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Many educators have long advocated the teaching of critical thinking skills such as reasoning and problem solving. No action was generated, however, until 1980, when the Rockefeller Commission on the Humanities recommended that critical thinking be

included in the U.S. Office of Education definition of basic skills. Three universities now offer a master of arts program in teaching critical thinking; the California State University system requires a course in critical thinking; and the College Board has made it one of the six basic skills needed for college (Educational Testing Service 1984, 8; Ennis 1985, 28).

There are many definitions of critical thinking. Richard Paul (1988, 49) calls it the ability to reach sound conclusions based on observation and information. Barry Beyer (1983) describes it as assessing the authenticity, accuracy and worth of knowledge claims, beliefs, or arguments. Stephen Norris (1985, 40-45) says it helps students to "apply everything they already know and feel, to evaluate their own thinking, and especially to change their behavior...."

Critical thinking is not the same as, and should not be confused with, intelligence; it is a skill that may be improved in everyone (Walsh and Paul 1988, 13). However, it is not something that necessarily develops with maturity and so should be taught to all ages. The New Jersey Test of Reasoning Skills, for example, found that the mean scores of college freshmen tested were less than one point above the mean scores of sixth graders (Lipman 1980).

HOW CAN CRITICAL THINKING BE TAUGHT?

There is some controversy as to whether or not critical thinking should be taught as an independent course (the process approach) or within established courses (the content approach).
Those favoring the process method maintain that like reading and writing, critical thinking is an enabling discipline and deserves separate instruction (Lipman 1988, 143). They argue that an independent course would prevent students from confining critical thinking to a specific subject matter, thereby inhibiting its development (Lipman 1980, 211); would avoid repetition of introductory principles in each subject; and would encourage the application of cognitive skills to other disciplines (Ennis 1985, 29). Matthew Lipman (1980, 209) recommends all grade levels learn reasoning through philosophy because of its unique, intellectually adventurous approach.

Learning cognitive skills separately, however, may not necessarily facilitate their application to content-area studies or real-life situations. Research suggests the effectiveness of such courses depends on parallel efforts across the curriculum (Resnick 1987, 34-35), including training all teachers in cognitive skills (Pauker 1987, 27).

Advocates of the content approach argue that certain cognitive skills are specific to particular disciplines and should be taught in context (Ashton 1988, 4). This method requires that teachers have extensive knowledge of their own discipline and of how it differs from others. They can then instruct students how to apply cognitive skills in their

areas and when to make contextual links with other areas (Chambers 1988, 5-6). While this approach enhances content-domain learning (Resnick 1987, 36) and eliminates the problem of scheduling an extra course (Martin 1983), it has not been widely successful in transferring cognitive skills across the curriculum (Resnick 1987, 36) and imposes the burden of redesigning the way courses are taught (Pauker 1987, 27).

Consideration of the advantages and disadvantages of each leads one to conclude the solution is not exclusively in either method, but in combination. Such a unified approach to critical thinking would provide a framework for instruction in any field (Presseisen 1988).

HOW WILL THIS EMPHASIS AFFECT TEACHER EDUCATION?

To improve student performance on critical thinking tests, schools of education must improve teacher training. They must teach cognitive skills to preservice teachers before training them to teach these skills in the classroom (Ashton 1980, 2). They must integrate critical thinking skills into all aspects of teacher preparation and train future teachers to be models of effective thinking strategies (Walsh and Paul 1988, 49). Schools of education have several obstacles to overcome before accomplishing these goals, including an inadequate knowledge base on teaching critical thinking; a lack of consensus on methods of evaluating critical thinking programs; conditions that require classroom management at the expense of academic instruction; and a lack of support for collaboration between liberal arts and teacher education faculty (Ashton 1988, 2-5).

Elementary and secondary schools considering a critical thinking skills emphasis must make a long-term commitment to programs fostering the critical thinking process; provide inservice training; assign mentors to new teachers; allot time for teachers to share effective strategies for instruction; involve experienced teachers in the selection of instructional materials and testing programs (Committee on Standards 1988); and appoint a committee to guide curriculum development (Walsh and Paul 1988, 49).

ARE THERE ANY PROGRAMS THAT PROMOTE CRITICAL THINKING?

Project THISTLE (Thinking Skills in Teaching and Learning) is a teacher training program designed to improve the precollege preparation of urban high school students by strengthening their critical thinking abilities (Oxman and Barell 1983).
Lipman's Philosophy for Children is a program for younger students that develops informal logic skills through the discussion of issues raised in narrative tests, including problems of meaning, truth, ethics, reality and imagination (Resnick 1987, 31).

The Instrumental Enrichment program (Feuerstein et al. 1986) is a content-free, paper-and-pencil program that improves problem-solving strategies in 14 cognitive areas and promotes broad application of these strategies from classroom subjects to real-life situations (Martin 1987). The program is currently being applied in the preservice education department at Gallaudet University (Martin 1984, 68-69).

Tactics for Thinking, a teacher-directed approach to critical thinking, is a flexible program for grades K-12 that can be tailored to each school's curriculum and student needs. It focuses on 22 skills and processes that can be applied selectively or to all grades and subjects.

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