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ABSTRACT

A review of the critical thinking literature reveals that there is growing interest in developing instructional strategies to develop students' critical thinking skills and dispositions. This paper reviews the research literature regarding the nature of critical thinking in the following areas: (1) differences in the conceptualization of critical thinking; (2) the degree to which critical thinking is generalizable across disciplines; and (3) the types of problems which should be measured in critical thinking assessments. The primary focus of the paper is on the different conceptualizations of critical thinking. Various areas of scholarly consensus are identified including the following ideas: that items central to critical thinking are analysis, evaluation, and inference; that critical thinking requires the use of cognitive abilities; that critical thinking includes metacognitive or self-monitoring skills; and that a student's thinking should meet certain criteria of good thinking or intellectual standards. Areas of scholarly disagreement are also identified including the questions of whether critical thinking is subject-specific or generalizable and how critical thinking can be measured. Contains 37 references. (GLR)

Critical Thinking Skills for College Students

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Critical Thinking Literature Review

A review of the critical thinking literature reveals that there is growing interest in developing instructional strategies to develop students' critical thinking skills and dispositions. By educational directive, the 20 state universities in California require a course in critical thinking prior to graduation. Colleges with competency-based curriculum programs, such as Alverno College and King's College, have integrated critical thinking programs at the core of their curriculum. At the secondary and postsecondary level, there exists a number of critical thinking textbooks which have become increasingly popular (see for example Halpern, 1984, Schwartz and Perkins,1990, Chaffee, 1992). John Chaffee's textbook *Thinking Critically*, for instance, has been adopted at close to 300 institutions.

According to a review of critical thinking studies conducted by Pascarella and Terenzini (1991), attending college has a positive influence on the development of students' critical thinking. Of the five studies reviewed by Pascarella and Terenzini, four suggest that freshmen-senior differences on measures of critical thinking are more than the result of differential academic ability or maturation effects. For instance, when controlling for secondary school critical thinking scores, secondary school grades, academic aptitude, socioeconomic status, and initial educational aspirations, Pascarella (1989) found that students (n = 70) with one year of college had significantly higher test scores (.44 of a standard deviation or 17 percentile points) on the Watson-Glaser Critical Thinking Appraisal than those in the study who did not attend college. In a review conducted of 27 studies on the effect of instructional strategies on critical thinking, McMillan (1987) found, while

attending college improves critical thinking of students, specific instructional strategies have little consistent impact on the development of their critical thinking. According to McMillan (1987, p. 10), the inconclusiveness of these studies in identifying instructional strategies that effect critical thinking may be a result of the use of Watson-Glaser Critical Thinking Appraisal (CTA). The CTA was developed to provide a sample of the ability to think critically about statements encountered in daily work, magazines, and newspapers and may not be sufficiently sensitive to pick up changes in critical thinking as a result of differences in instructional strategies at the college level. Sixteen of the 27 studies used the CTA. However, Pascarella and Terenzini (1991, pp. 143) cite a study by McKeachie, Pintrich, Lin and Smith which reconsidered McMillan's review that concluded "instruction that stresses student discussion and/or places explicit emphasis on problem solving procedures and methods may enhance critical thinking." In another review of studies conducted on the effect of instruction on critical thinking, Halpern (in press) reviewed 15 studies, including those connected with the national thinking instruction program in Venezuela from 1979 to 1984, which indicate that thinking can be improved through instruction.

Several issues have been debated regarding the nature of critical thinking. In short, these debates have revolved around 1.) differences in the conceptualization of critical thinking, 2.) the degree to which critical thinking is generalizable across disciplines, and 3.) the types of problems which should be measured in critical thinking assessments. This literature review will discuss each of these issues and will focus predominately on the different conceptualizations of critical thinking.

I. Conceptualization

The meaning of critical thinking has been an area of contention (see King, Woods, and Mines 1990; Ennis et al. 1987, McMillan 1987). One example from the literature illustrates this point. Johnson (1992) provides a review of five definitions of critical thinking, each imbedded in theory. They include the following:

a. Ennis's definition of critical thinking as reasonable reflective thinking that is focused on deciding what to believe or do. Johnson indicates that Ennis's definition is pertinent to theorists' concerns regarding the scope of their conceptualizations and the relationship of their conceptualizations to the network of other thinking terms, such as problem solving and creative thinking. According to Johnson, Ennis's definition equates critical thinking with rational thinking and makes a very tight connection between critical thinking, creative thinking, and problem solving.

b. Richard Paul's definition in terms of a list of perfections and traits of thought: critical thinking is disciplined, self-directed thinking which exemplifies the perfection of thinking appropriate to a particular mode or domain of thinking. Johnson maintains that the strength of Paul's definition is its emphasis on the capacity of the student to become aware of egocentric and ethnocentric thinking, the human tendency towards self-deception, and the moral character required of critical thinking.

c. McPeck's definition of critical thinking as the skill and propensity to

engage in an activity with reflective skepticism. Johnson indicates that McPeck's orientation to critical thinking emphasizes the importance of disciplinary knowledge and, like Ennis's definition, includes actions as well as beliefs in the scope of critical thinking.

d. Siegel's definition of the critical thinker as the individual who is appropriately moved by reasons: s/he has the propensity and disposition to believe and act in accordance with reasons; s/he has the ability to assess the force of reasons in the many contexts in which reasons play a role.

e. Lipman's (1988) account of critical thinking as skillful, responsible thinking that facilitates good judgment because (1) it relies upon criteria, (2) is self-correcting and (3) is sensitive to context. Johnson asserts that Lipman's definition does not give due emphasis to the social and communitarian nature of thinking, but he agrees that critical thinking involves the evaluation of an intellectual product.

As the above examples illustrate, there are clearly distinctions among philosophers and cognitive/educational psychologists in their conceptualizations of critical thinking. The distinctions relate to differences in regards to frames of reference, terminology, categorization of thinking skills, and the scope and substance of conceptualizations. Psychologists explain the workings of specific cognitive operations emphasizing cognitive structure and the activities of the mind (Young, 1980, Marzano et al. 1988, p. 7). From this perspective, critical thinking can

be characterized by "the ways in which the contents and mechanisms of human cognition are involved in the solution of problems and the making of decisions and judgments," (Young, 1980, p. ix). In this context, most of the definitions for critical thinking include skills in applying, analyzing, synthesizing, and evaluating information (Halpern, 1992). Berry (1990) maintains that while psychology offers insight into how thinking occurs and, consequently, how thinking procedures may be effectively taught, philosophy offers insight into what should be included in a thinking skills program. Berry contends that the teaching of thinking should include insights from both psychology and philosophy. Philosophers study, apply, and evaluate rules and standards of thinking for judging the substance of thinking (Berry, 1990). Berry identified six concepts in philosophy that have relevance to improving students' critical thinking:

- Reasoning is the systematic inferring of information according to rules of logic so as to demonstrate or ascertain the validity of a claim or an assertion.

- Argument recognition consists of the ability to distinguish a communication that presents a claim with one or more supporting reasons from a communication that simply describes or explains.

- Critical judgment is the willingness and ability to scrutinize and evaluate thinking - one's own as well as others - to determine the accuracy or worth and to construct logical arguments to justify claims or assertions.

• Criteria is used for judging the quality of thinking. For example, criteria is used to determine the reasonableness of given claims and arguments. (See Lipman, 1991; Paul, 1992).

• Point of view relates to the context in which thinking occurs. It is the position from which one views thinking and is a product of one's accumulated experience. A full understanding of an explanation or a description requires an understanding of the point of view that produced it.

• Dialogue refers to an interchange among two or more individuals or points of view on a given topic, claim, or subject in an effort ascertain the truth. It is a major method by which students exercise their critical thinking skills. It may be carried on between or among people, or it may be conducted by the student through critical self-reflection (see Paul and Nosich, 1991).

• Dispositions are distinct habitual ways of behaving. "Critical thinkers attach great value to seeking understanding, determining worth, and searching out truth" (Berry, 1990, p. 59).

Richard Paul, a leading philosopher in the critical thinking movement, proposes that at the heart of critical thinking is 1.) a question or problem at issue and 2.) reasoning about the question or problem. Good reasoning must deal with structural elements of thought integral to all reasoning and problem solving

regardless of disciplinary lines. These elements of thought include (Paul and Nosich, 1991):

a. Purpose, goal, or end view. Reasoning is performed to achieve some objective or fulfill some need; consequently, one source of problems in reasoning is traceable to defects at this level. If the goal is unrealistic, for example, the reasoning used to achieve it is problematic.

b. Question at issue or problem to be solved. Attempts at reasoning something out, implies there is at least one question at issue or one problem to be solved; hence, an area of concern for reasoners is the formulation of the questions to be answered or the problem to be solved.

c. Point of view or frame of reference. When we reason, we must reason within some point of view or frame of reference. Any "defect" in this perspective, such as a point of view that is narrow or that contains contradictions, is a possible source of problems in reasoning.

d. The empirical dimension of reasoning. When we reason, there is some phenomena, such as data or evidence, that we draw upon that may be subject to "defects."

e. The conceptual dimension of reasoning. All reasoning uses some concepts, such as theories, principles, axioms, or rules, that may have weaknesses.

f. Assumptions. All reasoning begins somewhere and takes some things for granted. Any faults in presuppositions with which the reasoning begins is a source of problems.

g. Implications and Consequences. As reasoning develops, statements will logically be entailed by it, which may have weaknesses or faults.

Despite the differences in frames of reference, terminology, and scope in conceptualizations of critical thinking, there is widespread agreement on a number of concepts. Facione's (1990, 1992) recent Delphi Method research project, conducted with a panel of 46 national experts, arrived at a consensus of opinion on critical thinking abilities and dispositions. The product of this process was used in the development of the California Critical Thinking Dispositions Inventory and the California Critical Thinking Skills Test. The panel members were affiliated with several fields including philosophy (52%), education (22%), the social sciences (20%) and the physical sciences (6%). Facione (1990) reached almost total consensus (N>95%) on including 1.) analysis (examining ideas, identifying and analyzing arguments), 2.) evaluation (assessing claims and arguments), and 3.) inference (querying evidence, conjecturing alternatives, and drawing conclusions) as central to critical thinking.

In Facione's research project, there was consensus (N>87%) with some disagreement regarding the inclusion of communication skills as central to critical thinking. Communication skills were listed in Facione's critical thinking categories of interpretation and explanation. Communication skills are integral to employing

critical thinking in a group context where collaboration is necessary to problem solving. Halpern (1984), Chaffee (1990), and Schwartz and Perkins (1990) in their critical thinking textbooks underscore the relationship between literacy abilities and thinking. Relevant critical thinking skills in this area include those that are needed to comprehend and defend against the persuasive techniques that are embedded in everyday language. They also encompass both listening and speaking skills used to clarify thinking, avoid ambiguity and increase specificity. In addition to listening and speaking skills, substantive concepts of critical thinking also emphasize critical reading and writing skills (Paul and Nosich, 1991; Browne and Keeley, 1981). Reading and listening skills, for instance, relate to the student's ability to assess the purpose, biases, and credibility of a speaker or author, and the ability to accurately identify the problem being discussed and underlying assumptions of one's narrative (Halpern, 1992; Paul and Nosich, 1991).

The dimensions of critical thinking (e.g. skills, dispositions, moral character) have also been a topic of discussion among scholars. In a review of the literature, there is a general consensus, as evidenced by Facione's Delphi project, that critical thinking requires the use of cognitive abilities, which may include the application of techniques, skills, rules of reasoning, or procedures. Although a student may possess the cognitive abilities to think critically, the individual may not be disposed or inclined to use them. Consequently, researchers maintain that critical thinking also includes an affective dimension, called dispositions or traits of mind, that characterizes a critical thinker's way of behaving (Ennis, 1987, Facione, 1992, Halpern, 1992, Paul, 1992, Paul et al, 1992, Perkins et al, 1993). Dispositions are integral to critical thinking. For example, a study found that while people may have

the ability to generate arguments on the side of an issue opposite their own, they may not be disposed to explore the other side unless prompted (Perkins, Farady, and Bushey, 1991).

There is similar agreement among scholars that critical thinking should include metacognitive or self-monitoring skills (Beyer, 1988, Halpern, 1992; Facione, 1990; Marzano et al., 1988; Paul and Nosich, 1991; Perkins 1992, Schwartz and Perkins, 1990). "Metacognition refers to what we know about what we know, or, in more formal language, our knowledge about knowledge" (Halpern, 1984, p. 15). Metacognition is being aware of one's thinking as one performs specific tasks and then using this awareness to control what one is doing.

Scholars of critical thinking emphasize that a student's thinking should also meet intellectual standards, also called norms or criteria of good thinking (Lipman, 1988, Lipman 1991, Paul, 1992, Paul et al., 1993). These intellectual standards implicit in critical thinking include clarity, relevance, accuracy, fairness, completeness, precision, depth, breadth, and adequacy. Intellectual standards represent legitimate concerns irrespective of the subject being explored or the question at issue (Paul, 1992).

II. Critical Thinking - Subject-Specific or Generalizable?

There is some disagreement as to whether critical thinking is subject-specific or generalizable, that is, if learned in one area, can it be applied in many areas (Ennis, 1987; Johnson, 1992, McPeck 1990). McPeck (1990) emphasizes that generalizable thinking skills do not exist and that thinking is always about a subject; consequently, thinking detached from a subject can not exist. McPeck concludes

that critical thinking must vary from subject area to subject area. The unresolved issue is how much knowledge of content is a significant factor in critical thinking. There is general agreement that a student's familiarity with the subject matter plays an important role in the student's performance on thinking tasks in that area (Ennis et al., 1987, Ennis, 1992). Furthermore, Perkins (1985) indicates that many intellectual skills are context-specific. Likewise, Paul and Nosich (1991) emphasize that a critical thinker should consider the epistemological structures and intellectual standards within the confines of the discipline in which a problem is being addressed.

In response to the claims that critical thinking is subject specific, Ennis (1987), suggests that there are general principles of critical thinking that bridge subjects and have application to many subjects. It seems that critical thinking instruction does transfer to new situations. Ruggiero (1988) indicates that comparison of approaches of thinking instruction designed for different subjects reveal some variations to thinking instruction designed for different subjects have some variations in terminology, but teach essentially the same cognitive skills. Ruggiero (1988, p. 10) indicates that a number of approaches to develop thinking skills in a particular discipline have been successfully applied to other disciplines as well. For example, the Guided Design approach developed for the University of West Virginia engineering program has been successfully used in chemistry, communications, counseling, journalism, nursing, political science, and physics.

III. Issues in Measuring Critical Thinking

Measures to assess critical thinking have also been a frequent subject of discussion. Topics of importance regarding assessment include the distinction

between well-structured and ill-structured problems and problems requiring the use of higher-order versus lower-order thinking skills (King, Woods, and Mine, 1990; Sternberg, 1982). Problem structure relates to the degree to which a problem can be described completely and the certainty with which a solution can be identified. For example, puzzles are well-structured problems and pollution and overpopulation are ill-structured problems. Lower-order thinking skills are those that are applied in addressing well-structured problems, such as solving a math equation, in a rote or mechanical manner using a memorized set of rules (Halpern, 1992). According to Halpern (1992), a national assessment of critical thinking skills should focus on such higher-order thinking skills because they characterize the skills required to work on college-level assignments, take examinations, and effectively participate in cocurricular activities. Higher-order thinking skills are applied to problems that are unstructured and require thinking that is reflective, sensitive to context, and monitored (Halpern, 1992). Resnick (1987) suggests that higher-order thinking is characteristic of thinking that:

- Is nonalgorithmic, that is, the path of action is not fully specified in advance.
- Is complex in the sense that the total path is not "visible" from any single vantage point.
- Yields multiple solutions each with costs and benefits.
- Involves nuanced judgments and interpretation.
- Involves the application of multiple criteria, which sometimes conflict with each other.
- Often involves uncertainty; not everything that bears on the task at hand is

known.

- Requires self-regulation of the thinking process (see Halpern, 1984, p. 15 on the concept of metacognition).
- Requires finding structure in apparent disorder.
- Involves considerable mental work and effort.

According to Chaffee (1992) becoming a critical thinker who is capable of working through problems that require higher-order thinking skills does not require the acquisition of a discrete set of thinking and language "tools"; it involves, instead, the transformational process of developing an integrated set of thinking abilities, language constructions, critical attitudes and fundamental beliefs that involve the whole person.

In conclusion, the critical thinking movement has covered considerable ground since John Dewey (1933) proposed that reflective thinking is a basic principle for organizing the curriculum. Courses and research in critical thinking have flourished. Upwards of 800 colleges and universities now offer a course in critical thinking in some form. Richard Paul (1985) calculated that, between 1977 and 1984 alone, 1,894 discussions of critical thinking have been published in academic journals. The critical thinking field is still evolving and has undergone many stages of assessment. Walters (1990) contends that there has been too much emphasis placed on debate, argument, and error spotting within the critical thinking field and an insufficient amount of attention paid to nonanalytical, intuitive, and creative ways of thinking. Similarly, Debono (1984) maintains that the field has emphasized reaction rather than "doing" and logic over perception. With each

episode of appraisal the field has adjusted, and theoretical perspectives have been reexamined.

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