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THE THEORY OF CRITICAL THINKING: DEFINITION, FORMATION AND ASSESSMENT

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A B S T R A C T

Professors have long recognized the significance of critical thinking skills as a result of student learning. Critical thinking has recently been identified as one of several learning and innovation skills required to prepare students for postsecondary education and the workforce. Furthermore, the newly developed Common Core State Standards emphasize critical thinking as a cross-disciplinary skill necessary for college and employment. Despite widespread recognition of its importance, there is a notable lack of agreement on how to define critical thinking. The goals of this literature review are to investigate how researchers define critical thinking, investigate how critical thinking develops, learn how teachers can encourage the formation of critical thinking skills in their students, and examine the most effective methods in assessing critical thinking skills.

K E Y W O R D S

approach, assessment, critical thinking, disposition, domain, transferability.

Introduction

The critical thinking literature is rooted in two primary academic disciplines: philosophy and psychology (Lewis & Smith, 1993). Sternberg (1986) also identified a third critical thinking strand in education. These distinct academic strands have evolved distinct approaches to explaining critical thinking that indicate their respective concerns. Each of these approaches is discussed in greater detail below.

Philosophical Approach

This approach focuses on the hypothetical critical thinker, enumerating the person's qualities and characteristics rather than the critical thinker's behaviors or actions (Lewis & Smith, 1993; Thayer-Bacon, 2000). According to Sternberg (1986), this school of thought views the critical thinker as an ideal type, focusing on what people are capable of doing in the best of circumstances. As a result, Richard Paul (1992) discusses critical thinking in the context of "thought perfections" (p. 9). The American Philosophical Association's consensus portrait of the ideal critical thinker as someone who is inquisitive by nature, open-minded, flexible, fair-minded, has a desire to be well-informed, understands diverse viewpoints, and is willing to both suspend judgment and consider other perspectives (Facione, 1990) reflects this preoccupation. Those working within the philosophical

tradition also emphasize thought qualities or standards. For example, Bailin (2002) defines critical thinking as "good thinking that meets specified criteria or standards of adequacy and accuracy."
Furthermore, the philosophical approach has traditionally been centered on the application of formal logic rules (Lewis & Smith, 1993; Sternberg, 1986). This approach to defining critical thinking has one limitation in that it does not always correspond to reality (Sternberg, 1986). This approach may contribute less to discussions about how people actually think by emphasizing the ideal critical thinker and what people are capable of.
Philosophical definitions of critical thinking include the following.
"purposeful, self-regulatory judgment that leads to interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or conceptual considerations on which that judgment is based" (Facione, 1990, p. 3);
"the propensity and skill to engage in an activity with reflective skepticism" (McPeck, 1981, p. 8);
"reflective and reasonable thinking that is focused on deciding what to believe or do" (Ennis, 1985, p. 45);
"skillful, responsible thinking that facilitates good judgment because it 1) relies on criteria, 2) is self-correcting, and 3) is sensitive to context" (Lipman, 1988, p. 39);
“the propensity and skill to engage in an activity with reflective skepticism” (McPeck, 1981, p. 8);
Goal-directed and purposeful thinking, also known as "thinking aimed at forming a judgment," in which the thinking itself meets standards of adequacy and accuracy (Bailin et al., 1999b, p. 287).

Psychological Approach

In two ways, the cognitive psychological approach differs from the philosophical viewpoint. Firstly, cognitive psychologists, particularly those steeped in the behaviorist tradition and the experimental research paradigm, have a tendency to focus on how people actually think rather than how they could or should think under ideal conditions (Sternberg, 1986). Second, rather than pointing to characteristics of the ideal critical thinker or enumerating criteria or standards of "good" thought, cognitive psychologists tend to define critical thinking by the types of actions or behaviors critical thinkers can perform. This approach to defining critical thinking typically includes a list of critical thinkers' skills or procedures (Lewis & Smith, 1993).
Philosophers have frequently criticized this latter aspect of the cognitive psychological approach as reductionist—that it reduces a complex orchestration of knowledge and skills to a collection of disconnected steps or procedures (Sternberg, 1986). For example, Bailin (2002) contends that viewing critical thinking as a series of discrete steps or skills is a fundamental misunderstanding, and that this misunderstanding stems from the behaviorist's need to define constructs in ways that are directly observable. Because the actual process of thought is undetectable, cognitive psychologists have tended to focus on the products of such thought—behaviors or overt skills (e.g., analyzing, interpreting, and formulating good questions), according to this argument. Other philosophers have warned against conflating critical thinking with its component skills (Facione, 1990), arguing that critical thinking is more than the sum of its parts (Van Gelder, 2005). Indeed, some adherents of the philosophical tradition have argued that it is possible to "go through the motions," or to go through the "steps" of critical thinking without actually engaging in critical thought (Bailin, 2002).
Psychological definitions of critical thinking include the following.

"seeing both sides of an issue, being open to new evidence that contradicts your ideas, reasoning objectively, demanding that claims be supported by evidence, deducing and inferring conclusions from available facts, problem solving, and so on" (Willingham, 2007, p. 8);
"the mental processes, strategies, and representations people use to solve problems, make decisions, and learn new concepts" (Sternberg, 1986, p. 3);
"the use of those cognitive skills or strategies that increase the probability of a desirable outcome" (Halpern, 1998, p. 450).

Educational Approach

Finally, those in the field of education have participated in critical thinking discussions. This category includes Benjamin Bloom and his associates. When it comes to teaching and assessing higher-order thinking skills, their taxonomy for information processing skills (1956) is one of the most widely cited sources for educational practitioners.
Bloom's taxonomy is structured in a hierarchical manner, with "comprehension" at the bottom and "evaluation" at the top. Critical thinking is often said to be represented by the three highest levels (analysis, synthesis, and evaluation) (Kennedy et al., 1991).
Unlike the philosophical and psychological traditions, the educational approach is founded on years of classroom experience and observations of student learning (Sternberg, 1986). However, some have complained that the educational critical thinking approach is too vague. The taxonomy's concepts lack the clarity required to effectively guide instruction and assessment (Ennis, 1985; Sternberg, 1986). Furthermore, educational frameworks have not been as rigorously tested as those developed in philosophy or psychology (Sternberg, 1986).

FORMATION

Apart from skills and abilities, critical thinking needs to background knowledge, transferability, disposition, and domain specificity for its formation.
The majority of critical thinking researchers agree that *background knowledge* plays an important role. Most researchers, in particular, believe that background knowledge is essential for students to demonstrate critical thinking skills (Case, 2005; Kennedy et al., 1991; Willingham, 2007). According to McPeck (1990), in order to think critically, students must have something to think critically about. Similarly, Bailin et al. (1999) contend that domain-specific knowledge is required for critical thinking because the types of explanations, evaluations, and evidence that are most highly valued vary from domain to domain. Facione (1990) observes the following:
Although the identification and analysis of critical thinking skills transcend specific subjects or disciplines in significant ways, learning and applying these skills in many contexts requires domain-specific knowledge. Understanding methodological principles and competence to engage in norm-regulated practices that are at the heart of reasonable judgments in those specific contexts are examples of domain-specific knowledge...Too much value is lost when critical thinking is viewed as a list of logical operations and domain-specific knowledge is viewed as an aggregation of information. (p. 10)
As early as 1985, critical thinking researchers recognized that the ability to think critically is distinct from the *disposition* to do so (Ennis, 1985). Empirical evidence appears to support the idea that critical thinking abilities and dispositions are distinct entities (Facione, 2000). These dispositions have been variously characterized as attitudes or mental habits. Critical thinking dispositions are defined by

Facione (2000) as "consistent internal motivations to act toward or respond to persons, events, or circumstances in habitual, yet potentially malleable ways" (p. 64). Researchers frequently identify similar sets of dispositions as critical thinking-relevant.

Another point of contention among critical thinking researchers is how far critical thinking skills and abilities can be *transferred* to new contexts. Researchers, for example, have discovered that students may demonstrate critical thinking skills and abilities in one context or domain but fail to do so in another (Willingham, 2007). This problem is related to the domain-specificity of critical thinking. Those who believe that critical thinking is completely domain-specific, for example, are more likely to be skeptical of students' ability to transfer critical thinking skills from one domain to another (Ennis, 1989). According to conventional wisdom in cognitive psychology, spontaneous transfer to new contexts is uncommon (Kennedy et al., 1991; Pithers & Soden, 2000; Willingham, 2007). Others, on the other hand, are more optimistic about the possibility of student transfer, particularly if students are given opportunities to practice critical thinking skills across multiple domains and contexts and are specifically taught to transfer those skills (Kennedy et al., 1991). McPeck (1990), a staunch supporter of domain specificity, notes that his approach does not preclude the transfer of critical thinking skills and abilities to real-world contexts, especially when instruction emphasizes authentic learning activities that represent real-world problems.

Transfer empirical evidence documents both successes and failures. According to Halpern (2001), one study sought to determine whether college students would transfer critical thinking skills acquired in the context of a specific discipline to an entirely new context several months after the course ended. Several months later, the majority of students in this study applied the reasoning they had previously learned to a non-academic topic.

Nickerson (1988) finds mixed empirical evidence on transfer in his review of the research. He concludes that the success of any transfer method appears to be dependent on what and how it is taught. Instructional programs aimed at improving students' metacognitive skills, for example, have shown greater success in transfer than training programs for basic cognitive processes like observing, measuring, and classifying.

Furthermore, stand-alone approaches to general critical thinking instruction appear to be less effective than approaches in which critical thinking instruction is integrated into discipline-specific courses alongside traditional academic content.

Another point of contention is the degree to which critical thinking skills are *domain-specific*. On the one hand, some researchers contend that critical thinking skills can be generalized across contexts and domains and thus taught in a generic manner. Those who argue that general critical thinking skills that transcend specific subjects do not exist are on the other side of the debate. Critical thinking skills, according to this argument, can only be taught within the context of a specific domain. Ennis (1989) identifies a number of domain specificity assumptions held by various theorists. Most researchers, for example, regard background knowledge as a necessary but not sufficient condition for critical thinking. Furthermore, some researchers believe that transfer of critical thinking skills across domains is unlikely unless students are given ample opportunities to practice these skills in a variety of domains and are explicitly taught to transfer. Finally, an even smaller number of researchers believe that general critical thinking skills instruction is unlikely to be successful because critical thinking skills are inherently domain-specific (Ennis, 1989).

Willingham (2007), for example, argues that it is easier to learn to think critically within a specific domain than it is to learn to think critically in general. Similarly, Bailin (2002) contends that domain knowledge is required for critical thinking because what constitutes valid evidence, arguments, and standards varies:

It makes no sense, for example, to refer to an interpreting process that is constant regardless of subject matter. Rather, what is involved in, and even what is meant by, interpreting varies depending on the context, and this difference is related to the various types of knowledge and understanding required for successful completion of a specific task (p. 366).

Although McPeck (1990) admits that there are a limited number of general thinking skills, he contends that domain-specific thinking skills are the most useful. McPeck believes that the more general the thinking skill, the less useful it is. Bailin (2002) agrees, arguing that what is common and general to the concept of critical thinking is so broad as to be ineffective. Those who believe that critical thinking skills and abilities are not domain-specific include Halpern (2001), who examines evidence on the effectiveness of general critical thinking skills instruction and concludes that such instruction has great potential. According to Lipman (1988), critical thinking facilitates good judgment because it is based on criteria. These criteria may vary across domains, but the fundamental meaning of critical thinking remains consistent. According to Van Gelder (2005, p. 43), critical thinking is "intrinsically general in nature," which is why critical thinking skills and abilities are notoriously difficult to transfer to new contexts.

ASSESSMENT

There are several difficulties in assessing students' critical thinking skills and dispositions. Researchers have identified issues with the reliability and validity of existing measures. Moss and Koziol (1991), for example, factor analyzed scores from a set of writing tasks designed to assess students' critical thinking skills in the context of social studies in grades 5, 8, and 11. Students who read a social studies passage either argued in support of an inference or evaluated an argument from the passage. The authors discovered no clear, common factor underlying performance across parallel tasks. Furthermore, students' abilities to use topic statements, evidence, explanations, conclusions, and logical organization did not generalize across tasks, implying that idiosyncratic and possibly construct-irrelevant characteristics of each passage or task were more salient aspects of student performance than any general ability to think critically. According to Silva (2008), performance-based assessments of creativity introduce subjectivity and error. Furthermore, using such performance tasks to assess the development of critical thinking skills over time is difficult as long as individual tasks communicate more noise than signal (Moss & Koziol, 1991).

Researchers have made several recommendations for developing assessments that are best suited to assessing critical thinking skills. For starters, open-ended problem types may be better suited to evaluating critical thinking than traditional multiple-choice formats. According to Ku (2009), available empirical evidence suggests that open-ended measures capture the construct of critical thinking better than multiple-choice measures because they are more sensitive to the dispositional aspects of critical thinking. As a result, Ku recommends using mixed-item format tests, both multiple-choice and open-ended, to better represent both the cognitive and dispositional aspects of critical thinking. According to Ku (2009), "teachers should use a variety of assessment methods, such as exercises that allow students to self-construct answers, assignments that allow students to practice

strategic use of thinking skills in everyday contexts, and when using multiple-choice exercises, follow-up questions should be given to probe students' underlying reasoning" (p. 75).

In addition, assessment tasks should reflect "authentic" problem contexts and performances (Bonk & Smith, 1998; Halpern, 1998). This means that evaluations should be based on simulations of real-world problems and issues. In addition, assessments should use illstructured problems, which Moss and Koziol (1991) define as test questions that require students to go beyond the available information in the task to draw inferences or make evaluations. Furthermore, problems should have more than one plausible or defensible solution, and there should be enough information and evidence in the task for students to support multiple points of view (Moss & Koziol, 1991).

According to Fischer, Spiker, and Riedel (2009), critical thinking is a "stimulus-bound phenomenon," which means that certain external task characteristics may influence whether critical thinking is elicited in a given assessment context. The authors identify a number of context variables that influence critical thinking use. For example, stimulus characteristics consider whether the stimuli present an orderly, well-organized, and coherent set of materials or an uncertain, ambiguous, disorganized, and contradictory set of materials. Fischer et al. (2009) demonstrated in experimental studies attempting to validate their model of critical thinking that some contextual stimulus variables appear to matter while others do not. The level of substance of stimulus text, for example, in terms of the number of unique propositions contained in that text, had no significant effect on the subjects' proclivity to use critical thinking, which was operationalized in this study as the number of questions of belief and checks on thinking observed during "think aloud" procedures.

Silva (2008) argued that new assessment modes are required to measure higher-order skills, citing several examples of recent critical thinking assessments that use novel item formats. For example, the College and Work Readiness Assessment (created by the Council for Aid and the RAND Corporation) assigns students a 90-minute task and gives them access to a variety of written materials on the topic, which is typically a real-world problem. Students are then asked to make decisions and devise a solution.

Moss and Koziol (1991) argue that rather than the "correctness" of the answer, students should be evaluated on the quality of their arguments. According to Lewis and Smith (1993), assessment tasks must go beyond simple recall of learned information. Tasks should instead require students to apply what they've learned in new or novel contexts. Another suggestion is that critical thinking assessments highlight students' reasoning. Norris (1989), for example, contends that valid testing for critical thinking necessitates observing an examinee's thought process. One suggestion for doing so in the context of a multiple-choice test is to require students to provide a rationale or justification for their choice, an idea that Kennedy et al. repeated.

To sum up, as aforementioned, newly created Common Core State Standards reflect critical thinking skills. Although a concrete definition of critical thinking on which most researchers can agree remains elusive, common areas of overlap exist among the various approaches. Typically, critical thinking is believed to include the component skills of analyzing arguments, making inferences by using inductive or deductive reasoning, judging or evaluating, and making decisions or solving problems. Background knowledge is believed to be a necessary, though not sufficient, condition for enabling critical thought within a given subject. Critical thinking entails cognitive skills, or abilities, and dispositions.

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