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Critical Thinking and Academic Achievement

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1. INTRODUCTION

Educators agree that the development of higher order or cognitive intellectual abilities is of utmost importance and that *critical thinking* "is central to both personal success and national needs" (Paul, 2004, p. 2). They are beginning to explore those pedagogical practices that could effectively develop student critical thinking knowledge, skills, and dispositions across the academic disciplines. Further, instructional strategies that advance critical thinking pedagogy on a consistent basis could enable instructors with the ability to encourage in their students the transfer of those critical thinking skills learned in the academic environment to their professional and personal lives.

In order to advance critical thinking pedagogy and encourage students' critical thinking abilities, however, educators must possess a clear definition of what critical thinking is. As the concept of critical thinking is highly complex, a variety of definitions exist, so it is difficult to pinpoint the exact meaning of the skills involved in this intricate process. Facione (1990), using the two-sentence definition of critical thinking generated from the Delphi Report, identified critical thinking as "the process of purposeful, self-regulatory judgment. This process gives reasoned consideration to evidence, context, conceptualizations, methods, and criteria" (p. 5). Facione argues that a true definition of critical thinking involves both skills and habits of mind or dispositions. Similar to Facione and his concern with the necessity for an inclination toward critical thinking, Paul (1992) asserts that critical thinking is an intellectually disciplined process "of actively and skillfully conceptualizing, applying, analyzing, synthesizing or evaluating information" (p. 3). Halpern (1998) believes that critical thinking is "purposeful, reasoned, and goal-directed" (p. 70), while maintaining that "it is the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions" (p. 70).

In general, critical thinking is "that mode of thinking —about any subject, content, or problem— in which the thinker improves the quality of his or her thinking by skillfully taking charge of the structures inherent in thinking and imposing intellectual standards upon them" (Paul & Elder, 2004, p. 1). Education experts have called for renewed interest in problem solving and critical thinking to teach learners how to logically analyze, compare, question, and evaluate within content areas. Thinking is not separate from content; it should be an integrated part of the learning process. Regardless of the educational level, critical thinking must be performed as an

active part of course curricula. Carr (1988) states that in an environment that emphasizes thinking, objectives must include application and analysis, divergent thinking, and opportunities to organize ideas and support value judgments. This creates a productive learning environment in which students are actively involved in critical thinking, and fosters educational advancement within the learning process.

A primary goal for educators, then, is to provide students with opportunities to struggle with concepts, find meaning, distinguish bias, and use logic in arguments so they may gain a deeper understanding of the world in which they live. The question is what teaching methodologies can be used by educators to promote the development of students' critical thinking skills?

Educators are beginning to place more emphasis on increasing students' critical thinking abilities while attempting to include critical thinking curriculum into a variety of academic disciplines. Although colleges and universities offer critical thinking courses, critical thinking can be embedded in the instruction of a variety of academic disciplines, and faculty can engineer their course focus so that it is more thinking-skills-based (Halpern, 1998).

Unfortunately, there has been little research to determine whether teaching critical thinking improves student academic performance. Thus, there is a need for continued research regarding the use of considerable critical thinking interventions consisting of well-designed educational opportunities to enable practicing teachers to improve outcomes for their students.

2. SIGNIFICANCE OF THE STUDY

A strong critical thinking pedagogy that encourages students' critical knowledge, skills, and dispositions may improve students' academic success while encouraging those abilities needed for transfer and for competency in the workplace. Elder (2007) contends, however, that traditional education is not nurturing the intellectual capabilities needed for personal and academic success. Often, students are merely asked to write down facts rather than to question or reflect on their reading, and, as a result, they are incapable of drawing inferences and of engaging in complex conversations about the literature (both fiction and nonfiction prose) they read. Elder (2007) suggests further that "as the economic structure of the world becomes more complex" (p. 1) and "as we become increasingly more interdependent both at home and abroad, 'training' students for job performance in narrowly defined skill areas no longer serves students well" (p. 1).

Wilson (1997) discusses the increasing complexities of the world and suggests these new global realities "are rapidly working their way into the deepest structures of our lives: economic, social, and environmental realities —realities with profound implications for teaching and learning" (p. 1). The question is whether educational institutions are preparing students to adapt to and accommodate for these complexities.

It is the responsibility of educational institutions to promote and develop students' critical thinking abilities. Sternberg (2003) argues that educational institutions far too often emphasize rote memorization; while "rote memorization requires recital and repetition", critical thinking "requires skillful analysis, evaluation, and interpretation" (p. 1). Although all individuals need a *knowledge base* (Sternberg, ibid) or store of information, this knowledge base must prove useful for living, and instead of emphasizing the memorization of trivial facts, Sternberg (2003) encouraged educators to teach usable information that students can transfer into their lives. Rather than being taught how to think critically, students are far too often being taught to do little more than recall and recognize; they "are becoming highly susceptible to the commission of cognitive fallacies" (Sternberg, 2003, p. 1) and, as a result, they may tend to "act on their prejudices and their fears" (Sternberg, ibid) rather than on reasoned judgment.

In recent years, a great deal of research in L1 and ESL field has been conducted on strategy training. Strategy training comes from the assumption that success in learning mainly depends on appropriate strategy use and that unsuccessful learners can improve their four skills by being trained to use effective strategies (Dansereau, 1985; Weinstein & Underwood, 1985).

However, a primary goal for educators is to instill in their students a questioning, reflective, critical mind. The educational system should have been a target for reform to teach students to think critically, and the educational arena should begin to take the issue of critical thinking seriously. In light of the increasing demands and accelerating changes occurring in the 21st century, educators are experiencing profound challenges, and the question continues as to which pedagogical practices would be most effective for the instruction and assessment of critical thinking. Paul (1995) believes that "only through an explicit shift to a critical conception of education, with an explicit critique and rejection of the assumptions of didactic education, can we achieve significant reform" (p. 278). As national assessment of student achievement far too often focuses on lower order thinking and learning, Paul (1995) argues that assessment must focus on higher order thinking, reasoning, and authentic performance.

Therefore, the development and implementation of pedagogy that promotes students' engagement in the learning process could encourage students' critical thinking abilities and the transfer of those abilities necessary for academic achievement, personal success, and success in the work force.

3. THE CRITICAL THINKING MOVEMENT

A fundamental understanding of the critical thinking movement begins with contributions from Socrates, who developed a method of asking meaningful questions, where "confused meanings, inadequate evidence, or self-contradictory beliefs often lurked beneath smooth but largely empty rhetoric" (Paul, Elder, & Bartell, 1997, p. 1). Socrates questioned the assumptions and beliefs of those in authority and established Socratic questioning, which is a methodology that advocates the importance of asking probing questions and seeking evidence to examine rhetoric. Socrates's search for the essence of reason and truth encouraged a thorough examination of statements, and an understanding of their evidence, assumptions, theories, reasoning, and implications. Socrates's practice and method of reflective, well-reasoned, systematic thinking influenced the writings of Plato, Aristotle, Thomas Aquinas, Erasmus, Francis Bacon, Descartes, Sir Thomas Moore, Hobbes and Lock, Robert Boyle, and Sir Isaac Newton (Paul et al., 1997).

Twentieth-century theorists whose writings have contributed significantly to critical thinking theory and education are William Graham Sumner, John Dewey, Edward Glaser, Jean Piaget, and Lev Vygotsky. Dewey's pragmatic approach to critical thinking advocates student-centered rather than subject-centered education. He believed that genuine education comes about through experience; however, "the quality of any experience has two aspects. There is an immediate aspect of agreeableness or disagreeableness, and there is its influence upon later experiences" (Brookfield, Tennant, & Pogson, 2005, p. 326). Education and life are interrelated, and educators must design and carefully monitor positive educational experiences.

In contrast to Piaget's view of learning as an individual endeavor, Vygotsky stressed the importance of past experiences, prior knowledge, society, and culture on promoting cognitive growth (Dahms, Geonnotti, Passalacqua, Schilk, Wetzel & Zulkowsky, 2007). Whereas Piaget was concerned with the characteristics exhibited by children of a particular age, Vygotsky focused on the process of child development. Vygotsky believed knowledge is developed through social interaction, that learning occurs through language and shared experiences, and adults "foster children's learning and development in an intentional and somewhat systematic manner" (Ormrod, 2004, p. 150).

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Individuals react to, alter, and adapt to their environment. Vygotsky's socio-cultural perspective includes the concept of the *Zone of Proximal Development* (ZPD), which assumes that learning is social and human potential is limitless, "but the practical limits of human potential depend upon quality social interactions" (Dahms et al., 2007, p. 3).

4. THEORETICAL PRINCIPLES OF CRITICAL THINKING

As stated earlier, critical thinking is a vital topic in education today. As a result, schools and school districts seek new and innovative ways of teaching critical thinking skills utilizing the many principles and definitions of critical thinking that exist. These current principles have been theoretically analyzed by education experts such as Paul, Elder, Brookfield, and DeBono. Critical thinking is distinguished as a careful evaluation and judgment, providing the ability to fully understand issues and make appropriate decisions.

Paul and Elder (2004) offer the following definition of critical thinking: It is the "kind of thinking about any subject, content, or domain that improves itself through disciplined analysis and assessment. The analysis requires knowledge of the elements of thought; assessment requires knowledge of the standards of thought" (p. 6). Finally, critical thinking, as stated by Scriven and Paul, is the intellectual process of "conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication" (as cited in The Center for Critical Thinking, n. d., para. 2) Ideally, critical thinking is the ability to engage in purposeful thought with the goal of eliminating personal and social biases.

Brookfield (1987) argues that critical thinking is a process. In fact, his definition includes emotional as well as rational components, and clearly acknowledges the importance of culture and context; he defined reflective skepticism as "the act of constantly questioning the status quo" (p. 7). The basic principle of reflective skepticism involves the components of critical thinking in questioning the unknown by exploring different alternatives.

DeBono (1985) describes critical thinking as a planned thinking process in a detailed and cohesive way. He used *Thinking Hats* as a simple but effective way to become a better thinker —a powerful problem-solving approach that enhances mental flexibility by encouraging individuals to attack an issue from several conceptual angles. Teaching critical thinking through the Thinking Hats requires drawing for the certain patterns of intellectual behaviors that produce prevailing results. 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" (Halpern, 1998, p. 450).

5. MODELS OF CRITICAL THINKING

When using critical thinking within *current methods of instruction*, it is more important to teach students how to think rather than what to think. Current models of instruction are relevant in integrating critical thinking within core curriculum.

Paul and Elder (2004) developed a model based on the elements of thoughts to analyze critical thinking. This process employs strategic and critical thinking in action. The elements that are used to analyze critical thinking in classroom activities are purpose, question or issue, information, interpretation and inference, concepts, assumptions, implications and consequences, and point of view.

The second model is Brookfield's *Reflective Thinking*. According to him, critical thinking focuses on assumptions and reflective reasoning (Brookfield, 1987). In doing this, teachers create learning environments in which learners are less likely to act or make decisions out of habit. Instead, it forces learners to ask hard questions, weigh the evidence, interpret complex problems, and, as a

result, make truly informed and wise decisions, thus fostering critical thought. According to Brookfield (1987), teachers play a role in helping students become critical thinkers by facilitating the search for new information and challenging personal assumptions whenever possible. Through Brookfield's principle of reflective thinking, students should confirm the accuracy of assumptions by exploring many different perspectives, viewpoints, and sources as possible.

The last model, DeBono's Thinking Hats, was designed by DeBono (1985). He supplied the following standpoint of critical thinking: It is the ultimate human resource, yet students can never be satisfied with the most important skill. No matter how good students become at thinking, the ultimate goal is to become better. Therefore, he offered six Thinking Hats as a model for integrating critical thinking. The development of critical thinking skills are imperative, and must become habits of the mind. DeBono (1985), separates thinking into six distinct modes, identified with six colored Thinking Hats, white, red, black, yellow, green, and blue. When engaging in white hat thinking, students should only focus on facts, figures, and objective information. An illustration would be students determining what facts are needed to solve a problem or answer a question. The red hat centers around emotions and feelings, and students should only focus on those representations during this mode of thinking. An example of red hat thinking would be students determining what the implications would be of determined facts and figures used to solve a problem or answer a question. The black hat symbolizes reasoning skills. When employing black hat thinking, students use logical, negative thoughts based on the consequences of red hat thinking. Yellow hat thinking is composed of positive, constructive thoughts whereby students seek to find resolutions, which contrasts black hat thinking. The green hat signifies creativity and new ideas. Students using green hat thinking apply the facts of white hat thinking to create new concepts. The blue hat serves as the mediator and controls the other hats and thinking steps. The Thinking Hats model allows students to approach issues from different perspectives utilizing both creative and critical thought.

6. EVALUATING CRITICAL THINKING TEACHING METHODS

A major paradigm shift has occurred in higher education from emphasis on curricular content to curricular outcomes, or in the case of nursing school, to student competencies. The focus on outcomes is, in part, caused by accrediting agencies, which now require nursing school programs to measure students' growth in critical thinking. This emphasis on teaching critical thinking necessarily leads to the need for reliable and valid ways of measuring critical thinking. However, the measurement of critical thinking is fraught with difficulty (Ennis, 1998). Commercial instruments are available to measure students' critical thinking abilities, but all of them have potential limitations. The following review of available instruments to measure critical thinking demonstrates some of the difficulties inherent in evaluating the effectiveness of these teaching methods.

The Watson-Glaser Critical Thinking Appraisal (WGCTA) (Watson & Glaser, 1980) is one of the most widely used standardized tests to measure the logical and creative components of nursing school students' critical thinking abilities. The WGCTA items include problems and arguments similar to those encountered in actual nursing school situations. The WGCTA is an 50-item, self-administered test, yielding a score that indicates critical thinking ability (Watson & Glaser, 1964). Two forms of the test are available for pretest/posttest administration.

Further, the California Critical Thinking Skills Test (CCTST) currently is one of the most frequently used standardized measurements of critical thinking in nursing schools, although it does not contain any discipline-specific content and, thus, would be appropriate for students in any discipline (P. Facione & N. Facione, 1992).

The CCTST contains 34 multiple-choice items designed to assess the core critical thinking skills of analysis, inference, and evaluation.

A companion to the CCTST is the California Critical Thinking Disposition Inventory (CCTDI), which consists of 75 Likert-type items, designed to reflect the critical thinking dispositions of truth-seeking, open-mindedness, analyticity, systematicity, critical thinking confidence, inquisitiveness, and maturity (P. Facione, N. Facione, & Sanchez, 1992). It addresses 3 of the 10 *habits of mind* nursing schools espouse as important to critical thinking: open-mindedness, confidence, and inquisitiveness.

In addition, the Ennis-Weir Critical Thinking Essay Test (EWCTET) uses written essays to evaluate a given argument (Ennis & Weir, 1985). This tool tests the critical thinking skills of getting the point, seeing the reasons and assumptions, stating one's point, offering good reasons (reflection), seeing other possibilities (open-mindedness), and responding appropriately. Two habits of mind, reflection and open-mindedness, appear to be measured by this test.

The Cornell Critical Thinking Tests (CCTT) have two forms, X and Z, designed to measure a wide range of critical thinking abilities (i.e., induction, deduction, value judgment, observation, credibility, assumptions, meaning) (Ennis, Millman, & Tomko, 1985).

Based on the APA's definition of critical thinking, the Minnesota Test of Critical Thinking (MTCT) is "designed to measure both critical thinking skills and a key disposition of critical reasoning: the willingness to critically evaluate arguments which are congruent with one's own goals and beliefs" (Edman, Bart, Robey, & Silverman, 2000, p. 3).

Finally, developed by American College Testing, the Collegiate Assessment of Academic Proficiency (CAAP) is designed to help postsecondary institutions improve teaching and enhance student learning. This test offers individual modules in five areas: reading, writing, mathematics, science reasoning, and critical thinking (Collegiate Assessment of Academic Proficiency, 2001). The critical thinking module measures students' ability to clarify, analyze, evaluate, and extend arguments. The format of this examination is multiple-choice questions developed from essays related to issues commonly encountered in postsecondary education.

7. IMPORTANCE OF TEACHING CRITICAL THINKING

Oliver and Utermohlen (1995) see students as too often being passive receptors of information. Through technology, the amount of information available today is massive. This information explosion is likely to continue in the future. Students need a guide to weed through the information and not just passively accept it. Students need to "develop and effectively apply critical thinking skills to their academic studies, to the complex problems that they will face, and to the critical choices they will be forced to make as a result of the information explosion and other rapid technological changes" (Oliver & Utermohlen, 1995, p. 1).

On the other hand, critical thinking involves questioning. Therefore, it is important to teach students how to ask good questions, to think critically, in order to continue the advancement of the very fields we are teaching. "Every field stays alive only to the extent that fresh questions are generated and taken seriously" (Center for Critical Thinking, as cited in Walker, 1997, Why Teach Critical Thinking? para. 2).

Beyer (1995) sees the teaching of critical thinking as important to the very state of our nation. He argues that to live successfully in a democracy, people must be able to think critically in order to make sound decisions about personal and civic affairs. If students learn to think critically, then they can use good thinking as the guide by which they live their lives.

Elder (2007) discusses the emphasis of teaching students the skills needed to become competent employees at the community college level. As society becomes more complex, and as a rapid change in technology occurs, "training students for job performance in narrowly defined skill areas no longer serves students well" (p. 1). Elder's contention was that students are not prepared for the challenges of the current job market. Therefore, educators should encourage in their students the intellectual tools that "will render them mentally flexible and intellectually disciplined" (p. 2). Successful employees must be able to utilize disciplined reasoning and the metacognitive process so they can direct and redirect their thinking. Rather than emphasizing the transfer of information, educators should encourage students to rethink their thinking and to reason, analyze, judge, and interpret that information.

8. CONCLUSION

To improve students' critical thinking knowledge, skills, and dispositions, educators can develop instructional pedagogy with purposeful learning activities that encourage critical thinking abilities. Students must be taught how to think critically, and frequent and explicit teacher modeling of critical thinking skills.

Furthermore, students need to be given opportunities for consistent, repeated practice of these skills over an extended period of time. As well, support from the administrative staff along with the implementation of teacher training in critical thinking instructional strategies.

What is of utmost importance is creating a classroom that encourages collaboration, open dialogue, and an acceptance of diverse values, beliefs, and perspectives. Students should be allowed to openly express their opinions without fear of judgment, censure, or reproach, and educators can encourage optimal critical thinking behaviors and attitudes through effective modeling of those behaviors.

It is hoped that this short review on the role of critical thinking skills will shed some light on blurred issues related to this topic in both EFL and ESL contexts. Therefore, the main reason behind writing this short introduction is to call *Íkala*'s readers and authors' attention on the possible topics to be investigated and the proposals to be sent to this journal.

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