Don't Reinvent the Critical Thinking Wheel: What Scholarly Literature Says About Critical Thinking Instruction

As colleges face accreditation requirements, or as departments undergo program review, they generally seek to integrate formal statements about critical thinking into their documentation. Yet, it is not uncommon for these institutions to be unsure about how to integrate such statements. Frequently, faculty meet to seek consensus about the meaning of critical thinking, as well as how it should be taught and measured. Because faculty have discipline-specific expertise, they may not be familiar with literature about critical thinking from the fields of cognitive science; educational, developmental, and social psychology; and even neuroscience. This can result in well-intentioned, but sometimes misinformed efforts. The goal of this article is to present an overview of what scholarly literature tells us about critical thinking, its instruction, and its assessment, in order to assist institutions and faculty align their efforts with the most current scientific knowledge and best pedagogical practices.

In 1988, a group of nearly 50 experts in critical thinking from the fields of education, philosophy, psychology, and other disciplines sought consensus about what characterizes critical thinking, and how to best teach and assess it. Led by Peter Facione of Santa Clara University, the group produced two documents: *The Delphi Report* and an executive summary of *The Delphi Report*. While both documents are exceedingly valuable, the 19-page summary provides more than enough information to orient any college or institution in its attempts to define critical thinking and implement programs to enhance its delivery and accurately measure the results.

The executive summary offers various findings regarding critical thinking and includes 15 recommendations for institutions regarding the "instruction and assessment" of critical thinking. Interestingly, the committee of experts specifically targeted the essential parts of critical thinking "which might reasonably be expected at the freshman and sophomore general education college level," delineating six "cognitive skills" that make up critical thinking: interpretation, analysis, evaluation, inference, explanation, and self-regulation. More than 95 percent of the committee agreed on three key terms: analysis, evaluation, and inference; a slightly lower percentage (around 87 percent) also included the other three items.

Faculty could easily use these guidelines in the process of defining critical thinking. For example, by taking the three cognitive skills most endorsed by the expert panel—analysis, evaluation, and inference—a college could create specific goals for any or all of these skills. However, as the *Delphi Report* points out, as well as a large body of scholarship before and after the report, these terms have precise meanings. While it is not uncommon for people to conflate "analysis" with "evaluation," sometimes even using the terms interchangeably, these terms have very different meanings in the world of critical thinking. "Analysis" refers to making explicit the relationship among facts, lines of reasoning, and conclusions drawn from that reasoning. "Evaluation," on the other hand, involves judging the truth, credibility, or validity of statements or arguments. Therefore, using the guidelines of the *Delphi Report* requires care and understanding of the technical sense of the terms, or skills, that make up critical thinking.

While the *Delphi Report* offered definitions of critical-thinking skills, the document also carefully delineates a second, essential part of critical thinking often ignored: dispositions. The report states explicitly and clearly that critical thinking is composed of (1) the skills necessary to perform cognitive tasks, such as analysis and evaluation, and (2) the disposition to use those tools in a conscious and reflective manner. In fact, extensive research in dual process theory confirms the distinction between critical-thinking skills and critical-thinking dispositions. In cognitive science, dual process theory claims that the human brain employs two cognitive systems (at least), each with its own distinctive tendencies. Labeled simply "System One" and "System Two," the first corresponds to a quick, intuitive way of thinking that is often affect-laden; the second refers to a more deliberate way of thinking associated with careful, effortful reasoning. Hundreds of experiments in fields ranging from social psychology to neuroscience confirm the distinct workings of these brain systems and, consequently, reveal important information about student' intellectual habits. As educators, failing to understand this fundamental functional makeup of the brain can lead us down the wrong path when defining effective strategies for critical-thinking skills and dispositions instruction.

Colleges seeking to increase critical-thinking competencies and dispositions among their students naturally want to know what pedagogical options are available to achieve their goal. Literature reviews (meta-analyses) and other studies of pedagogical strategies for critical-thinking interventions identify four methods of delivery: general, infusion, immersion, and mixed. The general method

involves targeted instruction in critical thought in which traditional content (e.g., content of a history or psychology course) is absent or deemphasized; this method could be called "content agnostic." The infusion approach entails explicit instruction of critical thinking in conjunction with traditional content; this method also requires that students think deeply about course content. The immersion approach requires cognitively challenging tasks related to course content without explicit instruction in critical thinking. The mixed method combines the above pedagogical methods, usually in conjunction with a separate emphasis on critical-thinking skills.

Although studies that test these different pedagogical methods vary greatly in many factors, meta-analyses reveal something about the efficacy of each. For example, a 2014 meta-analysis found the highest gains in critical-thinking abilities in courses deploying the general (targeted instruction) method, followed by the mixed method, the infusion method, and finally the immersion method. According to two separate meta-analyses, the immersion method is by far the least successful in generating gains in critical-thinking abilities, which is particularly interesting because the vast majority of college courses follow this method: they do not present explicit instruction in critical thinking. Meanwhile, numerous studies have found that deliberately teaching critical-thinking skills and habits increases student performance in measureable critical-thinking tasks, whether that instruction comes via a separate class in critical thinking or purposeful instruction in critical thinking within the content-based course. However, targeted instruction seems to create more generic—and therefore potentially transferrable—skills.

Colleges will rightly want to know what the targeted or purposeful instruction of critical thinking entails. Are some methods more effective than others? It is not uncommon for faculty to confuse a requirement that students "think critically" with instruction in critical thinking. Most often this effort involves assigning questions to students that require that they do more than memorize—even if such a requirement involves nothing more than offering a personal opinion. There is no evidence that this method enhances critical thinking. In other words, merely requiring students to "think critically" does not seem to have the desired effect.

Nonetheless, some methods do work better than others. Unfortunately, not all studies report the specifics about methodologies used, which limits readers' abilities to properly assess particular pedagogies. However, critical-thinking interventions that involve argumentation have received positive attention. Among these, argument mapping stands out. Argument mapping is a practical implementation of a theoretical concept that entails visually making explicit the relationships among evidence, reasons, and conclusions in an argument. Research—and practically

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every community college instructor's experience—shows that students have great difficulty following text-based arguments. In fact, students don't commonly see arguments as arguments, but rather as series of facts composing a story; or worse, as disjointed facts that need to be memorized. To help students see the connections between evidence and conclusion in an argument, some interventions use mapping software that helps students visualize the structure of an argument. Individual studies as well as meta-analyses of the effects of argument mapping on critical-thinking abilities claim truly impressive gains, sometimes on the order of a standard deviation of improvement between pre- and post-test scores. However, these gains may be partially attributable to other factors, such as feedback, amount of practice, teacher ability, and teacher training.

Teacher training seems to be a significant factor in students' critical thinking gains. From a purely common-sense perspective, it is reasonable that teachers unfamiliar with the pedagogy of critical thinking or argumentation would be less equipped to inculcate the desired skills in students. The scholarly literature lays out this intuitive conclusion: gains in student abilities in critical thinking are tied to teacher preparation, such as in-service or other formal training.

From a practical standpoint, an instructor, department, or college could begin efforts to implement evidence-based practices to enhance students' critical-thinking abilities by becoming familiar with the fundamental definitions of critical thinking in widely-accepted documents like the *Delphi Report*. This can help faculty clarify specific outcomes for students. Next, it would be appropriate to seek in-service instruction, particularly from experts in methodologies that have shown promise, or from local faculty members who have gained expertise in the instruction of critical thinking. Faculty may want to begin slowly, targeting one specific skill, such as argument evaluation, to incorporate into an existing class; or departments may decide to implement entire courses in critical thinking based upon the evidence from current scholarship. As faculty gain confidence in the targeted instruction of critical thinking—a skill that should not be limited to those who teach stand-alone critical-thinking classes—they should consider standardized, reliable assessment instruments that measure critical-thinking skills and dispositions. This final step can provide valuable information for instructors, as well as the institution. If standardized assessment instruments involving pre- and post-tests prove too formidable, even qualitative information like student feedback can be a valuable source of information for local improvement.

Scholarly literature on critical thinking, its instruction, and its assessment is quite extensive. While conclusions that various researchers draw are somewhat diverse, one finding predominates: measureable gains in critical

thinking among college students are obtainable by implementing proven methods and best practices, which always include explicit instruction in critical thinking.

What methods do you use to promote students' critical thinking? Tell us in the comments below or on Facebook.

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NISOD is excited to have John facilitate the session, "Teaching Critical Thinking," at the first-ever Regional Workshop in Chattanooga, Tennessee on February 10. Learn more about the workshop and register online!