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Changes in technology and the workplace have made the ability to think critically more important than ever before. Instruction designed to help college students think critically focuses on skills that are widely applicable across domains of knowledge and the disposition to use these skills.

Teaching for Critical Thinking: Helping College Students Develop the Skills and Dispositions of a Critical Thinker

Diane F. Halpern

It is twenty years since Robert E. Young served as guest editor of the issue of *New Directions for Teaching and Learning* titled *Fostering Critical Thinking* (1980) and thirteen years since James E. Stice accepted the same task in the issue titled *Developing Critical Thinking and Problem-Solving Abilities* (1987). These pioneers, including the authors of the chapters in these volumes, took us in a *new direction* in the early and mid-1980s, but where are we now, at the start of the third millennium, in our efforts to help students improve how they think? Young and Stice would be pleased to know that we have made progress in achieving the goals they set for us and would not be surprised to learn that we still have far to go.

The Naysayers Were (Mostly) Wrong

Many authorities in higher education did not enthusiastically embrace the idea that college students should receive explicit instruction in how to think. Not that the academic community was opposed to good thinking, but many educators believed that it was a misguided effort. For example, Glaser (1984) cited abundant evidence of critical thinking failures in support of his argument that thinking skills are context-bound and do not transfer across academic domains. Glaser and other skeptics were partly correct. Better thinking is not a necessary outcome of traditional, discipline-based instruction. However, when thinking skills are explicitly taught for transfer, using

multiple examples from several disciplines, students can learn to improve how they think in ways that transfer across academic domains. Rubinstein's highly successful course in problem solving (Rubinstein and Firstenberg, 1987), Lochhead and Whimby's analytical reasoning procedures (1987), and Woods's use of deliberate planning and monitoring (1987), all of which were described in Stice's volume, provided models of successful instruction in critical thinking that eventually swayed even the staunchest critics.

Many colleges and universities in North America now offer courses specifically designed to enhance their students' abilities to think critically, as part of the general education requirements. In fact, critical thinking instruction briefly assumed center stage on our national education agenda when the commission that wrote educational goals for the United States for the year 2000 established the following goal: "The proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems will increase substantially" (National Education Goals Panel, 1991, p. 62). Although support for the development of college-level thinking skills was a nonpartisan issue, with backing from both the Bush and Clinton administrations, no funding was ever provided to make this goal a reality. Nevertheless, dedicated professors and concerned community leaders have continued to define the enhancement of critical thinking as a primary reason for higher education.

Definitions and Assumptions

Young began his edited volume on critical thinking by asking, "Critical thinking: What is it?" (1980, p. viii). Although a variety of definitions has been offered in the intervening decades, most include the same underlying principles. Critical thinking refers to the use of cognitive skills or strategies that increase the probability of a desirable outcome. Critical thinking is purposeful, reasoned, and goal-directed. It is the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions. Critical thinkers use these skills appropriately, without prompting, and usually with conscious intent, in a variety of settings. That is, they are predisposed to think critically. When we think critically, we are evaluating the outcomes of our thought processes—how good a decision is or how well a problem is solved (Halpern, 1996, 1998). This definition is broad enough to encompass a variety of viewpoints, so critical thinking can be taught as argument analysis (see, for example, Kahane, 1997), problem solving (Mayer, 1992), decision making (Dawes, 1988), or cognitive process (Rabinowitz, 1993). Regardless of the academic background of the instructor or the language used to describe critical thinking, all of these approaches share a set of common assumptions: there are identifiable critical thinking skills that can be taught and learned, and when students learn these skills and apply them appropriately, they become better thinkers.

Exciting Changes

For some college faculty, the new emphasis on critical thinking instruction has fundamentally altered what and how they teach. For example, there are several national efforts to teach statistics as a broadly applicable critical thinking skill, instead of teaching it as technique for data analysis (for example, Smith, 1995). Many of these new courses, with excellent materials for teaching and learning, are available on the Internet so that they can be adopted and modified by faculty who want to try new ways of teaching but do not know how to get started. A stellar example is a course called Chance, which has been designed to teach statistical principles using a variety of real-world problems and materials. It has an active Web site (www.dartmouth .edu /~chance/course/course.html) with courses being offered by local faculty on multiple college campuses, including Spelman, Grinnell, Dartmouth, Middlebury, and the University of Vermont. Real-life subject areas covered in these courses include polls and surveys, lotteries, AIDS, DNA fingerprinting, and smoking.

There are numerous places on the Web where faculty can find help if they want to change the focus of any course to make it more thinking skills based. Many of these sites are administered within individual disciplines. In psychology, the field I know best, there is a general-purpose site for college-level psychology courses called, appropriately, Psychplace. It contains learning activities designed to help students think critically about issues in the discipline (www.psychplace.com). One recent example from this site provides instruction in the use of argument analysis skills, featuring a debate by two psychologists over the importance of parents to the development of their children. In this example, critical thinking skills are applied to course content, with explicit instruction in both the skills and the content. Other teaching materials, including sample syllabi, reading lists, demonstrations, and learning activities, are collected at a site run by the division of the American Psychological Association dedicated to the teaching of psychology. The on-line materials are available, free of charge, at the Office of On-Line Teaching Resources in Psychology (www.lemoyne.edu/OTRP/).

The changing nature of technology has not only provided us with more and better ways to teach in general but has also increased the need for the skills of critical thinking. The easy availability, with just a few keystrokes, of massive amounts of information has made the ability to evaluate and sort information more important than ever. Furthermore, much of the information available on the Internet is not reliable, and some of it is deliberately and dangerously deceptive (as on sites that tout miracle cures for serious illnesses or offer deliberately biased accounts of history or current events). Thus the ability to judge the credibility of an information source has become an indispensable critical thinking skill that needs to be deliberately and repeatedly taught in college and earlier.

Dispositions for Critical Thinking

Another major change since the earlier editions of *New Directions for Teaching and Learning* that focused on critical thinking is the recognition that critical thinking instruction must also address student dispositions. It is not enough to teach college students the skills of critical thinking if they are not inclined to use them. Critical thinking is more than the successful use of the right skill in an appropriate context. It is also an attitude or disposition to recognize when a skill is needed and the willingness to exert the mental effort needed to apply it. Sears and Parsons (1991) call these dispositions the *ethic* of a critical thinker. Lazy or sloppy thinkers may have a large repertoire of critical thinking skills but not be inclined to use any of them. No one can develop expertise in any area without engaging in the effortful processes of thinking (see Wagner, 1997). Thus we need to find ways to make students value good thinking and the work that is needed to achieve that goal.

The How of Critical Thinking Instruction: A Four-Part Model

I recently proposed a four-part model of instruction for critical thinking (Halpern, 1998). Not surprisingly, it includes two parts we have already discussed—instruction in the skills and dispositions for critical thinking—but it also includes *structure training* as a means of improving the probability that students will recognize when a particular thinking skill is needed, even in a novel context. The problem in learning thinking skills that are needed in multiple contexts is that there are no obvious cues in the novel contexts that can trigger the recall of the thinking skill. With structure training, students are taught to create retrieval cues from the structural aspects of a problem or an argument so that when these structural aspects are present in the novel context, they can serve as cues for retrieval. I borrowed the term from Hummel and Holyoak (1997), who identified structure sensitivity as a fundamental property that underlies human thought: "First thinking is structure sensitive. Reasoning, problem solving, and learning . . . depend on a capacity to code and manipulate relational knowledge" (p. 427). For example, students may be able to explain why correlation is not causation when presented with this question on an exam but still not recognize that this same principle is operating when they read that children who attend religious schools score higher on standardized tests than those who attend public schools. Specific instruction in recognizing the structure of correlational problems can improve the probability that students will recognize these problems, even when the topic is different.

The last component of critical thinking instruction is *metacognitive monitoring*. *Metacognition* is usually defined as "what we know about what

we know," so metacognitive monitoring is determining how we can use this knowledge to direct and improve the thinking and learning process. While engaging in critical thinking, students need to monitor their thinking process, checking that progress is being made toward an appropriate goal, ensuring accuracy, and making decisions about the use of time and mental effort. In the jargon of cognitive psychology, metacognitive monitoring serves the executive function of directing the thinking process. It is made overt and conscious during instruction, often by having instructors model their own thinking process, so that the usually private activity of thinking is made visible and open to scrutiny.

Using the Principles of Cognitive Psychology

Advances in critical thinking instruction have for the most part been based on the general principles of cognitive psychology, such as those discussed by Marilla Svinicki in Chapter One. Critical thinking instruction uses what we know about the way adults usually think and what has been effective in making positive changes to "thinking in the default mode." Some of the changes have resulted from changes in the world around us—for example, the new demands and challenges of technology; others have been based on past successes that have shown that it is possible to help college students think better. Although it is always tricky to predict the future, I believe that critical thinking instruction will continue to be an important component in college curricula. Workplace demands are becoming increasingly complex, and higher education is more important than ever before. As long as critical thinking is a desired outcome of education, we will need to find ways to help students improve their abilities to think critically and their disposition to use these skills.

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DIANE F. HALPERN is professor of psychology at California State University, San Bernardino.