8-2007

Effective Critical Thinking Teaching Strategies as Perceived by Affiliated Program Evaluation Faculty

Dhaifallah Almatrodi
Western Michigan University

EFFECTIVE CRITICAL THINKING TEACHING STRATEGIES AS PERCEIVED BY AFFILIATED PROGRAM EVALUATION FACULTY

by

Dhaifallah Almatrodi

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Philosophy
Department of Educational Leadership, Research and Technology

Western Michigan University
Kalamazoo, Michigan
August 2007

EFFECTIVE CRITICAL THINKING TEACHING STRATEGIES AS PERCEIVED BY AFFILIATED PROGRAM EVALUATION FACULTY

Dhaifallah Almatrodi, Ph.D.

Western Michigan University, 2007

Critical Thinking (CT) skills are important for effective evaluation. In order to increase CT competency and use in evaluation to improve evaluation results, training programs for evaluators should incorporate CT instruction.

This study focused on three areas of interest relative to CT strategies, teaching practices, and assessments to measure CT performance. Six research questions were identified to investigate Program Evaluation (PE) faculty's perceptions of effective CT teaching strategies. They are: (1) How many CT teaching strategies are faculty members aware of in teaching graduate students?; (2) How often PE faculty utilize CT teaching strategies in their teaching profession?; (3) Which CT teaching strategies are perceived to be effective by faculty members in PE?; (4) What are the practical steps taken by PE faculty in implementing the different kinds of CT teaching strategies?; (5) What are the different outcomes intended by PE faculty in implementing the different kinds of CT teaching strategies?; (6) How do instructors assess the intended outcomes for their favorite "effective" CT teaching strategies?

This study utilized a mixed method approach with a survey providing quantitative data and follow-up interviews providing qualitative information that further explained the

collected data. Examination of participating faculty members' course syllabi provided additional qualitative information.

Thirty one PE faculty members received the CT teaching strategies survey. Analysis of the 24 returned questionnaires (a response rate of 77 %) revealed that the teaching strategy, Instructor-Directed in Class Exercises in CT, was known by 100% of the participants. Socratic Questioning was one of the top five strategies used by PE faculty in their classrooms. Class Presentations of Small Group Projects was one of the top five strategies perceived as an effective CT teaching strategy.

The findings from this study suggest that PE educators have basic understanding of CT and are implementing various CT teaching strategies in their classrooms. However, the findings suggest the need to further develop the educators' knowledge of CT and their implementation in the classroom.

INFORMATION TO USERS

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleed-through, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

ProQuest Information and Learning Company
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346

ACKNOWLEDGEMENTS

I would like to thank the following people who were instrumental in helping me to complete my research: Brooks Applegate, the chair of my dissertation committee, for his support and guidance throughout this process; Michael Scriven for his encouragement and belief in the process of this research and its potential impact on the field; Donna Talbot for serving on my committee.

I would like to thank my parents, who passed away before I was able to finish my doctoral work, but who instilled in me a love of learning and the desire to achieve this degree.

I would like to thank my brother Mohammed for his continued support personally, educationally, and professionally.

There have been many others along the way who have guided and supported me through this process. Without them, this would not have been possible. Thank you, my family and Nasser.

Thank you to the entire program evaluation faculty for your insights and candor during the research phase of this work.

Dhaifallah Almatrodi

TABLE OF CONTENTS

Table of Contents – Continued

CHAPTER

Table of Contents – Continued

CHAPTER

Table of Contents – Continued

CHAPTER

LIST OF TABLES

CHAPTER I

INTRODUCTION

Problem Statement

Program Evaluation (PE) training programs not only have the task of preparing students to become future evaluators in a changing, demanding environment, but of ensuring that these future evaluators are competent and knowledgeable (Paul, Elder, & Bertell, 1997) [1]. Regrettably, misuse and lack of use of evaluation reports have led to expressions of doubt concerning the competency of those carrying out evaluations (Guba & Lincoln, 1981; Madaus, Scriven, & Stufflebeam, 1983; Patton, 1997; Simons, 1987; Thompson, 1994). That is, there is concern that evaluation reports that seem to reflect incompetent or irrelevant interventions will not be used or given serious consideration by stakeholders and clients (Cousins & Leithwood, 1986; Patton, 1997). Evaluation reports which reflect faulty process and conclusions are at best a waste of time, energy, and resources. More critically, at worst, defective reporting could lead to negative impact or injurious results. Professional competency and knowledge, of a high order, among evaluators are indispensable to realization of usable evaluations. Evaluations that are competently carried out have been found to be more usable for clients and stakeholders (Cousins & Leithwood, 1986; Patton, 1997; Scriven 1991). Moreover, evaluations which are competently carried out and, therefore, have the potential to be taken seriously and actually used by clients and stakeholders, could add to the program's strength and utility.

---

1 All references in this dissertation follow APA style (5th Ed) as expressed in the American Journal of Evaluation.

Critical thinking (CT) skills are important for effective evaluation (Scriven, 1991). Use of CT can help to shape, direct, and enrich the evaluation process. CT helps connect evaluation with expert judgment and practice. Through these connections, CT helps to achieve results that are more likely to reflect competent evaluation practice. Increased competency is necessary for achieving higher standards of quality in evaluation (Cousins & Leithwood, 1986; Patton, 2001). Increased use of competently produced evaluation results is essential for realizing maximum benefit from evaluations and for strengthening the professional practice of evaluation (Scriven, 2005).

Deployment of CT strategies in evaluation has been supported in the fields of both evaluation and CT as conducive to improvement in evaluation process and results (Cromwell, 1992; Scriven, 1991; Stevahn, King, Ghere, & Minnema, 2005). Increasing the use of CT within the practice of evaluation seems a reasonable directive for improving evaluator competency, quality of evaluation results, and acceptance and use of evaluation outcomes by clients and stakeholders.

In order to increase CT competency and use in evaluation to improve evaluation results, training programs for evaluators should incorporate instruction in CT. Teaching strategies and techniques that foster CT among graduate students in evaluation might then in turn improve their levels of competency. A more solid foundation in CT will facilitate individuals' preparation for engaging rewardingly with the evaluation challenges of the future. Increased use of CT in evaluation graduate teaching is therefore warranted. Determining effective teaching strategies for using CT within graduate study of PE is the core research problem and directive of this study.

Background

Two overlapping areas of knowledge formed the context and foundation of this study: CT and PE. Together, these two areas were conceptually combined within the context of graduate training programs in evaluation. The following pages briefly introduce and outline the components governing this analysis of CT and evaluation, as well as describe the relationships of these intellectual disciplines within the context of graduate training.

Critical Thinking

The development of CT skills has been identified as an essential educational goal by governmental organizations (Association American of Medical Colleges, 1984; Facione & Facione 1996; National Commission of Excellence in Education, 1983; U.S. Department of Education, 2001). Moreover, business leaders have stressed the importance of CT (AICPA, 1999) and institutions of higher education in the United States emphasize it (Damon, 2004; Elder & Paul, 2002). College graduates must demonstrate an increased ability to think critically, communicate effectively, and solve problems (United States Congress, 1994). Progress in the workplace requires CT, to compete in a global economy and to have the rights and responsibilities of citizenship in a rapidly changing and complex world (Conference Board of Canada, 2000; Facione, 1990; Paul, Elder, & Bertell, 1997).

Program Evaluation

Quality of evaluation reports could improve with increased concentration upon CT (Scriven, 1991). Cromwell (1992) and Ennis (1989) both indicated that PE was a form of CT that requiring a cluster of related skills. Bloom (1956) understood the process of evaluation as the most sophisticated of cognitive skills. Bloom's taxonomy (1956) enumerates levels of cognitive processing according to an increasing level of sophistication.

The taxonomy unfolds through knowledge, comprehension, application, analysis, and synthesis and culminates with evaluation (1956).

From his work with an assembled panel of CT experts, Facione (1990) derived an analysis of cognitive skills as central or core facets of CT. The core CT skills identified were analysis, evaluation, and inference. Ennis (1996) also viewed evaluation as playing a prominent part in CT, joining with reasoning, problem-solving, and analysis. Other writers, for example, Beyer (1985) and Scriven (1991) have understood evaluation and CT as roughly equivalent to one another. Stevahn, King, Ghere, and Minnema (2005) indicated that CT underlies all evaluation processes. Other CT theorists described evaluation as part of a holistic process (Miller, 2003). This process included CT (2003). Competencies of CT and evaluation often overlap and sometimes coincide (Bloom, 1956; Cromwell, 1992; Ennis, 1989). Facione's (1990) view of evaluation is somewhat more delimiting, relegating it to one of three core facets of CT.

Agreement is widespread in the literature that evaluators need CT skills to transfer knowledge and information from one situation to another (Stevahn, King, Ghere, & Minnema, 2005). They must transfer evaluation theory to the project in the field and also use what they have learned from previous evaluations. They have to apply this knowledge to current projects or those planned for the future (Worthen, Sanders, & Fitzpatrick, 1997).

The role played in evaluation by CT is essential (King, Stevahn, Ghere, & Minnema, 2001). CT helps evaluators to synthesize, analyze, and evaluate information. Stevahn, King, Ghere, and Minnema (2005) viewed evaluators as engaged in CT throughout the evaluation process. However, research about CT in evaluation was viewed as limited (King, Stevahn, Ghere, & Minnema, 2001; Stevahn, King, Ghere, & Minnema, 2005). More systematic

research is required to better understand the relation between the two disciplines (King, Stevahn, Ghere, & Minnema, 2001; Stevahn, King, Ghere, & Minnema, 2005).

Interconnections between evaluation and CT suggest evaluation depends, to a large extent, on the evaluator's ability to assess all key elements in CT to include: identifying problems (Patton, 2001), developing appropriate plans to solve the problems (Worthen, Sanders, & Fitzpatrick, 1997), exploring alternative ways of helping clients (Stake, 2004), and evaluating the effectiveness of the evaluation process (Scriven, 2005). Enhancing future evaluators' CT through evaluation instruction is needed. Such instruction must strive to ensure novice evaluators are critical thinkers (Paul, Elder, & Bertell, 1997). Ensuring that evaluation instructors have required skill and knowledge in CT is vital. It is the first step for incorporating CT as part of evaluation.

Teaching Strategies for Critical Thinking in Evaluation

Successful incorporation of CT teaching and assessment strategies within evaluation coursework initiates with assurance of requisite skill and knowledge on the parts of instructors (Elder, 2000; Paul, Elder, & Bertell, 1997). Mastery of CT and relevant teaching strategies cannot be assumed part of the usual intellectual and pedagogical repertoire of the typical graduate faculty member (Elder, 2000; Paul, Elder, & Bertell, 1997). Such mastery, however, is essential for effective teaching, in terms of incorporation of CT within a separate discipline (Elder, 2000; Paul, Elder, & Bertell, 1997). Instructors within a department should also agree about purpose, structure, and application of CT. Such agreement, centering upon understandings of CT knowledge, skill, and instructional strategies, is vital for successful teaching of CT (Elder, 2002). This does not mean that in absolutely all details faculty must conform and agree concerning the parameters of CT, its application processes, and the best strategies for its implementation. However, some uniformity among faculty concerning how

to approach and understand CT, how to interpret and value the major contributions to relevant theory, and how to implement the most workable, relevant CT teaching strategies (CTTS) should be in place. The fewer the discontinuities, discrepancies, and incongruous perspectives within a curriculum— in terms of CT-- the more efficient, sustaining, and developmental the departmental program's learning process for each learner.

In order to successfully realize a sustaining developmental learning process and efficiencies inherent to curricular continuity, and also resultant incremental CT development, instructors must take appropriate initiatives. The first of these is the evidence of a willingness to master and appropriately utilize the ideas, learning strategies, and necessary assumptions of CT (Dike, 2001; Elder, 2000; Shermis, 1992). In fact, some indication exists that a substantial level of agreement is necessary among departmental faculty. Agreement is needed in order to facilitate maximum learning of CT within a given program. Consensus must initiate with "complete understanding and shared definition of the concept of CT" (Dike, 2001, p. 45). That is, unified group or departmental comprehension and commitment to adoption and implementation of CT are essential for success (Dike, 2001). Faculty should, moreover, accept and develop commitment toward the fundamental idea that CT is not optional but foundational to learning (Fisher & Scriven, 1997). Without such consensus, the process of incorporating CT as instrumental breaks down within all phases of instruction and as an incremental building process. Evaluation instruction should emphasize CT within all learning as "an academic competency akin to reading and writing" (Fisher & Scriven, 1997, p. 21). Faculty knowledge concerning CT is clearly necessary for this emphasis. Equally essential is faculty understanding of and supportive disposition concerning pedagogical techniques appropriate to incorporating CT knowledge, skills, and disposition (Dike, 2001; Elder, 2000; Paul, 2002; van Gelder, 2001; 2005).

Following from consideration of the need to better utilize CT in evaluation pedagogy is increased awareness of factors problematic to successful CT teaching (Dike, 2001). Four prevalent teaching practices are of particular concern. The first is the perceived need, on the part of faculty, to "cover large amounts of content without in-depth exploration" (Dike, 2001, p. 45). The second is the lingering preference by faculty for lecturing over other approaches or techniques. The third is the over emphasis by faculty on acquiring the facts and knowledge. The final practice of concern is the predominant belief and commitment among faculty that teaching is essentially the process of having the instructor dispense information to those designated as students (Brookfield, 1987, 1995; Cross, 1986; Driscoll, 1994; Ennis, 1993; Haas & Keeley, 1998; Onosko, 1991; Sears & Parsons, 1991).

To the extent that the above indicates, prevalent teaching practices dominate evaluation teaching pedagogy; the difficulty escalates in discovering, articulating, and successfully adopting-- within graduate programs-- workable CT strategies appropriate to evaluation. CT hinges upon learners taking responsibility for their own learning and developing prowess in building, enacting, and evaluating their own thought and the resultant outcomes (Mezirow, 2000).

Conceptual Framework

The conceptual framework used to guide the research and data analysis of this study is derived from two epistemological bases, both of which are important for comprehending evaluation in terms of CT. The first of these is Constructivism, the second is Pragmatism. Constructivist approach to evaluation opens the process and associated considerations to "an expanded view of reality" (Frisbie, 1991, p. 44). Seeking ultimate confirmation of objective reality is nullified in favor of acceptance and utility of multiple views, frameworks, or systems of reality. Evaluation intent and outcomes exclusively reference meaningful

constructions of reality instigated and propounded by individuals and groups which they confirm as rationally explanatory of their own situations. CT, from its modern day origins in the teaching of John Dewey (1910; 1933), actively sought similar intellectual engagement with the immediacy of contexts and their elements, rather than accepting standardized formulations and routine edicts of authority. Thus, through Constructivism, evaluation finds itself immersed within the precepts of CT. Yet the constructivist concept of working from the perspective of "multiple" realities, rather than a core, essential , or objectively determined reality, toward which accumulation of data and associated elements of confirmation build, is critically tempered by Pragmatism's insistence upon necessary concrete implementation, testing, and verification of all thought, belief, interpretation, or conditional pattern of inquiry, through empirical investigation of "the grounds that support it and the further conclusion to which it tends" (Dewey, 1933, p. 9).

Constructivism's connection to Pragmatism is based on the principle that knowledge is created from experience. One key characteristic that distinguishes constructivism from other learning theories, such as behaviorism and cognitivism, is the nature of reality. The constructivist learning paradigm emphasizes that there is no single or objective reality "out there," which the instructor must transmit to the learner. Rather, reality is constructed by the learner during the course of the learning process. Driscoll (2000) suggested that constructivist theory rests on the assumption that "knowledge is constructed by learners as they attempt to make sense of there experiences" (p. 376).

Constructivists believe that learners are in control of constructing their own meaning in an active way. In a Constructivist learning environment, "learners are active organisms seeking meaning" (Driscoll, 2000, p. 376). This meaning is acquired on the basis of experience. Hence, learners have existing beliefs, attitudes, and knowledge that impact their

learning. The learning process in the constructivist environment is focused on enabling students to use knowledge in many different settings to make the learning itself as real-life as possible. Driscoll (2000) summarized the six major components of Constructivism as being (a) a complex and relevant learning environment, (b) social negotiation, (c) multiple perspective and multiple modes of learning, (d) ownership in learning, (e) ownership in learning, and (f) self-awareness and knowledge construction.

Constructivist epistemology assumes that learners construct their own knowledge on the basis of interaction with the environment. This assumption precisely mirrors the essential condition of CT, which is reflective individual interaction with the environment, according to systematic, referenced, and empirically engaged thought (Dewey, 1910; 1933). As a pioneer of constructivist learning, Piaget (King & Kitchener, 1994) implemented and expanded upon Dewey's ideas in creating a meaningful learning environment for students. According to Piaget, in a constructivist classroom, students must be given opportunities to construct knowledge through their own experiences. Less emphasis is put on directly teaching specific skills and more is put on learning in a meaningful context.

Constructivism, as a theory about learning, has been translated into educational practice in many different ways, but all focus on presenting students with the opportunity to construct meaning from experiential learning. New constructions are built through their relation to prior knowledge, and the pedagogic challenge for teachers is to concentrate on students' learning with understanding rather than the more common emphasis on covering content (Watts, 1994). Torp and Sage (2002) indicated that experiential learning (minds-on, hand-on) should be initially organized around the investigation and resolution of messy, real-world problems. Such investigation incorporates two complementary processes, curriculum organizing and instructional strategy. It includes three main characteristics: engagement of

students as stakeholders in a problem situation; organization of curriculum around a given holistic problem, enabling student learning in relevant and connected ways; and creation of a learning environment in which teachers coach student thinking and guide student inquiry, facilitating deeper levels of understanding.

Often the problem presented for experiential, constructivist learning is intentionally designed to be not merely complex but also appropriately ill-structured and without discernible system or correlation with available systems or patterns suggestive of apparent or possible solution (King & Kitchener, 1994). Ill-structured, moreover, means a problem may not be solved with a high degree of certainty and requires a complex reasoning process involving analysis and interpretation from multiple perspectives. Ill-structured problems are preferable in assessing CT skills in adults, because they are more similar to "real-world problem solving of adults" (p. 11) than are logically organized, textbook problems. Resolution of the problem requires higher order reasoning skills, such as the conjoining of application, analysis, synthesis, and evaluation. Within the realm of Constructivism, students are encouraged, supported, and facilitated in developing themselves as active learners engaged in real-world problem-solving. The key notion of "real-world" problem solving, of course, integrates Constructivism in all essential elements within the realm of CT/Pragmatism. Teachers as facilitators in this realm play a dual role; they are both a participant in learning and a cognitive coach (Torp & Sage, 2002).

CT is directed toward some desired, achievable outcome. The purpose of CT is the realization of a desired result or outcome. That result or outcome must be observable and measurable. The essence of CT therefore, is the comprehension of and dedication to the continuum of observation, thought, application of that thought, the achieved result, and the

analysis of that result (Scriven, 1991). These elements also conform to the essence of the definition of Pragmatism.

The conceptual frame of reference and epistemological foundation emanating from Constructivism and Pragmatism indicated above, because of the intellectual, philosophical commonalities held both between the two and conjointly with CT, contributed enormously to all facets of the present research undertaking. The conceptual framework facilitated structuring of understandings and outcomes relevant to how evaluation and CT informed and facilitated one another, and to how they could be meaningfully integrated within graduate evaluation curriculum.

The teaching strategies developed as part of this study and presented in Chapter III, for incorporating CT within graduate study of evaluation, reflect distillation and synthesis of epistemological assumptions comprising the above described conceptual framework. These strategies provided the fulcrum upon which all research initiatives with the study's research participants depended. They provided, further, the intellectual, epistemological basis for interpretation of findings and determinations of potential or necessary avenues for related inquiry and extended CT exploration.

Purpose of the Study

This study had three purposes. The first purpose was to identify effective CTTS as it is perceived by PE faculty in preparing graduate students as future program evaluators. The second was to examine the different ways faculty members of PE implement CTTS in their teaching practices. The third purpose was to document the specific assessment methods used by these faculty members to assess and measures students' CT performance during classrooms and field experiences.

Research Questions

Research questions 1-3 focus on instructor's knowledge of CTTS in evaluation graduate programs:

RQ1. How many CTTS are faculty members aware of teaching graduate students?

RQ2. How often do PE faculty members utilize CTTS in their teaching practice?

RQ3. Which CTTS are perceived to be effective by faculty members in PE?

Research questions 4-6 focus on the application or actual usage of CTTS in graduate programs:

RQ4. What are the steps taken by PE faculty in implementing the different kinds of CTTS?

RQ5. What are the outcomes intended by PE faculty in implementing the different kinds of CTTS?

RQ6. How do instructors assess the intended outcomes for the "effective" CTTS they implement?

Study Relevance

This study will inform and facilitate improvement in evaluation training programs through systematic study of CTTS. The development of an understanding of the context and usage of CTTS in graduate programs will provide the necessary foundation for continuous curriculum improvement related to CT.

Definitions

Critical Thinking

CT is an intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief or action (Scriven & Paul, 2004).

Critical Thinking Teaching Strategy

CTTS is defined as an "instructional method or style used for the purpose of promoting CT ability in students, usually associated with teaching that engages the student, facilitates inquiry, encourages analysis, and involves critical judgment and reflection" (Mezirow, 2000).

Program Evaluation

PE is defined here as "a process of gathering information, which will be used mainly to make decisions about alternative courses of action" (Alkin, 1974, p 106).

Delimitations of the Study

This study is limited to a purposive (Patton, 2002) sample of university graduate faculty teaching core and supporting courses in two separate Ph.D. evaluation programs. Caution should thus be taken in generalizing the findings of the study to other graduate evaluation programs. The study depends upon information individually provided by the study's faculty respondents. Therefore this studies findings and conclusions are limited by the willingness of the respondents to self report information about their CTTS, and possibly as well by their experience and familiarity with CT teaching. Interpretations derived from these data are to some degree, limited by reliance on self-report data.

The survey instrument used for eliciting data from faculty respondents was created specifically for the study by the researcher. It represents a compendium of information derived from the researcher's review and synthesis investigations of the scholarly literature concerning CT and evaluation. The research and analysis carried out for development of the instrument were exhaustive, but interpretations and selections are derived entirely from the researcher's own reflection and discrimination.

CHAPTER II

LITERATURE REVIEW

Information from the scholarly literature related to CT and PE is presented in three main sections: CT, PE, and teaching strategies. CT is organized according to, first, historical development of CT, and second, definition. PE is organized according to first, history and development, and second, PE and CT. The teaching strategies section is organized according to, first, CT strategies, second, definitional determinants of CT, and third, indications for effective teaching. The evaluation teaching strategic section is structured according to CT strategies connected with program evaluation, and assessment of CT. Following the presentation of these three research areas, a summary section is provided to support the research questions posed in Chapter I.

Critical Thinking

Historical Development of Critical Thinking

CT is often defined in terms of tracing the concept's earliest roots. To this end, McKown (2004) commented upon the relevance of the Socratic method of teaching. This method, both in its ancient form and in its current forms, stressed painstaking examination and evaluation of whatever were held as or appeared to be held as "assumptions of human knowledge" (2004, p. 17).

Expansion of what came to be understood as the scientific method, over the course of 2,500 years since Socrates, extending through "Plato, Aristotle... the Greek skeptics... Frances Bacon, Descartes, Locke, and Sir Isaac Newton... " (Mckown, 2004, p. 17) led to John Dewey's declaration that simply learning to think forms the structure, basis, and purpose of education (Dewey, 1933). This principle has indelibly inscribed itself upon the philosophy of CT within the doctrines of education (1933).

McCarthy (2004) emphasized that our understanding of CT is a function of its ancient construed origin and historic course of development. The term itself, "CT," postdates Socrates by many centuries. Clearly, the Socratic method of teaching is an essential CT process of deriving and testing knowledge and understanding, which formed the basis of modern concepts of CT (2004).

Following from this basis, Dewey (1910) was careful to distinguish critical or, what for him was the more encompassing term, "reflective," thought from ordinary human thought process. Dewey's entire approach to learning derived from CT, which in turn was derived from the school of philosophical thought known as Pragmatism. Pragmatism was developed at Harvard University by Dewey's immediate intellectual forebears, first Peirce, then James, from the mid-19th century through the first years of the 20th. Dewey himself has been generally accepted as the modern-era godfather of CT in learning (Fisher, 2001). The connections between Pragmatism and CT are immeasurably important for our understanding of the course of modern learning and intellectual development, so much so that it is reasonable to say that CT, in contemporary form, is an intellectual application of Pragmatism. Had Dewey not been schooled in Pragmatism, CT would likely not have developed as the core concern of learning strategy that it is today (Fisher, 2001).

Pragmatism itself followed from the scientific method of basing knowledge and understanding upon observation (Dewey, 1910, 1933). Thinking itself was not meaningfully activated in this view except as realized through some observable process with attendant effects. Dewey connected reflective thinking with, and grounded in whatever outcomes or applications it suggested (Valdes-Corbeil, 2005). Thought necessitated connection to and focus upon "experience, doing, and the consequences of action" (Valdes-Corbeil, 2005, p.17).

Definition of Critical Thinking

CT can be most comprehensively understood when viewed in a systematic fashion. Derived from Socratic dialectic, CT was formulated within Pragmatism (Dewey, 1910; Valdes-Corbeil, 2005). Dewey (1933) maintained that the process was essentially "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends" (p. 9). Other general definitions add further dimensions to understanding CT. Lipman (1988) stated that CT was "skillful, responsible thinking that facilitates good judgment because it (1) relies upon criteria, (2) is self-correcting, and (3) is sensitive to context" (p. 39). Brookfield (1987) viewed CT as "calling into question the assumptions underlying our customary, habitual ways of thinking and acting and then being ready to think and act differently on the basis of this critical questioning" (p. 5). McPeck (1981) saw CT as "reflective skepticism [which] requires knowledge of the subject or domain" (p. 81). Ruggiero (1988) understood CT as "a reaching for meaning" (p.28). Watson and Glaser (1991) emphasized that CT was "a composite of attitudes, knowledge, and skills that include attitudes of inquiry that involve an ability to recognize the existence of problems" (p. 29). Glaser (1941) interpreted CT as "being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences" (p. 5).

Extended Critical Thinking Definition. To derive some measure of uniformity of CT, Facione (1990) sought input from an international group of 46 professionals working within diverse fields in order to articulate a functional description of CT for educational purpose (Facione, 2006). They unanimously agreed upon six cognitive skills as representative overall of CT: interpretation, analysis, evaluation, inference, explanation, and self-regulation, each of which is supported by certain sub-skills.

Most leading CT scholars mention abstract activities like "interpret," "analyze," and "evaluate" as central components of CT. However, they also acknowledge that the critical thinker must exert cognitive effort to achieve a desired outcome, and that CT skills can be learned (Ennis, 1996; Fisher & Scriven, 1997; Halpern, 1993; Kurfiss 1988; Norris, 1985). Facione's recent attempt at summation is evidenced in the following consensual definition:

> We understand CT to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based. CT is essential as a tool of inquiry. As such, CT is a liberating force in education and a powerful resource in one's personal and civic life. While not synonymous with good thinking, CT is a pervasive and self-rectifying human phenomenon. The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit. Thus, educating good critical thinkers means working toward this ideal. It combines developing CT skills with nurturing those dispositions which consistently yield useful insights and which are the basis of a rational and democratic society. (Facione, 2006, p. 21)

Paul and Elder (2004) surmised that CT required a generative and creative conceptualization, interfused with system and order to regulate and correlate its intricacies:

> [W]e often have trouble in purposeful thinking, especially purposeful thinking that requires posing problems and reasoning through intricacies. Purposeful thinking requires both critical and creative thinking. Both are intimately connected to figuring things out. There is a natural marriage between them. Indeed, all truly excellent thinking combines these two dimensions. Whenever our thinking excels, it excels because we succeed in designing or engendering, fashioning or originating, creating or producing results and outcomes appropriate to our ends in thinking. It has, in a word, a creative dimension. (Paul & Elder, 2004, p. 8)

In the teaching strategies section of this chapter, these definitions and dimensions of CT will be brought back into focus in terms developing effective CT.

Program Evaluation

History and Development

Evaluation theory and practice greatly expanded during the 20th century. During the 1950's, a period of relative inactivity in evaluation was followed by its intensified proliferation and development. Stufflebeam (2001) analyzed growth in evaluation as responses to a series of national and international occurrences which were demanding new responsiveness from U.S. society and institutions.

> The main influences were the efforts to greatly strengthen the U.S. defense system spawned by the Soviet Union's 1957 launching of Sputnik I; the new U.S. laws in the 1960's to equitably serve minorities and persons with disabilities; federal government evaluation requirements of the Great Society programs initiated in 1965; the U.S. movement begun in the 1970s to hold educational and social organizations accountable for both prudent use of resources and achievement of objectives; the stress on excellence in the 1980s as a means of increasing U.S. international

> competitiveness; and the trend in the 1990's... to employ evaluation to ensure quality, competitiveness, and equity in delivering services. (2001, p. 8)

Frisbie (1991) maintained that "one basic approach has come to dominate current evaluation practice: decision oriented evaluation" (p. 46):

> Decision-oriented evaluation is intended to provide a knowledge and value base for making and defending organizational decisions... to use evaluation to plan and implement needed programs... and justify decisions about plans and actions. However, it usually requires close collaboration between the evaluator and decision maker, making it susceptible to accusations of "bias." Major contributors to the decision-oriented approach include Cronbach (1963), Stufflebeam, Foley, Gephart, Cuba, Hommond, Merriman, & Provus, (1971), and Alkin (1969). (Frisbie, 1991, p.46)

This decision oriented approach was followed by a shift in thought and conclusions from objective focus on outcomes or products to "an expanded view of reality" (Frisbie, 1991, p. 44) that emphasized qualitative, responsive, and constructivist approaches (Stufflebeam, 2001). It also dispensed with the notion of the disinterested observer (Scriven, 2004). This approach (unimpeachable objectivity) to the pursuit of reality is "illusory" (Frisbie, 1991, p.49). Increasingly moving toward a constructivist consideration of evaluation, the underlying principle becomes "that no 'true' reality exists" (1991, p. 49). Truth in reality must only give reference to "meaningful constructions individuals or groups use to make sense of their own situations" (1991, p. 49). Ambiguity becomes inherent to evaluation. No single person or group has either all of the answers or the single best answer or most incisive and encompassing perception concerning a given situation or context. Evaluation faces a world of multiple realities. Evaluation approaches which allow for

dialogue toward comprehension of multiple realities will grow in importance, acceptance, and usage. In general, these approaches fall under the headings or categories of "qualitative," "responsive," and "constructivist" (1991, p. 49).

The Responsive Evaluation (Stake, 2004) requires a close working relationship between evaluators and the client or client group. Throughout the evaluation process, evaluators interact with stakeholders during all evaluation activities. Beyond responding to this call for continuous interaction with stakeholders, evaluators express and maintain support for "the diverse client group" (Stufflebeam, 2001, p. 63).

Ultimately correct conclusions are neither sought nor held as critical for meaningful evaluation. Drawbacks to "responsive" approaches include the increased likelihood of absence of closure, an ever-present vulnerability to confusion and/or inertia in understanding, and a lack of clarity for decision-making (Stufflebeam, 2001). The Constructivist approach, overall, emphasizes raising stakeholders' consciousness. They, along with the evaluators themselves, act as the instruments of evaluation. Stakeholders are enjoined, through the consciousness-raising process of evaluation, to transform the evaluand. The inquiry process of evaluation is governed by whatever emerges, through stakeholder and evaluator input, as considerations for effectively changing and improving society (Stufflebeam, 2001). In the approach, balance of perspective is sought; between the need for verification and methodological rigor and the quest for discovery; and between quantitative and qualitative research approaches. Locality, specific focus, and rich, deep description are emphasized rather than surface interpretations or guidelines. Continued illumination and construction of reality are sought. The approach follows from its own defining philosophical constraints; opposition to positivist or scientific positions are related to knowledge acquisition generally and evaluation specifically. The experimental method,

objectivist epistemology, realist ontology, absolutist search for correct answers, value-free evaluation, and attempts to cover over or expunge human bias— all inherent to science's manifestation— are rejected. Constructions of reality propounded by study participants become the core evaluation focus (2001).

Program Evaluation and Critical Thinking

Multiple skills and competencies related to CT and evaluation overlap, coincide, and in many instances precisely mirror one another (Bloom, 1956; Cromwell, 1992; Ennis, 1989). Facione's (1990) view of evaluation is somewhat more focused, relegating it to one of three core facets of CT. Scriven (1991) viewed the two processes as virtually inseparable, if not entirely interchangeable and identical. CT is engaged throughout the entire evaluation, from beginning to end. For example, CT is employed when determining the "value" of the evaluand, in prioritizing assumptions underlying the evaluation and in the utility of the evaluation's recommendations and generalizations. In a related study, the "comprehensive set of proposed evaluator competencies" developed by King, Stevahn, Ghere, and Minnema (2001, p. 231) were drawn up as evidence which seemed to indicate that CT was a substantial and vital component of evaluation process and required skills. The later revision of their taxonomy (Stevahn, King, Ghere, & Minnema, 2005) explained CT not as an area of evaluation competency, but rather as a necessary intellectual function underlying virtually the whole of evaluation and all of its competencies.

Scriven's (2005) analysis of the essential components for excellence in evaluation requires deep reflection and CT. As with epistemic cognition (Kitchener, 1983) which includes monitoring, considering, comprehending, controlling, and adjusting, Scriven's evaluation system hinges entirely upon full engagement of highest order CT. This process allows for analysis, structuring, and interpretation of results entirely derived from the

immediate evaluation context "through the whole process of evaluation" (2005, p. 1). CT is the determining element, the fulcrum of Scriven's entire evaluation system. In its purest form and at its most extended level of CT exercises, rules, structures, and determines all evaluation processes and results (Paul & Elder, 2004).

From the above it seems reasonable to suggest that CT skills correspond in virtually all respects to evaluation competencies. CT skills correspond to the skills, dispositions, and processes that are identified as essential for evaluators for their work in the field. CT skills suggest how a given evaluation competency, potentially intensifies, justifies, and invigorates the process of evaluation (Bloom, 1956; King, Stevahn, Ghere, & Minnema, 2001; Kitchener, 1983; Paul, Elder, & Bertell, 1997; Scriven, 2005; Stevahn, King, Ghere, & Minnena, 2005).

Scriven (2005) explained that the evaluation task of reporting on and offering rationale or support for one's conclusions may, "involve creation and depiction of various possible scenarios that are or are not consistent with the findings" (p. 8). Variation demand is generated through stakeholder perspective and different stages of evaluation. In addition to all of the CT skills indicated by Paul, Elder, and Bertell (1997) the epistemic cognitive level of extended possibility through CT is required. In Scriven's taxonomy, meta-evaluation is carried out. This evaluation of the evaluation will require a true exercise of CT to the extent that interpretation concerning the evaluation is problematic. Otherwise, fairly routine judgment, resulting from application of systems of requirements to the reported results, should suffice.

CT enabled through epistemic cognition (Kitchener, 1983) allows for imaginative, creative synthesis necessary to evaluate cogently, meaningfully, and effectively in order to provide essential information for policy adoption, change, and action. Ability to extract

relevant information concerning implementation of "similar programs in the past" (Scriven, 2005, p. 7) provides a key resource for reliable prediction. This ability or process provides the basis for extrapolation of structure. Without structure, of course, cognitive process for resolution of problems cannot begin; hence, the mind's capability to indicate structural completeness, to provide this through CT process of epistemic cognition, when the "absolutely correct solution" (Kitchener, 1983, p. 230) is not available. To accomplish all of this requires following a rational process unique to this level of CT, allowing for predictive evaluation beyond guesswork. Such evaluation, or policy analysis which is predictive, moreover, as it necessarily derives from epistemic, cognitive, CT, manifests the evaluative function of "reflection on the limits of knowledge, the certainty of knowledge, and the criteria for knowing" (1983, p. 230).

Critical Thinking Teaching Strategies

Multiple studies over the past 25-30 years (Denardo, 2003) have lent substance to the widely-expressed view that CT instruction had proved highly effective in improving the quality of education and the development of students' CT skills. Reed (1998) and Anderson, Halliday, Howe, and Soden (1997) indicated positive evaluation results from studies of programs designed to enhance CT skills. Earlier research cited by Denardo (2003) had concluded that students themselves were convinced they had made gains in thinking ability through in-class CT study (Dansereau, Collins, McDonald, & Holley 1979; Wheeler, 1979). CT instruction has been found to produce measurable gains in I.Q. (Detterman & Sternberg, 1982; 1993; Rubinstein, 1980). Students in general instruction in problem-solving skills were found to make "significant gains in measures of cognitive growth and development" (Denardo, 2003, p. 7). Evaluations of van Gelder's (2004) programmed instruction in logical

reasoning have shown consistent elevations in CT scores on Facione's (1990) standardized inventory of CT.

Definitional Determinants of Critical Thinking

As previously emphasized, how we define CT is the subject of some debate, due to the multiplicity of definitions, rather than an encompassing or definitive one, dominating the field. Several approaches toward definition, as well as some attempts at definitive statements have been introduced thus far. The initiating assumption tying CT definition into pedagogy is simply this: how one defines the subject strongly influences one's instructional approach to it (McMurray, 1989).

Definition influences instructional approach as well as the foreseen or expected outcomes for one's instructional approach or program. Given sufficient instructional insight, intelligence, and planning, how one defines whatever one sets out to teach should also substantially determine strategies of assessment of attainment of desired outcomes, and thus the rationality of one's teaching "efforts to teach CT presume the ability to diagnose needs and to measure intervention effects, and measurement, in turn, presumes the ability to define the construct being measured" (McMurray, et al. 1989, p. 5).

Facione (1990) substantiated this idea in maintaining that one must first clearly conceptualize the nature of CT, and from this conceptualization, accurately account for perceived likely implications. One's definitional conceptualization and account are the essence of "valid critical assessment tools and effective critical instructional programs" (1990, p. 5).

Multiple definitions offered here have indicated there is some divergence in perspective concerning CT. Alternatively a convergence of understanding and perspective is necessary to build toward a workable instructional paradigm for implementing CT within

evaluation. Convergence of multiple perspectives has led to the emphasis of overly restrictive, confining models of CT, such as those requiring strictly logical procedures or systems of problem solving exclusively. Opposite to strictly logical procedures is CT expert opinion that suggested that excellence in CT inevitably is under-laid with a substantial stratum of creative thinking (Ennis, 1996; Lipman, 1988).

No matter how broadly the concept of CT is defined, its pragmatic function must be maintained. Underlying the aim of CT is not merely instigating, developing, and enhancing thinking abilities, but also enabling its effective application for productive living and accomplishment in a changing world (Ennis, 1996). The notion of self-reflection is always inherent to CT, especially as directed toward problem solving or constructive understanding of the environment. CT moves beyond simply objective demeanor and questioning of norms and established modes. CT equally progresses toward "exploring and imagining alternatives" (Brookfield, 1987, p. 229).

> CT is a kind of evaluative thinking— which involves both criticism and creative thinking— and which is particularly concerned with the quality of reasoning or argument which is presented in support of a belief or a course of action. (Fischer, 2001, p. 16)

Paul (1991) distinguished between two types of CT. In the first type, sets of discrete skills, categorized, codified, and systematically transmitted in their entirety through directed pedagogical practice are characterized as "CT in the weak sense" (p. 5). On the other hand, CT in "the strong sense" (p. 5) emerges through the individual thinker's or learner's exercise of capacity to entertain multiple conceptual perspectives, in view of multiple and individual demands for perception, insight, and interpretation. This rather elevated and uniquely contrived cognitive perspective demanded a requisite, accompanying intellectual disposition:

to wit, openness to understanding points of view not ostensibly taken to be one's own and, moreover, perceived as in disagreement with one's usual take on the given matter at hand (1991).

Strong CT demanded openness toward and confidence about acting upon points of view and interpretations which contradicted well thought out perspectives, supported by facts and data, and necessitated by available empirical evidence (Scriven, 2005). Siegel (1988), in attempting to simplify understanding of this complex and elevated conceptual perspective, referred to it as "a critical spirit manifesting certain attitudes, dispositions, habits of mind, and character traits" (p. 39).

Halpern (1998) reinforced the transparency of connections among: (a) problem solving, (b) CT, and (c) creativity, through summarization of their interrelationships in terms of the decision-making process. In the context of this relationship, problem-solving necessarily evokes and requires decision— typically, multiple instances of decision, directed toward problem solution and resolution. "Many decisions are involved... and generating satisfactory solution paths often requires considerable creativity" (1998, p. 162) connecting evaluation, CT, problem-solving, creative solution, decision, and effective teaching of these processes (Halpern, 1993).

Paul and Elder (2004) advocated teaching CT and creative thinking together. Combining teaching of CT with development of individual creativity, allows creativity to "be demystified and brought down to earth... in its most humble manifestations (in everyday perception and thought)" (p. 1).

> There are ways to teach simultaneously for both creative and CT. To do so requires that we focus on these terms in practical, everyday contexts, that we keep their central meanings in mind, that we seek insight into how they overlap and interact

with one another. When we understand critical and creative thought truly and deeply, we recognize them as inseparable, integrated, and unitary.... In learning new concepts, in making sense of our experience, in apprehending a new subject field or language, in reading, writing, speaking, and listening, our minds engage in full-fledged (though commonplace) creative acts. To understand how and why this is so, we need not appeal to the esoteric, the recondite, or the arcane. To live productively, we need to internalize and use intellectual standards to assess our thinking (criticality). We also need to generate— through creative acts of the mind— the products to be assessed. That minds create meanings is not in doubt; whether they create meanings that are useful, insightful, or profound is. Imagination and reason are an inseparable team. They function best in tandem, like the right and left legs in walking or running. Studying either one separately only ensures that both remain mysterious and puzzling, or... are reduced to stereotype and caricature. (2004, p. 1)

Criticality and creativity are mutually interdependent (Paul & Elder, 2004). This interdependent functioning potentially creates the most inventive, intellectual, and high-quality thought. Creativity is the path toward mastery of making and producing criticality, the path toward correctly judging or assessing. Creativity connects with artistry and imaginative freedom of expression; criticality acknowledges intellectual standards, discipline, and rigor. However, evaluative standards, as properties, should not be distorted in concept so as to make them irreconcilable with originality and productivity. The critical and creative are ideally interwoven together, within the "the most mundane intellectual acts of the mind or those of the most imaginative artist" (Paul & Elder, 2004, p. 4). Quality within this creativity must be realized through application of criticality standards. This integrative

process of creating and critically evaluating and guiding tends toward design, construction, and realization of systems:

> [A]ll creation of meaning tends toward systems of meanings ... .This is integral to the nature of thought itself. The construction of any meaning assumes other meanings and implies yet further meanings ... .When attempting to understand any meaning, humans naturally seek to place it in a cluster of meanings, however partial their understanding might be. When they attempt to understand an idea as a thing unto itself, it doesn't take root in the mind. It doesn't connect to the systems of meanings within the mind... .We must create systems of meaning and assess our creations for accuracy, relevance, and adequacy. (2004, p. 4)

Creative thinking combines with CT, or "criticality," (Paul & Elder, 2004, p.4) to generate a process which "accomplishes the purpose of thinking" (p. 5).

> However, we often have trouble in purposeful thinking; especially purposeful thinking that requires posing problems and reasoning through intricacies. Purposeful thinking requires both critical and creative thinking. Both are intimately connected to figuring things out. There is a natural marriage between them. Indeed, all truly excellent thinking combines these two dimensions. Whenever our thinking excels, it excels because we succeed in designing or engendering, fashioning or originating, creating or producing results and outcomes appropriate to our ends in thinking. It has, in a word, a creative dimension. (2004, p.5)

Mezirow (2000) emphasized how learning infused with CT becomes transformed into creative experience potentially reconstructing how we conceptualize ourselves and our world. In explicitly underlining the connection of CT in pedagogy to critical theory in

social, political, and economic analyses, Mezirow emphasized how CT characterized a mode of learning which he called perspective transformation.

> Through CT, perspective transformation realizes the emancipating process of becoming critically aware of how and why the structure of psycho-cultural assumptions has come to constrain the way we see ourselves and our relationships, reconstituting this structure to permit a more inclusive and discriminating integration of experience, and acting upon these new understandings. (Mezirow, 2000, p. 6)

In her synthesis of the literature attempting to define CT, Vaske (1998) pointed to a consensus that CT is a construct of two dimensions: "analytic thought or the judging of information... and the birthing of new ideas based on the combination of previous information" (p. 31). CT thus ascends in interpretation, rising from purely rational analysis to embrace creative thinking.

Indications for Effective Teaching

Moving from the perspective that CT is a synthesis of analytical and creative processes suggests that effective critical-thinking teaching should not be limited to instruction related to knowledge and inculcation of relevant skills. It is likely that, in striving to realize individual learner's capacity to greatly expand thought processes, a teaching approach which facilitates the learners' own, individual self-development and self-directedness, must be primarily emphasized. Strong CT must be the goal, realized and exemplified through creative thinking enrichment, facilitation, and growth. Weak CT must not act to limit higher-order CT development. It must not serve to create false understanding that it is the goal or critical-thinking end-product. Rather, weak CT, perhaps as the initiating phase of the overall process, should help foster the correct interpretation

that skill acquisition serves as a tool, primarily, and a steppingstone toward maximum CT development (Brookfield, 1987; Mezirow, 2000).

Based on the methodological and philosophical basis of pedagogy and learning which are facilitative of higher order CT, Knowles (1984) suggests that learners are engaged as equal partners with the instructor at all times throughout the learning process. Within this approach, teachers build upon what learners already know to actively involve them in the learning process (1984).

By incorporating CT into the given curriculum, rather than teaching it as stand alone subject (Paul & Elder, 2004) the curriculum transforms (Knowles, 1984) to encompass more CT within the learning process of students. This transformation is essential for effective CT, teaching, and learning processes. According to Knowles (1984) observations, through adoption and implementation of CT, teaching methods change; the role of teachers changes, and the classroom environment changes (1984). These changes both respond to and work toward actively involving students in the learning, initially through building upon what learners already know. The questioning role of the teacher expands toward generation of open-ended questions. The changed environment creates built-in opportunities to consider at length real-life situations and contexts bearing relevance to the learning or helping to build new contexts for learning (1984).

De Bono (1994) determined that CT skills must be related to circumstances individuals face in their personal and professional lives. CT strategies and problem solving approaches require practice within contexts of application, in order for the learner to assimilate and feel comfortable with the intricacies of strategic, appropriate use.

Explicit instruction of CT, that is, direct reference to the specific skill, concept, or strategy, and the sum of its components, may be incorporated within the "other" subject

matter or discipline such that the purposes and processes of CT are pedagogically immersed. Evidence and scholarly opinion supporting explicit or direct facilitation of CT (Bangert-Drowns & Bankert, 1990) have not been explicitly addressed (van Gelder, 2004, p. 1) as a stand alone class or to teach it hand-in-glove as part of, another discipline, such as evaluation (Fisher, 2001). The question arises as to whether CT can be taught independently of context, or if its facilitation requires evocation of principles through contexts, through exemplum and use according to the concrete situation of application and observable processes and results.

Fisher's (2001) professed demonstration of direct, explicit CT instruction, for example, involved continuous reference to an accompanying narrative of various scenarios providing context or exemplum of the CT skill or skills, strategy, or aspect drawn to our attention. These scenarios were deemed essential, to realizing CT learning attainment among those attempting to follow the thread of CT ideas and terms introduced. How the concept worked or applied within the "real world," was demonstrated in a way, hopefully, germane to the reader/learner's concrete realm of understanding.

"Direct," "explicit" instruction pertains, to instructional unfolding of some explication of the presented, informative scenario, by means of the explicitly-referenced CT concept the scenario is held to embody or demonstrate. Successful team play could be used, as a case to exemplify facets of successful group interaction relative to CT. Reference to apropos and familiar contexts, such as team play requiring intelligence, refined individual skill levels, and group coordination and cooperation, helps the facilitator to graphically show how the given CT concept works. Graphic, contextual demonstration, moreover, increases our understanding of the referential context itself. That is, in the example of the game of basketball indicated above, when we apply CT to understanding and learning this game, we

begin by comprehending the structure, play, and problems in a fresh and more penetrating, perhaps more systematic, way. Application of CT, thus, acts to resolve issues inherent to the context, determine rational problem solutions, and then reach the best solution or conclusion, with greater assurance of its appropriateness. But at the same time, the pragmatic context relevant to the learner helps to ensure clear, concrete, realization of the essentials of CT.

There appears to be no essential distinction between the above-described direct, explicit approach and the explicit, immediate incorporation of CT within the given subject matter discipline which is the focus of one's learning or teaching. That is, no difference in terms of the rhetorical, pedagogical processes involved, in the purely mechanical sense, seems apparent. The essential difference between the two approaches may be rather in terms of their degrees of relevance, utility, and sense of direct application to important contingencies for the learners. These levels would appear higher for learners experiencing direct, immediate, explicit incorporation of CT within their specific core subject areas. CT learning as outlined here within core subject areas seems very likely more efficacious for the learner, not only due to issues of relevancy, but also because, in such subject area application process, CT itself is transformed to interfuse with the discipline of focus (Elder & Paul, 2002). Thus it is reconfigured to correlate more intensely and essentially with the learners' customary intellectual-learning interests and areas of long-term life involvement.

Application and practice according to learners' intellectual and life-involvement comfort areas that are areas of dedication and commitment, such as the discipline of their professional or future professional interest, reasonably heighten facilitation of CT, related problem solving, and associated learning acquisition. At the same time, deployment of CT within learners' day-to-day, regular class work and learning, more than likely, serves to

intensify, clarify, and solidify that learning (Paul & Elder, 2002) due to the contiguous heightened CT acquisition, through its incorporation within the study/discipline area of focus.

Incorporating CT within another subject matter discipline may be carried out explicitly and directly, it seems clear, from the above analysis. Skills, principles, and procedures of CT for their learning facilitation are ideally applied to concrete information in order to establish cognitive awareness. CT must be re-expressed in terms of the situation or context of application, so that understanding, relevance, and learning are established. Pedagogically, it is rational and efficacious to explicitly acknowledge and precisely reiterate whatever CT principles are exemplified and worked through within course materials, learning procedures, presented concepts, and stated learning goals. Explicit attendance upon CT, thereby, expedites both subject matter and CT skill and knowledge acquisition. The subject matter of the course, one would justifiably say, provides the concrete, organizing material upon which to hang the principles, precepts, and practices of CT. Course materials, ideas, and pedagogically-sought outcomes are the pragmatic focus and indicators providing learning substance— for both course concepts and the learning facilitation of CT. Directly, immediately, and contextually conjoining one's focus discipline with CT enhances learners' acquisition of both— enhances them beyond what could be attained through their independent, stand-alone study. Contextual conjoining of the two mutually enhances acquisition of each, without interference of intervening variables, as would likely be the case when constructing add-on mechanisms for ensuring "transference" of one learning context to the next.

Among advocates of CT instruction within university curricula, the advantages of fusing CT, its direct and explicit teaching immediately as a contiguous part and function of

another area of study and intellectual discipline, have been neither perceived nor accepted to the extent presented in the above analysis. This factor is considered here, in terms of the literature, not only as an area of pedagogical disagreement, but as a factor which must be clearly distinguished in analysis from the commonly associated factors of explicit presentation and direct instruction with which it is, unfortunately, all too often confused. Admonitions concerning the urgency for direct teaching of CT, as facilitated through extensive, repetitive application practice within the learning context (de Bono, 1994; Penner, 1995; Statkiewicz & Allen, 1983) are readily misconstrued as exclusive endorsements for stand-alone CT teaching, though they are not. As presented in this study, it is this confusion of terms and therefore not only of teaching approaches, but, far more importantly, how one pedagogically considers what is involved in teaching CT, which has provided most of the basis for resultant pedagogical controversy. The gist of the controversy and confusion, then, and the core factor in its negative impact on CT incorporated in separate curricula is simply this; direct, explicit teaching of CT is overwhelmingly favored among expert theorists and practitioners (Ennis, 1996; Paul & Elder 2002; Scriven & Fisher, 1997). Commonly understood, however, for whatever reason, explicit and direct are thought to designate stand-alone teaching of CT followed, if application to another discipline is the intention, by transfer to that other area of study. The common understanding is incorrect. Explicit and direct mean only that the skills and processes of CT are explicitly referred to and directly applied within the given learning context. The literature supports this type of direct infusion (Ennis, 1996; Paul & Elder, 2002) with specific reference and acknowledgement and evidence of CT pedagogical awareness and ability on the part of the instructor, ensuring that the learners are fully aware that they are engaged with and developing CT skills in conjunction with CT facilitation of their learning. Why this superior pedagogical and

learning efficacy prevails for direct and explicit over indirect and inexplicit rests upon fundamental learning and teaching principles of CT. Briefly stated, the fundamental principle operant in this situation is that CT develops to the extent that we are aware of the thinking and learning processes with which we are engaged and, furthermore, to the extent all processes are openly acknowledged, communicated, and the understanding of the nature and purpose of all learning process is assured for all participants (Ennis, 1996; Paul & Elder 2002; Scriven & Fisher, 1997).

Confusing explicit/direct with stand alone is very likely to result in the erroneously perceived need for independent, isolated instruction of CT in order for it to take effect or make much of an impact. This is a stultifying factor for instructors who, due to this confusion, believe they do not have sufficient expertise, or do not have the time to add an independent, separate unit to their already congested schedule and workload. They may also believe such effort would detract from dedicated fulfillment of content learning, and so set aside consideration of CT as a curricular topic wholly outside their own pedagogical purview better left to administrative curricular decision. This confusion delimits instructors of many disciplines from gaining awareness that they are well able to begin incorporating CT directly and explicitly within their regular subject matter and course work. This kind of incorporation provides the best possible context for their students to utilize CT and to understanding how CT works. Through this in-class, direct, explicit infusion of CT, students not only potentially learn CT at maximum level, but, also learn their regular, content area subject much better due to application of CT skills. Their learning is enhanced in a more efficient, timelier manner, in greater depth, with more sense of pragmatic application, and with greatly increased awareness of the possibilities of and motivation for, extended, continuous, relevant learning.

When CT teaching transpires as a stand-alone course, the issue of transference to other areas and other classes arises. De Bono (1983) viewed the circumstance as mostly involving sufficient practice, so that students were thoroughly comfortable in their understanding of and skill in using the many available approaches (such as those of informal logic, as recently structured by van Gelder (2004), for example, in programmed instruction, or, even more exhaustively by Facione and Facione (1996) involved with CT problem solving. Additionally, in tending to favor stand-alone, direct or explicit approaches, de Bono emphasized that at the same time that CT process, approach, or steps are introduced and facilitated, they must include consistent connection to and relationship with the circumstances individuals face in their day-to-day personal and professional lives. This contextual process connection was necessary for effective learning (in this case, referencing de Bono, specifically, meaning learning CT and not any subject with which it might be infused) to transpire.

In emphasizing the need for explicit instruction of CT, Bangert-Downs and Bankert (1990) viewed the matter as mostly occurring in courses specifically focused on CT. The efficacy of courses-- which is, to say, their relative capacity for ensuring that intended, effective learning transpired-- designed to specifically teach CT has been noted in many studies: Browne, Haas, and Keeley (1978); and Logan (1976) determined employment of such approaches was a more important determining factor in improving CT skills in learners than any other examined, such as level of academic achievement. Halpern (1993), also in general support of this perspective, but, quite importantly, moving the whole discourse into a significantly different direction, envisioned that cross-disciplinary, broad-based, generically-focused courses, employing a wide spectrum of contextual examples or situations for application, might provide greater certainty in building CT skill and ensuring its extended

transference to multiple courses and situations. Intensive rather than sporadic focus upon CT was the key factor and desirable element in effecting positive CT instruction.

Enthusiasm for stand alone approaches has been tempered by many studies which routinely indicate that simply effective classroom teaching is the primary means for developing CT (McMillan, 1987). It is widely supposed, within academe, that appropriate instruction and materials equate with accretion of CT enhancement (McMillan, 1987). Specific, direct, explicit deployment of CTTS within curriculum has also been strongly favored in precisely-defined disciplines, such as journalism and communications (McMillan, 1987).

Logically, factors favorable to effective teaching and learning of CT: explicit, direct instructional approach; intensive, continuous focus upon the core subject, issue, skill of CT; and focus upon direct, continuous relationship of CT to vital interests and circumstances of learners' personal and professional lives— all may be holistically realized through integration of CT within subject matter courses (Chance, 1986). Just as importantly, integration potentially enables pursuit of greater depth, extent, precision, extension, and application of subject matter learning. Once this level of understanding is reached, and setting out upon a course of full integration of CT within subject matter is instigated, the question remains: from the pedagogical perspective, and from the point of view of achieving maximum levels of learning and professional development, which specific methods, approaches, and strategies work best?

Therefore, having developed the above somewhat complex analysis, concerning how various desirable, efficacious factors and aspects may be brought together, and utilized together to maximize, within the same implementation process, both CT and other-discipline content learning, support for a foundational contention of this study has been

derived. That is, incorporation of infusion of CT within another subject-matter is not only feasible but is also understood as the pedagogical approach most facilitative of both CT and subject matter mastery. Moreover, its accomplishment realizes enormous and highly desirable pedagogical efficiencies, since such maximum enhancement of each facet of the learning— CT on the one hand, content area on the other-- occurs simultaneous with its counterpart. With this foundational contention in place and supported, the next step, examination of information germane to development of appropriate teaching strategies, specifically intended for infusion of CT within evaluation, may commence.

Strategic Methods

Highly specific recommendations and suggestions concerning methods, approaches, and strategies thought conducive to effective learning and teaching of CT abound in the literature, with multiple sources of support for each. CTTS that can be used effectively by educators to promote CT ability, along with experts or researchers in the area of CT who have published scholarly works on the CTTS (see Appendix A).

Allen (1995) in an extensive examination of the literature on active learning, determined the apparently clear advantage of incorporating in-depth, class case discussion and analysis, focused upon problem-solving and decision-making skills in conjunction with lecture-recitation format. He found these strategies to be superior to the more traditional approaches, such as total concentration upon lecture-recitation, or even lecture-recitation combined with reflective student logs.

Inquiry methods, useful for determining, understanding, and further applying causal relationships connecting ideas, as well as for correcting misconceptions, initiate instructor-led, deliberate instigation and/or exposure of misconception. Deliberate instructional misleading or misinforming of the learners is the key factor. Inquiry methods use questions,

selected (likely of dubious logical reference or connection with the subject at hand) examples, and entrapment strategies, wherein the learner inevitably must be led to recognize, acknowledge, and focus upon faulty perceptions and misinterpretations. This degree of disclosure, and, possibly, more critically, self-disclosure, must eventuate in close reexamination of the essential elements upon which one's misunderstanding are based. This approach, as are many in the inquiry repertoire, is of course rather transparently inspired by Socrates' dialectic,-- the learner master's CT stratagems for unraveling the complexities of error and deriving astutely corrective reassessments and reevaluations. Baker and Anderson (1987) observed this structured-inquiry approach to realize the highest CT gain. Kurfiss' (1988) examination of multiple uses of this approach substantiated their results. Tien and Stacy (1996) used a modeling, coaching, scaffolding, and fading paradigm of Collins, Brown, and Newman (1989) to demonstrate the increased efficacy of creating a critical reasoning environment which required and supported inquiry into application of class learning and subject-matter themes and principles to everyday problems and informational concerns of the surrounding environment.

Utilization of opportunities for critical reflection in class learning has been widely supported as helping to build CT (Clarke, 1995; Darkenwald & Merriam, 1982; Gipe & Richards, 1992). Discussion, questions, and collaborative exploration support this approach. Reflection upon one's learning, primarily in written form, and extending this reflection in terms of contemplation of career application and goals were found to enhance both learning and application, and the understanding of relationship between the two (Gipe & Richards, 1992).

The positive relationship between collaborative learning/ discussion groups (Beyer, 1985; Dixon, 1996; Gokhale, 1995; Halpern, 1998; McPeck, 1981) and fostering CT was

contrasted with neutral CT effect for traditional drill and practice. Discussion mode advanced CT. Didactic approach was viewed as failing in this respect (McPeck, 1981). Didactic approach inculcates learner passivity and disallows freedom to consider ideas, perceive and meet challenges, question what they are presented with, and process information through focused peer interaction. Discussion mode actively facilitates all such self-projection and learner interaction, both powerful dimensions of CT engagement. Consideration of peer arguments and ideas encourages critical analysis, active learning, and, most importantly, accepting responsibility for their own learning (Beyer, 1985). Karabenick and Collins-Eaglin (1996) substantiated the many claims that group learning and evaluation of group, rather than individual performance enhanced CT. It was also found to be enhanced by reduced grade emphasis replaced with increased thought emphasis, increased learner mutual cooperation, and reduced emphasis on individual competition and comparison among individuals. Smith (1977) had previously determined similar, positive interrelationship between CT prowess and high levels of peer interaction, as joined with increased emphasis on student participation in class discussion, and higher levels of encouragement by the teacher, a paired-samples t test was conducted to evaluate whether students' CT skills increased by the end of the semester and test score were significantly higher ($p < .05$). The later, follow-up study (1983) seemed to conclude that continuous application and reinforcement throughout the curricula, rather than a single intervention, no matter how successful in itself, were required for renewable acceleration and extended maintenance of CT ability. Discovery learning, which in itself posits student participation as a learning condition, elicits self-awareness and informed guessing on the parts of learners (Meiss & Bates, 1984). This approach, acknowledged as serving to increase cognitive growth, in general, was determined as essential for development of CT (1984). Combining

participatory learning with directly drawing upon learners' own life experiences has been shown efficacious to CT development (Feur & Geber, 1988; Knowles, 1984). These findings have been extensively elaborated and drawn upon through a host of experiential techniques developed through pragmatic facilitation applications of Mezirow (1990; 2000).

Other successful interventions support the contention (far from universally shared, however) that CT is not unconditionally grounded within group learning and collaboration. Individual practice outside of the classroom experience has been demonstrated as effective in establishing CT (Statkiewicz & Allen, 1983). Individual practice seems able to improve skill level and transferability of skill as well. Hayes (1993) insisted that facilitation demanded instructional flexibility. Instructors must not feel bound by too narrow a codification of acceptable facilitation strategy. Purpose, content, and objectives of varying lessons, as always, should largely determine instructional 'methods, with which the informed instructor in CT will keep the pedagogical repertoire well stocked in ample variety. Merriam and Caffarella (1998) advocated maintaining the above pedagogical resourcefulness provision, of ensuring flexibility and appropriateness of response to instructional context and the learners' spectrum of requirements by means of special consideration given to contract learning, experiential approaches, portfolios, and learner self-pacing. Intensified facilitation of learner motivation and enhanced process of cognition, through expert application of appropriate learning strategies for empowering cognitive engagement, has been demonstrated as effective in developing CT (Merriam & Caffarella, 1998).

Important to CT teaching strategy is incorporating discipline, both mental and study, within the learner's approach, and to include daily practice with CT development. The paramount issue and indispensable requirement for this pedagogical aspect is ensuring that, first of all, "teachers must understand what it means to be intellectually disciplined if they

want to teach intellectual discipline" (Elder, 2002 p. 3). CT teaching, at the same time, emphasizes encouragement of learning interaction (Paul, 1991). Open learning environments set the stage for learning, through encouraging and channeling learners to participate throughout all aspects of their education. Collaboration between learners and teachers establishes an educational relationship fostering both learning and teaching effectiveness (Kirschling, et al., 1995).

Strategic Contingencies

The appropriate environment for developing learner participation and sharing of information and perspectives has been widely assumed to be the basis of CT pedagogy (Knowles, 1984; Lee, 2003; Merriam & Caffarela, 1998). Authority, control, and power relationships are necessarily restructured according to the directives, parameters, and underlying dynamics of the reestablished educational context appropriate to the evolution of CT. The appropriate environment encourages the values emanating from and conducive to CT. Indication, demonstration, and salutation of these values, on the parts of learners are recognized, encouraged, lauded as exemplary social perspectives and ministrations, and are unreservedly rewarded. Such laudable values include truth, open-mindedness, empathy, autonomy, rationality, and self-criticism (Paul, Binker, Martin & Adamson, 1995). Ideally, classes focused upon fostering CT are conceived of as self-activated. They self-project as miniature societies functioning through their considered attendance upon the precepts and guidelines of CT (1995).

> In such an environment, students learn to believe in the power of their own minds to identify and solve problems. They learn to believe in the efficacy of their own thinking. Thinking for themselves [that is within the appropriate, conducive CT environment, at least in the initiatory stages of CT] is not something they fear.

> Authorities are not those who tell them the "right" answers, but those who encourage and help them figure out answers for themselves, who encourage them to discover the powerful resources of their own minds. (p. 21)

Utilization of the questioning approach to pedagogy, recalling the Socratic Method (Elder & Paul, 2002), must reflect "clarity, accuracy, precision, relevance, depth, breadth, and logic" (Gardner, 2004, p. 29). If the learning environment conducive to CT— and thus to better facilitation and fuller realization of all learning— is properly construed as a society in miniature, it is perhaps in a similar vein equally rational to consider that environment or classroom as correspondent to the workplaces within that society (and as the CT society ideally takes hold, to think of the workplace itself as a CT classroom and laboratory). Brookfield (1987) found that when "innovation, creativity, and flexibility" (p. 139) are everywhere in evidence, the practice as well as the practitioner of CT are highly valued. Classrooms that adhere to, promote, and can be readily characterized by such values are effectively fostering CT (Hurte, 2004).

Evaluation Teaching Strategies

The following examples of evaluation pedagogy provide an indication of currently prevalent concerns and approaches characteristic of the discipline and intended for achieving effective training of graduate students. The approaches described taken all together represent hardly an exhaustive list but rather, hopefully, a representative sample of current concerns, strategies, and difficulties.

Central to the notion of effective evaluation teaching is the concept of process utilization, which relates to the core evaluation idea that effective evaluation, after all, is a mode of and a transformation of the teaching-learning process. Process utilization relates to and is indicated by individual changes in the ways of acting and thinking, as a result of

evaluation learning on the part of participants during the process. Process impacts may also include effects on organization culture, program, and overall procedures. Patton (2004) indicated that evaluation, in and of itself "constitutes a culture of sorts" (p. 288). Learning how to operate within the evaluation culture through participation in evaluation process, is what implements process utilization. Process utility evaluation in Patton's (2004) perspective equates with learning how to learn. Learning how to think in an evaluative way is thus a form of meta-learning. Process utility is the measure of this learning. It is the descriptor of the idea that meta-learning is taking place. Patton (2004) surmised that by positioning and designating evaluation as such higher order learning process, this opens new professional vistas for the field.

Review of Alkin and Christie's (2002) study of evaluation learning facilitation leads this researcher to conclude that approaches generated toward evaluation teaching, even when connections with CT dynamics are fairly discernible (though perhaps not made knowingly; with clear insight as to implications for pedagogical approach) tend toward traditional formats. That is, generally, all learning directives are pre-played by the instructor. They have very minimal learning space left open for learners' fresh engagement with ideas, materials, and processes. Even when advancing learning strategies potently addressing the channeling and opening up of CT dynamics, such as role playing or simulation, evaluation teaching approaches are framed within traditionalist, teacher-centered orientations. Thus, Alkin and Christie (2002) in their advocacy of role playing, a strategy very open to learners' free interplay with CT ideas, formulations, expectations, and strategies, seem hardly able to go beyond the traditionalist concern for minute structuring of the entire process, by the instructor, step by step. Their expressed concern seems in this respect not how to encourage maximum, unhampered learner engagement with the subject, including learners'

individual extrapolations, extensions, associations, and inspirations, but rather whether students can "be engaged so that they really understand"(p. 209). A pedagogic problem associated with the above expressed concern is the structural limitations of the courses themselves which Alkin and Christie have in mind--"two ten-week evaluation courses" (p. 210).

From their perspective, under the pressure of time constraints, it becomes urgent for the instructor to guide the focus and thinking of the learners. The instructors "provide students with an in-depth understanding" and "get students to focus on evaluation" (p. 210). They must get them to "develop meaningful questions" (p. 210). They provide them "with an understanding of major issues in evaluation and in the processes of theory development" (p. 210). They believe that the

> ... goal of the procedures course [is to] provide students with the skills needed to conduct evaluations that are useful, by learning to: initiate and focus an evaluation; design and write an evaluation proposal; develop technical skills required to conduct an evaluation; and develop evaluation reports. (p. 210)

It is held that the instructors, in a very real sense, must be the ones to create the learning experience for these graduate college level learners,- "to create an experiential learning environment" (p. 210). Surprisingly, after all of this detailed pedagogical direct control, Alkin and Christie (2002) interpret their approach as follows:

> Experiential learning environments are designed to increase student engagement in the learning process and in turn, academic achievement. For us this means moving away from a more traditional top down pedagogical model to the creation of student-student and student-faculty partnerships in the classroom. We like to think of our students as "participants" and ourselves as "facilitators" of learning. (p 210)

The essential point to be taken from the above self-description and self- interpretation of pedagogical approach may be that the theorists appear unknowing in terms of the extent to which their approach underwrites a traditionalist, instructor-centered and-dominated perspective. Another essential point may be that they appear a little outdated in assuming that they are in advance in moving away from a traditionalist approach and espousing a learner-centered instructional approach which originated many decades prior to their writing (Alkin & Christie, 2002). Must we necessarily conclude, given the expertise and high professional standing of these writers within evaluation that the discipline, in terms of its pedagogy, has seriously stagnated? The aforementioned authors' ideas that they are present-day innovators in evaluation pedagogy, in opening it toward learner self-projection and self-development, may rather be salubrious and predictive of incipient advance. Certainly the following, to the extent it represents some indication of prevalent or even simply germinating thought in the profession, may be taken as encouraging to thoughts of achieving the ideal of having learners assume the lead in and take responsibility for their own learning:

> Our belief is that the best way to understand evaluation theory and procedures is through participation. One useful technique that inspires participation is role-play. While it is plausible to picture how students can participate in the practice of evaluation, it may be more difficult to imagine what it means to participate in evaluation theory... (Alkin & Christie, 2002, p. 210)

Participatory learning in evaluation, the writers seem to be saying, essential to CT— both application and derivation— has been difficult to instructionally manage and to implement. It is difficult to construct relevant learning approaches because it is difficult to imagine how learners can "participate in evaluation theory" (p. 210). Bearing these factors in mind, it becomes understandable that the writers are suggesting that the present is the appropriate

time for manifesting participatory and CT learning in evaluation, even though essential difficulties remain.

Darabi (2002) indicated that the practice, the substance, or the phenomenon of evaluation, from the learner's perspective, is likely viewed as a "seemingly fragmented and chaotic" (p. 219). Current teaching practices in evaluation "exacerbates the problem by only organizing and conveying conceptual and factual knowledge while seeming to render key aspects of program evaluation practice invisible to students" (p. 219). Darabi indicated that quite different learning approaches were essential to shift learner self-projections from alienation to the evaluation process and its customary pedagogy toward a learner capacity for creating "their own big picture" (p. 219) of evaluation. Darabi devised a five-phase teaching approach designed to help the learners build structure and system within the chaotic context wherein evaluation is carried out. Each phase was indicated in terms of, first, instructional goals and, second, learner behavioral objectives. These are summarized here as follows:

The first phase, "Program Analysis and Evaluability Assessment" (p. 223) has the stated goal of enabling "students to conduct evaluability assessment" (p. 223). Evaluability assessment is a pre-assessment process to determine if assessment is worth doing or necessary. This is projected as accomplished through meetings with actual, potential clients and visiting their programs. Instructors directly guide learners in meeting objectives: (a) observe the American Evaluation Association Guiding Principles and apply the appropriate Joint Committee on Standard Educational Evaluation standards to the activities of this phase, (b) analyze the client's purpose for the evaluation, (c) describe the evaluation object (program), its components, its goals and objectives, and its allocated resources, (d) identify the evaluation scope and analyze its context, and (e) decide whether the program is appropriately and legitimately evaluable.

The second phase, evaluation design emanates, of course, from decision to evaluate the program, or that it is evaluable. The design goal was stated as using information from phase one to conceptualize their approach and develop "their Logic Model" (p. 224), contemplate design, and carry out follow up interviews to formulate questions. Behavioral objectives included the first objective of phase one and added four more: (a) identify the appropriate evaluation approach, (b) develop a logic model, (c) formulate qualitative and quantitative evaluation questions and criteria, and (d) design the evaluation methodology.

Phase three utilizes phase two questions to develop management and communications plans, data collection instruments, and a pilot testing plan for the instruments. Behavioral objectives, after replication of the first objective about observing professional principles and standards, included stipulations to: (a) develop appropriate evaluation instruments, (b) develop project management and communication plans, (c) describe the significance of pilot testing of the instruments, (d) describe the importance of client and stakeholders input in developing the evaluation plans, and (e) develop a validation plan for evaluation instruments.

Phase four, implementation and administration emphasize discussion among learners involved with the project. Objectives, after repeat of the first, as usual, were stated as: (a) describe the implementation and administration issues, (b) propose the data collection and data analysis procedures, (c) describe the procedures for studying preliminary evaluation findings, and (d) describe how to revise the evaluation design if findings do not address what had been planned for (Darabi, 2002).

Phase five is the communication of evaluation findings, which calls for the integration of structure and content of the report "with the perspectives of the clients and stakeholders" (Greene, 1988; cited in Darabi, 2002, p. 226). According to all steps of this

learning approach, the instructor maintains a critical overview to ensure that "the required threads and linkages" (p. 225) among the phases are maintained.

Ensuring attendance upon the repeated first objective about meeting principles and standards, the learners must then: (a)Identify and discuss methodological issues in preparing a draft report and having it reviewed and revised, (b) outline the structure and layout of an evaluation report, (c) discuss the protocol for preparing and submitting the final evaluation report (Darabi, 2002).

This approach is directly learner-experiential in facilitating learners' immediate engagement with actual evaluation contexts. Some instructor guidance and control measures are utilized. The behavioral objectives are prescribed and are assumed the arbiters of successful learning--whether they are met or not, and the extent to which they are met. The learners are provided with "a mental picture of the whole before they are asked to considered the pieces" (p. 227). Their initial evaluation learning engagement is with a "mental framework or schema" (p. 227). Practice with the systems approach and direct experiencing of evaluation process and context were viewed as strengths. Highlights of pedagogical value through the approach were learning to communicate with clients, coordinate evaluation activities, understand the political nature of evaluation, and translate the technical language of evaluation into common-sense practice (Darabi, 2002).

Incorporating Critical Thinking Within Program Evaluation

Some indications within the recent literature of evaluation pedagogy suggest a venturing beyond the traditionalist frame of reference and evidence a concern to fundamentally reconsider how evaluation is taught. These considerations would attempt to reinvigorate the teaching process with fresh approaches, changes in emphasis, and increased commitment to the evaluation teaching profession (Preskill, 2000). These newer approaches

reflect unique correspondence with CT. Evaluation represents a special body of skills and knowledge in many senses going beyond those required of traditional research. The relationship among pedagogical skills, knowledge, and experience necessary to classroom learning and experiential learning in fully carrying out evaluations in the field is complex (2000). This factor remains the crux of developing and fully utilizing the best pedagogical resources available to enhance learning and practice in evaluation.

Bare (2005) explained how following through on this emphasis has brought increased interest in utilization of the case method approach, increasing the correspondence of learning with practice, while potentially supporting increased professionalism within evaluation (2005). "Evaluation professionals can benefit from practice in the same way that lawyers, doctors, and other professionals improve their performance through practice. The case method enables practice through role plays and situational analyses" (Bare, 2005 p. 83).

The case method through role play particularly enables learners to test learning not merely in terms of its applicability, but, more pointedly, in terms of how well the individual learner, or the group, is actually able to correlate conditions with approach or technique correctly. Requisite sophistication, assurance, and timeliness for desired effect would also be included in this measure. Alkin and Christie (2002) distinguished between role play and simulation in evaluation learning. Simulation was viewed as the more comprehensive term, designating "complex, lengthy, and inflexible events, yet they always include an element of role play" (p. 211). Both procedures allow for learning through experiencing. Role play provides greater flexibility and spontaneity, since it is more open to imaginative interplay, and can be easily and quickly set up and instigated to suit the immediate situation. Through role play, interaction and peer learning are enhanced. A by-product of these factors is

reduction of anxiety, which allows for increase in motivation. The net result is experimentation becomes more customary and expansive (2002).

Trevisan (2004) noted a deficiency in "formal research on practical evaluation training" (p. 256). A prevalent recommendation emerging from scholarly literature, despite the research deficiency, is for students to receive "hands-on or practical experiences during their education" (p. 256). Since the 1970's, recommendation within scholarly literature for hands on experiential training has become more prevalent (2004). Sanders (1986) saw a need to incorporate this training within pre-service programs. Chelimsky (1997) noted didactic coursework should be strengthened with hands-on experiences. In-field practice was viewed as especially critical for learning toward the end of direct, pragmatic application of one's class work— the predominant characteristic of practice orientation (Altschuld, 1995). The intricacies of real world practice (Chelimsky, 1997; Cronbach, Ambron, Dornbusch, Hess, Hornik, & Philips 1980) included issues of (a) negotiating an evaluation within an organization, (b) handling incomplete data, (c) dealing with clients who don't communicate well, and (d) thinking creatively and flexibly about an evaluation design because of resource, organizational, or political constraints. (p. 256)

Technical and non-technical issues of evaluation are better explicated, understood, and appreciated through practical training (Chelimsky, 1997). Trevisan (2002) pointed out that the challenge of non technical aspects (missing data, client communication difficulties, response to unpredicted constraints) is well understood and appreciated, and is predictably handled with greater professionalism, competence, and responsibility, as a result of practical, hands-on experience. Alstchuld (1995) and Cronbach, Ambron, Dornbusch, Hess, Hornik, and Philips (1980) recommended that evaluation training include practicum and internship postgraduate programs. Context and nuance across multiple domains were emphasized by

Cronbach et al. as realized through carrying out evaluations according to interdisciplinary formats (1980).

Levin-Rozalis and Rosenstein (2003) emphasized mentoring as a key foundational element, relationship, and process for evaluation learning. Mentoring course structure was realized through year-long evaluation in-field projects. Lectures were joined with small group work, following instructor leadership, and instructor mentoring. Practice was viewed as a better learning and training exposure than in-class study and "technical rationality" (Levin-Rozalis & Rosenstein, 2003, p. 247).

Support, coaching, and guided experience were viewed as essential for practical evaluation experience, success, and learning by doing (Trevisan, 2002). Preparation for engaging in practical experience was kept minimal. After selection of a project, the learners carry out preliminary data gathering, consult with the instructor to go over material and determine feasibility, and otherwise move efficiently toward joining the practical and theoretical together. They are incorporated and joined within the learning, facilitation, mentoring process.

Throughout the learning process, instruction evolved from student work in the field. Theories were explained from these in-practice examples. Small group work involved discussions. Instructors selected topics based on their perceptions concerning how far along the group of learners were in their studies and project. Students presented information concerning their projects in the small groups of 7-15 students. Instructor-selected topics followed a restructured format according to the time-table of learner study. Individual guidance included personal mentoring. Mentoring ranged from simply imparting good advice "to personal guidance, reflection, and joint planning, to more personal support of

professional, emotional needs, and encouragement of students to persevere and improve" (Levin-Rozalis, & Rosenstein, 2003, p. 248).

Reichardt (2003) understood that the true excellence of his graduate learning in evaluation derived from not only the program's exemplary faculty, but also from the hands-on interaction with and professional development of the students (2003). For example, graduate students often assumed the lecturing duties of their professors. The essential pedagogical determinant, however, in Reichardt's recollection, was that "The intellectual abilities of the faculty were not primarily devoted to or exhibited in classroom instruction" (p. 273):

> Instruction outside the classroom was so profoundly outstanding that it was adaptive for both faculty and students alike to place little emphasis on traditional in-the-classroom learning... .[B]ecause we didn't have to expend much energy on conventional coursework, we had more time to work on research and to read what we thought was most important. (p. 274)

In Reichardt's study, professors gave students opportunities to write whole chapters of books (acknowledging the students as the contributing authors). The chapter he wrote as a graduate student for Donald Campbell, Reichardt maintains, was still recognized as his best contribution to the field after over 25 years. Professors selected graduate students to substitute for them at conference presentations— calling for intense preparation and of course confrontation of an even more intense level with the professional realities of evaluation peer interaction. The faculty had no trepidation whatsoever concerning throwing their graduate students into the fray as their own fill-ins. Reichardt's consummate insight as to how to establish training excellence in evaluation was based on this unnerving yet exhilarating learning experience. His approach to improving evaluation learning he indicated

as follows: "[I]f I were to design a training program, I would select faculty to a large extent based on their ability to provide such opportunities to students" (p. 274).

Assessment of Critical Thinking

CT skills represent a complex body of accomplishments, dispositions, and abilities (Facione, 1990; Paul, 2002; Scriven & Fisher, 1997). Adequate assessment of the level of CT skills for a given individual is a complex matter, and perhaps, if undertaken successfully, as much or more of an accomplishment than acquisition and development of the CT skills themselves in the first place (Ennis, 1993) Questions concerning the adequacy of assessment should address also the purpose of the assessment, or in other words: adequate, sufficient, and for what? (Ennis, 1993).

Assessment of CT skills in terms of this study designates measurement of CT improvement or gain within the context of some educational setting, learning strategy, and instructional intervention. Assessment of CT is understood as a process related to the associated educational purpose and goals of that educational context. How adequacy is determined for assessment of the CT component would vary according to the context and purpose, even if these intervening factors are limited only to an educational setting (Staib, 2003). Three variations in terms of CT assessed in relation to education or learning are important to this response (Ennis, 1993). The first of these are standardized tests intended for measurement of CT ability, and CT accomplishment or achievement, such as mastery of van Gelder's (2004) self-teaching tutorial on concept mapping. The second variation is instructor developed tests designed to assess CT learning carried out within a specific course for direct teaching of CT, rather than CT incorporated within the content of another discipline. The third instance is, similarly, teacher-designed tests for assessing CT

accomplishment in relation to a separate discipline's content and coursework materials (Morrison, & Free 2001).

CT instruction within a separate discipline could take the form of direct instruction for CT— that is, a separate, distinct instructional component within the total course— followed by application of the skills acquired to the material of the course (Elder, 2002). Equally likely, however, CT instruction could occur primarily in terms of working through the ideas, principles, methods, practices, and so forth of the given separate discipline using the focus and application of CT (Elder, 2002; Paul, Elder & Bertell, 1997). These two types of CT instruction provide an interesting possibility for variation concerning assessment of CT. It is reasonable to assume that any testing carried out might simply focus on knowledge and application skill improvement in terms of the course content or target discipline itself, rather than direct testing of the critical skills applied to increase mastery of the given discipline. In this case, however, improvement in CT is assumed to be directly and positively related to resultant improvement in the target discipline's knowledge and skill level (Paul, Elder & Bertell, 1997). Reasonably, assessment of CT gain can be made indirectly. Assessment is made for measuring improvements in mastery of the target discipline (1997) rather than CT prowess (Ennis, 1993) directly. Again, if mastery level of the target discipline is raised (through application of CT learning to the target discipline, by means of a separate course component, or, alternatively, through incorporation of CT within the day-to-day teaching and learning of the content of the separate target discipline) then, the assumption is made that CT level also has been raised.

Framing assessment of CT in terms of the three instructional approaches enumerated above is complex. The assessment framework should include attendance upon multiple components. First is teaching CT as a subject or discipline unto itself. Second is

teaching it as a separate component within the coursework of another discipline, intended for application to that coursework of which it is a component. Third is integrating the focus, principles, and procedures of CT with the organizing, scholarly frame of reference and methodology of the coursework of the other discipline, rather than attending to CT as a separate component. In this third approach, the goal is that the two disciplines become fused.

Coming to terms with an essential framework for CT assessment, analysis of multiple choice assessment strategies vis a vis CT proved instrumental in initiating the above. The ongoing dialogue within CT teaching and its assessment have long focused on this specific yet encompassing aspect (Ennis, 1993). Consideration of multiple-choice assessment designs, strategies, instruments, and perceived intentions and results, in relation to CT, discloses the core of an essential assessment debate. Understanding the terms and conditions of this debate proved invaluable for approaching this complexity in a meaningful way. Overall consideration of these issues facilitates measurement of CT ability or gain.

Multiple-choice assessment may find rational use for measuring gains of knowledge and skill which have been facilitated in their acquisition through employment of direct CTTS (van Gelder, 2004). van Gelder's (2004) self-teaching approach through concept mapping is an important example. Facione's (1990) multiple choice inventory of CT level was used to derive learner CT improvement. Form (a) of the inventory was administered prior the learning intervention, and form (b) was completed afterwards. Very high levels of individual gain were determined. The limitation of results to a particular set of skills and related specialized knowledge concerning informal logic or informal reasoning (van Gelder, 2004) was what van Gelder was teaching and, similarly, what Facione's inventory seems primarily to test. These skills and knowledge were understood by both van Gelder (2004) and by

Scriven (1991), though perhaps not by Facione (1990), to be only one part of the CT complexity. As a system of logical thinking or reasoning derived from formal logic (Scriven, 1991), informal reasoning or logic is essential to CT. It manifests ways of thinking, sorting out information, and drawing inferences which are highly systematic and precise and which are quite distinct in many ways from the ordinary, usual course of human thought, even the most intelligent and insightful. Mastering this system— a body of knowledge— must inevitably raise one's CT capacity. Yet it is not CT in and of itself (Scriven, 1991; van Gelder, 2004). Multiple choice testing serves the purpose of assessing knowledge attainment admirably. Its facilitation of assessment of CT is problematical (Ennis, 1993).

In order for a given individual's CT to come fully into play, the individual should be immersed within a context, the understanding, resolution, or solution of which calls for a high level of engagement of CT process. Comprehending the results of such engagement make it reasonably likely that rational assessment of that individual's CT can also take place. In other words, consideration of assessment of CT is likely best realized within a context of authentic and full engagement of CT. That context, wherein CT is given reasonable opportunity for full play, the best, authentic assessment should be the test or testing process itself. The context must immerse the individual critical thinker (the test taker, in this instance) within the full milieu of factors, relevant or not, impinging or not, which must be recognized, understood, sorted out, and otherwise rationally determined through requisite exercise of CT. This complexity of milieu and requisite engagement is essential for authentic, full assessment of the process of CT. It is essential in ways very likely not essential for the specific -discipline multiple-choice testing of content knowledge or for assessing specific knowledge and skill acquisition related to but not wholly comprising CT (Staib, 2003).

Standardized CT tests intended to assess the full process or engagement of CT may, first of all, gloss over the important distinction between achievement or skill acquisition and the ability to engage with CT process. This latter has widely been thought of as a form of intelligence or a special aptitude or cluster of aptitudes (Scriven & Fisher, 1997). Criticism of any testing which purports to measure or even better understand what might be considered actual, innate ability within individuals, extends to the position that, quite simply, there is , at present, no good way to evaluate individual ability, especially in the sense of this "innate" capacity (Scriven & Fisher, 1997).

The counterpoint to this type of denial that assessment of ability, such as that ability assumed required for engaging with effective CT, falls ineluctably beyond the scope of testing— at least testing in any usual sense, and perhaps most clearly beyond the capacity of multiple choice testing— are two arguments. The first is that ability is discernible and measurable through testing precisely, through standardized multiple choice instruments (Yeh, 2001) and that this capacity is depended upon, routinely, throughout education, greatly informing and facilitating its directives. The second counterargument critically assessing the view that testing and measuring ability, such as CT, is misdirected, irrational, and at best unlikely to be realized, is the notion that ability comprehends much more, in the ordinary language sense of the term, than simply innate capacity or intelligence. Ability includes acquired skills, knowledge, and even learned dispositions (Facione, 1990). The assumption made in this study is that the terms skill and ability may be understood as virtually synonymous. Either term very reasonably is understood to include acquired knowledge, learned skills, and adopted, acquired dispositions. Conjunctively with this matter, it is further understood— as this is well accepted in the scholarly literature (Ennis, 1993; Facione, 1990; Paul, 2000; Scriven & Fisher, 1997) that CT capacity rests mainly with learned

achievement. The more fundamental questions, thus, boil down to the following. Even though skill level, especially in the sense of intellectual skill, necessarily involves learning, adaptation, and acquisition over time, is skill, any skill, including that of CT, ever discernable or measurable except through observable demonstration of the results of application of the skill?

Multiple choice instruments intended for elicitation of CT skill and ability inevitably incorporate specific knowledge factors for successful response, even when assessment of CT skill alone is the requisite focus. Yeh (2001) indicated multiple choice assessment instruments which focused on problem solving, presumably toward the end of measuring skill level, were necessarily context bound, and, therefore, results could not be generalized to other situations. Yeh also, nevertheless, understood that multiple choice testing, could, and undoubtedly should, entirely shift focus toward CT and away from measurement of information acquisition (2001). Emphasis upon recognition and analysis of argumentation and requirements for response of synthesizing, analyzing, and ultimately applying knowledge would facilitate this direction (2001). In Yeh's view, multiple-choice is inevitably a forced choice situation and open-ended, application response is, for reasons of purely mechanical limitation, not feasible as part of this format. From such perspective it must be concluded that entirely circumscribing procedures within the boundary of forced choice answers is simply too restrictive for one to evaluate this assessment approach as reasonably adequate for coming to grips with individual capacity and achievement in CT.

Consideration of the adequacy of standardized multiple choice instruments must include discussion of the skills associated with CT from the relevant scholarly literature. Paul, Elder and Bertell (1997) approach has been widely used to focus instruction upon CT skill development. It seems rational to assume that assessment instruments should focus

upon the same skills toward which instruction intended to inculcate or enhance CT is directed. The 17 skills from Paul, Elder and Bertell (1997) are indicated (see Appendix B) with following brief analysis of how well or adequately, multiple choice items are able to assess or measure that skill.

These additions support the contention made concerning severe limitation of multiple choice in terms of engagement with CT. Standard essay format tests appear to be improvements over multiple-choice, and are able to answer for most criticisms, as those indicated here (Ennis, 1985). Time, cost, and difficulty in finding expert input for evaluating results and grading have limited usage.

Modifications to the standard multiple choice format have been studied, experimented with, and suggested. Two factors have been addressed in these reconsiderations. One is allowance for the test takers to generate their own responses, rather then simply select from among those offered. Another is to provide opportunities for test takers to provide reasons for responding as they have. This latter could be accomplished through offering students follow-up multiple choice questions to get at the test takers' reasons for choosing the answer they decided upon (Ennis, 1996). Appending verbal reports of thought process, i.e., justification of an answer, underlying answer choices has found support (Ennis, 1989) for reclaiming multiple-choice CT endorsement. Ranking answer choice through inclusion of multiple-rating items directed toward getting at the test takers' actual reasoning process has been argued for (Paul & Nosich, 1991). Scriven and Fisher (1997) have indicated that research supports the idea of switching from multiple-choice to a rating system as a more meaningful measure. One concern of test-makers, apparently, is to eliminate guessing as a test score factor. One strategy would be for possible answers to be

grouped together. A given answer could work for more than a single test item, or not for any, or for only one single response.

Finally, the multi-faceted item is an attempt to increase the assessment proximity between CT and the multiple-choice item format has extended to the measurement of dispositions. Disposition (inclusive of intellectual traits and attitudes) has widely been considered integral to CT. Disposition indicates likelihood that the individual will employ CT where appropriate to do so, or when called upon to do so (Halpern, 1993). Facione and Facione (1992) in creation of the California CT Disposition inventory emphasized CT disposition through testing for seven subsets of CT (1992).

Multiple choice approaches are widely viewed as severely limited in measuring the full content and expression of CT. Nevertheless, in its capacity for rationally engaging with individual level of development through critically thinking in terms of interpretation, analysis, inference, recognition of assumption, assessing credibility, and detecting fallacies, multiple-choice has considerable value as an indicator of CT engagement and learning. Taken together, these aspects of CT seem to cover a wide intellectual spectrum. By wide consensus (Murphy, Conley & Impara, 1994) multiple-choice assessment has validity and utility in relation to virtually all levels and manifestations of intellectual attainment and ability. Yet the limitations are severe in disallowing formative expression through the procedures of forced choice, in terms of material attended to, focus specified, and limited, preset response selection. The antithetical disposition of such approach to CT has led to an impetus toward direct address and individual decision in intellectual assessment matters even though informal logic and reasoning approaches can be rather meticulously attended to through ordinary multiple-choice format (van Gelder, 2004). Most of the matters manifesting a deeper, self-generating intellectual immersion, capability, and commitment to--

for one thing--working out the nature, understanding, and solution of the problem, according to one's perceived relation to the context of the problem, lie outside the range of the multiple choice approach as generally understood and employed.

Summary

Review of literature supported the study's initial contentions concerning the relevance of the process of CT to all human intellectual endeavors. Origins of CT trace back to anciently founded formulations for applying the intellect, rigorously and systematically, to understanding of oneself, especially in relation to the world-context of which one was a part. It includes analysis of commonplace, assumed truths, as well as unchallenged, apparently authoritative assumptions, and perseverance in painstaking analysis, even when known or available structures for comprehension seemed unworkable, inapplicable, or unavailable. The Socratic dialectic, in western thought, seemed the essential basis of CT, originating as a teaching, learning process. Though anciently derived, it seemed entirely correspondent with our contemporary understandings of CT. The dialectic in essence conveyed that the teacher, through questioning of the learner and facilitating the learner's pursuit of understandings through reflection, enhanced pursuit of ultimate truth concerning the matter at hand by assisting the learner to penetrate to a fresh engagement on the basis of her own comprehension. The dialectic process, requiring nothing other than the learner's own access to seemingly innate (the position taken by Socrates and Plato) or internalized understandings, assiduously applied to whatever could be objectively perceived, was unwavering, through the guiding persistence of the instructor, in necessitating the learner's unbiased and fully disclosed analysis of the basis of her own conjectures. This profound origin was traced rather consistently in the literature, up through the foundations of modern science, that particular framework of objective analysis, carrying over into the present time,

to complete the formulation of our contemporary, intellectual milieu, particularly regarding philosophy, psychology, and education.

It is important to point out of this juncture that without the practice and ideas associated with John Dewey and with the philosophical approaches of American Pragmatism, it would not be conceivable to productively consider CT in terms of modern education up through the present time. These essential concepts were touched upon here in the literature review. Their importance will manifest more directly in terms of research carried out for the study, its interpretation, and consideration of extended implications. Briefly put, at this point of the research, the incisive analysis and teaching of John Dewey, derived from the pragmatist philosophy of James and Pierce within the 19th and 20th centuries, his personal uniting of philosophy, psychology, and education in his studies and teachings, constituted the initiating and driving force of CT in learning. Without these contributions it is almost a certainty no injunction for CT would have transpired. This study, for example, would not come under anyone's consideration. Dewey's pragmatist approach indicated that the capacity and habit of CT, mastered at maximum levels among all individuals, was the highest aspiration of society, culture, and learning. While not necessarily fully accepted and promulgated in all areas of intellectual endeavor, that concept continues to grow in influence and reverberate throughout the halls of learning worldwide Setting Dewey aside when approaching CT in education would intellectually be the equivalent of ignoring the prophet Moses when considering the Ten Commandments. At the behest of Moses, all humankind was enjoined to comprehend and adhere to God's law; at Dewey's, all education was enjoined to align their processes toward best realizing fulfillment of CT potential.

Examination of scholarly thought concerning CT and its associated pedagogical processes indicates contemporary educational commitment to realizing the ideals of Socrates, Plato, and Dewey, among those who have devoted their research and professional practice in developing this intellectual attribute within the pedagogy of all intellectual disciplines. CT develops simultaneous to its application to and development of any given discipline.

CT posits as an absolute condition of the free-flow of the individual intellect and the unrestricted pursuit of individual, objective contemplation of what is real, that is, whatever can be known. Teaching strategies toward enabling and mobilizing the individual learner in terms of CT have developed and have been extensively used with rewarding results. This pedagogy extols and supports the individual learner according to self-enlightening forays within a fresh, contemplative, dialectic engagement with ideas, learning, and individually derived formulation of structures for comprehension and solution.

Intellectually, PE has been found commensurate in detail with the formulations of CT. Pedagogically, however, evaluation has tended to follow mostly doctrinaire approaches and teacher-centered and-evolved practices. Theoretically, the review of literature has related, these practices, regrettably at the heart of much evaluation pedagogy, are detrimental to CT formation and development. Such unfortunate influx of inappropriate pedagogical practice running up against universally desired learning outcomes, to which such practice serves as a detriment, constitutes the essential problem addressed here, but at the same time points toward its solution. CT has been shown to lie at the heart of evaluation thought, practice, and, reasonably, its envisioned, desired pedagogical outcomes. Unfortunately, it has not, by any measure, pervasively characterized nor contributed much toward its standard pedagogical procedures. Improvement in evaluation teaching and professional application

and process seems logically to entail adoption of CT learning within evaluation teaching. This seemed unlikely to occur except if the methods and approaches of CT pedagogy were well known, accepted, applied, and instilled among both instructors and learners.

The extent to which such dedicated application is in fact underway in evaluation is not clear from the literature. Some approaches to evaluation teaching suggested an opening up of conditions and strategies to learner initiative and individual, creative engagement. As this researcher has hypothesized throughout the writing thus far, study concerning how CT is understood and considered among evaluation professionals, primarily those involved with teaching, is not yet abundant in the literature. Study concerning evaluation professionals in terms of their consideration of teaching approaches thought to facilitate CT has not been forthcoming. Their levels of interest or support for pursuing such ends as pedagogically and, by consequence, professionally fully realizing what seems almost a predestined marriage of CT with evaluation seemed an unknown quantity. Assessment of CT was viewed as a complex undertaking. Multiple-choice formats were understood as valuable and useful but with severe limitations which worked against their comprehension of the core attributes, processes, and indications of CT. The review of literature for this study strongly upholds the value, rationality, and utility for implementing the study at this time. The framework for initiating necessary investigation has been indicated in the research questions of Chapter I. The plan for execution of this study within the context of a selected group of evaluation faculty is provided in the ensuing Chapter III, Methodology. The rationale for the planned study is also indicated.

CHAPTER III

METHODOLOGY

Development of effective strategies for teaching CT in graduate classes of PE is needed to improve evaluation quality and utility. Moreover, teaching CT in PE calls for increased research into the nature of this teaching (King, Stevahn, Ghere, & Minnema, 2001; Stevahn, King, Ghere, & Minnema, 2005; Trevisan, 2004).

The following research questions developed for the study: Research questions 1-3 focus on instructors' knowledge of CTTS in evaluation graduate programs:

RQ1. How many CTTS are faculty members aware of teaching graduate students?

RQ2. How often do PE faculty members utilize CTTS in their teaching practice?

RQ3. Which CTTS are perceived to be effective by faculty members in PE?

Research questions 4-6 focus on the application or actual usage of CTTS in graduate programs:

RQ4. What are the steps taken by PE faculty in implementing the different kinds of CTTS?

RQ5. What are the intended outcomes configured by PE faculty in implementing various kinds of CTTS?

RQ6. How do instructors in PE assess the intended outcomes for their "effective" CTTS?

General Procedures

This study used a mixed method research approach by combining quantitative and qualitative methodologies. A two-phase methodology was used to answer the research questions posed in this study. In the first phase, all graduate faculty members at Western Michigan University (WMU) in affiliated with the two graduate evaluation programs were invited to participate, thus representing a purposive sample. A questionnaire was developed from a synthesis of relevant scholarly literature concerning CT, evaluation, teaching strategies utilized in each, and commonalities joining the two intellectual disciplines, and was administered. The survey invited respondents to rate different CTTS in terms of their perceptions concerning the strategy's utility and effectiveness in teaching CT in program evaluation. It also asked the respondents whether they were familiar with each strategy specifically. Respondents were invited to indicate the frequency of their use of each individual strategy. The survey questionnaire used for the study is attached in Appendix C.

In the second phase, a follow up interview with each respondent was conducted individually. These interviews focused on clarifying information from the surveys and allowing respondents to expand upon their responses as provided in the survey. Respondents were encouraged to amplify and articulate at length which CTTS they used. They were asked to provide explanation of how they used and implemented strategies in the classroom. For example, interview questions probed respondent's reflection upon the general capacity of CT for functioning as a meta discipline. In this respect, questioning directed the respondents to reflect upon the extent to which they encouraged learners to actively contemplate the course and direction of their present and ongoing learning related to evaluation. The researcher further questioned the extent to which respondents encouraged learners to develop skills for articulating and communicating, through multiple

channels, such individual reflections upon their own learning. The researcher asked which CTTS they used, or considered using, to facilitate learners' active contemplation of their own learning.

Finally, the researcher asked respondents to reflect upon their own individual contemplation, as graduate instructors, concerning (a) their intellectual engagement in terms of CT with the discipline they profess and the courses which they teach within that discipline, (b) the extent to which they communicate the ideas and questions of this engagement to their students, modeling CT dynamics and processes, and (c) the intended learner outcomes and how they assess these outcomes.

All data for the study were collected during the 2006/07 academic year. Existing available documents for the academic year 2006/07 concerning course offerings, catalogue descriptions, syllabi, and associated materials were examined to determine if specific CTTS were present in course related materials. This information, together with respondent survey answers, was used to assist the researcher in forming interview questions.

Survey

The survey informed the research concerning evaluation graduate faculty perceptions of the effectiveness of CTTS. It also informed the research concerning this faculty's knowledge and use levels of the strategies.

Participants

Research participants for the study were the faculty teaching in the two graduate evaluation programs at WMU, Evaluation, Measurement and Research (EMR), and Interdisciplinary Program in Evaluation (IPE), which offer degrees in evaluation. All 37 members as listed on the programs' web pages were invited to participate (http://evaluation.wmich.edu/phd/faculty/ and

http://www.wmich.edu/coe/elrt/faculty.htm. Retrieved September 30, 2006.). Together they represent the core university faculty responsible for training doctoral students in the two programs. However, not all of the participants teach courses in evaluation, e.g., evaluation theory; many of them teach supporting courses, e.g., survey research methods.

In following a purposive, criterion-based sampling approach (Patton, 2002), the researcher's intention was to provide a close, fairly intensive, and in-depth understanding and analysis of an admittedly restricted research group. The research group, nevertheless, conformed to descriptions and criteria qualifying it for inclusion within the projected, envisioned larger group of the total population (Lecompte & Preissle, 1993; Patton, 2002) of graduate faculty in program evaluation, worldwide. The group thus met the criteria necessary for selection into the purposive sample. The sample was not randomly selected this it is not statistically generalizable.

A comparison sample was not consider necessary for the study and was thought instead likely to work to misdirect interpretation. This study did not seek to measure or evaluate the informants' sufficiency in relation to CT. Rather, the intention was to ground and clarify, within the realm of relevant, professional practice, the study's theoretical findings and interpretive work and analysis, concerning development and deployment of effective CTTS for use in graduate evaluation study. The research was based on that information indicative of theoretical understandings, was synthesized from the relevant literature, and was "grounded in the social activity it purports to explain" (Glaser & Strauss, 1967). In other words, this information, in the form of extracted CTTS, provided the basis and substance of researcher interaction with evaluation faculty informants. Informants who comprised the purposive sample, by nature of their professional activities, were viewed as

sufficient, and, in fact, were admirably suited and prepared for their research role in this study.

Instrument

A CT teaching strategy survey instrument (CTTSS) (see Appendix C) was developed through review and critical analysis of available literature related to CT, program evaluation, and relevant instructional strategies. The CTTSS has three general sections: demographic questions (years of teaching in evaluation, and type of degree); 33 CTTS; and a final section providing extended definitions related to each strategy.

Each of the 33 instructional strategies (see Table 1), for example, item 2 Socratic questioning, or item 32, instructional scaffolding--was presented as an individual questionnaire item. Each item included definitional information from the scholarly literature concerning how the term or strategy was conceptualized in relation to teaching CT within the context of PE graduate instruction. Such information established a generally agreed upon, uniform meaning and context of understanding from which respondents were invited to reflect upon their own, individual thought and interpretation, and provide their considered reactions (Elder, 2000).

Table 1
CTTS as Appeared on the Survey

	CT Teaching Strategy
1	Instructor Initiation in CT
2	Socratic Questioning
3	Instructor CT Disposition Modeling
4	Open-book Tests
5	Class Presentations of Small-Group Projects
6	Individual Learners Acting as Class Instructors
7	Conspicuous Reward of CT
8	Develop Class as a Model Society of CT
9	Learner Discovery of the Power of Their Minds
10	Assuming Alternate Perspectives and Points of View
11	Drawing Reasonable Conclusions
12	Transferring Insights into New Contexts
13	Cognitive Disequilibrium
14	Class Journal
15	Intellectual Log Keeping
16	Instructor Intellectual Log-Keeping Lead-In and Modeling
17	Cultural Difference Awareness-Social Practice Approach
18	Social Justice Strategy
19	Variation On the Theme of CT
20	Consideration of Multiple Perspectives of Use of CT
21	Learner On-the-Spot analysis of pedagogical Failure Areas
22	Guiding Students Toward Analysis of CT Disposition
23	Evaluating Authors' Reasoning: "No-Choice" Solution
24	Defusing Activated Ignorance
25	Precipitating Activated Knowledge
26	Exposing and counteracting Egocentrism in Our Thought
27	Initiating Ongoing learner Assessment of CT
28	Developing a Holistic Assessment of CT
29	Developing Externalizing CT Presentations
30	Class Evaluations of Externalizing
31	Mind Mapping and Concept Mapping
32	Scaffolding
33	Argument Mapping

Respondents indicated their responses on a 5-point Likert-type scale. Participants were asked to rate their perceptions of the effectiveness and utility of each strategy as well as the frequency, with which they used the strategy. The numerical rating system employed for

strategy effectiveness was:

A rating of 1 indicates no effectiveness of the strategy.

A rating of 2 indicates a minimal level of effectiveness of the strategy.

A rating of 3 indicates a moderate level of effectiveness of the strategy.

A rating of 4 indicates a high level of effectiveness of the strategy.

A rating of 5 indicates the maximum level of effectiveness of the strategy.

The numerical rating system for strategy implementation was:

A rating of 1 indicates no use of the strategy.

A rating of 2 indicates infrequent use of the strategy.

A rating of 3 indicates occasional use of the strategy.

A rating of 4 indicates frequent use of the strategy.

A rating of 5 indicates very frequent use of the strategy.

An additional response column was provided for respondents to indicate whether they were familiar or not familiar with the strategy prior to taking the survey, coded Y/N.

Pilot Study

A Pilot study was conducted to examine the readability and clarity of the CTTSS items and response scale. Additionally, information was collected to discover if there were additional strategies for developing CT that should be added to the 33 strategies included in the CTTSS. Five university faculty members who teach graduate courses in departments or programs not formally affiliated with either the (EMR) program or the (IDE) were contacted by telephone and asked to participate in the pilot study. Five Participants from each of the following departments or programs were part of the pilot study: Philosophy, Communication, Criminal Justice, Art, and Counselor Education and Counseling Psychology.

Results of the pilot administration were also analyzed in terms of participants' ratings of the utility of presented strategies. This analysis adhered to procedures developed for analysis of survey results from the study's primary respondents. The participants were asked to read the survey for clarity, complete the survey, and note the time taken to complete. In addition, the participants were asked to provide feedback and suggestions for improvement.

Suggestions for change included (1) changing the order of the survey to start with the rating of the use of the strategies first, then the rating for the effectiveness, (2) wording changes for some of the items' brief description, and (3) change made to instructions on page 1 to make it clear for the participants how to response to the survey. The results of the pilot analysis, in addition to allowing for adjustments in the questionnaire, were made available to pilot study participants. Participants provided data concerning clarity and readability of the survey, as well as indication of time required to complete the survey items (Gall, Borg, & Gall, 1996). Suggested changes derived from the pilot study report were specifically noted, and those changes adopted for the survey instrument were identified (Elliot, 2003).

Survey Procedure

The survey instrument, with accompanying cover letter and letter of informed consent, was delivered in person by the researcher to the 37 faculty affiliated with the two evaluation programs at WMU. Participants were invited to take part in the study, sign the consent, and take the survey. They were given the option of consenting immediately or taking additional time, in which case the researcher arranged to pick up the consent later. The time needed to take the survey, as ascertained from pilot study feedback, was approximately 30 minutes. The researcher asked that surveys be completed and ready to be picked up by the researcher within one week from the time of dropping them off at the

participant's office. The researcher agreed with each participant, at the time of dropping off the survey, concerning a specific time, convenient to the respondent, to have the researcher return to pick up the survey and signed letter of consent.

A cover letter describing the survey and indicating procedures also informed participants that they were invited to meet with the researcher, approximately one week after receiving and completing the survey, for a follow-up interview concerning their responses and the overall results of the survey. Participants also, at the time of receiving the survey, were provided with an identification code number to use as their identification concerning the survey. They were identified only by the code number. Questionnaires were labeled with the individual codes but not names. Resultant data were retained, organized, and analyzed by code, not by name. A separate list of participants' names with identifying code numbers was retained by the researcher, for his exclusive access. Identification or association of survey responses with participants was essential for conducting follow-up interviews after analysis of the questionnaire data. Each participant's actual name was known and kept on file by the researcher during the course of the research and reporting of the findings. The participants were encouraged to contact the researcher via telephone, e-mail, or correspondence, concerning any questions or issues they wished to raise during the process of completing the survey.

Each faculty member was contacted in person during their office hours by the researcher and invited to participate as indicated in the invitation script (Appendix D). If the faculty member agreed to participate they were giving a survey questionnaire packet with (a) CTTSS, (b) a cover letter briefly stating the purpose and nature of the research (see Appendix C), and (c) the letter of informed consent (see Appendix E). Individual interview

appointments were set when the researcher collected the completed surveys and signed consent forms at the participant's office.

Identities of participants for both survey and interview were known only to the researcher for purposes of arranging the interviews. This information was kept entirely secure and confidential by the researcher. After collection of survey and interview data, individual respondents were identified only by a code number assigned to them. Records connecting data to informants was kept in a secure location with access available only to the researcher.

Interview

Follow-up interviews were conducted as a means to expand participants' responses related to their understanding and implementation of CT in their teaching. Interviews were conducted in accordance with Dexter's (1970) definition of the interview as "a conversation with a purpose "(Cited in Lincoln & Guba, 1985, p. 268). This process allowed the interviewer and the interviewees to work back and forth, reconstruct the past, analyze the present, and predict the future (Maxwell, 1996).

Participants

The participants in this phase of the study (follow-up interviews) were those who participated in the survey. The original consent document included an invitation to participate in the interview portion of the research. Thus, the interview participants were not recruited separately from the recruitment for the survey and did not comprise a distinct and separate group.

Interview Procedure

During the interview process, faculty participants were encouraged to concentrate on describing their personal, individual experiences in teaching evaluation graduate students as

these experiences related to CT. They were encouraged to offer clarification and extension of their responses on the survey. At interview, each participant retained a copy of the survey they completed. Interviewees were thus able to respond to specific questions with reference to how they responded during survey participation. Specific, directed questions initiated by the researcher during the interviews appear below in Table 2.

Table 2
Interview Questions

1.	Do you have any strategy(s) other than those indicated in this questionnaire that you find particularly effective in teaching your students to think critically about your subject?
2.	This question has two components: (a) How do you emphasize CT in the strategy(s) you indicated above as effective? (b) What is the context relevant to that (those) strategy(s) that promotes CT?
3.	How do you measure or assess your students' CT skills, as these emanate resultant of your strategy(s) implementation? Could you please give examples of the types (multiple-choice, essay, etc.) of assessment you used?
4.	What factors: (a) limit or (b) foster your ability to focus on CT in your course(s)?
5.	One question that arises from the debate on CT is whether it should be taught as a general skill and separate discipline unto itself, intended for subsequent application and adaptation within a distinct, adoptive discipline or field of inquiry, or, rather, situated from the point of strategic inception within another course and integrated within its regular course teaching processes and material(s). What is your position on this issue?
6.	Do you think the CT skills taught in a course you teach readily transfer to other courses or real-life situations? Why? Why not? How? Could you possibly give me a relevant example from the design of one of your courses?
7.	Will this study change your practice of teaching? If so, how? If not, why not?

It was initially expected that the interview sessions would take approximately one hour to complete They were conducted at times agreeable to the interviewees and at a location convenient for the participants. All interviews were audio taped and transcribed.

Potential Benefits Related to Participation

Participants in this research potentially received one or more of the several, following benefits in relation to their contribution. First, they might have gained information

concerning CT, its relationship to program evaluation, and its strategic incorporation within evaluation teaching. Second, they might have found that information gained and reflection stimulated concerning the relationship between CT and PE could assist them in developing and implementing their own thought more effectively. Third, their potential acquisition of further knowledge and skill, vis a vis information communicated through the study and made available by means of their participation, could help them strengthen their own teaching and add greater depth and purpose to the courses they teach. And fourth, they might have acquired gratification in the course of their participation, as they increasingly sensed how their own contribution substantiated the depth and intensity of value manifested through the study's inter relating of CT with evaluation.

Analysis of Data

To answer the study's research questions, data collected from the above procedures were analyzed in the same order as they were collected. First, the survey questionnaires were analyzed. Second, the follow-up interviews were analyzed.

Survey Questionnaire

The survey questionnaire developed for the study was used to answer the study's first three research questions. Survey data were collected using a Likert-type scale which participants used to rate use and effectiveness of the CTTS. Prior knowledge of a CTTS was rated as yes/no. Data were aggregated and analyzed by examining means and/or frequencies for each item. The Statistical Package for the Social Sciences (SPSS) Release 14 and SAS version 9.1.3 was used for the analysis of the data from the survey instrument. None of the questionnaires contained missing data. The demographic information was summarized using basic descriptive statistical techniques for (1) teaching major, (2) years of teaching experience, (3) academic classification or rank. A Spearman correlation analysis was

conducted to examine the relationship between the rank used and rank of the perceived effectiveness. Fishers Exact tests were conducted to examine if there were any statistically significant differences between knowledge, use and effectiveness ratings and several demographic variables, experience (dichotomized at 20 years), academic rank (full professor vs not full professor) and home department (dichotomized as EMR+IDP vs all others) for each CTTS individually.

Interviews

Follow-up interviews developed for the study were used to answer research questions 4, 5, and 6. These questions focused more directly upon actual use of CTTS within courses which are part of graduate evaluation programs

Results from the follow-up interviews were summarized, interpreted, and written for inclusion with the other findings of the study. All audio data from participant interviews were transcribed in. Interpretation was initially made individually, for each interview conducted. Analysis and interpretation followed content analysis approach of Glaser (1967) qualitative analysis procedures. Patterns of relationship among findings internal to the interviews were identified. Patterns and themes emerged through an inductive process from analysis.

Subsequent to participant-level, individual-interview analysis, the transcribed information from these individual analyses was summarized, correlated, and re-analyzed. Interrelationships among all the participant data were noted, organized, and analyzed. Comparisons and contrasts of information evidenced among participants were then analyzed for identification of emergent themes and patterns (Glaser, 1967; Maxwell, 1996; Regan-Smith, 1991). Essentially, survey data, interview data, and information from examined extant data were reorganized, reconsidered, and re analyzed. These were examined in relation to

teaching strategies developed for the study within the context of the full body of information from the review of literature concerning focused-upon CT pedagogical intentions relevant to graduate evaluation teaching and learning.

Content analysis was the methodology employed in this study to analyze the content of the interview transcripts and syllabus related to the CTTS, their implementation, their intended outcomes, and how they assesses the outcome of that strategies. Content analysis has often been used in the past to analyze documents including textbooks (Gall, Borg, & Gall, 1996; Krippendorff, 1980). Qualitative content analysis is a systematic process of formulating and relationships between the defined categories (Patton, 2002). The challenge is to make sense of massive amounts of data, reduce the volume of information, and identify significance. Patton (2002) described content analysis as a multipurpose research method developed specifically for investigating any problem in which the content of communication serves as the basis of inference.

The results of the quantitative and qualitative analyses were examined together to identify common findings. Triangulation. "... . the use of multiple sources of data... and/or multiple methods is another technique that is used to enhance the probability that interpretations are credible" (Ary, Jacobs, & Razavieh, 1996, p. 480).

CHAPTER IV

RESULTS

The first purpose of this study was to identify effective CTTS, as perceived by PE faculty, in preparing graduate students as future program evaluators. The second purpose was to examine the different ways PE faculty members implement CTTS in their teaching practices. The third purpose was to document the specific assessment methods used by these faculty members to assess and measures students' CT performance during classroom and field experiences.

Research questions 1-3 focused on instructor's knowledge of CTTS in evaluation graduate programs, while research questions 4-6 focused on the application or actual usage of CTTS in PE graduate programs. Section I presents quantitative data from the administration of the study's survey questionnaire of the 24 evaluation faculty at WMU who elected to participate. Section II presents qualitative data of the follow-up interviews with the 22 evaluation faculty members who elected to participate in the interview process, and also presents results of the examination of extant data, which included graduate catalog descriptions, course syllabi concerning the teaching and learning philosophies, requirements, and intentions of the programs. Examination of extant data was confined to identifying and indicating statements and extended ideas apparent in these data, which suggested intention, concern, procedure, outcome, requirement, or strategy relevant to and reflective of correspondent CT factors, as derived from the scholarly literature, and as examined and annotated in this study. The overriding intent and focus of extant data examination presented in this chapter was to discover and precipitate explication of their correspondence with CTTS synthesized in the study's survey questionnaire. Data and analysis are organized in terms of the research question addressed.

Survey Findings

Findings from these ratings and subject demographic for the 24 survey participants are presented in Table 3. This table reveals that most faculty are from EMR, 33.3% suggesting that most of courses that graduate students are required to take are from EMR,

Table 3
Summarize Teaching Area of the Faculty of PE, Experience, and the Academic Classification

Major of teaching	*f*	%
EMR	8	33.3
ENG	6	25.0
HEALTH	4	16.7
SOCI	6	25.0
Experience	***f***	**%**
1 year, <10	4	16.7
10 year, <20	9	37.5
20 year, <30	3	12.5
30 year, <40	5	20.8
40 year, <50	3	12.5
Academic Classification	***f***	**%**
Professor	15	62.5
Associate Professor	6	25.0
Assistant Professor*	3	12.5

Note: EMR is Evaluation, Measurement, and Research Design. ENG is Engineering. Health is the College of Health. SOCI is Department of Sociology.
* part-time faculty were recoded as Assistant Professor

37.5%, or the majority of the respondents, have between 10 and 20 years of teaching experience, with over 45% reporting 20 or more years of experience. These data suggest that most of the PE faculty received their training in the 1970s and 1980s. Consistent with longer teaching tenures, the majority of respondents, 62.5%, hold the rank of full professor.

RQ1. How many CTTS faculty members are aware of teaching graduate students?

The participants as a group reported to have prior knowledge of approximately 20 CTTS; M =19.83, SD = 8.64. Table 4 showed that participants they had reasonably high levels of prior knowledge of the 33 CTTS used in the study. Among the 33 strategies used, only one, instructor directed exercises, was recognized by 100% of respondents in terms of their knowledge of the strategy prior to participating in the survey although three of the strategies were recognized by 95.8% of the participants. Ten of the 33 strategies were similarly recognized by 70% of the participants and 23 of the strategies were recognized by 50% of the participants. Thirty of the strategies were recognized by 40% of the participants and all 33 of the strategies were recognized by only 29% of the participants.

Table 4
Prior Knowledge of the CTTS by the Respondents

Teaching Strategies	f	%
Instructor-Directed in-Class exercises in CT	24	100
Socratic Questioning	23	95.8
Class Presentation of Small-Group Projects	23	95.8
Transferring Insights into New Contexts	21	87.5
Open Book Tests	20	83.3
Instructor CT Disposition Modeling	20	83.3
Individual Learners Acting as Class Instructors	19	79.2
Class Journal	19	79.2
Assuming Alternative Perspectives and Points of View	18	75.0
Concept Mapping and Mind Mapping	17	70.8
Drawing Reasonable Conclusions	16	66.7
Conspicuous Recognition and Reward of CT	16	66.7
Initiating Ongoing Learner Assessment of Their Own Thinking	15	62.5
Variation On the Theme of CT	14	58.3
On-the-Spot Analysis of Pedagogical Failure Areas	13	54.2
Guiding Students Toward Analysis of CT Disposition	13	54.2
Defusing Activated Ignorance	13	54.2
Culture Difference Awareness/Social-Practice Approach	13	54.2
Evaluating Authors Reasoning The No-Choice Solution	12	50.0
Precipitating Activated Knowledge	12	50.0
Intellectual Log-Keeping	12	50.0
Structuring the Class As a Model Society of CT	12	50.0
Social Justice Strategy	12	50.0
Consideration of Multiple Perspectives of Use of CT	11	45.8
Scaffolding	11	45.8
Learner Discovery of the Power and Resources of Their Own	11	45.8
Exposing and Counteracting the Egocentrism in Our thought	11	45.8
Developing Externalizing CT Presentations	11	45.8
Cognitive Disequilibrium	10	41.7
Argument Mapping	10	41.7
Developing a Holistic Assessment of CT	9	37.5
Class Evaluation of Externalizing CT Presentations	8	33.3
Instructor Intellectual Log-Keeping Lead-in and Modeling	7	29.2

RQ1 Secondary Analyses. Table 5 presents the findings comparing teaching experience (dichotomized as <20 years, >=21 years) and CTTS prior knowledge. Results from the Fisher Exact Tests reveal only one statistically significance findings: Developing a Holistic Assessment of CT. Fisher Exact tests for academic rank recoded as full professor,

not full professor revealed statistically significant differences in prior knowledge between academic rank for only Developing a Holistic Assessment of CT.

Table 5
Summarized Fisher Exact Tests (p-values)for Teaching Experience (TE), Rank (R) and Home Department (HD) by Prior Knowledge

Teaching Strategy	TE	R	HD
Instructor-Directed in-Class Exercises in CT	*	*	*
Socratic Questioning	.4167	1.000	1.000
Instructor CT Disposition Modeling	1.000	1.000	1.000
Open-Book Tests	.2721	1.000	.2622
Class Presentations of Small-Group Projects	.4167	1.000	1.000
Individual Learners Acting as Class Instructors	.1222	.6146	.1304
Conspicuous Recognition and Reward of CT	.6734	.6570	**.0222**
Structuring the Class As a Model Society of CT	1.000	1.000	.1930
Learner Discovery of the Power and Resources of Their Own Minds	.2397	.6752	.0825
Assuming Alternative Perspectives & Points of View	.1921	.3509	.3618
Drawing Reasonable Conclusions	1.000	1.000	.6674
Transferring Insights into New Contests	.5504	1.000	1.000
Cognitive Disequilibrium	1.000	.4028	.2038
Class Journal	.1222	.6144	.1304
Intellectual Log-Keeping	1.000	1.000	.1930
Instructor Intellectual Log-Keeping Lead-in and Modeling	.6529	.6752	.1670
Culture Difference Awareness/Social-Practice Approach	.6968	1.000	.6792
Social Justice Strategy	1.000	.0333	1.000
Variation on the Theme of CT	.2112	.6752	1.000
Consideration of Multiple Perspectives of Use Critical	1.000	.1049	.0825
On-the-Spot Analysis and Interpretation of Pedagogical Failure Areas	.0953	1.000	.6792
Guiding Students Toward Analysis of CT Disposition	.6869	1.000	.6792
Evaluation Authors' Reasoning The No-Choice Solution	.6802	1.000	1.000
Defusing Activated ignorance	.4081	.1049	1.000
Precipitating Activated Knowledge	.6802	1.000	.6648
Exposing and Counteracting the Egocentrism in Our Thought	.2397	.2060	1.000
Initiating Ongoing Learner Assessment	.4028	.3891	.1782
Developing a Holistic Assessment of CT	**.0333**	**.0361**	.0994
Developing Externalizing CT Presentations	.6968	.6752	.3905
Class Evaluations of Externalizing CT Presentations	1.000	1.000	.0649
Concept Mapping and Mind Mapping	.3926	.6687	.3521
Scaffolding	.2397	.6752	**.0078**
Argument Mapping	1.000	.6687	.2038

* Fisher Exact Test cannot by conducted due to lack of variation along one marginal.

Fisher Exact results for home department, recoded EMR, not EMR revealed statistically significant differences in CTTS prior knowledge for Conspicuous Recognition and Reward of CT and Scaffolding with marginally significant findings for Learner Discovery of the Power and Resources of Their Own Minds, Consideration of Multiple Perspectives of Use Critical, and Class Evaluations of Externalizing CT Presentations suggesting there may be some differences in how faculty incorporated CT into their curriculum and that these differences are probably not a function of experience.

RQ2. How often do PE faculty members utilize CTTS in their teaching practice?

Respondents rated the strategies in terms of perceptions of actual use. The ratings were based on a 5-point Likert-type scale as indicated above: 1: no use of the strategy; 2: infrequent use of the strategy; 3: occasional use of the strategy; 4: frequent use of the strategy; and 5: very frequent use of the strategy.

Table 6 presents the CTTS use ratings for the 24 survey participants in rank order. Use rankings were determined by aggregating the "frequent" and "very frequent" categories. The CTTS rated as frequently used by the greatest number of participants (58.3%) was "Socratic Questioning" and the second highest CTTS was by 45.8% was "Instructor-Directed in-Class Exercises in CT" followed by "Instructor CT Disposition Modeling" and "Drawing Reasonable Conclusions" both used frequently by over 40% of the faculty. As can be seen from this table there are many infrequently used CTTS.

RQ2 Secondary Analyses. Parallel to the analyses for RQ1, Fisher Exact tests (Table 7) were conducted to determine if teaching experience, rank or home department influenced the frequency of CTTS use.

Table 6
CTTS Ranked by Use

Teaching Strategies	f	%
Socratic Questioning	14	58.3
Instructor-Directed in-Class Exercises in CT	11	45.8
Instructor CT Disposition Modeling	10	41.7
Drawing Reasonable Conclusions	10	41.7
Assuming Alternative Perspectives and Points of View	9	37.5
Transferring Insights into New Contests	8	33.3
Initiating Ongoing Learner Assessment of Their Own Thinking	8	33.3
Conspicuous Recognition and Reward of CT	7	29.2
Developing a Holistic Assessment of CT	7	29.2
Class Presentations of Small-Group Projects	6	25.0
Learner Discovery of the Power and Resources of Their Own	6	25.0
Open-Book Tests	6	25.0
Defusing Activated Ignorance	6	25.0
Social Justice Strategy	6	25.0
Structuring the Class As a Model Society of CT	6	25.0
Concept Mapping and Mind Mapping	5	20.8
Evaluation Authors' Reasoning The No-Choice Solution	5	20.8
Guiding Students Toward Analysis of CT Disposition	5	20.8
Scaffolding	5	20.8
Exposing and Counteracting the Egocentrism in Our Thought	5	20.8
Precipitating Activated Knowledge	4	16.7
Developing Externalizing CT Presentations	4	16.7
Intellectual Log-Keeping	4	16.7
Individual Learners Acting as Class Instructors	4	16.7
Consideration of Multiple Perspectives of Use CT	4	16.7
Culture Difference Awareness/Social-Practice Approach	3	12.5
Class Journal	3	12.5
Variation on the Theme of CT	3	12.5
Cognitive Disequilibrium	2	8.3
On-the-Spot Analysis of Pedagogical Failure Areas	1	4.2
Class Evaluations of Externalizing CT Presentations	1	4.2
Argument Mapping	1	4.2
Instructor Intellectual Log-Keeping Lead-in and Modeling	1	4.2

Results for the dichotomized teaching experience failed to reveal any statistically significant findings for CTTS use. Similarly Fisher Exact results for dichotomized academic rank and home department failed to reveal any statistically significant findings.

Table 7
Summarized Fisher Exact Tests (p-values)for Teaching Experience (TE), Rank (R) and Home Department (HD) by Use

Teaching Strategy	TE	R	HD
Instructor-Directed in-Class Exercises in CT	1.000	1.000	.6792
Socratic Questioning	.4212	1.000	1.000
Instructor CT Disposition Modeling	.4212	1.000	1.000
Open-Book Tests	.6653	1.000	1.000
Class Presentations of Small-Group Projects	1.000	.6399	1.000
Individual Learners Acting as Class Instructors	.6146	.6146	.5784
Conspicuous Recognition and Reward of CT	1.000	.6667	.6466
Structuring the Class As a Model Society of CT	.6653	1.000	.1288
Learner Discovery of the Power and Resources of Their Own Minds	.3408	1501	.3618
Assuming Alternative Perspectives & Points of View	1.000	.6785	.4120
Drawing Reasonable Conclusions	.2112	.6785	.6734
Transferring Insights into New Contests	.6734	1.000	1.000
Cognitive Disequilibrium	.4928	.1304	1.000
Class Journal	1.000	1.000	1.000
Intellectual Log-Keeping	.1140	.6146	.0909
Instructor Intellectual Log-Keeping Lead-in and Modeling	1.000	.3750	.3333
Culture Difference Awareness/Social-Practice Approach	.0593	.2643	.5275
Social Justice Strategy	1.000	1.000	.6214
Variation on the Theme of CT	.2391	.5331	1.000
Consideration of Multiple Perspectives of Use Critical	.6146	.1304	.5784
On-the-Spot Analysis and Interpretation of Pedagogical Failure Areas	1.000	.3750	.3333
Guiding Students Toward Analysis of CT Disposition	1.000	.6146	.6311
Evaluation Authors' Reasoning The No-Choice Solution	.6146	.1181	.6311
Defusing Activated ignorance	.3408	.1501	1.000
Precipitating Activated Knowledge	.6146	.1304	.5784
Exposing and Counteracting the Egocentrism in Our Thought	1.000	1.000	.2885
Initiating Ongoing Learner Assessment	1.000	1.000	.6674
Developing a Holistic Assessment of CT	.6529	.3564	.1670
Developing Externalizing CT Presentations	1.000	.6146	.5784
Class Evaluations of Externalizing CT Presentations	1.000	.3750	.3333
Concept Mapping and Mind Mapping	1.000	1.000	1.000
Scaffolding	1.000	1.000	.2885
Argument Mapping	1.000	1.000	1.000

RQ3. Which CTTS are perceived to be effective by faculty members in PE?

Respondents were asked to rate their perception of each of the 33 CTTS on their effectiveness in promoting CT skills. The ratings were based on a 5-point Likert-type scale

as follows: (1) Indicated the perception of no effectiveness; (2) Indicated the perception of minimal effectiveness; (3) Indicated the perception of moderate effectiveness; (4) Indicated the perception of a high level of effectiveness; (5) Indicated the perception of maximum level of effectiveness. The CTTS presented in Table 8 are ranked by the number of faculty

Table 8
CTTS Perceived Effective Ratings

Teaching Strategy	f	%
Class Presentations of Small-Group Projects	14	58.3
Socratic Questioning	14	58.3
Instructor CT Disposition Modeling	13	54.2
Transferring Insights into New Contexts	11	45.8
Conspicuous Recognition and Reward of CT	11	45.8
Guiding Students Toward Analysis of CT Disposition	10	41.7
Concept Mapping and Mind Mapping	10	41.7
Instructor-Directed in-Class Exercises in CT	9	37.5
Assuming Alternative Perspectives and Points of View	9	37.5
Initiating Ongoing Learner Assessment of their Own Thinking	9	37.5
Learner Discovery of the Power and Resources of their Own	9	37.5
Variation on the Theme of CT	8	33.3
Scaffolding	8	33.3
Evaluating Authors Reasoning the No-Choice Solution	8	33.3
Drawing Reasonable Conclusions	7	29.2
Developing a Holistic Assessment of CT	7	29.2
Intellectual Log-Keeping	7	29.2
Structuring the Class As a Model Society of CT	7	29.2
Developing Externalizing CT Presentations	7	29.2
Individual Learners Acting As Class Instructors	6	25.0
Defusing Activated Ignorance	6	25.0
Class Journal	6	25.0
Open-Book Tests	5	20.8
Precipitating Activated Knowledge	5	20.8
Culture Difference Awareness/Social-Practice Approach	5	20.8
Social Justice Strategy	5	20.8
Consideration of Multiple Perspectives of Use of CT	4	16.7
Cognitive Disequilibrium	4	16.7
Instructor Intellectual Log-Keeping Lead-in and Modeling	3	12.5
Class Evaluations of Externalizing CT Presentations	3	12.5
Exposing and Counteracting the Egocentrism in Our Thought	3	12.5
Argument Mapping	3	12.5
On-the-Spot Analysis of Pedagogical Failure Areas	3	12.5

members rating the CTT as effective and are presented in descending order from the highest to lowest.. As was done for RQ2, effectiveness ratings were dichotomized by collapsing the top two categories into high effectiveness and the bottom three categories into least effective. As revealed in Table 8 the five strategies perceived as most effective were (a) Class Presentations of Small-Group Projects, (b) Socratic Questioning, (c) Instructor CT Disposition Modeling, (d) Transferring Insights Into New Contexts, and (e) Conspicuous Recognition and Reward of CT. Together these five CTTS were rated as effective CTTS by about 50% of the respondents. Clearly, there was no specific CTTS favored by these faculty members.

RQ3 Secondary Analyses. Parallel to RQ1 and 2, effectiveness ratings were compared by dichotomized versions of teaching experience, rank and home department. Table 9 presents the Fisher Exact tests summary findings form these analyses. As can be seen from this table, there were no statistically significant differences in perceived effectiveness by teaching experience or academic rank and the only CTTS effectiveness rating that differed between EMR faculty and non EMR faculty was Structuring the Class As a Model Society of CT where EMR faculty rated this strategy more frequently in the effective category than non EMR faculty.

To determine if a relationship exists between a faculty's use of a CTTS and their perception of its effectiveness, a Spearman Rank-order correlation was computed between the use and effectiveness ratings for each CTTS separately, see Table 10. Significant relationships were apparent for all strategies except Socratic Questioning and Instructor Intellectual Log-Keeping Lead-in and Modeling. Additionally, an overall Spearmen Rank-order correlation was calculated comparing the CTTS ranks. Results indicated a rank-order

correlation of 0.76, $p<0001$ suggesting that these faculty members do in fact use the CTTS that they rate as effective for fostering CT skills in graduate students.

Table 9
Summarized Fisher Exact Tests (p-values)for Teaching Experience (TE), Rank (R) and Home Department (HD) by Effectiveness

Teaching Strategy	TE	R	HD
Instructor-Directed in-Class Exercises in CT	.6785	.6785	1.000
Socratic Questioning	.1041	.4028	.3875
Instructor CT Disposition Modeling	.4081	1.000	.6792
Open-Book Tests	1.000	1.000	1.000
Class Presentations of Small-Group Projects	.2112	.2099	1.000
Individual Learners Acting as Class Instructors	1.000	1.000	.6214
Conspicuous Recognition and Reward of CT	1.000	1.000	.3905
Structuring the Class As a Model Society of CT	1.000	1.000	.0207
Learner Discovery of the Power and Resources of Their Own Minds	1.000	.6785	1.000
Assuming Alternative Perspectives & Points of View	1.000	.6785	.4120
Drawing Reasonable Conclusions.	.3924	1.000	.6466
Transferring Insights into New Contests	1.000	1.000	1.000
Cognitive Disequilibrium	1.000	.6146	1.000
Class Journal	6653	1.000	.6214
Intellectual Log-Keeping	.3926	.1907	.6466
Instructor Intellectual Log-Keeping Lead-in and Modeling	.5504	1.000	1.000
Culture Difference Awareness/Social-Practice Approach	.1222	.6146	.6311
Social Justice Strategy	.6146	.6146	.6311
Variation on the Theme of CT	.6734	1.000	1.000
Consideration of Multiple Perspectives of Use Critical	1.000	.6146	.5784
On-the-Spot Analysis and Interpretation of Pedagogical Failure Areas	.5504	1.000	1.000
Guiding Students Toward Analysis of CT Disposition	1.000	1.000	1.000
Evaluation Authors' Reasoning The No-Choice Solution	.2038	.6570	1.000
Defusing Activated ignorance	1.000	.1501	1.000
Precipitating Activated Knowledge	1.000	.3256	1.000
Exposing and Counteracting the Egocentrism in Our Thought	.5504	1.000	1.000
Initiating Ongoing Learner Assessment	.4028	1.000	1.000
Developing a Holistic Assessment of CT	.3926	1.000	.1670
Developing Externalizing CT Presentations	.0850	.6687	1.000
Class Evaluations of Externalizing CT Presentations	1.000	.5331	.2490
Concept Mapping and Mind Mapping	.6785	1.000	1.000
Scaffolding	.6734	1.000	.3625
Argument Mapping	.5504	1.000	.5257

Table 10
Spearman Correlations Between Use and Effective Ratings for the 33 CTTS

Teaching Strategies	Spearman Correlation	USE Rank	Effective Rank
Socratic Questioning	.357	1	2
Instructor-Directed in-Class Exercises in CT	.874 **	2	8
Instructor CT Disposition Modeling	.827 **	3	3
Drawing Reasonable Conclusions	.723 **	4	15
Assuming Alternative Perspectives and Points of View	.816 **	5	9
Transferring Insights into New Contests	.762 **	6	4
Initiating Ongoing Learner Assessment of Their Own	.851 **	7	10
Conspicuous Recognition and Reward of CT	.726 **	8	5
Developing a Holistic Assessment of CT	.683 **	9	16
Class Presentations of Small-Group Projects	.426 **	10	1
Learner Discovery of the Power and Resources of Their Own Minds	.780 **	11	11
Open-Book Tests	.718 **	12	23
Defusing Activated ignorance	.792 **	13	21
Social Justice Strategy	.734 **	14	26
Structuring the Class As a Model Society of CT	,689 **	15	18
Concept Mapping and Mind Mapping	.486 *	16	7
Evaluation Authors' Reasoning The No-Choice Solution	.641 **	17	14
Guiding Students Toward Analysis of CT Disposition	.753 **	18	6
Scaffolding	.652 **	19	13
Exposing and Counteracting the Egocentrism in Our Thought	.813 **	20	31
Precipitating Activated Knowledge	.833 **	21	24
Developing Externalizing CT Presentations	.687 **	22	19
Intellectual Log-Keeping	.559 **	23	17
Individual Learners Acting as Class Instructors	.692 **	24	20
Culture Difference Awareness/Social-Practice Approach	.510 **	25	25
Consideration of Multiple Perspectives of Use CT	.743 **	26	27
Class Journal	.787 **	27	22
Variation on the Theme of CT	.727 **	28	12
Cognitive Disequilibrium	.864 **	29	28
On-the-Spot Analysis of Pedagogical Failure Areas	.853 **	30	33
Class Evaluations of Externalizing CT Presentations	.637 **	31	30
Argument Mapping	.533 **	32	32
Instructor Intellectual Log-Keeping Lead-in and Modeling	.377	33	29

* Correlations significant at $p<05$
** Correlations significant at $p<01$

Interview Findings

The data were analyzed using Suskie's (1992) guidelines for coding qualitative data. Content analysis was used to identify, categorize, and code the primary patterns in the data. After reading the responses, words and phrases were highlighted. Then the descriptors in all participants' comments were extracted and compiled into a list. Meanings were formulated by reviewing the significant words and phrases. Words and statements of redundancy were eliminated, and many of the words and phrases emerged as themes.

RQ4. What are the steps taken by PE faculty in implementing the different kinds of CTTS?

To narrow down the number of CTTS to a reasonable number, only the top five CTTS were covered in the interview. Table 11 shows the top five CTTS and the emergent themes developed from the content analysis of the interview transcripts.

Table 11
Top Five Strategies and Associated Themes

Teaching Strategies	Themes
Class Presentation of Small-Group Projects	Sharing and Taking Ownership of Their Learning
Socratic Questioning	Challenging Students
Transferring Insights into New Contexts	Hands-on Experience
Conspicuous Recognition /Reward of CT	Benchmarking
Instructor CT Disposition Modeling	Bring the problems to the classroom

Strategy 1 Class Presentations of Small-Group Projects. Survey endorsement of this CTTS among the study's participants indicated they used this strategy for both ongoing and completed projects. During the interviews, participants expressed a number of ideas or

implementation steps they use to engage students in the CTTS. One participant indicated that "after introducing concepts [instructor introduction] in this way, the class breaks into small groups, generally working toward making small group presentations to the class concerning the assigned idea or problem. I use simple problems to solve in small groups." Analysis of the interview transcripts suggested that the way instructors use this CTTS is to fostering learning ownership among the students.

Sharing and Taking Ownership of Their Learning. One participant simply stated, "I find ways for them to take ownership: group presentations. We set up a debate— say between qualitative and quantitative approaches." Another participant offered, "We use small groups. I comment on their work. This leads to further discussion. We present with small groups and revise with small groups."

One participant emphasized "feedback, evaluation, sharing information, group evaluation of one another, not depending on you [the instructor]." The small group generates interactive implementation and helps structure learner autonomy and responsibility for individual learning. Another form of implementation was for the class as a whole to provide open-ended questions for each group's exploration and analysis.

From another perspective, group work embodied learner sharing of "progress in their projects and associated learning with their peers." Small group work emerged as "discussion and presentation of ideas inherent to learning." Implementation of the strategy was initiated in one case with the instructor's "course list of topics suggested as possibilities," all of which were expected to change, "as individual learners develop their interests independently and report on them." In a similar instance, presentations were also initiated on "recommendations about ideas/material/applications introduced/covered in class." This latter implementation rather clearly combined multiple CT initiatives within a single focus.

Another approach emphasized not simply "sharing with class members individual informational findings," but also, "relevant individual experience," which drew two key strategies (group work and relating life experience to learning— as in the literature these strategies are typically co-determined) into a single execution.

Strategy 2 Socratic Questioning. Survey participants who endorsed this CT teaching strategy suggested a fairly strong presence of instructional implementation to "probe individual assumptions of learners and of the instructor," as the strategy specified. Information from interviews of the participants is presented, followed by information from examination of extant data, in each case correspondent with implementation of this strategy.

During the interviews, participants discussed deployment of this strategy according to multiple channels and perspectives. One participant considered Socratic Questioning as singularly apropos for introducing new topics, new sections or levels of the course. This same participant, however, regretted his own deficiency, and suspected similar deficiency within most instruction, in actual implementation to this effect due to common understanding that Socratic Questioning was far too time-consuming a process for broad usage. The central theme driving the implementation of Socratic Questioning was to challenge the students.

Challenge Students. Socratic questioning, the participant maintained, was ill-advised when the instructional agenda necessitated "covering large amounts of information." The same participant described implementation succinctly as, "giving the question back to the student." The participant modeled turning questions into other questions: "I don't answer questions," which worked to good effect with the learners, who acquired the habit also: "I use questioning; they turn it into another question." This enactment of continuous recycling of questioning may resonate considerably more with current CT learning theory which

emphasizes the value of protracted, probing focus upon questioning, while deliberately resisting any compulsion to settle matters with what appear at the moment as acceptable responses, either affirmative or negative.

To some extent the participant joined the process of Socratic Questioning through assuming the apparently larger pedagogical agenda of using "the technique of making them uncomfortable with their knowledge, they begin to learn with fearing that their knowledge is inadequate". This characteristic of Socratic implementation indicates, of course, a major, underlying premise: those learners (Socrates included) had first to clarify, order, and substantiate their own base assumptions and suppositions which in the initial encounter are almost never engaged with easy success.

With some reassurance and support in the form of subsequent Socratic mentoring, learners are able, at this point of "cognitive disequilibrium" with assistance, to better prepare them to learn. This reconsidered and restructured form of learning is intended to carry the learner to heightened, cognitively more aware, and more critical ventures of the intellectual and pragmatic application.

During the interview, some of the other participants seemed to regard any questioning process they implemented as Socratic questioning. Hence, said one, "I follow up with their responses. I push them to generalize or think about something they haven't considered. For example, I ask them to alternate between positive and negative. This makes you think. Does it disadvantage anyone? I try to raise issues or ideas they haven't considered."

Part of this self-analytical process appeared to coalesce with the CT injunction to maintain an open mind, an intellectually accepting point of reference: "Start with the most general, no wrong answer, what are the assumptions, think outside the box... They [learners]

show what, how, assumptions, and conclusions they arrive at." This informant strongly expressed a desire "to move to a more Socratic style, but you need to develop this style. The problem is in a large lecture, you tend to focus on only 10-12 students at a time, and the same ones."

In terms of information extracted from extant data relevant to implementation of the Socratic method, the following statements seem germane: "What was good enough for Socrates is good enough for us: Assist learners to address and clarify all of the following on a continuous basis: the knowledge they seek; the questions to which they require answers; how others addressed these questions; how they, individually, can discover answers to their questions, inclusive of relevant data acquisition; why they are seeking such answers; and, what they would accomplish should they acquire the learning and answer to the questions they pursue."

Strategy 3 Transferring Insights into New Contexts. Participants' high level of endorsement for perceived effectiveness and use for this strategy indicated support for or involvement with implementation which focused on group discussion of life experiences, followed by application of real-life insights into evaluation contexts. Information from participant follow-up interviews and the study's examination of extant data is provided below.

In terms of interview evidence of implementation for this strategy, one participant asserted that implementation was conditional to setting (context). However, for connecting learning with application/life experience (possibly of correspondent others) the case study was the modus operandi of choice. Another implementation initiative emphasized instructional presentation of "topics and thinking from my experience to the class." Another implemented through eliciting examination of "how the subject under study [for class as a whole or group] connects with other industries." Demonstrating knowledge of

facts while focusing on implementation of "learned procedures" was the focus of implementation for another.

Hands-on Experience. Implementation concerning relevancy of life to learning found focus in multiple structures and initiatives: "Teaching CT is a separate activity. Then, try to transfer it to practical life." Relate instruction to pragmatic concerns and needs. Always combine knowledge and application of knowledge. Relate the technical learning of evaluation to the real-life political context. Help learners bring themselves into line for a job. Establish a bridge between school and work. Turn toward the profession and professional setting for real-life connection. Strengthen the connection between profession /clients and teaching/learning. Provide hands-on, case study, experience in writing reports. Examine causation contexts with preference for student examples. Seek evaluation principles application to actual life ethical dilemmas. Combine emphases on meaning, relationship, and application.

One participant emphasized presenting clinical scenarios: the information clients need; the interface with the client. Learners remain abreast of how research is reflected in the popular literature [meaning newspapers, magazines, books not related to the discipline/subject matter], how science has interfused day-to-day life. Always carrying the investigation of learning "beyond the classroom" was considered essential for CT life-application implementation. Another respondent stated, "My whole motivation is to teach so that it transfers to the field." Implementation toward transferring insights into new contexts initiates with looking for patterns, explaining patterns and then applying solutions based on insights from one problem that transfer to another. Any gain in CT, anything you do in that respect automatically enables transfer to other situation/context areas. "CT helps you understand content."

Another aspect voiced from the above participant, assuming the obverse perspective, was offered as delineating CT as that thinking which "occurs while you're thinking about something else." Learners need to be activated within understanding of the whole process of learning and how one transfers this "to other courses." Another very basic, but, at the same time, instructionally demanding, approach was to have the learners work with professionals in the field. The participant helped to prepare the learners with questions appropriate to the field. Hands-on learning, class case reports, and provisions of opportunity to apply learning were all used. Learners' venturing into the field to seek expert advice and answers, of their own initiative, was greatly encouraged. Development of practical application and interpersonal skills was a key point. Simply encouraging and when and where possible, facilitating learner access through their own inclination and initiative professional contact in the field, within the relevant areas of active professional engagement, were stressed. Along the same lines, another participant modeled applying ideas from class to current issues as the essential point of embarkation for transfer of insights.

Information concerning implementation of transfer to new contexts was extensive in the extant literature, more so in terms of indication of learning activities rather than instructional directives. Instructional directives, however, covered much ground. Instructors did all of the following to effect the strategy: They encouraged learners to capitalize on previous experience and skills. They used assessment related to learners' connecting course work with individual fields of interest. This was accomplished individually or in conjunction with other learners. Class discussion was widely used to promote learner contribution to deliberations concerning competencies needed for expert skill in evaluation. Teaching all topics from an applied perspective was almost universally pursued. Supporting and assisting learners in structuring their learning through their

personal experience was indicated as essential as well as guiding field application of principles with intermittent group discussion of progress and contingent issues.

Strategy 4 Conspicuous Recognition and Reward of Critical Thinking. During the interviews, benchmarking was mentioned by several participants as allowing learners to structure a built-in reward system through adherence to recognized achievement levels and professionally endorsed stipulations of achievement. This direction of reward and achievement was viewed as motivating, satisfying, and encouraging. Monitored, stipulated achievement was viewed as innately instilling essential confidence in one's capacity to reach expectations for accomplishment.

Benchmarking. This theme fostered a certainty about process, application, and seeing confirmed results, including a level of professional endorsement for meeting criteria and developing analysis skills. Interviewees understood the very apparent, noticeable, and shared reward inherent to having learners participate meaningfully in pedagogical structuring. As the process unfolds, learner structuring of the class agenda, "the things we will do," and, perhaps more in the vein of drawing out CT, determining of "the advantages, disadvantages," of various and optional ways of proceeding, along with attendant concepts and ideas (that is, concepts, ideas emergent from process decision) realize multiple CT stimulation and substantiation— beyond reward itself.

Another participant emphasized offering immediate and conspicuous reward to learners through providing direct access to their own determination and individual structuring of the overall learning engagement, which surprisingly, the participant interpreted as a very "traditional" take on the matter. Simply put, the instructor recognizes and engages through "having them go to the board to see what they can do."

Another participant characterized a form of broadly defined reward and recognition, inscribed throughout the learning process, as pervasively posing the query, essential to every step made or interconnection derived: "How can we explore this together?" Having learners describe their own expertise in evaluation and encouraging them to assess their own accomplishment in the learning process were described as indications of such recognition and essential to mutual progress, exploration, and learning.

As a co-investigator, rather than authority figure, the participant strove to ensure that recognition and reward came to the instructor and learners alike, through shared success, after "trying to develop their thinking," toward the achievement of "well-founded thoughts." The reward is actually more intense, in a doubling sense for the instructor, who shares the increase in accomplishment exactly along with the learners, but also achieves the realization that as the burden of instructional control of learning is lifted (from the shoulders of learners and instructor alike,) the instructor is assuredly "better off to have them [the learners, that is] do things [such as design, invent, structure all of their own learning]," yet still, with the instructional proviso that "some courses are more amenable, others not."

Assisting learners to assess and apply their own evaluation designs was viewed as highly rewarding, allowing them "a chance to fly" (which is to say, "try their wings in independent, actual practice contexts"). Letters of commendation rather than grades added up to more significant reward and recognition for graduate students of one participant. Unabashed recognition rendered up to learner input, accomplishment, or expression of individual interpretations and positions, vis-a-vis the ongoing course of study— input which has perhaps exceeded the ongoing instructional/professional expectations or levels, and is thus instructionally extolled— may comprise the maximum reward and recognition.

Strategy 5 Instructor Critical Thinking Disposition Modeling. The critical feature throughout scholarly consideration of implementation for this strategy was of course emphasis upon attitudes, motivation, self-direction, dedication, and so forth, which the instructor when engaged with this strategy must clearly evince, providing learners with material evidence of the rewards, satisfactions, and deep learning absorption possible, through CT application to material, projects, and ideas..

Bring the Problems to the Classroom. A participant exploited her own preoccupation with extensive research projects by making them, as well as her evident research dedication and diligence, the focus of learning engagement: "I bring into the classroom the problems I encounter in doing my research, in relation to what I should teach—the struggles." One respondent indicated that positive, well-directed and – articulated CT disposition was most effectively modeled through the transparency of preponderance of instructional effort to do everything possible "to foster CT in the classroom." This pedagogical preoccupation was viewed as "more important" than course content. Learner satisfaction with simply mastering content was viewed as a professional source of irritation, if not demoralization. The instructor was "frustrated with students satisfied with content [viewed as the norm (perhaps for both the instructional frustration and the learner limitation in learning focus)]." The clear need, for the learners, that is, it seemed, was "to be taught to go beyond," and, thus, the instructor's most essential role and most pedagogically effective action were to persistently foster, directly, explicitly, as needed, CT as part of the context of every opportune classroom aspect.

Information from examination of extant data suggested the following concerning instructor CT disposition modeling. One instructor emphasized direct setting up of experimental design (modeled in class process, of course, by the instructor) and conducting

the process as essential to evidencing (or modeling) "the disposition and direct application of science." The instructor modeled the process as invoking "analysis of experimental design and how to draw appropriate conclusions." Another instructor drew attention to and would initiate demonstration of (within class CT facilitation) the process of "how to focus one's interests, how to utilize relevant research, how to frame research questions, and how to individually design a workable study."

Another informant provided explicit, direct CT disposition modeling through engagement to "succinctly disclose with supporting detail... rationale for emphasis upon [designated] perspectives [used to structure the basis of the class]." Another evidenced modeling of CT simply, but comprehensively, in terms of the evident learning structure of the class: "Structure the course and associated facilitation as foundational to learners' further formal study, independent reading and research, and other work in related fields." And, at the same time: "Disclose this structure and your thinking and rationale relevant to outcomes associated with learners' extended interests, involvement, and study."

Another instructional approach to implementation was to inquire into "design issues in the educational setting." Assessment was viewed as the essential opportunity and occasion for instructional modeling of CT disposition. Thus, for one thing, assessment must always clearly implement and display "multiple outcome measures" per assessment. Assessment helped to determine instructional facilitation, and in this view, it modeled instructional disposition toward CT within a very tangible context.

RQ5. What are the different outcomes intended by PE faculty in implementing the different kinds of CTTS?

Survey, interview, and extant data findings (i.e., course syllabi) are reconsidered in terms of indications of CT pedagogical intentions. Survey questionnaire teaching strategies

are first reiterated as essential to fully incorporating findings concerning expected outcomes or pedagogical intentions emanative from the qualitative data. For this purpose, CTTS were organized according to their fit within an identified categorical grouping. Each of these groups embodies and gives description to a specific, identified, and pedagogically unifying CT teaching intention (CTTI). The given CTTI corresponds to the usual pedagogical understanding of "outcome," but is more informative and useful in that it embodies the critical aspects of intentionality and purposive strategic design with identified, reasonably predictable expectations. The strategy groupings with a corresponding description from the survey questionnaire answer sheet are numbered as they appeared in the survey questionnaire (see Appendix F).

The six CTTI groupings were determined by grouping the 33 CTTS presented in the survey questionnaire: (1) Learners are supported, (2) Learners are stimulated, (3) Learners envision their own learning, (4) Learners openly share learning, (5) Learners reflect upon experience, and (6) Learners imagine and evaluate various problem. Extracted extant data statements of information were also considered and similarly organized according to the CTTI grouping. Within the six CTTI groups seven descriptive categories were determined from literature and applied to each grouping. The descriptive categories are as follows: Experimentation, (b) Self-learning, (c) Logic., (d) Multiple Perspectives, (e) Communication, (f) Pragmatism, and (g) Self Assessment. Table 12 provides a summary of the information from both interview and extant data presented according to six CTTI's by each descriptive category

Table 12
Six CTTI Groupings by the Seven Descriptive Categories

	Experimentation	Self Learning	Logic	Multiple Perspective	Communication	Pragmatism	Self Assessment
CTTI 1	Understanding what's involved Designing a workable study Evaluating design issues	Take ownership of information Learn from expert modeling of critical thinking	Thinking through problems Discovering underlying assumptions	Engage in experimental thinking process to introduce news topics Demonstrate of multiple perspectives for evaluation	Thinking " out loud" Learn to develop question	Understanding application of strategies Learning through problems	Understanding ones own accomplishment levels Understanding thought process of others
CTTI 2	Providing sufficient data for interpretation/design Evaluating Data Discerning between essential	Developing mastery of reflective thinking Writing response papers Tailoring ones learning Trying multiple learning strategies	Considering strongest alternatives Justifying ones critical discernments and decisions	Attending to alternative explanations Assuming alternative mindsets	Mastering increased sensitivity and mastering in terms of word view Using questioning approach	Provided examples Find opportunities for innovation and improvement	Awareness of deficiencies Reviews change in ones own thinking Examining how ones world view influences ones evaluative stance
CTTI 3	Preparing an instrument for use is revenant Developing conceptual skills of design analogies and interpretation Assembling ones own individual competency tool kit Intrigue survey studies and findings	Taking ownership of ones learning relying on oneself or other learners (rather than instructor) Instructing ones own learning Accepting that burden of learning is on the learner	Focusing on low arguments are put together Working through problems, defining solutions Developing predictable questions Identifying key concerns	Going beyond knowledge of content Examine proposals Exploring underlying scholarly debate Compare and contrasting classic theories	Acknowledging contributions of others Contributing professional quality participation Contributing to student led sessions	Drafting outline of research proposal Preparing publishable reports presentations Successfully completing open note exams	Utilizing "art of empowering people" Identifying gaps in ones own learning Developing approaches to fill those gaps

Table 12 – Continued

	Experimentation	Self Learning	Logic	Multiple Perspective	Communication	Pragmatism	Self Assessment
CTTI 4	Develop small group projects relevant to research Selecting Methodology	Participate a learning through group engagement Topic hunting	Solving problems in small groups Reading critically Interviewing fellow learner	Contributing to class and small group debates Showing facility with diverse perspectives and approaches	Participating in small group presentation Refining feedback skills Engage in constructive debate	Developing strategies for influencing policy Sharing work experience Present implementation	Nourish interest in differences Openness to critiques of one's work
CTTI 5	Perceives flaws in argument and/or methodology	Determines relevance of course information Expresses personal philosophies of management and leadership	Understands systems thinking and connects with other areas Finds patterns Critiques articles in the profession	Joins separately-learned concepts Synthesizes multiple types of knowledge Transfers learning to other fields	Reporting on what one learns in case studies Enhancing interpersonal skills Consider competencies of skillful evaluation	Combining knowledge with practical application to bring self in line for a job Applying information from research articles	Awareness of cultural differences Connect course work with field of interest
CTTI 6	Use primary resources of information and research and evaluate trustworthiness of these sources Concentrate on over-arching issues inherent to research initiative	Distinguish between learning/problem solving and passing a test Comprehend role of power and politics in all human interaction	Putting facts to work Favoring problem based learning Practicing art of conjecture Find successful learning through inquiry as opposed to lecture Keep core focus and work through thorniest issues	Consider situations with no right answer Work from position of "not enough information" Put self in alternate contexts Make multiple perspectives customary in one's conversations	Enthusiastic participation in "heavily inquiry oriented" learning	Dealing effectively with real-world messy problems Applying major categories for explaining behavior Weaving together various strategies of one's discipline and critical thinking.	Reconstructing what one has projected in discussion Reflecting on one's own thought processes. Determine one's own knowledge base

QR6. How do instructors assess the intended outcomes for the "effective" CTTS they implement?

Said one participant,

> "... it is critical to never lose sight that assessment is in actuality primarily for adjustment/improvement of the teaching. Therefore, instructional assessment must come to terms with attainment of whatever it was the instructional process was trying to convey. If meeting that objective was not much in evidence amongst the learners, then rethinking of the instructional process becomes top priority. Beyond that, rethinking of our assessment is needed when learners respond insufficiently to our expectations. As teachers, we need to learn how to come up with the right questions."

Table 13 showes the CT assessment techniques used by the interview participants.

Table 13
CT Assessment Techniques Used by the Interview Participants

Homework Assignments
Quizzes and Tests
Rubrics and Benchmarks
Formative Assessment
Self-assessment
Peer-assessment
Synthesis or Higher Level of Bloom's Taxonomy
Open Book Tests
Problem Solving Approach
Group Evaluation
Working with Professionals
Solve Real World Problem
Multiple-choice Items

Several participants endorsed dialogic assessment processes since, from such point of view, engaging learners in dialogue was viewed as the best assessment approach. Assessment must work to assist the structuring of present and future learning. Assessment was best

realized through imposing elemental demands on learners in terms of exercises and requirements and in terms of levels of expected proficiencies. Participants expressing enthusiasm for dialogue also ascribed to various amplifications of this process: writing exercises every morning; having students go to the board and see [assess] what they can do; seeing what new ideas they can trigger [any format, the idea triggered, and not the format it is triggered in, registering as consequential]; analyzing case studies; learners developing their own context and structure in response to assessment process; and providing both their best answer and (more importantly) justifying that answer, identifying alternatives, and explaining the insufficiency of such alternatives.

Another participant required that learners both demonstrate their knowledge as adequate and impress that they have full confidence in that knowledge and its application(s). Learners must support all answers/conclusions with data and show understanding of related research. Writing and oral exchange were emphasized, but justifying choice in *multiple choice* was considered also appropriate by several instructors in terms of requiring demonstration of CT. In such case, justifying approaches used for response was emphasized.

One of the participants emphasized the important of *questioning*. "I assess my students by asking them to provide me with questions" they have about the topic because questions generates more questions and if students have questions about something that means they are thinking and learning "answer is a stop signal in thought". The quality of the questions students pose concludes the quality of the thinking they are doing

One faculty added that he makes judgments about students every day, based on informal and formal appraisals of classroom work, *homework assignments*, and *performance on quizzes and tests.* Assessment rubrics listing *benchmarks* for student achievement assist in evaluation by providing objective guidelines to measure and evaluate learning. These rubrics

also improve learning because students who understand them before a project is due can take the evaluation criteria into account as they complete their work.

One of the respondents gave details in how the instructor assess students by saying I asked students to reflect on, make a judgment about their own work and their peer's work and performance; the evaluation tools could include sentence completion, Likert scales, checklists, or holistic scales. This method helps students to gain information about themselves and how they view their performance. But I tell them this for *formative assessment* and not for summative assessment to make the process safer. *Self-assessment and peer assessment* allows for an honest sense of their own level of understanding

Self assessment by learners was used in more than one case by participants. Learners were required to demonstrate CT. In one case, assessment was carried out daily to determine extent of "drawing reasonable conclusions." Another assessed through responses to "reflective questioning." Another emphasized appropriateness of "rationale" and evidence of having considered other aspects or ways of thinking.

Every assignment I use required student cognitive manipulation of the material at the *synthesis or higher level of Bloom's taxonomy* a faculty member believed. In some of the project that I asked students to do I ask students to make meaning of the information and incorporate it into their own mental world model by generating example calculations, illustrations, tables and/or diagrams

Open book tests were perceived by participants as useful, since participants understood the need to go beyond simply content knowledge and "parroting back" of information, but open-book was at the same time quite often viewed as too time-consuming, and, therefore, the extent of actual use, despite clear knowledge concerning, and fairly consistent support,

remains somewhat questionable. One participant noted that open book assessment was far more difficult, if properly structured and carried out, than the usual "parroting" approach.

Problem solving approach was perhaps the most consistently mentioned factor for assessment among participants. One participant emphasized problem solving throughout the learning process, culminating in the assessment: "individuals must demonstrate capacity to work through problems from defining through solution." Through problem solution, in summary, assessment was focused on evidence of "well-founded thoughts." Another participant noted continued emphasis upon drawing reasonable conclusions as essential to assessment: "In terms of assessing outcomes related to development of CT, detective-type stories are used to demonstrate the process of group decision-making."

Group evaluation of learners by one another and "not depending on you [the instructor]" was customary for several participants. Evaluation through group process in terms of responses to open-ended questions concerning instructor-selected topics was indicated by one participant. Another indicated that reading critically, *writing in teams*, and revision by committees was absolutely the best way to assess. One participant relied on anonymous evaluations by small group team members of one another. Another always had learners grade one another's papers.

Emphasis upon "how to implement procedures while clearly demonstrating knowledge of facts" was specified for assessment by one participant. Case studies, all the way down the line, amongst participants, were touted as more useful than "exams." Transferring class knowledge to "practical life" was a universally key element in assessment. One participant thoroughly "professionalized" assessment, in stating that, "How we assess is they have to send out the report. We don't give a grade. They get a letter of commendation."

Another participant stressed that the necessity of having the learners "tested on content, but also on application to different types of problems." Another seemed certain that testing for content could also access CT, since the value of incorporating CT was to increase the learning, overall, in the content area. Thus, excelling in content knowledge, but especially excelling in content application, indicated acquisition also of CT. This perspective was rather clearly supported in the literature of CT pedagogy.

Another participant understood that assessment must "ultimately" be achieved through evaluation of written and oral demonstration of ability to critique current scholarly articles in the learner's own field of future work. Open-ended questions in this respect were preferred. One participant demanded transfer of all knowledge and insight into alternate contexts in terms of learner assessment response. Several participants, to one degree or another, echoed such predilection, with one stressing that the whole motivation and expectation was that learning manifest as transferable to multiple contexts, especially in evaluation, and thus assessment must engage to discover and evaluate this attribute. Through written and dialogic assessment process, "We're looking for patterns [and the capacity for] explaining patterns. . . . They are tested on content, but also on application to different types of problems." As with a previously cited participant, as noted above, one respondent clearly grasped that since CT was engaged to strengthen course learning in the fullest sense, one could, and likely should, assess content and CT attainment occurring as one. One should test for content knowledge and assume attainment in that respect was largely an outcome of having incorporated, on the part of the learner, essential CT learning stratagems, as pedagogically intended, because as the participant was at pains to explain: "I think CT has to be about something. CT helps you understand content."

For another participant assessment was directed through learners' acuity and facility in *working with professionals* in the field and then gauging these learners' capacity to deal with the instructor's questions addressed to that experience. In a similar vein, among many respondents, assessment had to focus upon achievement of desired outcomes from hands-on learning; primarily it had to consider the quality of learners' reports concerning what they achieved in class case-studies and the extent to which learners, by means of such reporting, evidenced taking opportunity to correctly apply what they had, in simulation or in the field, learned.

One participant emphasized assessment of learners' capacity for doing two things: pursuing one's own thought process to significantly deeper levels than had been the case prior to the learning intervention, and, similarly, joining unlike concepts together and putting them together, to work for rational effect. Another emphasized assessment of how well learners could comprehend and *resolve real world, "messy" situations* with which they were presented. This participant also stressed in assessment the learner's ability to access and utilize pertinent, available resources when resolving problems, contexts as presented for assessment purposes. Another explored assessment through problems, *inquiry scenarios* intentionally constructed and presented as having no right answer. Through such a process the instructor required solution but just as importantly required exposition of one's assumptions leading to understanding of one's answer or solution as the best. Another, for assessment, often presented in that context a variety of solutions to the considered problem for learner evaluation. In this approach, analysis, clarification, and justification of one's assumptions were addressed as of primary importance: any response is correct, providing its justification seems rationally developed and convincing. In a somewhat correspondent vein, one participant emphasized in assessment the learner's capacity for completing the

incomplete picture, making organized and structured what was presented as vague and loosely delineated, while demonstrating capacity for working through ambiguity with patience and concentration. This assessment process often introduced and required attention to far too many variables, accompanied by entirely insufficient data, making multiple alternatives seem reasonable. Essential synthesis of material was the process instructionally evaluated for assessment, from this participant's point of view. Another looked primarily in assessment for the learner's ability to assume alternative perspectives, to convincingly assume another's position, and from such vantage argue convincingly multiple points of view.

A final participant contributing to the rich dialogue of assessment added a somewhat original twist in emphasizing conjecture. The learner's expanded capacity for meaningful conjecture, including application to the professional, practical realm, and convincing structure of scenario and results, was what the instructor sought to develop through class experience and thus to gauge enhancement of thorough assessment.

CHAPTER V

CONCLUSION, DISCUSSION AND RECOMMENDATIONS

This study was conducted to identify effective CTTS as perceived by PE faculty, in preparing graduate students as future program evaluators. Secondly, to examine the different ways faculty members of PE implement CTTS in their teaching practices. A third purpose was to document the specific assessment methods used by these faculty members to assess and measures students' CT performance during classrooms and field experiences. In this chapter are presented the conclusion, a discussion of the study, recommendations, and suggestions for further studies.

Conclusion

The demographic data for the 24 participants represent a fairly homogenous group, with the majority of the educators holding the rank of full professor with many years teaching experience. It also showed that most of the faculty members teach in the EMR program.

The finding revealed that 29 % of the faculty had prior knowledge of 33 strategies on the survey, moreover, 50 % had recognized 23 strategies, and 70% were familiar with 10 teaching strategies.

The top five CTTS used by faculty were (a) Socratic Questioning, (b) Instructor-Directed in-Class Exercises in CT, (c) Instructor CT Disposition Modeling, (d) Drawing Reasonable Conclusions, (e) Assuming Alternative Perspectives and Points of View, although their actual use was rather low, by between 38% and 58% of the faculty. The five strategies perceived as most effective were (a) Class presentation, (b) Socratic Questioning, (c) Instructor CT Disposition Modeling, (d) Transferring Insights Into New Contexts, and (e) Conspicuous Recognition and Reward of CT. The most common forms of assessment

were (a) Essay Examination, (b) Peer Assessment, (c) Self Assessment, (d) Project Assignment, (e) Case Study, (f) Group Problem Solving, (g) Instructor/Learner Dialogue.

The findings from this study suggest that PE faculty have extensive, in-depth pedagogical understanding relevant to CT. PE faculty members implement various CTTS in their classrooms. However, the findings also suggest the need to further develop faculty knowledge of CT and their implementation. Specifically, several faculty indicated that participating in this study helped them to better understand CT and that they would possibly participate in professional development related to incorporating CT practice in their teaching.

This study supplied the researcher with a richly, comprehensively informative depth of understandings concerning approaches toward CT pedagogical application to graduate programs in evaluation. Interpretations introduced at this concluding point of the present study are in fact preliminary considerations, hopefully pointing out likely channels for more elaborate inquiry and investigation. Having said that, nevertheless, the researcher is confident that Chapters IV, and V provide clarification to important area of inquiry which seeks to both understand and facilitate the operations of CT, within graduate-level learning and pedagogy.

Discussion

The discussion section is aimed at examining the findings of this study in relation to the stated problem of the study, and in light of the literature review. The following discussion examines the five top CTTS that the participants rated as highly effective for teaching evaluation in a graduate program.

Class presentations and small group discussion strategies were the most highly rated CTTS. Evaluators have to be able to lead small group discussions as well as be able to teach

others the skills and dynamics of small group participation. Evaluation is a group process; being able to present and discuss the issues, with both good presentation and active listening is essential. Evaluation requires a close working relationship between evaluators and the client or client group. Throughout the evaluation process, evaluators interact with stakeholders during all evaluation activities (Alkin, 1969; Cronbach, 1963; Frisbie, 1991; Stufflebeam, 2001). The best way to understand evaluation theory and procedures is through participation and one useful technique that accomplishes this is participation in small group discussions (Alkin & Christie, 2002p. 210). Class presentations and small group discussions were viewed as instrumental in facilitating learners' taking ownership of their learning. This factor, expressed in several instances by participants in terms of "learner ownership of learning," rather clearly lies at the core of the relationship between CT and all pedagogy, and perhaps most particularly evaluation pedagogy.

The second CTTS that emerged throughout the survey and interview findings was that Socratic Questioning is an important tool to improve the quality of the evaluator's role and work. Being able to investigate the issue from different angles is essential to make the stakeholders think about the difficulty they are facing. Frisbie (1991) believes that ambiguity is inherent to evaluation and no single person or group has either all of the answers or the single best answer. In addition, he believes that being able to use questioning in evaluation is an important factor that would lead to the right plan to solve the problem. In other words, the more questions asked, as in the categories listed by Paul, Elder, and Bertler (1997) the more productive the discoveries and truths. Stakeholders are enjoined, through the consciousness-raising process of evaluation, to transform the evaluand. The inquiry process of evaluation is governed by whatever emerges, through stakeholder and evaluator input, as considerations for effectively changing and improving society. In this study there was strong

endorsement of Socratic Questioning throughout ant the use of this strategy went much beyond simply instructional practice to respond to learner questions with a follow-up, instructional question.

Transferring Insights into New Contexts was also highly regarded by the participants, both in frequency of use and perceived effectiveness, for its apparent stimulation of participant thinking. This CTTS emphasizes the importance of real world practices for students studying evaluation (Altschuld, 1995; Cronbach, Ambron, Dornbusch, Hess, Hornik, & Philips, 1980; Chelimsky, 1997; Fitzpatrick, 1994). Moreover, evaluators need CT skills to transfer knowledge and information from one situation to another (Stevahn, King, Ghere, & Minnema, 2005). They must transfer evaluation theory to the project in the field and also use what they have learned from previous evaluations. They have to apply this knowledge to current projects or those planned for the future (Worthen, Sanders, & Fitzpatrick, 1997). Trevisan (2004) indicated there is deficiency in practical evaluation training and that future evaluators need hands-on or practical experiences during their education that would help to transfer the knowledge. The transfer of learning was thought to depend upon learners acquiring base knowledge about the learning process in general. This concept corresponded closely with CT pedagogy imposition to bring the learner focus more into line with the process of learning engagement. Projection of the idea of discerning patterns common to various types of learning/subject matter/life experience/professional application also strongly underwrote CT formulation. Stressing the importance of learners establishing their own direct contact with professionals in the field, again, brought evaluation learning into line with CT pedagogy. CT emphasis upon building interpersonal dialogue was connected to the high value placed on transfer by participants. Transfer of understandings from life, learning, and then into professional practice could all

only be realized through strong interpersonal relationship skills. Instructor facilitation, encouragement, and attendance to the processes learners set out on were all viewed as essential.

Reward and recognition was viewed as important to the creative aspects of CT, primarily in terms of clarifying its direction and in helping to emphasize how mutually-shared learning interacted with individual creativity and the full process of "developing one's own learning." Instructors implemented reward to channel CT process toward both explorative approaches and creative responsibility to invent one's own learning. Through heightened cognitive stimulation and sense of recognized achievement, learners were conditioned to accept and exploit a heightened learning challenge. Learners and instructors were joined as co-investigators of process and phenomena. The instructional role of authority was revealed as pure fabrication in terms of authentic learning and CT. Learners were viewed by one participant as joined with the instructor as they mutually tried to "develop their thinking." To one, achieving "well-founded thoughts" stated the learning intention and the basis of reward. Enabling learner independent CT through recognition of its engagement was seen in one case as clearly doubly rewarding for instructors. Their pedagogy found much greater success through the only channel available; lifting the burden of instructional control from the instructor and allowing it to rest in its natural state with the learner. Instructors are doubly rewarded as they perceive the ease which had been inherent to the process all along and that incrementally, without limits, they (the instructors) are "better off to have them [the learners, that is] do things [such as design, invent, and structure all of their own learning]." Recognition for CT, expertly provided, is paramount for facilitation of required learner self-activation, without which all other learning and facilitation possibilities fail.

The last of the five strategies identified as most frequently considered effective in terms of participant survey response was Instructor CT Disposition Modeling. This CTTS was viewed as especially germane to evaluation pedagogy, since it was understood that clinical enactment of evaluation procedure depended as much upon how the process and the evaluator were perceived as it did upon the actual substance of the evaluation process (Alkin & Christie, 2002).

Finally, a discussion of how valuable these five strategies are in teaching evaluation and how much impact these strategies have on the quality of the graduate of program evaluation is relevant. Using CT strategies in evaluation has been supported in the fields of both evaluation and CT as conducive to advance in evaluation process and results (Scriven, 1991; Stevahn, King, Ghere, & Minnema, 2005; Cromwell, 1992). Increasing the use of CT within the practice of evaluation seems a rational directive for improving evaluator competency, quality of evaluation outcome, and acceptance and use of evaluation outcomes by stakeholders.

Evaluation graduate programs should incorporate instruction in CT. Teaching strategies and techniques which foster CT among graduate students in evaluation might then act to improve their levels of competency. A more solid foundation in CT will facilitate individuals' preparation for engaging rewardingly with the evaluation challenges of the future. Bloom's (1965) assertion that evaluation is the most sophisticated of cognitive skills combined with Scriven's (1991) recommendation that the quality of evaluation reports would be enhanced by increased focus on CT carries strong implications for ways to meet these futures challenges. These five strategies, then, may be explicitly and fundamentally important to integrate into PE programs that prepare future evaluators. CT lies beneath all evaluation procedures (Stevahn, King, Ghere, & Minnema 2005). The emergence of these

five strategies from a field of 33 suggests that they may be the most important areas for development in students' learning.

In this study, participants, overall, assessed learning outcomes in multiple ways including essay exams, peer assessment, self-assessment, and case studies. These are all strategies that are in line with assessment strategies recommended in the literature as eliciting most valuable information from students about their learning experience. (Facione & Facione, 1992; Halpern, 1993; Murphy, Conley, & Impara, 1994; Scriven & Fisher, 1997).

Recommendations

The findings of this study and the concurrent review of literature lead to several recommendations in the area of teaching CT teaching strategies.

1. This study serves as a foundation for further research and provides faculty with information for professional development in relation to CTTS. The follow up interviews indicate that PE educators desire more information about CTTS and their best utilization.
2. PE as a discipline should consider extensive study in CT. Specifically by involving faculty directly in the development of a cohesive, participant designed and endorsed program-encompassing commitment to and structuring of CT in evaluation. Workshops for faculty to learn more about CTTS and assessment would be important to such further study.
3. To enhance the ability to foster CT in graduate of program evaluation, there should be more CTTS/CTTI resource sharing among PE faculty. Faculty knowledge and skills are valuable and should be shared among program faculty. The participants in this study were invaluably rich resources.

4. Curriculum should be reviewed to document how CTTS/CTTI are used across the curriculum, this should also include information on CT assessment strategies
5. Although respondents perceived several strategies as effective in promoting CT in students, further research is needed to ascertain levels of CT improvement for the students. Consideration of learner perceptions of instructional strategy effectiveness in promoting CT would be valuable.
6. Longitudinal studies are needed to measure the development of CT skills during the process of evaluation study and are instrumental for achieving recommendation # 5.

REFERENCES

AICPA. (1999). *Focus on the Horizon, the CPA profession in 2011.* New York, NY: AICPA.

Alkin, M. C. (1969). Evaluation theory development. *Evaluation Comment, 2,* 2-7.

Alkin, M. C. (1974). Evaluating "curriculum" and "instruction." *Curriculum Theory Network, 4*(1), 43-51.

Alkin, M. C., & Christie, C. A. (2002). The use of role-play in teaching evaluation. *American Journal of Evaluation, 23*(2), 209-218.

Allen, J. D. (1995). *The use of case studies to teach educational psychology: A comparison with traditional instruction.* Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

Altschuld, J. W. (1995). Developing an evaluation program: Challenges in the teaching of evaluation. *Evaluation and Program Planning, 18,* 259-265.

Anderson, R., Halliday, J., Howe, C., & Soden, R. (1997). *Bridging the academic/vocational divide by integrating critical thinking.* End or Award Repot to ESRC.

Ary, D., Jacobs, L., & Razavieh, A. (1996). *Introduction to research in education.* Orlando, Harcourt Brace, College Publisher.

Ashman, A. F., & Conway, R. N. (1997). *An introduction to cognitive education.* London: Routledge.

Association of American Medical Colleges. (1984). *Physicians for the twenty-first century: Report of the project panel on the general professional education of the physician and college preparation for the medicine (GPEP Report).* Washington DC: Association of American Medical Colleges.

Baillie, C., & Toohey, S. (1997). The "power test": Its impact on student learning in a material science course for engineering students. *Assessment and Evaluation in Higher Education, 22*, 33-48.

Baker, P. J., & Anderson, L. E. (1987). *Social Problems: A critical thinking approach.* Belmont, CA: Wadsworth.

Bangert-Drowns, R. L., & Bankert, E. (1990). *Meta-analysis of effects of explicit instruction for critical thinking. Paper presented at the meeting of the American Educational Research Association.* Boston, MA. (ERIC Document Reproduction Service No. ED328614)

Bare, V. (2005). Evaluation case teaching from a participant perspective. *New Directions for Evaluation, 105*, 83-90.

Beyer, B. K. (1985). Critical thinking: what is it? *Social Education. 49*(4), 270-276.

Bloom, B. S. (1956). *Taxonomy of educational objectives: Cognitive domain.* New York: Longman.

Brookfield, S. D. (1987). *Developing critical thinkers: Challenging adults to explore alternative ways of thinking and acting.* San Francisco, CA: Jossey-Bass.

Brookfield, S. D. (1995). *Becoming a critically effective teacher.* San Francisco, CA: Jossey-Bass.

Browne, M. N., Haas P. F. & Keeley, S. (1978). Measuring critical thinking skills in college. *Educational Forum, 42*(2), 2219-226.

Chance, P. (1986). *Thinking in the classroom: A survey of programs.* New York: Teacher's College Press, Columbia University.

Chelimsky, E. (1997). The political environment of evaluation and what it means for the development of the field. In E. Chelimsky & W. Shadish (Eds.), *Evaluation for the 21st century- a handbook* (pp. 53-68). Thousand Oaks, CA: Sage.

Clarke, A. (1995). Professional development in practicum settings: reflective practice under scrutiny, *Teaching and Teacher Education, 11*(3), 243-261.

Collins, A., Brown, J., & Newman, S. (1989). Cognitive apprenticeship: Teaching the crafts of reading, writing, and mathematics. In L. B. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser.* Hillsdale, NJ: Erlbaum Associates.

Conference Board of Canada. (2000) *Employability skills. Canada, Ottawa.* Retrieved July 28, 2006, from http://www.conferenceboard.ca/education/learning-tools/pdfs/esp2000.pdf

Cousins, J. B., & Leithwood, K. A. (1986). Current empirical research on evaluation utilization. *Review of Educational Research*, 56(3), 331-364.

Cromwell, L. S. (1992) Assessing critical thinking. In C. A. Barnes (Ed.), *Critical thinking: Educational Imperative* (pp. 37-50). San Francisco: Jossey-Bass.

Cronbach, L. J. (1963). Course improvement through evaluation. *Teachers College Record, 64,* 672-683.

Cronbach, L. J., Ambron, S. R., Dornbusch, S. M., Hess, R. D., Hornik, R. C., & Philips, D. C. (1980). *Toward reform of program evaluation.* San Francisco: Jossey-Bass.

Cross, N. (1986). Understanding design: The lessons of design methodology. *Design Methods and Theories. 20*(2), 409-439

Damon, W. (2004). What is positive youth development? *Annals of the Americans Academy of Political and Social Science, 591,* 13-24.

D' Angelo, E. (1971). *The teaching of critical thinking.* Amsterdam: B. R. Gruner.

Dansereau, D. F., Collins, K. W., McDonald, B. A., & Holley, C. D. (1979). Development and evaluation of a learning strategy training program. *Journal of Educational Psychology, 71,* 64-73.

Darabi, A. (2002). Teacher program evaluation: Using a systems approach. *American Journal of Evaluation, 23*(2), 219-228.

Darkenwald, G. G., & Merriam, S. B. (1982). *Adult education: Foundations of practice.* New York: Harper and Row.

Davidson, B.W., & Dunham, R.L. (1996). *Assessing EFL student progress in critical thinking with the Ennis- Weir critical thinking essay test.* (ERIC Document Reproduction Services No. ED403302)

De Bono, E. (1994). *Thinking course.* New York: Facts on File.

Denardo, M.D. (2003). *A status report of critical thinking. Current knowledge of and exemplary teaching practices at the higher education level.* Unpublished doctoral dissertation. University University of Pittsburgh. (MUI No. 311729)

Detterman, D. K., & Sternberb, R. J. (1982). *How and how much intelligence can be increased?* Norwood, NJ: Ablex Publishing.

Detterman, D. K., & Sternberg, R. J. (1993). *Transfer on trial: Intelligence, cognition, and instruction.* Norwood, NJ: Ablex Publishing.

Dewey, J. D. (1910). *How we think.* Boston: D.C. Heath.

Dewey, J. D. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process.* Lexington, MA: Heath.

Dike, S. E. (2001). *Air force professional military education: faculty perceptions of critical thinking.* Unpublished doctoral dissertation, Auburn University, Alabama. (MUI No. 3028893)

Dixon, F. A. (1996). *Using a dialectical approach to improve critical thinking in secondary classrooms.* Unpublished doctoral dissertation, Purdue University, West Lafayette, IN. (MUI No. 9725536)

Driscoll, M. D. (1994). *Psychology of learning for instruction.* Boston: Allyn & Bacon.

Driscoll, M. D. (2000). *Psychology of learning for instruction.* Needham Heights, MA, Allyn & Bacon.

Eichorn, R. (2001). *Developing thinking skills: Critical thinking at the army management, Staff College, Army management staff college symposium workshop on leadership excellence.* Retrieved February 27, 2006, from: www.amsc.belvoir.army.mil/roy.html

Eilersten., T. O. & Valdermo, O. (2000). Open-book assessment: A contribution to improved learning? *Studies in Educational Evaluation, 26*, 91-103.

Eisner, E. W. (1991). *The enlightened eye: Qualitative inquiry and the enhancement of educational practice.* New York, NY: Macmillan Publishing Company.

Elder, L. (2000). Critical thinking: Nine strategies for everyday live. Part II. *Journal of Developmental Education, 24*(2), 38-39.

Elder, L., & Paul, R. W. (1994). Critical thinking: why we must transform our teaching. *Journal of Developmental Education, 18*, 34-35.

Elder, L. & Paul, R. W. (1998). The role of Socratic questioning in thinking, teaching, and learning. *Clearing House, 71*(5), 297-301.

Elder, L., & Paul. R. W. (2002). *Critical thinking: teaching student how to study and learn (Part II)*, Dillon Beach, CA: the foundation for critical thinking.

Ennis, R. H. (1989). Critical thinking and subject specificity: Clarification and needed research. *Educational Researcher, 18*(3), 4-10.

Ennis, R. H. (1993). Critical thinking assessment. *Theory into Practice. 32*(3), 179-186.

Ennis, R. H. (1996). *Critical thinking.* Upper Saddle River, NJ: Prentice Hall.

Ericsson, K. A., & Charness, N. (1994). Expert performance. *American Psychologist, 49*, 725-747.

Ericsson, K. A., & Krampe, R. T., & Tesche-Romer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100*, 363-406.

Ericsson, K. A., & Lehmann, A. C. (1996). Expert and exceptional performance: evidence of maximal adaptation to task constraints. *Annual Review of Psychology, 47*, 273-305.

Facione, P. (1990). *Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction. Research findings and recommendations prepared for the Committee on Pre-college Philosophy of the American Philosophical Association, 3.* (Eric Document Reproduction Service No. ED 315423).

Facione, P. A. (2006) *Critical thinking: What it is and why it count*, 2006 Updated, California Academic Press. Retrieved January 5, 2006, from http://www.insightassessment.com/articles.html

Facione, P. A., & Facione, N. C. (1996). *The California critical thinking dispositions inventory.* Millbrae, CA: California Academic Press.

Facione, P. A., Facione, N.C., & Sanchez, C. (1998). *The California Critical Thinking Skills Test (CCTST): Forms A and B, and the CCTST Test Manual.* Millbrae, CA: California Academic Press.

Fetterman, D. M., Kaftarian, S. J., Wandersman, A. (1996). *Empowerment evaluation: Knowledge and tools for self-assessment & accountability*, Thousand Oakes CA: Sage Publications.

Feur, D., & Gerber, B. (1988) Second thought about adult learning theory. *Training, 25*(12), 125-149.

Fisher, A., & Scriven, M. (1997). *Critical thinking: Its definition and assessment.* Point Reyes, CA: Edgepress.

Fisher, B. (2001). Teaching literacy for lifelong learning: A new look. *The Journal of Correctional Education, 52*(2), 58-61.

Frisbie, R. D. (1991). New directions in evaluation: a school district perspective. *Theory into Practice, 30*(1), 46-51

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction* (6th ed.), New York: Longman.

Gardner, S. M. (2004). *Graduate nurses' conceptualization of critical thinking and perceptions of classroom strategies that foster critical thinking.* Unpublished doctoral dissertation. University of Missouri- St. Louis. (MUI No. 3122901)

Gipe, J. P., & Richards, J. C. (1992). Reflective thinking and growth in novices' teaching abilities. *Journal of Educational Research, 86*(1), 52-57.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of ground theory: Strategies for qualitative research.* Chicago: Aldine.

Glaser, E. M. (1941). *An experiment in the development of critical thinking.* New York: Teachers College, Columbia University.

Glaser, R. E. (1985). Critical thinking: education for responsible citizenship in a democracy. National Forum: *The Phi Kappa Phi Journal, 65*(1), 24-27.

Gokhale, A. (1995). Collaborative learning enhances critical thinking. *Journal of Technology Education, 7*(1), 22-30.

Guba, E. G., & Lincoln, Y. S. (1981). *Effective evaluation.* San Francisco: Jossey-Bass.

Halpern, D. F. (1993). Assessing the effectiveness of critical thinking instruction. *The Journal of General Education, 42*(4), 238-254.

Halpern, D. F. (1998). Teaching Critical thinking for transfer across domains: Dispositions, skills, structure training, and metacognitive monitoring. *American Psychologist, 53*(4), 449-455.

Hanley, G. L. (1995). Teaching critical thinking: Focusing on metacognitive skills and problem solving. *Teaching of Psychology, 22*, 68-72.

Hargreaves, W. A., Attkisson, C. C., Horowitz, M. J., & Sorensen, J. E. (1978). The education of evaluators. In C. C. Attkisson, W. A. Hargreaves, M. J. Horowitz, & J. E. Sorensen (Eds.), *Evaluation of human service programs*. San Francisco: Academic Press.

Hass, P. F., & Keeley, S. M. (1998). Coping with faculty resistance to teaching critical thinking. *College Teaching, 46*(2), 63-67.

Hayes, S. C. (1993). Analytic goals and the varieties of scientific conceptualism. In S. C. Hayes, L. J. Hayes, H. W. Reese, & T. R. Sarbin (Ed.), *Varieties of scientific conceptualism* (pp. 11-27). Reno, NV: Context Press.

Henderson, J. G., & Hawthorne, R. D. (2000) *Transformative curriculum leadership*. New Jersey: Prentice-Hall.

Hurte, V. J. (2004). A comparison of the scaffolding approach and the cognitive enrichment advantage approach in enhancing critical thinking skills in first-year university freshmen. Unpublished doctoral dissertation. Knoxville, TN: The University of Tennessee. (MUI No. 3130160)

Ionnidou, M. K. (1997). Testing and life long learning: Open book and closed book examination university course: A factor analytic study. *Studies in Educational Evaluation, 23*, 131-139.

Johnson, D., & Johnson, R. T. (1993). Creative and critical thinking, through academic controversy. *American Scientist, 37*(1), 40-54.

Jones, S. A., & Brown, L. N. (1991). Critical thinking: Impact on nursing education. *Journal of Advanced Nursing*, 16, 529-533.

Karabenick, S. A., & Collins-Eaglin, J. (1995). College faculty as educational researchers: Discipline-focused studies of student motivation and self-regulated learning. In P. R.

Pintrich (Ed.), *Understanding self-regulated learning* (pp. 71-86). San Francisco: Jossey Bass.

King, A. J., Stevahn, L., Ghere, G., Minnema, J. (2001). Toward a taxonomy of essential evaluator competencies. *American Journal of Evaluation, 22*(2), 229-247.

King, P. M., & Kitchener, K. S. (1994). *Developing reflective judgment: Understanding and Promoting intellectual growth and critical thinking in adolescents and adults*. San Francisco: Jossey-Bass.

Kirschling, J. M., Fields, J., Imle, M., Mowery, M., Tanner, C. A., Perrin, N., & Stewart, B. J. (1995). Evaluating teaching effectiveness. *Journal of Nursing Education, 34*(9), 401-410

Kitchener, K.S. (1983). Cognition, metacognition , and epistemic cognition, *Human Development 26*, 222-232.

Knowles, M. S. (1984). *Pedagogy in action: Applying modern principles of adult learning.* San Francisco: Jossey-Bass.

Krippendorff, K. (1980). *Content analysis: An introduction to its methodology.* Beverly Hills, CA: Sage Publication.

Kurfiss, J. G. (1988). *Critical thinking: theory, research, practice, and possibilities* (ASHE-ERIC Higher Education Report No.2). Washington, D.C: Association of the Study of Higher Education.

Lecompte, M.D. & Preissle, J. (1993). *Ethnography and qualitative design in educational research.* New York: Academic press.

Lee, M. C. (2003). Impacts of cognitive structuring methods on students' critical thinking enhancement in-line collaborative learning. Unpublished doctoral dissertation. University of Illinois at Chicago. (MUI No. 309832)

Levin-Rozalis, M., & Rosentein, B. (2003). A mentoring approach to the one-year evaluation course. *American Journal of Evaluation, 24*, 245-259.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* Beverly Hills, CA: Sage Publications.

Lipman, M. (1988). Critical thinking: what can it be? *Educational Leadership.* 46(1), 38-43.

Logan, C.H. (1976). Do sociologists teach student to think more critically? *Teaching Sociology, 4*(1), 29-48.

Madaus, G. F., Scriven, M., & Stufflebeam, D. L. (1983). *Evaluation models: Viewpoints on educational and Human Services evaluation.* Boston: Kluwer-Nijhoff Publishing.

Maxwell, J. A. (1996). *Qualitative research: An interactive approach.* Thousand Oaks, CA: Sage Publications.

McBride, R. F. (1999). Critical thinking in physical education classes. *Clearing House,* 72(4), 217-220.

McCarthy, M. C. (2004). *Critical thinking performance: examining relationship.* Unpublished doctoral dissertation. Auburn University. (UMI No. 3124282.

McKown, C. (2004). Age and ethic variation in children's thinking about the nature of racism. *Journal of Applied Development Psychology, 25,* 597-617.

McMillian, J. H. (1987). Enhancing college students' critical thinking: A Review of studies. *Research in Higher Education, 26*(1), 3-29.

McMurray, A. (1989). Time to extend the "process"? *Australian Journal of Advanced Nursing, 6*(4), 40-43.

McPeck, J. (1981). *Critical thinking and education.* New York: St. Martin's.

Meiss, G. T., & Bates, G. W. (1984). *Cognitive and attitudinal effects of reasoning message strategies.* (ERIC Documents Reproduction Services No. ED246519)

Merriam, S., & Caffarella. (1998). *Learning in adulthood. A comprehensive guide.* San Francisco: Jossey-Bass.

Mezirow, J. (1990). *Fostering critical reflection in adulthood.* San Francisco: Jossey-Bass.

Mezirow, J. (2000). *Learning as transformation: critical perspectives on a theory in progress* (1st ed.). San Francisco: Jossey-Bass.

Miller, M. G. (2003). *Holistic design for critical thinking instruction: case studies of instructional practice.* Unpublished doctoral dissertation. Concordia University. (UMI No 0-612-77898-3)

Morrison, S., & Free, K. W. (2001). Writing multiple-choice test items that promote and measure critical thinking. *Journal of Nursing Education, 40*(1), 17-24.

Murphy, L. L., Conoley, J. C., & Impara, J. C. (Eds.) (1994). *Test in print IV*. Lincoln, NE: University of Nebraska Press.

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative of educational reform.* Washington, DC: U.S. Department of Education.

Onosko, J. J. (1991). *Barriers to the promotion of higher-order thinking social studies.* (ERIC Documents Reproduction Services No. ED340640)

Patton, M. Q. (1997). *Utilization-focused evaluation:* The New Century Text. (3rd ed.). Thousand Oaks, CA: Sage Publications.

Patton, M. Q. (2001). Evaluation, knowledge management, best practices, and high quality lessons learned. *American Journal of Evaluation, 22*(3), 329-336.

Patton, M. Q. (2002). *Qualitative evaluation and research methods* (3rd Ed). London: Sage Publications.

Patton, M. Q. (2004). *The roots of utilization-focused evaluation.* In M. C. Alkin (Ed.), Evaluation roots: Tracing theorists' views and influences (pp. 276-292). Thousand Oaks, CA: Sage Publications.

Paul, R. W. (1991). Dialogical and dialectical thinking. In A. Costa (ed.). *In developing minds: A resource book for teaching thinking* (pp. 280-289. Alexandria, VA: Association for Supervision and Curriculum Development.

Paul, R. W. (1998). Critical thinking: Why it must be at the heart of ethics instruction. *Journal of Developmental Education, 22*(1), 32.

Paul, R. W. (2000). Critical thinking: Nine strategies for everyday life, part 1. *Journal of Developmental Education, 24*(1), 40-41.

Paul, R., W. (2002) *A brief history of the idea of critical thinking.* Retrieved September 20, 2006, from http://www.criticalthinking.org/university/cthistory.html

Paul , R.W., Binker, A. J. A., Martin, D., & Adamson, K. (1989). *Critical thinking handbook: High School.* Santa Rosa, CA: Foundation of Critical Thinking.

Paul, R. W., Elder, L., & Bertell, T. (1997). *California teacher preparation for instruction in critical thinking: Research findings and policy recommendations.* Sacramento, CA: California Commission on Teacher Credentialing.

Paul, R. W., & Elder, L. (2001). *Critical thinking: Tools for taking charge of your learning and you life.* Upper Saddle River, NJ: Prentice Hall.

Paul, R. W., & Elder, L. (2002). Critical thinking: Teaching students how to study and learn (Part I). *Journal of Developmental Education, 26*(1), 36-37.

Paul, R. W., & Elder, L. (2004). *The miniature guide to critical thinking: Tools and concepts.* California: The Critical Thinking Foundation.

Paul, R. W. & Nosich, G. M. (1991). *A proposal for the national assessment of higher order thinking at the community college, college and university levels.* (ERIC Document Reproduction Service No. ED340762).

Paul, R. W. & Nosich, G. M. (1995). *A model for the national assessment of higher order thinking. Critical Thinking.* Santa Rosa: Foundation for Critical Thinking.

Penner, J. (1995). Changes and conflict: Introduction of the communicative approach in China. *TESL Canada Journal, 12*(2), 1-17.

Perkins, D. N. (1989). *Reasoning as it is and could be: An empirical perspective.* In D. M. Topping, D. S. Cromewell, & V. N. Kobayaski (Eds.), Thinking across cultures: Third international conference on thinking (pp 175-194). Hillsdale, NJ: Erlbaum.

Philips, D. C. (1980). *Toward reform of program evaluation.* San Francisco: Jossey-Bass.

Preskill, H. (2000). Coming around again: renewing our commitment to teaching evaluation. *American Journal of Evaluation 21*(1), 103-104.

Preskill, H. & Torres, R. T. (2000). The learning dimension of evaluation use. In V. J. Caracelli, V. & H. Preskill (Eds.), *New Directions for Evaluation, 88.* San Francisco, CA: Jossey-Bass.

Reed, J. H. (1998). *Effect of a model of critical thinking on student achievement in primary source document analysis and interpretation, argumentative reasoning, critical thinking dispositions, and history content in a community college history course.* Unpublished doctoral dissertation. University of South Florida (UMI No. 9911510.

Reed, J. H., & Kromrey, J. D. (2001). Teaching critical thinking a community college history course: Empirical evidence from infusing Paul's model. *College Student Journal, 35*(2), 201-303.

Regan-Smith, M. (1991). Teacher's experiential learning about learning: International *Journal of Psychiatry in Medicine. 28*(1), 133-138.

Reichardt, C. S. (2003). Lessons and memories from the northwestern training program in methodology and evaluation research. *American Journal of Evaluation, 24*(2), 273-276.

Rubinstein, M. F. (1980). *Concepts in problem solving.* Englewood Cliffs, NJ: Prentice Hall.

Ruggiero, V. R. (1988). *Teaching thinking across the curriculum.* New York: Harper and Row.

Sanders, J. R. (1986). The teaching of evaluation in education. In B. G. Davis (Ed.), *The teaching of evaluation across the disciplines*. New Directions for Program Evaluation, No. 29. San Francisco: Jossey-Bass.

Scriven, M. (1973). *The methodology of evaluation. Educational evaluation: Theory & practice.* Belmont, CA: Wadsworth.

Scriven, M. (1991). *Evaluation thesaurus* (4th ed.). Newbury Park: sage Publications.

Scriven, M. (2004). Reflections. In M. C. Alkin (Ed.), *Evaluation roots: Tracing theorists' views and influences* (pp. 183-195). Thousand Oaks, CA: Sage Publications.

Scriven, M. (2005). *Evaluation key checklist.* Retrieved February 28, 2006, from http://www.wmich.edu/evalctr/checklists/kec_october05.pdf

Scriven, M., & Fisher, A. (1997). *Critical thinking: Definition and assessment.* Inverness: Edgepress.

Scriven, M., & Paul, R. (2004). *Defining critical thinking: A draft statement for the National Council for Excellence in critical thinking.* Retrieved April 1, 2006, from http://www.criticalthinking.org/aboutCT/defining critical thinking.html

Sears, A., & Parsons, J. (1991). Towards critical thinking as an ethic. *Theory and Research in Social Education, 19*(1), 45-68.

Shaughnessy, M. F. (2002). *An interview with Linda Elder about using critical thinking concepts and tools. The Critical Thinking Community.* Retrieved January 12, 2006, from http://www.criticalthinking.org/resources/articles/an-interview-l-elder-ct-concepts-tools.shtml

Shell, R. C. (2000). *Perceived barriers to the teaching of critical thinking skills by nursing faculty in generic BSN programs in Tennessee.* (Unpublished doctoral dissertation, East Tennessee State University (UMI NO. 9978795)

Shermis, S. S. (1992). *Critical thinking: Helping students learn reflectively.* (ERIC Document Reproduction Service No. ED341954)

Shermis, S. S. (1999). *Reflective thought, critical thinking.* ERIC Clearinghouse one Reading English and Communication Bloomington IN. ED436007.

Simons, H. (1987). *Getting to know schools in a democracy: the politics and process of evaluation.* Philadelphia: The Falmer Press.

Smith, D. G. (1977). College classroom interactions and critical thinking. *Journal of Educational Psychology, 69*, 180-190.

Smith, M. F. (1999). Should AEA begin a process for restricting membership in the profession of evaluation? *American Journal of Evaluation, 20*(3), 521-532.

Smith, Z. K., (1998). *Building classroom community group assignments, role plays and molding.* (ERIC Document Reproduction Service No. ED428007)

Stabib, S. (2003). Teaching and measuring critical thinking, *Journal of Nursing Education, 42*(11), 498-508.

Stake, R. (2004). Stake and responsive evaluation. In M. C. Alkin (Ed.), *Evaluation roots: Tracing theorists' views and influences* (pp. 203-217). Thousand Oaks, CA: Sage.

Statkiewicz, W & Allen, R. (1983) Practices exercise to develop CT skills. *Journal of Research in College Science Teaching, 12*(5), 5-9.

Stevahn, L., King, A. J., Ghere, G., Minnema, J. (2005). Establishing essential competencies for program evaluation. *American Journal of Evaluation, 26*(1), 43-59

Stufflebeam, D. L. (1994). Empowerment evaluation, objectivist evaluation, and evaluation standards: where the future of evaluation should not go and where it needs to go. *Evaluation Practice, 15*(3), 321-338.

Stufflbeam, D. L., (2001). *Evaluation models*. New Directions for Evaluation. Jossey-Bass, Willey & Sons Inc.

Stufflebeam, D. L. (2004). The 21st-centary CIPP model: origins, development, In M. C. Alkin (Ed.), Evaluation roots: *Tracing theorists' views and influences* (pp. 245-265). Thousand Oaks, CA: Sage Publications.

Stufflebeam, D. L., Foley, W. J., Gephart, W. J., Cuba, E. G., Hommond, R. L., Merriman, H. O., & Provus, M. M. (1971). *Educational evaluation and decision-making.* Itasca, IL: Peacock.

Suskie, L. A. (1992). *Questionnaire survey research: What works.* Association for Institutional Research. Tallahassee, FL: Florida State University

Tepper, R. (1995). *The 10 hottest consulting practices: what they are, how to get into them.* USA: john Wiley & Sons.

The National Center for Fair & Open Testing. (2007). *Assessment and accountability for improving schools and learning: Principles and recommendation for federal law, state and local system.* Retrieved on June 28, 2007, from http://www.fairtest.org/nattest/AssessmentFullReportJUNE07.pdf

Theophilides, C., & Dionysiou O. (1996). The major function of the open-book examination at the university level: A factor analytic study. *Studies in Educ Eval 22*, 157-170.

Thompson, B. (1994) *the revised program evaluation standards and their correlation with the evaluation use literature. Paper presented at the annual meeting of the American Educational Research Association.* New Orleans, LA.

Torp, & Sage. (2002). *Problems as possibilities: Problem-based learning for K-16 education* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Trevisan, M. S. (2002). Enhancing practical evaluation training through long-term evaluation projects. *American Journal of Evaluation, 23*, 81-92.

Trevisan, M. S. (2004). Practical training in evaluation: a review of the literature. *American Journal of Evaluation, 25*, 255-272.

Valdes-Corbeil, M. E., (2005). *The effect of the Watson-Glaser Critical Thinking Appraisal test preparation program.* Unpublished doctoral dissertation, University of Houston (UMI NO. 3165003)

van Gelder, T. J. (2001). How to improve critical thinking using education technology. In G. Kennedy, M. Keppell, C. McNaught, & T. Petrovic (Eds.) Meeting at the crossroads. *Proceeding of the 18th Annual conference of the Australian Society for Computers in Learning in Tertiary Education* (pp. 539-548). Melbourne: Biomedical Multimedia Unit, the University of Melbourne. Retrieved October 23, 2006, from http://www.medfac.unimelb.edu.au/ascilite2001/pdf/papers/vang%eldert.pdf

van Gelder, T. J. (2004). *Enhancing and augmenting human reasoning.* In A. Zilhão (Ed.), Cognition, Evolution, and Rationality. London: Routledge.

van Gelder, T. J. (2005) Teaching critical thinking: some lessons from cognitive science. *College Teaching, 53*(1), 44-46.

van Gelder, T. J., Bissett, M., & Cumming, G. (2004). Cultivating Expertise in Informal Reasoning. *Canadian Journal of Experimental Psychology, 58*, 142-152.

Vaske, J. M. (1998). *Defining, Teaching and Evaluation critical thinking Skills in Adult Education. Specialist in Education Thesis*, Drake University. (ERIC Document Reproduction Service No. ED420794)

United States Congress. (1994) *Goals 2000: Educate America Act.* Washington, DC Retrieved December 22, 2006, from http://www.acs.ucalgary.ca/~iejll/volume2/Knudsen2_4.html

U.S. Department of Education, National Center for Education Statistics (NCES). (2001). *The Condition of Education 2001. NCES 2001-072.* Washington, DC: U.S. Government Printing Office.

Watson, G., & Glaser, E. M. (1991). Watson-*Glaser critical thinking appraisal manual.* Kent, OH: The Psychological Corporation.

Watts, D. M. (1994). Constructivism , Re-Constructivism & Task – *oriented Problem Solving,* in P. Fensham, R. Gunstone & R. White (eds.), *The Content of Science : A Constructivist Approach to Teaching and Learing,* London: The Falmer Press.

Weiss, C. H., & Bucuvalas, M. J. (1980). Truth tests and utility tests: Decision-makers' frames of reference for social science research. *American Sociological Review 45*, 302-313.

Wheeler, D. D. (1979). *A practicum in thinking.* Cincinnati, OH: University of Cincinnati.

Worthen, B. R., Sanders, James R., and Fitzpatiric, Jody L. (1997). *Program Evaluation: Alternative Approaches and practical guideline* (2ed.), White Plains, NY: Longman publishers.

Yang, Y. C., Newby, T. J. & Bill, R. L. (2005). Using Socratic question to promote critical thinking skills through asynchronous discussion forums in distance learning environments. *American Journal of Distance Education, 19*(3), 163-182.

Yeh, S. S. (2001). Test worth teaching to: constructing state-mandated tests that emphasize critical thinking. *Educational Researcher, 30*(9), 12-17.

Appendix A

CTTS from the Literature that Promotes CT

Teaching Strategy	CT Expert or Researcher
Instructor-Directed, In-Class Exercises	(Dansereau et al., 1979; van Gelder, 2004; Wheeler, 1979).

Description:

The instructor directs the learners through all steps of in-class exercises specifically intended to promote CT, such as, student analysis of case-study descriptions that require informal logic knowledge, procedural skills, and input on the parts of class members to complete understanding. Exercises may focus on individual work, small-group activities, or full-class interaction. The critical factor in this strategy is that the instructor acts continuously and actively as the hands-on guide and resource of expert knowledge through all phases of the learning, step-by-step, and moment-by-moment. She keeps direct control and makes no prior assumptions concerning learners' levels of knowledge or capacities for self-direction.

Socratic Questioning	(Paul& Elder 2004; Yang, & Newby, 2005).

Description:

In-class individual, small-group, and full-class exercises in Socratic questioning probe underlying assumptions and stimulate a noticeable increase in self-awareness and self-analysis of the learners' as well as the instructor's thinking and ideas.

Open-book Tests	(Vanderborgh, 2005). (Baillie & Toohey, 1997; Eilerson & Valdermo, 2000; Ionnidou, 1997; Theophilides & Dionysiou, 1996; Wilke, 2003).

Description:

Promotion of active learning continues and is amplified through open-book assessment strategy. Learners must call upon creative inner resources to use and apply knowledge. Rather than facile response characteristics, learner dispositions and learning processes are more deeply probing. Combining the approach with learner-developed questions has met positive results.

Instructor CT Disposition Modeling (Brookfield, 1987, p. 139); (Brookfield, 1987; Mezirow, 2000; Smith, 1998).

Description:

The instructor displays, for learner consideration, her own ongoing study and learning. She informs and presents indication and evidence of her progress, success, dedication, and positive attitudes. She stresses intellectual and study discipline. She draws attention to her belief that learning is more than joyless labor. It is "innovation, creativity, and flexibility"

Class Presentations of Small-Group Projects (Paul, 1993).

Description:

Small-group, in-class and out-of-class learning projects are emphasized. Focus for mastery of CT is upon in-class presentation by groups concerning their ongoing work and their completed projects. Each group assumes responsibility for the instruction of the class for a day.

Individual Learners Acting as Class Instructors (Kirschling, 1995; Paul, 1993).

Description:

Each student acts as instructor for the class for one or more days. In terms of devising strategy and preparation prior to her term of acting-instructor, the learner works in close collaboration with the class professor.

Conspicuous Recognition and Reward of CT Contributions (Paul, Binker, Martin & Adamson, 1995).

Description:

Instructors underwrite, reward, and otherwise noticeably recognize indications of CT. These indications could include original and striking use of analogy and metaphor, turning the point of a question around to see the whole matter in a different light, delivering an incisive critique that is truly eye-opening, and in general fully utilizing class opportunities for free discourse to reflectively engage with ideas, provide new structure to thinking, and critique and restructure habitual ways of thinking.

Structuring the Class as a Model Society of CT and Democracy (Paul, Binker, Martin, & Adamson, 1995).

Description:

Individual interaction and the class social structure, process, and milieu, in all aspects, are

founded upon and reflect democratic ideals and principles clearly and incisively. Democratic structure and CT are modeled as consubstantial with one another, in all aspects. Engendering CT amongst all participants is codified as having priority status over skill acquisition, and mastering formulas and precepts.

Learner Discovery of the Power and Resources of Their Own Minds (Paul, 1995).

Description:

Problems from the particular intellectual discipline of focus, which are deemed insoluble are submitted by students and the instructor for class consideration and solution. Solutions are developed interactively, individually, and are presented in class. All available instructional modes and means for stressing learner resolution and resourcefulness are brought to the forefront. Most importantly, the ever present watchwords are: "never fearing thinking for oneself."

Instructor Intellectual Log-Keeping Lead-In and Modeling (Fogarty, 1990).

Description:

The instructor interrupts her intellectual log-keeping directive assignment and recognizes that her directive has overwhelmed or frustrated them. She indicates her recognition of their difficulty to the students. She directs them, therefore, to observe and monitor her as she develops and models the type of response she had requested from them. She "thinks aloud" through her own thought process as she extemporaneously develops and directly expresses the "ideal" response for the learners' benefit.

Cultural Difference Awareness/Social Practice Approach (Jantrasakul, 2004).

Description:

Rather than striving to isolate what is universal to learning, instructors deliberately focus upon cultural context, difference, and influence, which are part of every learning opportunity. Instruction emphasizes the difference culture makes, including its impact upon logical thought processes, analytical disposition and ability, and emotional and aesthetic inclinations. Guest instructors and learners of varying cultural backgrounds ideally contribute to this awareness facilitation in relation to class study.

Social Justice Strategy (Jantrasakul, 2004).

Description:

Social justice strategy directs attention to how social, cultural, economic, political, and educational life-experience acts to control all thinking. Such combined experience acts to formalize, legitimate, and sanction multiple forms and levels of mass oppression. All elaborated process and influence of social experience are re-analyzed, reconverted, and re-expressed to enhance CT ability and awareness. CT learning works toward counteracting oppressive social tendencies when the social justice strategy is utilized.

Variation On the Theme of CT: Focusing Upon, Introducing, Presenting, Opening to Discussion, and Relating to the Current Class Topic: Multiple Views and Definitions of CT (Ennis, 1987; Facione, 1990; Beyer, 1985.

Description:

CT is examined through class process according to its multiple variations of form and meaning, determined according to the intellectual discipline to which it is applied (Elder, 2002). Emphasis upon this strategy throughout the course of a semester allows for intellectual comprehension of CT and grasp of its potential variations across the spectrum of intellectual disciplines

Drawing Reasonable Conclusions (van Gelder, 2004); (Scriven, 2005).

Description:

Multiple strategies and class activities allow practice in drawing reasonable conclusions. These could include, among many others: programmed instruction reflective of informal logic completing detective stories of Sherlock Holmes-- which are given minus the conclusion, or writing evaluation projected-final-report summaries—even though provided with only initiating information on day one.

Transferring Insights into New Contexts (Mezirow, 1990).

Description:

Groups discuss life experiences. They are led by instructor example to apply real-life lessons learned, as discussed, to evaluation contexts, scenarios, and problem situations

Cognitive Disequilibrium Reed, 1998).

Description:

The instructor resists learner demands for her to specify in advance: (a.) instructional requirements and expected outcomes; and (b.) the "right answer" to everything. She shifts learning emphasis toward ill-structured and "multi-logical problems." She models absolute lack of concern whether or not she is witness to "rapid and substantial change in students' abilities to think critically" (p. 26). She models protracted engagement with problems and difficult concepts, with little apparent concern or sense of urgency vis a vis their resolution. She underscores the primary value of, as well as her own fascination with, the ongoing process of CT inquiry.

Class Journal (Beyer, 1987; Dewey, 1910; Fogarty, 1990).

Description:

Learners and the instructor maintain reflective, personal journals of writings inspired by or simply relevant to class learning. Writings and sharing of writing help learners structure thought reflectively toward highest-order cognitive process of reflective thinking.

Intellectual Log Keeping (Paul, 2000),

Description:

Maintaining a "thinking log" unlike the journal is group-process-oriented and follows from instructor-initiated lead-ins. Direct, interpretational response to readings and class materials, and reactive analyses of essential course information are the strategy's basis for individual log writing entries.

Consideration of Multiple (Kurfiss, 1988).

Perspectives of Use of CT

Description:

Emphasis is upon how learners consider or generally interpret the need for application of CT and in general conceptualize the nature of knowledge. Four paradigms of CT application are used: dualism/received knowledge; multiplicity/subjective knowledge; relativism/procedural knowledge; and commitment in relativism and constructed knowing.

Learner On-The-Spot Analysis and Interpretation of Pedagogical Failure Areas (Denardo, 2003).

Description:

Instructors begin with confession of all they do not know about CT, and then shift responsibility for resolving their own CT and CT pedagogy difficulties onto their students. Instructors enunciate their need and ask for student intervention to resolve universal quandaries. For example, what is CT, what is the tradeoff in teaching content or CT what are the most important CT skills, how to teach for development of these skills, what are the intellectual criteria and standards of CT, how to understand basic terminology of CT (such as assumption, inference, and implication), and how to assess faculty efforts in teaching CT and raising learners' relevant skill and knowledge levels.

Guiding Learners Toward Analysis of CT Disposition ((Facione & Facione, 1996)

Description:

Faculty guide learners to actively research, assemble information concerning, and communicate and present in class results of findings about CT stumbling blocks. Examples of stumbling blocks include: failure to address and maintain truth-seeking, open-mindedness, defining and understanding the applications of "analyticity" (Facione & Facione, 1996, p. 5), "systematicity" (1996, p. 5), CT self-confidence, maintaining both an acute inquisitiveness and a protracted attention span, and, intellectual maturity, especially in terms of the need to conditionally accept and work with multiple interpretations and definitions of CT as well as other concepts, and to resolve uncertain matters toward closure--even when knowledge is incomplete and seemingly insufficient (1996).

Evaluating An Author's Reasoning: The "No-Choice" Solution (Elder, 2002).

Description:

Learners are rewarded (assessed, evaluated, graded) only for actual evidence of knowing, but not for memorizing, or parroting instructor pronouncements. They

are rewarded for (a) understanding an author's purpose, (b) articulating and comprehending the import of apparent yet unstated questions, (c) determining types of information used by an author, a text, or other materials and media, to "make a case" or express thinking, (d) understanding and explicating both the conclusions the author/material actually do derive and those they might well have derived, and (e) evaluating the conclusions reached, the logical processes followed, and the intellectual adherence to standards.

Defusing "Activated Ignorance" (Elder, 2002).

Description:

Dysfunctional learning assumptions are exposed and laid to rest. Among these are, all learning must be fun, all learning should be easy, the teacher is responsible for my learning, and learning success derives mainly from following all directions from others precisely as they are enunciated.

Precipitating "Activated Knowledge" (Elder, 2002).

Description:

Through instructional invocation, learners feel compelled and driven to come to grips with the ideas and knowledge which they (a) hold very deeply and sincerely in their individual understandings and (b) comprehend at a very fundamental level. Learners are facilitated in developing intellectual humility. They clarify all that they do not know. They develop caution concerning and resistance to acting according to prejudice and superficial understanding. Conclusions are derived with care and held tentatively as the situation warrants.

Exposing and Contracting the Egocentrism in Our Thought (Elder, 2002).

Description:

Learners persevere in eliminating egocentrism from their process of intellectual inquiry. They recognize egocentrism as possibly "the greatest barrier to learning." Instructors concentrate upon themselves in this respect, modeling process and results. Thought process which reaches out to others and their ideas, and ways of thinking are encouraged and emulated in class process. Normal thought process, which strives to get what it wants, validates its own views, and justifies the behaviors it elicits as negated. Tuning in to others' worldviews is expanded.

Initiating Ongoing Learner Assessment of Their Own Thinking		(Elder, 2002).

Description:

Embarkation toward CT mastery is begun as students assess their thinking according to specific standards. Learners interact continuously, building requisite, effective communication as they do, to facilitate one another's fulfillment of assessment standards for the class.

Teaching Strategy	CT Expert or Researcher
Developing a Holistic Assessment of CT	(Facione & Facione, 1996).

Description:

The instructor shifts the CT learning dynamics of the course toward a mode of assessment reflective of "holistic CT" (Facione & Facione, 1996, p. 8). Learners and instructors maintain record, communicate, and help to facilitate in others a holistic CT track record. This CT track record accurately interprets information as evidence and questions as directives for inquiry. It also identifies salient arguments, pro and con; analyzes with care alternative points of view; draws warranted, non-fallacious conclusions; justifies and explains clearly results, procedures, assumptions, and reasons; and otherwise follows fair-mindedly where evidence and reason lead (1996).

Class Evaluations of Externalizing CT Presentations	(Facione & Facione, 1996).

Description:

A format is derived for class member evaluations through instructor and class deliberations. The instructor may request individual written reports. Eventually, everyone presents an externalizing report of their CT process in relation to the covered subject matter. Everyone participates in evaluating others' reports, according to twelve key points: (a) definitions rendered are germane to the central issue, (b) all arguments and claims are cogently made, (c) sufficient evidence is marshaled to convince not only the true believer but the circumspect and wary as well, (d) sufficient considerations, equally for pro and con, are projected, (e) assumptions and consequences to assumptions are reasonably developed and presented, (f) logical analysis is transparent and openly communicated supporting

recommended positions and conclusions, (g) professional practice guidelines presented are convincing, relevant, and fully communicated, (h) reason and evidence were clearly demanded throughout the presentation (i) the same was true for tolerance of divergent viewpoints, (j) all benefits and consequences of all arguments put forth were clearly rendered, (k) diligence and focus concerning assembly of ideas and information and their communication were evident, and (l) consideration of all reasonable and possible solutions and points of view was in evidence throughout (Facione & Facione, 1996).

Scaffolding (Ashman & Conway, 1997; Hanley, 1995).

Description:

Scaffolding emphasizes intensive, step-by-step support for the learning process of novice critical thinkers. Levels of difficulty are orchestrated and staged, carefully and strategically. Learning contexts intensify as knowledge, skill, and confidence are acquired. Initiative in learning transfers gradually from instructor to learner. Initially, learners' customary thought process is broken down and replaced by a systematically guided, increasingly complex adoption of well-defined, precise, expert thinking and learning directives and patterns for inculcation of CT (Ashman & Conway, 1997; Hanley, 1995).

Argument mapping (van Gelder, 2002).

Description:

Any argument can be understood as a structure of claims standing in inferential or evidential relationships to each other. An argument map is a presentation of an argument in which the inferential structure is made completely explicit, usually by graphical techniques. The typical argument map is a "box and arrows" diagram in which the nodes correspond to claims. These claims and the links indicate their evidential relationships (van Gelder, 2002).

Appendix B

Paul, Elder, and Bettler (1997) 17 CT Skills with a Brief Analysis

1. Refining generalizations and avoiding over-simplifications

Brief Analysis

Multiple choice instruments seem well able to assess this capacity. In offering answer choices with only slight variance as to meaning or interpretation of meaning, they seem well-suited to engaging the test-taker actively with understanding distinctions, knowing when to apply or recognize them, and using them to evolve thinking from the general to the specific. Well designed questions requiring logical reasoning, analytical grasp of presented materials, disposition and ability to go beyond the generalization, or the overly simplified response, to the response requiring a higher level concentration upon detail— such types of questions, which seem predictably to lie at the core of standardized multiple choice instruments--are well able to meet this test of adequacy.

2. Comparing analogous situations: transferring insights into new contexts

Brief Analysis

Similarly, that is, following the logic applied above to skill one, well-made, cogently designed approaches are potentially well suited for requiring and demanding of the test taker penetration in thought to whatever is analogous to presented statements or not. Current standardized assessment instruments, such as the GRE (ETS, 2006), the most notable, most examined instance among many, which are at pains to get at and objectively consider CT skills of test takers and to get at these from multiple perspectives, strive to construct questioning contexts so as to demand clearly reasoned and logical transfer of insight from the informational or learning context, or the context of assumed prior learning, to some newly presented and introduced context. They seem well able to accomplish this end and to do it well. They are likely able to accomplish this function with greater attention to nuance and detail than the given learner had encountered in any learning or assessment context prior to taking the test. That is, moreover, generally the test makers' intention, particularly in the cases of the GRE, GMAT, and similar graduate-level examinations.

3. Developing one's perspective: creating or exploring the implications of beliefs, arguments, or theories

Brief Analysis.

Interpretation of the assessment capacity of standard multiple choice instruments in

relation to skill 3 generally follows suit with 1 and 2. Capacity for actually engaging the learner/test-taker with active demonstration of these skills, within the bounds of multiple-choice format; that is, reaction to presented materials according to specified choices, seems dependent upon only the design approach and the skill and knowledge of the test makers. It is, however, the accepted bounds of multiple choice, vis a vis skill three, which serve to disclose the core, underlying limitation of the multiple choice format. This limitation is especially relevant to consideration of CT assessment. Paul's specification of creating implication to belief, argument, or theory is clearly demanding beyond the scope of multiple choice. The multiple choice test-taker has no opportunity to demonstrate an ability to create implication but only to select from among those indicated. Ultimately, CT is all about self-assertion, realizing and expanding one's own, unique intellectual dynamics, and assuming full responsibility for and self-control of one's learning, or whatever one is occupied with and committed to in terms of intellectual engagement (Paul, & Elder, 2002). Multiple choice format for assessment of CT seems unworkable in this respect. It is workable for assessing skills associated with CT --primarily informal logic (Scriven, 1991;van Gelder, 2004)— but for the essential and necessarily creative, self-generating process, it is not up to the standards and capacities of, say, dialogue or essay; group or individual presentation. But this is getting way ahead of the argument, and must wait until the other skills have been duly considered.

4 Clarifying issues, conclusions, or beliefs.

Brief Analysis

Skill 4, at least in surface consideration, would appear to return the context of CT assessment safely to the realm of whatever is discernible to multiple choice approach, or discernible to any measure or test for that matter, and exterior to the learners, as individuals, themselves. Granting the multiple choice approach assessment legitimacy, in terms of skill 4, however, carries with it certain limitations. The issues, conclusions, and beliefs, that one encounters, along with whatever associated information, in the multiple choice format, are not one's own. They may replicate one's own, but this is not the same as one's own assertions. They can offer answer choices responding to others' statements of belief and so forth which, with care, insight, and diligence, can be made to logically clarify or improve the original, or not. They might not, however, be the only choices, nor even the best. They may well deviate from one's own concepts and insight. Selection among forced limitations

perhaps plays a part in CT but probably does not provide indication of one's actual, full CT ability with respect to skill four.

5. Clarifying and analyzing the meanings of words and phrases.

Brief Analysis

In general words and phrases of any language depend upon standardized and generalized definition and fairly uniform agreement of usage, meaning, and extended implications of intended meaning. The multiple choice testing instrument would seem well able, except when, perhaps verging toward attempts to nail down, classify, regulate, guide, specify, or control the highly symbolic, poetic, metaphorical, or creative implications of language, to at least provide a thumbnail assessment of ability with language. One might well convincingly argue that this assessment was in terms of CT. The exceptions— the creative, individual, and individually expressive and imaginative— nevertheless, loom large in the realm of CT formation and expression.

6. Developing criteria for evaluation: clarifying values and standards.

Brief Analysis

This skill, as with four, is measurable using multiple choice, as long as one accepts the limitation of confronting, rather abstractly, the values and standards of others, which, as with issues, conclusions, or beliefs of others, are the least important for CT. Engaging with one's own value and standard formation in a very meaningful way is not well open to multiple choice approach.

7. Evaluating the credibility of sources of information.

Brief Analysis

Multiple choice, within very narrow, comparative confines, and within the confines of informal reasoning or logic (Scriven, 2000; van Gelder, 2004) is very adept at drawing upon this ability.

8. Questioning deeply: raising and pursuing root or significant questions.

This skill, as with skill three, exposes the weakness of multiple-choice at the root level: The test taker has no opportunity whatsoever to engage in this type of dialogue. The multiple-choice test may pose questions. The test-taker may select among those posed the most appropriate or applicable. Some indication of ability to discern level, relevance, or depth of posed questions is derived. But this can hardly be understood as constituting dialogue in the sense of arriving at, formulating, and expressing one's own questions,

followed by one's assessment of how appropriate is the response. In fact, it is a fabrication of language in general to suggest that this type of test establishes dialogue in any genuine sense whatsoever (The National Center for Fair & Open Testing, 2007). Such dialogue, especially, in the Socratic sense nearly all contemplations of CT begin with, seems unlikely to flow from the multiple choice directive.

9. Analyzing or evaluating arguments, interpretations, beliefs, or theories.

Brief Analysis

Accepting that one's analysis is always limited to four or five choices, one can agree that multiple-choice can penetrate into comprehension of individual capacity in this realm.

10 Generating or assessing solutions.

Brief Analysis

Generating is the key word for CT. Multiple-choice cannot help us when it comes to generating. Assessing is accessible, but even then one has but the four or five responses from which to select.

11. Analyzing or evaluating actions and policies

Brief Analysis

Accepting the limitations of five choices, multiple-choice can exercise this skill with authentic measure and outcomes.

12. Reasoning dialogically: comparing perspectives, interpretations, or theories.

Brief Analysis

Multiple-choice can give one practice in doing this. However, the limitation of selecting from among the outcomes of others' dialogical reasoning is quite severe in terms of the self-generating ideals associated with CT.

13. Reasoning dialectically: evaluating perspectives, interpretations, or theories.

Brief Analysis

Limitation of selecting from among outcomes of others, especially in terms of one's own dialectical process, is more severe than was the case for skill 12, which indicates statement, response, argument, counter argument— the give and take of conversation, so to speak— which dialectic does not so indicate. Multiple choice questioning and response could be interpreted as a dialogic process, up to the point indicated above. Dialectic, on the other hand, although initiated or engaged, very likely, through conversation or questions posed, presupposes process not discernible as dialogue: a self-generating examination of

one's own thought process and a self-imposed evaluation of both process and implications, but not fully, not necessarily, and, ultimately, not at all derived from or in accordance with externally imposed goals, principles, standards, measures, accepted practices, and so forth.

15. Listening critically: Constructing an accurate interpretation of, understanding the elements of thought in, and evaluating the reasoning of oral communication.

Brief Analysis

Multiple-choice can of course not measure ones CT toward constructing anything. It probably is also very limited in terms of evaluating anything. It can offer choices of what others have constructed and reflected upon, as well as choices of what others have had to say concerning value and worth. One is then able to designate among alternatives presented appropriately. But construction and the direct confrontation of evaluation seem far removed from its realm.

16. Writing critically: creating, developing, clarifying, and conveying, in written form, the logic of one's thinking.

Brief Analysis

The vast divide between CT and multiple-choice is unbridgeable in this respect. Written communication of one's thoughts is the cornerstone of CT. Without the cornerstone, the edifice of CT crumbles.

17. Speaking critically: creating, developing, clarifying, and conveying, in spoken form, the logic of one's own thinking..

Brief Analysis

Concern for perceived limitations of multiple choice tests in terms of responding to increased demand for assessing CT ability have recently been demonstrated with incorporation of essay writing sections as part of standardized tests for college admissions and similar requirements.

Appendix C

CITSS

CRITICAL THINKING TEACHING STRATEGIES SURVEY

The definition of critical thinking used for this study is that it is an intellectually disciplined "process of actively applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief or action" (Scriven & Paul, 2004, p.1). On the answer sheet below are 33 strategies used for incorporating critical thinking within graduate study programs and classes. You are invited to read each strategy and to respond to each in three separate ways, as shown on the answer sheet: (a.) indicate the frequency with which you use the strategy; (b.) rate it individually according to your own perception of the strategy's effectiveness for developing and fostering critical thinking; and (c.) indicate whether you had knowledge concerning the strategy prior to your survey participation. You may indicate this prior knowledge by marking the appropriate box in the final column with a check mark (√). You indicate that you had no prior knowledge of the strategy simply by leaving the box associated with the strategy blank. Please note: Prior use or prior knowledge of the given strategy is not intended as a precondition for providing a rating of your perception of the strategy's effectiveness.

In providing your rating, you are invited to rely upon your own understandings and interpretations from your personal experience, knowledge, and synthesis of information concerning the effectiveness of each strategy. Initially, the survey answer sheet presents the individual strategies with a brief description for each. Then, if you need more information or are unfamiliar with specific details of any of the strategies, you are invited to refer to the extended description provided for each strategy, attached after the survey answer sheet. Additionally, if still more information is required for your informed response, comprehensive descriptions of all strategies and suggestions of how each individually might be used are available to you upon request from the researcher. You are invited to contact the researcher at any time concerning this information.

The numerical rating system for strategy frequency of use:

A rating of **1** indicates *no use* of the strategy.
A rating of **2** indicates *infrequent use* of the strategy.
A rating of **3** indicates *occasional use* of the strategy.
A rating of **4** indicates *frequent use* of the strategy.
A rating of **5** indicates *very frequent use* of the strategy

The numerical rating system for strategy effectiveness:

A rating of **1** indicates *no effectiveness* of the strategy.
A rating of **2** indicates a *minimal level of effectiveness* of the strategy.
A rating of **3** indicates a *moderate level of effectiveness* of the strategy.
A rating of **4** indicates a *very high level of effectiveness* of the strategy.
A rating of **5** indicates the *maximum level of effectiveness* of the strategy.

Completing the questionnaire proceeds as follows:

Review Instructions: page 1
Complete Demographic Information Sheet: page 2
Respond to the Strategies on the Survey Questionnaire Answer Sheet: pages 3-6
Optionally, Review Attached Detailed Descriptions of Strategies: pages 7-15

Demographic Information Sheet

Please list the course(s) that you are currently teaching or taught last semester (please list a course only once if you taught it more than once or multiple sections.

Course Number & Name	Level (circle)
1) _____	Master Doctoral
2) _____	Master Doctoral
3) _____	Master Doctoral
4) _____	Master Doctoral
5) _____	Master Doctoral

Approximately how many years have you been teaching? _____ years

Check your current academic classification:

- ☐ Professor
- ☐ Associate Professor
- ☐ Assistant Professor
- ☐ Board Appointed Term (Professor)
- ☐ Board Appointed Term (Associate Professor)
- ☐ Board Appointed Term (Assistant Professor)
- ☐ Part time

	1-Never 2-Infrequently 3-Occasionally 4-Frequently 5-Always					1-Not 2-Minimally 3-Moderately 4-Very 5-Maximum					(√)
TEACHING STRATEGY	FREQUENCY OF USE					PERCEPTION OF EFFECTIVENESS					Prior Knowledge
	1	2	3	4	5	1	2	3	4	5	
1. Instructor-Directed, in-Class Exercises in Critical Thinking Direct instructional guidance. No assumptions of learner prior knowledge or self-direction capability.											
2. Socratic Questioning Probes individual assumptions to increase self-awareness of learners and of instructor.											
3. Instructor Critical Thinking Disposition Modeling The instructor displays her own learning projects, and, thereby, positive attitudes, dedication, and acumen.											
4. Open-Book Tests Creative use and application of knowledge emphasized, with particular attention to learner-developed questions.											
5. Class Presentations of Small-Group Projects Concerning both ongoing and completed projects. Ideally, groups each assume instruction for a class period.											
6. Individual Learners Acting as Class Instructors Individual learners act as instructors for a day, following collaborative preparation with the instructor.											
7. Conspicuous Recognition and Reward of Critical Thinking Instructors underwrite, reward, and otherwise noticeably recognize indications and examples of critical thinking—speaking, writing, actions, group process.											
8. Structuring the Class As a Model Society of Critical Thinking All class process mirrors democratic ideals and procedures. Critical thinking is given priority status over skill acquisition, formulas, and learned precepts.											
9. Learner Discovery of the Power and Resources of Their Own Minds Instructor submits problems held insoluble within the discipline for learner solution and discussion of results.											
10. Assuming Alternative Perspectives & Points of View Learners hypothetically assume, probe, advocate, and defend perspectives at odds with their own.											

TEACHING STRATEGY	1-Never 2-Infrequently 3-Occasionally 4-Frequently 5-Always FREQUENCY OF USE 1	2	3	4	5	1-Not 2-Minimally 3-Moderately 4-Very 5-Maximum PERCEPTION OF EFFECTIVENESS 1	2	3	4	5	(√) Prior Knowledge
11. Drawing Reasonable Conclusions Practice with informal logic, writing evaluation report summaries, or completing detective stories which have no conclusion—for example.											
12. Transferring Insights into New Contexts Group discussion of life-experiences, followed by application of real-life insights into evaluation contexts.											
13. Cognitive Disequilibrium Instructor withholds intellectual, learning closure and displays prolonged concentration upon learning without need for resolution. She exclusively focuses upon ill-structured, "multi-logical" problems.											
14. Class Journal Emphasis on the reflective, individual, and personal, but exclusively as inspired by relevant class learning.											
15. Intellectual Log-Keeping Instructor-initiated lead-ins to direct interpretational response to readings and materials. Not personal reflection but intellectual grappling with essential ideas.											
16. Instructor Intellectual Log-Keeping Lead-In & Modeling Instructor recognition of the learners' difficulties with log entries leads to her modeling of writing informed, thoughtful, original responses. She exploits the "thinking aloud" stratagem.											
17. Culture Difference Awareness/Social-Practice Approach Emphasis is made, using all possible channels and resources, upon cultural context and difference, stressing their impact upon logical thought process, analytical disposition and ability, and emotional and aesthetic inclinations.											
18. Social Justice Strategy Directs attention to how social, cultural, economic, political, and educational life-experience act to control thinking—largely oppressively.											
19. Variation On the Theme of Critical Thinking Focusing upon, introducing, presenting, opening to discussion, and relating to the current class topic: multiple views and definitions of critical thinking.											

TEACHING STRATEGY	1-Never 2-Infrequently 3-Occasionally 4-Frequently 5-Always FREQUENCY OF USE 1 2 3 4 5	1-Not 2-Minimally 3-Moderately 4-Very 5-Maximum PERCEPTION OF EFFECTIVENESS 1 2 3 4 5	(√) Prior Knowledge
20. Consideration of Multiple Perspectives of Use of Critical Thinking Four paradigms of critical thinking application are focused upon for learner experimentation: dualism/received knowledge; multiplicity/subjective knowledge; relativism/procedural knowledge; and commitment in relativism and constructed knowing.			
21. On-the-Spot Analysis and Interpretation of Pedagogical Failure Areas: Instructors confess all they do not know about critical thinking. They identify key teaching difficulties associated with critical thinking instruction and ask for student intervention to resolve.			
22. Guiding students Toward Analysis of Critical Thinking Disposition Learners are guided to research and present blocks to essential critical thinking outlook and attitude.			
23. Evaluating Authors' Reasoning: The " No-Choice" Solution: Learners rewarded only for actual demonstration of learning, that is, knowing, understanding, and not parroting.			
24. Defusing "Activated Ignorance" Dysfunctional learning assumptions are exposed as fraudulent and laid to rest: For example: all learning should be easy; all learning should be fun; the teacher is the source of all knowledge and right answers.			
25. Precipitating "Activated Knowledge" Instructional invocation drives learners to come more objectively to grips with thinking held deeply and individually, and ideas comprehended at a very fundamental level. Intellectual humility is exalted. Prejudice resisted.			
26. Exposing & Counteracting the Egocentrism in Our Thought Normal thought process, which almost exclusively strives to get what it wants, validate its views, and justify the behaviors it elicits, is negated. Tuning into others' worldviews is expanded.			
27. Initiating Ongoing Learner Assessment of Their Own Thinking Embarkation into the realm of critical thinking through self-assessment according to specific standards. Student interaction is emphasized.			

	1-Never 2-Infrequently 3-Occasionally 4-Frequently 5-Always					1-Not 2-Minimally 3-Moderately 4-Very 5-Maximum					(√)
TEACHING STRATEGY	FREQUENCY OF USE					PERCEPTION OF EFFECTIVENESS					**Prior Knowledge**
	1	2	3	4	5	1	2	3	4	5	
28. Developing a Holistic Assessment of Critical Thinking Learners track and record evidence; interpret; question; identify arguments; analyze multiple perspectives fairly; draw rational conclusions; develop explanations of results, procedures, assumptions, and reasons; and thus assemble holistically the critical thinking apparatus.											
29. Developing Externalizing Critical Thinking Presentations Simultaneous with and integral to making her individual research presentation, each learner discloses and narrates her own critical thinking process underlying the research and writing for the presentation.											
30. Class Evaluations of Externalizing Critical Thinking Presentations Both instructor and full-class deliberations critique the externalizing critical thinking presentations, immediately upon their conclusions.											
31. Concept Mapping & Mind Mapping Visualization and structuring of how ideas relate to the process of problem solving and to the elements contained within the problem field toward which the cognitive engagement must be directed.											
32. Scaffolding Emphasizes the instructor's intensive guidance and support for first-time critical thinkers in class process. Initially, the learner's native thought process is broken down and systematically replaced with a guided, increasingly complex adoption of expert thinking for inculcation of critical thought patterns.											
33) Argument mapping Argument mapping is producing graphical "boxes and arrows" maps of complex debates. The result — an argument map—is a paper chart presenting an overview of the reasoning.											

Appendix D

Invitation Script

Hello, I'm Dhaifallah Al Matrodi, how are you doing today? [pause]

I'm a doctoral student in the Evaluation, Measurement, and Research program in the College of Education and I would like to talk to you about my dissertation project. The title of my dissertation is Effective CT Teaching Strategies as Perceived by PE Faculty. [pause]

I am employing a mixed method research design utilizing both survey and interview techniques to investigate how CT is incorporated into evaluation graduate programs. I have developed a 32 item survey, called the Critical Thinking Teaching Strategy Survey (CTTSS), to measure how instructors perceive and use teaching strategies for developing CT. [pause]

If you agree to participate I would like you to complete the CTTSS, which should take less than an hour, and also agree to participate in an hour long interview in about one week. In the interview we will discuss in greater depth your perceptions and teaching techniques concerning fostering CT in your graduate students. [pause]

Your participation is purely voluntary and at your own individual discretion. You may withdraw from participation at any time. [pause]

Would you like to participate in my study? [pause]

If you would like to participate in my study I would like to leave the survey and consent letter with you. I can return to pick them up when they are completed. I would like to be able to pick-up the survey sometime next week. Can we set a time now at which I can come back to collect the completed survey? [pause]

If you need extra time, let's decide the best time for me to get back with you. The written information with the consent form and survey should answer any questions

you might still have, concerning your participation in the survey, and the follow-up interviews.

[end of script]

Appendix E

HSIRB Letter of Approval and Letter of Informed Consent

Date: December 15, 2006

To: Brooks Applegate, Principal Investigator
Paula Kohler, Co-Principal Investigator
Dhaifallah Almatrodi, Student Investigator for dissertation

From: Mary Lagerwey, Ph.D., Vice Chair Mary Lagerwey

Re: HSIRB Project Number: 06-11-18

This letter will serve as confirmation that your research project entitled "Effective Critical Thinking Teaching Strategies as Perceived by Program Evaluation Faculty" has been **approved** under the **expedited** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may **only** conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: December 15, 2007

Walwood Hall, Kalamazoo, MI 49008-5456
PHONE: (269) 387-8293 FAX: (269) 387-8276

Letter of Informed Consent

You are invited to participate in a research project entitled EFFECTIVE CRITICAL THINKING TEACHING STRATEGIES AS PRECEIVED BY PROGRAM EVALUATION FACULTY. This project is intended to analyze strategies for effectively teaching critical thinking in graduate classes of program evaluation. The study is being conducted by Brooks Applegate and Dhaifallah Almatrodi from Western Michigan University, Department of Educational Studies, Evaluation, Measurement, and Research. This research is being conducted as part of the dissertation requirements for Dhaifallah Almatrodi. You have been selected as part of the purposive sample for the study because, by your faculty position, teaching experience, and expertise in evaluation, you are representative of the population of evaluation faculty worldwide. We got your name from the departmental website.

The research for the study includes two components. The first is a survey comprised of 32 teaching strategies. For each presented strategy, research participants are asked to indicate their perception concerning the degree of effectiveness of each strategy, on a scale of one to five, one indicating the lowest level of perceived effectiveness, five the highest level of perceived effectiveness. The survey will take approximately 30 minutes to complete. The second research component is a follow-up interview conducted with each participant taking the survey. Interviews will be conducted by student investigator individually two weeks after administration of the

survey. Interviews should require approximately one hour and they will be scheduled at a time convenient to you. Your participation in both survey and interview will be completely confidential. Your identity will be known only to Dhaifallah Almatrodi and Dr. Paula Kohler. The survey questionnaire you complete has a code number which will identify you to Dhaifallah Almatrodi and Dr. Paula Kohler during the course of the research. Because Dr. Brooks Applegate is a member of the evaluation program this information will be kept entirely secure and confidential by Dr. Paula Kohler until identification have been removed. Nothing in the research descriptions or statements of results will connect you to any aspect of your participation at any time. By signing the consent form you agree to participation in both the survey and the follow-up interviews.

Your participation is completely voluntary and you may withdraw from participation at any time. If you agree to participate, the researcher will pick up the survey and the consent form with your signature at your office, and we can arrange the time for the interview then. If you have any questions, you may contact Brooks Applegate at 269-387-3886 or Dhaifallah Almatrodi at (269-823-8695, the Human Subjects Institutional Review Board (269-387-8293) or the Vice President for Research (269-387-8298).

Your reactions to the strategies presented and your related ideas and questions are important for better understanding of how critical thinking may best contribute to teaching, learning, and professional practice in evaluation. Through your participation you may also gain some further insight into your own teaching practice and possibilities for greater facilitation of critical thinking in your students, throughout their course of learning and their professional development. Please contact the researcher directly if you

wish to have more information concerning the ideas or results of this study and related research in critical thinking.

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board as indicated by the stamped date and signature of the board chair in the upper right corner. You should not participate in this project if the stamped date is more than one year old.

_____ _____

Signature Date

Appendix F

Six CITI Groupings with Associated Teaching Strategies

CTTI 1 Learners Are Supported
1. Instructor-directed, In-class Exercises in CT
3. Instructor CT Disposition Modeling
16. Instructor Intellectual Log-keeping Lead-in and Modeling
20. Consideration of Multiple Perspectives of Use of CT
22. Guiding Students Toward Analysis of CT Disposition.
32. Scaffolding
CTTI 2 Learners Are Stimulated
2. Socratic Questioning:
7. Conspicuous Recognition and Reward of CT
11. Drawing Reasonable Conclusions
19. Variation on the Theme of CT
24. Defusing "Activated Ignorance"
25. Precipitating "Activated Knowledge"
26. Exposing and Counteracting the Egocentrism in Our Thought
31. Concept Mapping and Mind Mapping:
33. Argument Mapping
CTTI 3 Learners Envision Their Own Learning
4. Open-book Tests:
6. Individual Learners Acting as Class Instructors
9. Learner Discovery of the Power and Resources of Their Own Minds
15. Intellectual Log-keeping:
21. On-the-Spot Analysis and Interpretation of Pedagogical Failure Areas
23. Evaluating Authors' Reasoning.
27. Initiating Ongoing Learner Assessment of their Own Thinking:
CTTI 4 Learners Openly Share Learning
5. Class Presentations of Small-group Projects
8. Structuring the Class as a Model Society of CT
10. Assuming Alternate Perspectives and Points of View
17. Culture Difference Awareness
29. Developing Externalizing CT Presentations
30. Class Evaluation of Externalizing CT Presentations
27. Initiating Ongoing Learner Assessment of their Own Thinking
CTTI 5 Learners Reflect Upon Experience
12. Transferring Insights into New Contexts
14. Class Journal Emphasis
18. Social Justice Strategy
CTTI 6 Learners Imagine and Evaluate Various Problem
13. Cognitive Disequilibrium:
28. Developing a Holistic Assessment of CT