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Review

Do instructional interventions influence college students' critical thinking skills? A meta-analysis

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ABSTRACT

Promoting students' critical thinking skills is an important task of higher education. Colleges and universities have designed various instructional interventions to enhance students' critical thinking skills. Empirical studies have yielded inconsistent results in terms of the effects of such interventions. This meta-analysis presents a synthesis of empirical studies designed to promote measurable changes in students' critical thinking skills using instructional interventions. Findings demonstrated statistically significant but small average effect size and evidence of heterogeneity among studies. Hierarchical linear model was adopted to explore potential predictors of the variance across effect sizes. Results showed that student discipline and treatment length explained part of the variability among treatment effects. Limitations and implications are discussed.

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1. Introduction

Most educators agree that critical thinking represents a pinnacle of sophisticated thinking ability which schools aim to develop in students. Future employers also place a high priority on seeking critical thinking skills in prospective employees (Burbach, Matkin, & Fritz, 2004). Generally, critical thinking skills refer to the abilities to analyze, synthesize, and evaluate information as well as the disposition to apply these abilities (Halpern, 2001). As a higher-order cognitive ability, critical thinking is important for individuals to make decisions in their career, personal life and public life. For students, critical thinking skills not only help them make meaning of the subject matter knowledge they learn, but also stay with them even after knowledge is forgotten (Dressel & Mayhew, 1954). In a time when individuals are required to make decisions more frequently than ever, critical thinking has become a widely recognized learning outcome of college students (Halpern, 2001; Reinstein & Lander, 2008). Helping students to learn how to think has been identified as an important educational goal of colleges and universities by national reports (e.g., National Institute of Education, 1984).

Although it is widely agreed that fostering college students' critical thinking skills is necessary, discussion continues about how this can be realized through educational efforts. Improving students' critical thinking abilities through instruction has been a widely adopted approach in reaching this goal, due to the belief that thinking skills can be improved with instruction that is specifically designed for that purpose (Halpern, 2001). During the past decades, efforts to incorporate critical thinking skills into college curriculum have been rising. Empirical studies have examined the effects of instructional interventions on college students' critical thinking skills development. However, the results have been mixed. Some studies show that certain interventions are effective (Erickson, 1999; Solon, 2001; Yang, Newby, & Bill, 2008; Yuan, Kunaviktikul, Klunklin, & Williams, 2008), while others demonstrate statistically non-significant results of similar or same interventions (Arburn & Bethel, 1999; Hesterberg, 2005; Sendag & Odabasi, 2009). Is the teaching of critical thinking among college students effective in general? Which interventions are effective with what population under what conditions and to what degree are they effective? Answers to these questions can be useful in informing higher education administrators, teachers and researchers about effective curriculum designs and the use of instructional practices that are likely to promote critical thinking skills.

To answer these questions, a synthesis of existing empirical evidence of the effectiveness of critical thinking teaching in higher education is necessary. Although researchers have conducted systematic reviews of the teaching of critical thinking (Abrami et al., 2008; Allen, Berkowitz, Hunt, & Louden, 1999; Bangert-Drowns & Bankert, 1990; Gellin, 2003; MacMillan, 1987; Tsui, 1998), a quantitative synthesis that focuses solely on the teaching of critical thinking in postsecondary settings has yet to be reported. This study aimed to help fill such gap in the current literature of critical thinking development.

2. Critical thinking skills

In order to explore the teaching of critical thinking skills, it is necessary to first define what critical thinking is, how it is measured, and what interventions are being used to improve it. In this section, we discuss the definition of critical thinking, the measurement of critical thinking skills, the instructional interventions used to improve critical thinking skills, and the current research literature on this topic.

2.1. Definition of critical thinking

There is no absolute agreement on how critical thinking (CT) is defined. As a complex notion, critical thinking has been described as an attitude, a logical process, purposeful reflection and a developmental process. Glaser (1942) was one of the first to define critical thinking. He considered it to be an attitude and logical application of skills in problem-solving contexts. Ennis (1962) defined critical thinking as a logical process and product-oriented phenomena, such as the correct assessment of statements. Brookfield (1987), Ennis (1989), Paul (1992), and Sternberg (1986) suggested that critical thinking is a process of purposeful reflection that requires logic. Beginning in the 1990s, other researchers asserted that critical thinking skills depend on individuals' pre-dispositions and purposeful reflection (Facione, 1990b).

Despite the differences in these specific definitions, there is significant overlap among them. Generally, critical thinking is considered to be intellectually engaged, skillful and responsible thinking. It facilitates good judgment that requires the application of assumptions, knowledge, competence, and the ability to challenge one's own thinking. Critical thinking skills require self-correction, monitoring the reasonableness of thinking, and reflexivity. One characteristic that uniquely defines critical thinking is that individuals are capable of stepping back and reflecting on the quality of their thinking.

Some researchers argue that critical thinking is essentially the same construct as human intelligence due to the high correlation of critical thinking tests such as the Watson–Glaser Critical Thinking Appraisal (WGCTA, Watson & Glaser, 1980) and intelligence tests (McPeck, 1990). However, numerous studies have pointed out that critical thinking is a distinct construct from intelligence (Elder, 1996, 1997). Empirical findings suggest that cognitive ability is in fact independent of critical think-