make. The empirical method of a social scientist is different from the ways that historians or lawyers justify their claims. Good critical thinkers are always aware of the methodological assumptions at work behind various claims and theories, and our courses should promote careful consideration of those issues.

3. Evaluation of Source Materials

The new "age of information" poses particular challenges to our students. First, they must be able to use broadcast, electronic and print media to be able to inform themselves on both familiar and unfamiliar subjects. Second, it is important to be able to evaluate the quality of a source of information based on relevant facts about the context, authorship, intent, and media of that information, and to know how to distinguish between controversial and non-controversial ideas.

Appendix B

APA Skills and Subskills

| CT Category | Brief description | Subcategories |
|-----------------|---|---|
| Interpretation | Comprehend and express meaning or significance of a wide variety of experiences, situations, data, events. | Categorization Decoding Significance Clarifying Meaning |
| Analysis | Identify intended and actual inferential relationships among statements, questions, concepts, descriptions. | Examining Ideas Detecting Arguments Analyzing Arguments |
| Evaluation | Assess credibility of statements; Assess logical strength of relationships among statements. | Assessing Claims Assessing Arguments |
| Inference | Identify and secure elements needed to draw reasonable conclusions; Form conjectures and hypotheses; Consider relevant information. | Querying Evidence Conjecturing Alternatives Drawing Conclusions |
| Explanation | State results of one's reasoning and justify it; Present one's reasoning in the form of cogent arguments. | Stating Results Justifying Procedures Presenting Arguments |
| Self regulation | Self-consciously monitor one's cognitive activities, elements used in those activities, and results. | Self-examination Self-correction |

Note. Adapted from "Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction" (Facione, 1990).

Appendix C

Revised Lakenorth College Critical Thinking Competency Definition

Definition

Critical thinking enables one to examine a problem, a question or a situation, integrate all the available information about it, arrive at a solution or hypothesis, and justify their position. More formally, critical thinking includes a wide range of cognitive skills and intellectual dispositions needed to identify, analyze, and evaluate arguments and claims, to discover and overcome personal prejudices and biases, and to formulate and present rationally convincing reasons in support of conclusions. Critical thinking skills are also a foundation for creativity and problem solving.

High-level learning outcomes

Upon graduation from Lakenorth College, a student should be able to:

- Recognize, analyze and evaluate arguments, and create well-constructed arguments.
- Criticize and defend research methods in their discipline, draw appropriate conclusions from statistical arguments, and understand the general method of empirical (scientific) research.
- Evaluate the reliability and accuracy of sources of information on the basis of its authorship, intent, and its comparison to other sources of similar information.
- Recognize when and how habitual methods, techniques and assumptions fail, and arrive at creative solutions and ideas.

Critical Thinking Competency Levels

| Competency | Sophomore Level (2 nd year) | Senior Level (4 th Year) |
|--------------------------|--|--|
| Argumentation | <ul style="list-style-type: none"> Distinguish between arguments and non-arguments Identify the exact conclusion, premises and sub-arguments Recognize and criticize the use of definitions, assumptions and the connotation of language in arguments Create arguments by writing and speaking in a fashion where well-supported premises support clearly framed conclusions | <ul style="list-style-type: none"> Evaluate and criticize the reasoning in arguments Recognize and effectively challenge factual claims in arguments Recognize arguments in non-verbal media |
| Methodology | <ul style="list-style-type: none"> Recognize "methodological issues" by explaining how we arrive at the claims we make (personally, professionally, academically, etc.) Distinguish between scientific and unscientific research methods | <ul style="list-style-type: none"> Evaluate the relative reliability of different methods Apply expanded knowledge of discipline-specific methods |
| Source Evaluation | <ul style="list-style-type: none"> Locate sources in various media (electronic, print, visual, etc.) Identify authorship of source material Cite and document source materials appropriately | <ul style="list-style-type: none"> Apply expanded knowledge of discipline-specific sources Evaluate the reliability of a source based upon its authorship and intent Distinguish between controversial and non-controversial claims from source |
| Creative Thinking | <ul style="list-style-type: none"> Identify and state assumptions at work in an argument or problem solving technique Recognize problems where traditional ideas and techniques fail | <ul style="list-style-type: none"> Solve problems in ways that vary or go beyond established techniques |

Appendix D

Letter to Faculty Members

Hope Seidman
 Ph.D. Candidate
 Department of Education
 Concordia University
 1455 de Maisonneuve
 H3G 1M8

Dear *Instructor*,

I am conducting research about critical thinking as part of my doctoral dissertation within the Department of Education at Concordia University, Montreal, Canada. I am interested in how faculty beliefs about critical thinking impact teaching practices for critical thinking. It is hoped that the information found in this study will be useful for the design of more effective professional development programs in the area of critical thinking.

As Lakenorth's Instructional Design consultant last year, I had the opportunity to work with many of you on the *Course Enrichment* process. Since you have given considerable thought to the design of your courses and are addressing the higher order/critical thinking competency in a number of interesting ways, I would appreciate it if you could provide me with information about your general teaching goals.

Specifically, I am asking you to participate in my research during the Spring 2003 semester if you are teaching a Sophomore, Junior or Senior level course that you have focused on in the *Course Enrichment* process. The questionnaire takes about 20 minutes to complete and is available on the World Wide Web.

This survey is the first stage of my research; the second stage will include in-depth case studies of your teaching practices for critical thinking and related beliefs. You will have the opportunity on the survey to indicate your willingness to participate in the case study, which will involve interviews, surveys and classroom observations. In return for your participation in the case study, I would provide you with consultation services related to planning, instruction and assessment of this important skill.

I will not be working at Lakenorth College this year. Your job performance will not be evaluated nor will it be reported to Lakenorth administration. In addition, all individual replies will be kept confidential and viewed only by me. Your name will not be associated with your responses in my report and your participation is voluntary and can be withdrawn at any time by contacting me directly.

To access the survey, please go to <http://www.surveymonkey.com/#####>

Completion of the survey by January 27th would be greatly appreciated.

If you have any questions or have technical difficulties, feel free to contact me as listed below.

Sincerely,

Hope Seidman
 Ph.D. Candidate, Educational Technology
 Concordia University
 Tel:
 Email:

Appendix E

Faculty Survey

PART A

Directions: Part A of this survey is the **Teaching Goals Inventory** (Angelo & Cross, 1993). Please select ONE sophomore, junior or senior level course you are currently teaching, for which you have focused on in the *Course Enrichment* process.

Name of Course _____

Level: ☐ Sophomore ☐ Junior ☐ Senior

Is it a required course for the major? ☐ Yes ☐ No

Date of Course Packet Submission: ☐ Spring 2002 ☐ Fall 2002

Please rate the importance of each of the fifty-two goals listed below to the specific course you have selected. Assess each goal's importance to what you deliberately aim to have your students accomplish, rather than the goal's general worthiness or overall importance to your institution's mission. There are no "right" or "wrong" answers; only personally more or less accurate ones. For each goal, choose only one response on the 1- to -5 rating scale. You may want to read quickly through all fifty-two goals before rating their relative importance.

In relation to the course you are focusing on, indicate whether each goal you rate is:

- | | |
|--------------------|--|
| (1) Not applicable | a goal you never try to achieve |
| (2) Unimportant | a goal you rarely try to achieve |
| (3) Important | a goal you sometimes try to achieve |
| (4) Very Important | a goal you often try to achieve |
| (5) Essential | a goal you always/nearly always try to achieve |

1. Develop ability to apply principles and generalizations already learned to new problems and situations
2. Develop analytic skills
3. Develop problem-solving skills
4. Develop ability to draw reasonable inferences from observations
5. Develop ability to synthesize and integrate information and ideas
6. Develop ability to think holistically: to see the whole as well as the parts
7. Develop ability to think creatively
8. Develop ability to distinguish between fact and opinion
9. Improve skill at paying attention
10. Develop ability to concentrate
11. Improve memory skills
12. Improve listening skills
13. Improve speaking skills
14. Improve reading skills
15. Improve writing skills
16. Develop appropriate study skills, strategies, and habits
17. Improve mathematical skills
18. Learn terms and facts of this subject
19. Learn concepts and theories in this subject

20. Develop skill in using materials, tools, and/or technology central to this subject
 21. Learn to understand perspectives and values of this subject
 22. Prepare for transfer or graduate study
 23. Learn techniques and methods used to gain new knowledge in this subject
 24. Learn to evaluate methods and materials in this subject
 26. Develop an appreciation of liberal arts and sciences
 27. Develop an openness to new ideas
 28. Develop an informed concern about contemporary social issues
 29. Develop a commitment to exercise the rights and responsibilities of citizenship
 30. Develop a lifelong love of learning
 31. Develop aesthetic appreciations
 32. Develop an informed historical perspective
 33. Develop an informed understanding of the role of science and technology
 34. Develop an informed appreciation of other cultures
 36. Develop ability to work productively with others
 37. Develop management skills
 38. Develop leadership skills
 39. Develop a commitment to accurate work
 40. Improve ability to follow directions, instructions, and plans
 41. Improve ability to organize and use time effectively
 42. Develop a commitment to personal achievement
 43. Develop ability to perform skillfully
 44. Cultivate a sense of responsibility for one's own behavior
 45. Improve self-esteem/self-confidence
 46. Develop a commitment to one's own values
 47. Develop respect for others
 48. Cultivate emotional health and well being
 49. Cultivate physical health and well being
 50. Cultivate an active commitment to honesty
 51. Develop capacity to think for one's self
 52. Develop capacity to make wise decisions
53. In general, how do you see your primary role as teaching professor?
Although more than one statement may apply, please choose only one.
- a. Helping students develop higher order thinking skills
 - b. Helping students develop basic learning skills
 - c. Teaching students facts and principles of subject matter in the discipline
 - d. Serving as a role model of liberal arts appreciation and academic values for students
 - e. Preparing students for jobs/careers
 - f. Fostering student development and personal growth

PART B – Background Information

First Name:

Last Name:

What is your highest academic degree?

- ☐ Bachelor's degree
☐ Master's degree
☐ Doctorate
☐ Other _____

Approximately how many years have you been instructing, educating, or teaching?
_____ years

How many years have you been teaching at Lakenorth College?
_____ years

I teach courses in the following programs: (Check all that apply)

- ☐ Accounting
☐ Multimedia & Graphic Design
☐ Paralegal / Legal Assistant
☐ Public Relations & Media Communications
☐ Radiography
☐ Respiratory Therapy
☐ Communication
☐ History
☐ Social Science
☐ Arts
☐ Humanities
☐ Science
☐ Math
☐ Sport Management
☐ Social Work
☐ Elementary/ Early Childhood
☐ Videoconference to Israel
☐ CCOL
☐ E-Business and Commerce
☐ Web Site Development & Management
☐ Computer Networking
☐ Software Development/Engineering
☐ Global Networks & Telecommunications
☐ Hotel-Restaurant Management
☐ Business/Management
☐ Marketing Management
☐ International Business
☐ Honors Program
Other (please specify)

My teaching status is:

- ☐ Part-time
- ☐ Full-time
- ☐ Adjunct faculty

I attended Lakenorth College's workshop on Critical Thinking in the spring of 2002:

- ☐ Yes
- ☐ No

I have attended professional development workshops to help improve my teaching skills in the last five years:

- ☐ Yes
- ☐ No

If so, please describe briefly.

I would be willing to participate in an in-depth case study:

- ☐ Yes
- ☐ No
- ☐ Need more information before I decide

If you are willing to participate in the case study, please provide your contact information:

Thank you!

Appendix F

Faculty Consent to Participate in Research

This is to state that I agree to participate in a program of research being conducted by Hope Seidman of the Education Department of Concordia University, Montreal, Canada.

A. PURPOSE

I have been informed that the purpose of the research is to investigate the relationship between faculty beliefs about critical thinking and teaching practices for critical thinking.

B. PROCEDURES

As a faculty member participating in this research, I understand that the research will be conducted at Lakenorth College and my participation involves the following:

- Interview of beliefs related to critical thinking (1- 1.5 hours)
- Interview of instructional practices related to critical thinking (1-1.5 hours)
- Critical Thinking Dispositions Inventory (20 minutes)
- Survey of student perceptions of instructional practices related to critical thinking

Participation also involves:

- Classroom observations throughout the Spring semester
- Access to "course packet" and course-related documents

In total, participation will be about five hours distributed throughout the Spring 2003 semester.

C. CONDITIONS OF PARTICIPATION

- I understand that I am free to withdraw consent and discontinue participation at anytime without negative consequences by contacting the researcher named above.
- I understand that the data from this study may be published,
- I understand that participation in this study is confidential and that I will have the opportunity to review and approve reports of the observations and interviews in which I participate before they become part of the research study.

I have carefully studied the above and understand this agreement. I freely consent and voluntarily agree to participate in this study.

NAME (please print) _____
 INSTITUTION NAME _____
 SIGNATURE _____
 WITNESS SIGNATURE _____

Contact information:

Hope Seidman
 Ph.D. Candidate, Educational Technology
 Concordia University
 Tel:
 Email:

Appendix G

Student Consent to Participate in Classroom Observation Research

This is to state that I agree to participate in a program of research being conducted by Hope Seidman of the Education Department of Concordia University, Montreal, Canada.

A. PURPOSE

I have been informed that the purpose of the research is to investigate the relationship between faculty beliefs about critical thinking and teaching practices for critical thinking.

B. PROCEDURES

As a student participant in this research, I understand that the researcher will observe classes in which I am a student.

C. CONDITIONS OF PARTICIPATION

- I understand that I am free to withdraw consent and discontinue participation at anytime without negative consequences by contacting the researcher named above.
- I understand that the data from this study may be published,
- I understand that participation in this study is confidential and that I will have the opportunity to review and approve reports of the observations in which I participate before they become part of the research study.

I have carefully studied the above and understand this agreement.

☐

I freely consent and voluntarily agree to participate in this study.

☐

I do not wish to participate in this study

SEAT NUMBER _____

SIGNATURE _____

Contact information:

Hope Seidman
Ph.D. Candidate, Educational Technology
Concordia University
Tel:
Email:

Appendix H

Interview Protocol: Instructional Strategies

- *Purpose of this interview is to discuss your teaching practices that support or promote critical thinking in your course*
- *The questions revolve around your conception of CT, instructional strategies and assessment*
- *Some are open-ended questions and some are closed or forced-choice questions*
- *It should take about an hour /hour and a half*
- *We'll begin with your definition or conceptualization of CT...*

CONCEPT/DEFINITION

1. Please define your own concept of CT. Perhaps you could begin by completing the following sentence:

To me, CT is _____

Follow up:

- Could you elaborate further on your conception?
- In your answer, you've mentioned skills such as _____ (i.e., analysis). What intellectual standards would you use to distinguish whether or not these processes are being done critically versus uncritically?
- Does your conception of CT involve any traits of mind or dispositions toward CT?
- In your concept of CT do you explicitly distinguish between CT skills and dispositions or traits? An example of a trait that some might identify is open-mindedness.

INSTRUCTIONAL STRATEGIES

2. How do you develop your students' critical thinking skills in this course? For example, what instructional strategies, types of assignments or in-class activities do you use to develop CT skills in your students?

Follow up:

- Perhaps the best example of more successful integration of CT into my class instruction is...
- Is there anything you do on a regular basis in the classroom that you believe fosters CT? Please provide examples.
- I noticed in your class, you...

3. What particular CT *skills* are you addressing in this course? *How* do you address this type of CT skill in your course? *How often?*

Follow up:

- Are there other CT skills that you emphasize in this course? [Give category/subcategory examples, for each category- *How? How often?*]

4. I'm going to ask you to rate how often, if at all, you ask students to participate in the following activities:

Probes for activities: (Never, Sometimes, Often)

- ☐ Student presentations in class
- ☐ Solve problems / analyze case studies
- ☐ Work on writing activities in class
- ☐ Participate in class discussions
- ☐ Brainstorm ideas (in small groups or as a whole class)
- ☐ Engage in role-plays
- ☐ Participate in formal debates
- ☐ Work in small groups (what kinds of activities?)

5. About how often do *you* do the following in this course:

Probes for strategies: (Never, Sometimes, Often)

- ☐ Provide direct instruction (or lecture students) on how to think critically
- ☐ Provide feedback on student *thinking* – *how*?
- ☐ Model CT and dispositions (openness to ideas)
- ☐ Make connections from course content to other disciplines, courses, real-world contexts...
- ☐ Find out what students know or think about a subject prior to instruction
- ☐ Give time to students to reflect and to structure their thinking
- ☐ Provide specific grading criteria / intellectual standards for CT
- ☐ Explicitly state expectations for CT (in class or in assignments)
- ☐ Ask open-ended questions

ASSESSMENT

6. What is a good indicator that your students have learned the essential aspects of your course content?

Follow up:

- How do you measure or assess your students' CT skills in this course? Could you please give me examples from this course?
- Do you grade participation? Opportunities to revise work?
- Types of exams? Multiple-choice? Essay? Group work?

7. Is there anything else you'd like to say that we haven't covered in the interview?

Thank you.

Appendix I

Critical Thinking Examples

| Skill | Do you ask students to: |
|--------------------|---|
| Interpretation | <input type="checkbox"/> Explain concepts or clarify ideas in their own words (use examples, provide description, summarize) <input type="checkbox"/> Categorize, sort or classify information taken from a text or other source of information <input type="checkbox"/> Interpret data from texts, procedures, or experiments |
| Analysis | <input type="checkbox"/> Analyze the structure of an argument <input type="checkbox"/> Identify if any arguments or claims are being made and supported in a text <input type="checkbox"/> Compare & contrast ideas concepts or statements (examine similarities and differences) |
| Evaluation | <input type="checkbox"/> Agree/disagree with an argument based on the supporting evidence (i.e., Is there evidence? Is it credible?) <input type="checkbox"/> Judge if an argument's conclusion follows logically from its premises <input type="checkbox"/> <i>Distinguish between evaluating the validity and soundness of arguments</i> <input type="checkbox"/> <i>Distinguish between deductive and inductive arguments</i> |
| Drawing Inferences | <input type="checkbox"/> Identify where additional information is needed to support an argument or opinion <input type="checkbox"/> Determine which of several possible conclusions is the best supported by the evidence <input type="checkbox"/> Propose multiple alternatives for solving a problem |
| Explanation | <input type="checkbox"/> Explain the steps/strategies used to work through a problem or procedure <input type="checkbox"/> Argue for a particular position or policy <input type="checkbox"/> State reasons for holding a particular point of view |
| Self-regulation | <input type="checkbox"/> Judge the extent to which their thinking is influenced by personal prejudices, biases or deficiencies in knowledge <input type="checkbox"/> Review their work and revise it if they've discovered errors |

Note. Items in italics indicate items were drawn from Lakenorth College's definition.

Appendix J

Interview Protocol: Instructor Beliefs

- *The purpose of this interview is to discuss your beliefs related to CT.*
- *It is also your opportunity to add anything you may have forgotten to mention in the last interview*
- *It should take about an hour/hour and a half*
- *There are 11 main questions. Let's get started with the first question...*

1. In our last interview, we talked about your definition of CT and discussed how you promote it in your course. ... Why is critical thinking important?
2. How do you believe students acquire or develop CT skills?

Follow up:

- What works the best to make students think critically? Why do you say that? What makes it work? What can make it fail?
- What is your role in the development of your students' skills (or dispositions?)
- What is the student's role in this process?

3. Generally speaking, do you feel students upon entry into your course are well-prepared by their prior education or background to exercise their CT skills?
4. What qualities or intellectual standards do you look for in your students' reasoning that tells you whether or not they are reasoning well or poorly?

Follow up:

- For example, if you emphasize the importance of being accurate in their thinking, then "accuracy" is a general standard or criteria you value.
- Could you name or elaborate upon them?
- By intellectual standards I mean general criteria that one uses to decide what to accept as true or false, reasonable or unreasonable etc...

5. Some faculty feel they have too much content to cover to have much time left for fostering CT. What is your view of this position?
6. What factors limit or foster your ability to focus on CT in your course? What factors limit or enhance your effectiveness?
7. One question that arises from the debate on CT is whether CT should be taught as a general skills course or situated in a context. What is your position on this issue?

Follow up:

- Do you think the CT skills taught in this course transfer to other courses or real-life situations? Why? Why not? How? Could you please give me an example from the design of your course?

8. Prior to this interview, you filled out the Epistemological Beliefs Survey. The survey was aimed at identifying your beliefs about the nature of knowledge. I'd like to follow up on some of your answers.

Follow up:

- Sometimes there are no right answers to life's big problems
 - How do you know or accept when something is true? What is the evidence?
 - Truth means different things to different people
 - Absolute moral rules do not exist.
 - The moral rules I live by apply to everyone
 - Some people have a knack for learning and others do not
9. Do you see some disciplines, by the nature of their subject matter, as providing more fertile ground for the teaching of CT than others? Your discipline? Why?
10. What in particular about this institution impedes or fosters the development of students' CT? (or at the department/division level?)
11. Do you feel you have adequate professional training to teach for CT?

Follow up:

- Why? Why not? What kinds of training support do you think you need? How were you taught in college and do you teach in a similar manner? Do you participate in any kinds of professional development related to teaching? CT in particular?
12. Do you have any additional comments or thoughts about critical thinking? Anything you feel you may have omitted from last week's interview?

Thank you.

Appendix K

Classroom observation protocol

| | |
|----------------------|----|
| Course Title: | |
| Instructor: | |
| Class size: | |
| Date: | |
| Time of observation: | to |

STUDENT ACTIVITY:

| Activities | Description/Notes | Time |
|---|-------------------|------|
| Make a class presentation | | |
| Solve problems / analyze case studies in class | | |
| Work on writing activities in class | | |
| Contribute to class discussions | | |
| Brainstorm ideas (in small groups or as a whole class) | | |
| Engage in role plays in class | | |
| Group work (peer evaluations, problem-solving, critique of course materials, debates) | | |
| Conduct experiments / hands on activities with materials in class | | |

INSTRUCTOR:

| Strategies | Description/Notes |
|---|--------------------------|
| Provides feedback on student thinking | |
| Provides direct instruction for CT | |
| Models CT (raise questions, acceptance of viewpoints, alternative solutions, demonstrate thinking process) | |
| Makes connections from course content to other disciplines, courses, real-world contexts... | |
| Elicits prior knowledge (ask how they feel or what they know prior to instruction). | |
| Gives time to reflect and to structure thinking | |
| Provides specific criteria / intellectual standards | |
| Explicitly states expectations for CT | |
| Asks open-ended questions | |

Questions / classroom activities provide opportunities for students to use the following skills:

| Skills | Description/Notes |
|--|-------------------|
| Interpretation: -Explain or summarize ideas in your own words -Provide examples that help explain a concept -Categorize information according to a system -Interpret data from articles, procedure, or experiment | |
| Analysis: -Analyze the structure of an argument -Compare or contrast ideas -Identify relationships among concepts in the course | |
| Evaluation: -Assess credibility of an author or website -Identify if claims in a text are being made and supported -Agree/disagree with a claim based on the presence & credibility of the supporting evidence | |
| Drawing inferences: -Identify where additional information is needed to support an argument or opinion -Determine which of several possible conclusions or choices of action is best -Propose multiple alternatives for solving a problem | |
| Explanation: -Write a paper arguing for a particular position -Explain the steps/strategies used in working through a problem | |
| Self-regulation: -Revise work that contains factual or methodological errors -Review decision-making processes for errors -Reflect on opinions/reasons for holding them -Judge extent that thinking is influenced by deficiencies in knowledge, prejudices, values. | |

Description of physical set up of classroom:

Description of instructional material and resources used: (print, technology, hands-on materials)

Notes and Comments: (activities /instructional strategies, overall student participation, openness, admin...)

Sequence of events/Activity:

a)

b)

c)

d)

e)

f)

| Activity | Approximate time in minutes |
|--|-----------------------------|
| Total class time observed | |
| Administrative tasks | |
| Lecture (+ discussion) | |
| Students engaged in activity other than lecture (+ discussion) | |

Appendix L

Survey of Student Perceptions of Critical Thinking Instruction

The purpose of the following survey is to obtain your feedback on the teaching strategies that were used in this course to promote your critical thinking (CT) skills (e.g., analyze, interpret, evaluate). Your participation will contribute to a better understanding of how instructors teach for CT in their courses.

The survey will take approximately 10 minutes to complete. Survey responses are anonymous; please answer the questions *honestly*. Thank you for your participation!

1a. Course Title: _____

1b. What is your current classification in college?

- ☐ Freshman
☐ Sophomore
☐ Junior
☐ Senior
☐ Other _____

2. In your experience in this course this semester, about how often were you asked by your instructor to participate in the following *in-class* activities:

| Activities | Never | Some-times | Often |
|---|--------------------------|--------------------------|--------------------------|
| Make a class presentation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Solve problems in class | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Prepare and participate in a <i>formal</i> debate in class | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Work on writing activities or assignments in class | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Contribute to class discussions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Brainstorm ideas in class | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Engage in role plays in class | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Work in small groups in class (e.g., problem-solving activities, peer feedback, sharing ideas...) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Analyze case studies in class | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

3. In your experience in this course this semester, were you asked by your instructor to:

| Assignments | Yes | No |
|---|--------------------------|--------------------------|
| Keep a journal to reflect on course material or experiences | <input type="checkbox"/> | <input type="checkbox"/> |
| Work on a research paper or major project | <input type="checkbox"/> | <input type="checkbox"/> |
| Participate in field experiences or internships related to the course (supervised activity in a professional setting) | <input type="checkbox"/> | <input type="checkbox"/> |
| Submit plans or drafts of your work for feedback, prior to submitting the final version of the assignment or project | <input type="checkbox"/> | <input type="checkbox"/> |
| Solve problems (homework assignment) | <input type="checkbox"/> | <input type="checkbox"/> |
| Work in small groups outside of class (e.g., problem-solving activities, sharing ideas, peer feedback) | <input type="checkbox"/> | <input type="checkbox"/> |
| Work on writing assignments (homework assignment) | <input type="checkbox"/> | <input type="checkbox"/> |
| Analyze case studies (homework assignment) | <input type="checkbox"/> | <input type="checkbox"/> |

4. Please list any other activities that helped you to think critically about course material (e.g., synthesize, evaluate information, identify relationships among concepts...) and rate how often they occurred:

| Activities | Sometimes | Often |
|------------|--------------------------|--------------------------|
| a. | <input type="checkbox"/> | <input type="checkbox"/> |
| b. | <input type="checkbox"/> | <input type="checkbox"/> |
| c. | <input type="checkbox"/> | <input type="checkbox"/> |
| d. | <input type="checkbox"/> | <input type="checkbox"/> |

5. In your experience in this course this semester, about how often did your *instructor* do the following:

| Activities | Never | Some-times | Often |
|--|--------------------------|--------------------------|--------------------------|
| Provide you with feedback on your <i>thinking</i> (e.g., ask you to be more specific in support of your ideas). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Provide direct instruction (lecture) about critical thinking (e.g., identify or demonstrate specific skills, teach methods for evaluation) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Model critical thinking or good reasoning behavior (e.g., accept other viewpoints, state his/her biases, work through a problem systematically...) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Make connections from course content to other disciplines, courses, real-world contexts (through examples, analogies). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Find out what you already know, believe, or feel about the subject matter <i>prior</i> to instruction. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ask open-ended questions (require more than yes/no response). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Give you time to reflect and structure your thinking. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Provide specific grading criteria to assess the quality of your thinking (e.g., Express ideas clearly, logically...). | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Explicitly state his/her expectations of you to think critically or in complex ways. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Provide you with opportunities to revise and re-submit your work. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

6. In your experience in this course this semester, about how often did course activities (e.g., questions, assignments, projects) emphasize the following skills:

| Skills | Never | Some-times | Often |
|---|--------------------------|--------------------------|--------------------------|
| Compare and contrast ideas concepts or statements (examine similarities and differences) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Review and revise your work when you discover errors in it | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Identify where additional information is needed to support an argument or opinion | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Explain concepts or clarify ideas in your own words (use examples provide description, summarize) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Propose multiple alternatives for solving a problem | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Interpret data from texts, procedures, or experiments | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Judge the extent to which your thinking is influenced by personal prejudices, biases or lack of knowledge | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Argue for a particular position or policy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Determine which of several possible conclusions is the best supported by the evidence | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Agree/disagree with an argument based on the supporting evidence (i.e., Is there evidence? Is it credible?) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| State your reasons for holding a particular point of view | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Explain the steps/strategies you used to work through a problem or procedure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Analyze the structure of an argument | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Judge if an argument's conclusion follows logically from its premises | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Distinguish between evaluating the validity and soundness of arguments | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Distinguish between deductive and inductive arguments | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Categorize, sort or classify information taken from a text or other source of information | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Identify if any arguments or claims are being made and supported in a text | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

7. In your experience in this course this semester, about how often did your instructor encourage you to:

| | Never | Some-times | Often |
|---|--------------------------|--------------------------|--------------------------|
| Seek the truth and new evidence in any situation, even if the findings do not support your self-interests or opinions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Be open-minded, tolerate different views, monitor your ideas for bias | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Be analytical or demand the application of reason and evidence | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Be focused, organized, diligent and systematic in your decision-making | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Trust your reasoning skills and judgment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Be inquisitive, curious and eager to acquire knowledge even when the application of knowledge is not apparent | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Be prudent in making, suspending, or revising your judgments | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

8. Comments:

Thank you!

Appendix M

Scales of the CCTDI

| Subscale | Definition |
|--------------------|---|
| Truthseeking | A courageous desire for the best knowledge, even if such knowledge fails to support or undermines one's preconceptions, beliefs or self interests. |
| Openmindedness | Tolerance of divergent views, self-monitoring for possible bias. |
| Analyticity | Demanding the application of reason and evidence, alert to problematic situations, inclined to anticipate consequences. |
| Systematicity | Valuing organization, focus and diligence to approach problems of all levels of complexity. |
| CT Self-Confidence | Trusting of one's own reasoning skills and seeing oneself as a good thinker. |
| Inquisitiveness | Curious and eager to acquire knowledge and learn explanations even when the applications of the knowledge are not immediately apparent. |
| Cognitive Maturity | Prudence in making, suspending, or revising judgment. An awareness that multiple solutions can be acceptable. An appreciation of the need to reach closure even in the absence of complete knowledge. |

Appendix N

Instructions for Completing the CCTDI**Instructions:**

This is a survey of your beliefs, expectations, and perceptions. It should take you about 15 or 20 minutes to respond to the 75 items. In each case, select the response which best expresses your own personal opinion.

- Find a suitable environment that is quiet and well-lit.
- Please complete the inventory **without interruptions**.
- Read the "directions" provided in the exam booklet, including the 2 examples.
- Mark your answer choice on the CCTDI answer sheet by completely darkening the bubble. Please use a **pencil**.
- Be sure to completely erase any mistakes or stray marks.
- When you have completed the CCTDI, place the CCTDI with your answer sheet inside the envelope provided.
- Seal the envelope and return it to Hope Seidman (in person) before April _____, 2003.

Appendix O

Summary of EBI Subscales

| Subscale | Definition |
|----------------------|---|
| Omniscient Authority | Knowledge is handed down by authority rather than derived from reason |
| Simple Knowledge | Knowledge is simple rather than complex |
| Certain Knowledge | Knowledge is certain rather than tentative |
| Innate Ability | Ability to learn is innate rather than acquired |
| Quick Learning | Learning is quick or not at all |

Appendix P

General Coding Scheme for Major Themes

| Major categories/ themes | Examples |
|-----------------------------|---|
| Background Information | <ul style="list-style-type: none"> • Teaching Status • Years Teaching • Courses Teaching • Academic Background • Professional experience • Professional development • Course used as context of study • Number of students • Academic Level • Average daily attendance |
| Teaching Practices | <ul style="list-style-type: none"> • Classroom overview • CT skills fostered in the course • Course structure and instructional strategies • Assessment strategies • Strategies used in other courses |
| Beliefs About CT | <ul style="list-style-type: none"> • CT conceptualization <ul style="list-style-type: none"> → Definition → Value of CT → Skills → Dispositions → Intellectual standards or criteria • How CT develops <ul style="list-style-type: none"> → General theories → Student characteristics → Teaching strategies → Institutional variables • Obstacles to CT development <ul style="list-style-type: none"> → General → Student Characteristics → Instructor characteristics/teaching strategies → Institutional variables |
| Related Beliefs | <ul style="list-style-type: none"> • Perceptions about the students • Self-Efficacy • Epistemology • Disciplinary beliefs |