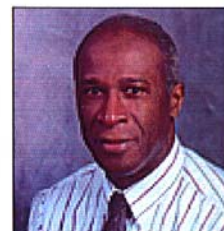


# Critical Thinking: The Concept and Applications

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The earliest known significant use of the concept of Critical Thinking (CT) was about 2,500 years ago when Socrates developed a method of probing questions to gain knowledge of and to form beliefs about the environment. The idea became known as "Socratic questioning" and is acknowledged today as being an important teaching strategy in effective classroom instruction. CT reached its next important point during the Renaissance when scholars began to question formal religion and to examine the basis of human nature. A central figure in the promulgation of these ideas was Francis Bacon, who argued that one should study world events empirically instead of relying on religious authority to address human concerns. Subsequently, he laid the foundation for the information gathering process of the scientific method. From these philosophical roots CT emerged in the 20th century as the foundation of modern scientific inquiry. John Dewey is credited with popularizing CT in the early twentieth century, which was based on the idea of "reflective thinking" and "inquiry". Today, modern CT has been seen as an effective method of problem-solving, which is also the heart of modern scientific research.

In the classroom, CT has been used as a vehicle to improve the comprehension of subject matter at the public school and the undergraduate levels. Within this framework CT today has focused on formal logic and reasoning, and the application of CT strategies and the scientific method as an approach to solving real-world problems. This foundation in CT helped form the Critical Thinking Through Technology Center (CTTTC) at Elizabeth City State University (ECSU) by the Mathematics Professor Dr. Sahenda Sachdev in 1992.

The focus of CT in undergraduate curricula is to replace traditional classroom instruction with one that is centered on critical thinking strategies to enhance student comprehension. A classroom based on CT does not suggest a total rejection of teaching strategies that have been developed by an instructor, strategies that usually involve a focus on lecture presentation as the primary source of the transfer of knowledge in the classroom. Rather, this change involves infusing selected CT strategies that would create an environment that is more favorable for student comprehension of course content within the framework of what may already be taking place in the classroom. CT strategies involve the active participation of the students in the learning process. This includes such strategies as question and answer sessions, round table discussions, and group activities.

CT may also involve strategies that take advantage of modern technology. Distance learning

courses, for example, can benefit students greatly by facilitating the comprehension of knowledge through use of computer technology in the learning process. Presently, "Online Weather Studies" (OLWS), developed by the AMS Education Program, includes a review of CT strategies that may enhance the ability of students taking the course to comprehend subject matter. The offering of this course is also a part of a project on diversity in science education in which Historically Black Colleges and Universities (HBCUs) and other Minority institutions (MIs) are targeted in an effort to provide a greater opportunity for students at these institutions to pursue careers in science.

A major challenge facing the GD/NDP is the manner in which CT strategies are effectively introduced to project participants so as to maximize their ability to use these strategies in their classroom. A review of CT concepts and applications is on the faculty page of the OLWS course (<http://66.208.12.20/amstedu/online/onlinewx/>). Leaders in this field of study commonly recognize two categories of the concept. Cognitive skills are described as the means by which scientists raise questions and attempt to answer them, such as in problem identification, analysis, and methods of analysis. Affective attributes include the attitude that individuals have in their approach to solve problems, such as confidence, point of view, and integrity. Each of the course's 12 weeks has a specific cognitive skill and affective attribute for the teacher to consider. The strength of CT is that various strategies may be infused into the instructor's current classroom course outline; the instructor simply evaluates the value of a particular strategy to his or her current lesson plans being employed. It is hoped that instructors will objectively assess the value of these strategies to their science classes and utilize them where warranted.

## Selected References on Critical Thinking

Paul, Richard W. "Critical Thinking: How to Prepare Students for a Rapidly Changing World," Published by the Foundation for Critical thinking, Santa Rosa, CA, 1995.

Paul, Richard W. and Linda Elder. "Critical Thinking: tools for Taking Charge of Your Learning and Your Life," Prentice Hall Publishers, 2001.

Web Source  
<http://66.208.12.20/amstedu/online/onlinewx/>