

# Critical Thinking in Higher Education

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本論文は、一般教養教育および専門化された高等教育において、クリティカル・シンキング(批評的思考、分析・判断力)がどのようにして概念化され検査されているかを議論する。まず、学生のクリティカル・シンキングの技術と性質を奨励する方法を議論し、そして、心理学の講座におけるクリティカル・シンキングを学ぶための能動的・主体的学習計画の例を紹介する。最後に、単なる教授技術としてではなく、世の中に参加・従事するための首尾一貫した方法としてのクリティカル・シンキングを奨励する必要性を強調する。

This paper discusses how critical thinking is conceptualized and tested in liberal arts and specialized higher education. Methods to cultivate students' critical thinking skills and dispositions are discussed, and an example of an active learning project on critical thinking in a psychology course is presented. The need to cultivate critical thinking as part of a coherent way of engaging the world, rather than treating it as a simple set of teachable skills, is emphasized.

Critical thinking is a stated outcome goal of liberal arts education. A disposition to use critical thinking and ability to do so is seen as a prerequisite for responsible citizenship and a successful life (ten Dam & Volman, 2004). Liberal arts educated academicians at times speak glowingly about the value of liberal arts education in nurturing critical thinking in students. A recent expert panel on the assessment and instruction of critical thinking, for example, proposed that: "One cannot overemphasize the value of a solid liberal education to supplement the honing of one's critical thinking skills and the cultivating of one's critical thinking dispositions" (Facione, 1990). In this paper I take a brief personal look at definitions and measures of critical thinking in higher education. As a teacher in a liberal arts program in Japan and graduate of liberal arts education in the USA, I am particularly interested in critical thinking in the context of liberal arts education, and will focus on that. The first part of the paper introduces common definitions of critical thinking and reviews standardized testing of critical thinking skills and dispositions. The second part of the paper discusses methods of cultivating students' critical thinking and discusses them in the larger context of liberal arts education.

## Critical Thinking Defined

How can we define critical thinking? Definitions abound in the burgeoning literature on critical thinking and most focus on the notion of self-regulation: a critical thinker systematically and consistently manages his or her own thought processes. Experts convened by the American Philosophical Association (APA) reached consensus on the following definition of an ideal critical thinker: "The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit" (Facione, 1990). This conceptualization includes two complementary dimensions of critical thinking: cognitive skills and affective dispositions (*ibid.*). In past research students have been tested on both of these dimensions, primarily through standardized tests, with a greater emphasis on affective dispositions.

## Cognitive Skills

The notion of cognitive *skills* in critical thinking implies learning. As such, scores on a standardized test of cognitive skills in critical thinking are not to be equated with scores on standardized measures of intelligence. True to their origin, contemporary measures of intelligence, such as IQ tests, purport to measure mental ability through scholastic aptitude, while standardized tests of critical thinking skills purport to measure mental cultivation through scholastic achievement. Indeed, if critical thinking is a key aspect of “mental cultivation,” then it is, to paraphrase Whitehead (1929, pp. 26; cited in Walsh, & Seldomridge, 2006), “nothing else than the satisfactory way in which the mind will function when it is poked into activity.” From this perspective, critical thinking skills can be cultivated in any person with basic abilities, although few of us may become fully adept at the full range of skills and sub-skills that are considered central to critical thinking (Facione, 1990; Table 1).

**Table 1. Skills and Sub-skills of Critical Thinking**

Skills	Sub-skills
Interpretation	Categorization Decoding significance Clarifying meaning
Analysis	Examining ideas Identifying arguments Analyzing arguments
Evaluation	Assessing claims Assessing arguments
Inference	Querying evidence Conjecturing alternatives Drawing conclusions
Explanation	Stating results Justifying procedures Presenting arguments
Self-regulation	Self-examination Self-correction

Adapted from Facione (1990).

The APA panel mentioned earlier proposed the basic critical skills listed in Table 1 and several standardized tests have been designed with this basic set of skills in mind. The tests most commonly used in higher education include the Watson-Glaser Critical Thinking Appraisal (WGCTA; Watson & Glaser, 1994), and the California Critical Thinking Skills Test (CCTST). The WGCTA measures the underlying constructs of classical logic embedded in critical thinking skills, including inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments (Walsh, & Seldomridge, 2006). The CCTST is based on similar constructs and includes five scales: inductive reasoning, deductive reasoning, analysis, inference, and evaluation. Ironically, the CCTST was recently criticized for including 9 (out of 34) defective questions that make errors in critical thinking (Fawkes, O’Meara, Weber, & Flage, 2005). These authors also warn that standardized testing using instruments such as the CCTST can only be understood as a measure of minimal competency for the skills tested, but not as an adequate measure of critical thinking (*ibid.*).

**Table 2. Affective Dispositions of Critical Thinking****Approaches to life and living:**

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- Inquisitiveness with regard to a wide range of issues.
  - Concern to become and remain generally well informed.
  - Alertness to the use of critical thinking.
  - Trust in the process of reasoned inquiry.
  - Self-confidence in one's own ability to reason.
  - Open-mindedness regarding divergent world views.
  - Flexibility in considering alternatives and opinions.
  - Understanding of the opinions of other people.
  - Fair-mindedness in appraising reasoning.
  - Honesty in facing one's own biases, prejudices, stereotypes, egocentric or sociocentric tendencies.
  - Prudence in suspending, making or altering judgments.
  - Willingness to reconsider and revise views where honest reflection suggests that change is warranted.

**Approaches to specific issues, questions or problems:**

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- Clarity in stating the question or concern.
  - Orderliness in working with complexity.
  - Diligence in seeking relevant information.
  - Reasonableness in selecting and applying criteria.
  - Care in focusing attention on the concern at hand.
  - Persistence though difficulties are encountered.
  - Precision to the degree permitted by the subject and the circumstance.
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Adapted from Facione (1990).

## Affective Dispositions

What motivates learners and teachers to allocate mental energy to critical thinking and how is that mental energy distributed? According to the APA panel of experts, the way a person learns to approach life is closely connected to his or her actual application of critical thought. From this perspective, people who have developed the affective dispositions listed in Table 2 are much more likely to apply their critical thinking skills appropriately in both their personal and civic life than those who have mastered the skills but are not disposed to use them. Students' acquisition of this basic set of dispositions has also been measured through standardized testing, in particular through the California Critical Thinking Dispositions Inventory (CCTDI; Facione & Facione, 1992). The CCTDI consists of 75 items on a six-point Likert scale that measure seven sub-scales: truth seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and maturity (*ibid.*).

## Standardized Testing

What have the first decades of systematic standardized testing of critical thinking taught us thus far? Surprisingly little systematic research has been done to test the claim that liberal arts education is particularly successful in cultivating critical thinking in students. A recent longitudinal study in the USA that compared 49 liberal arts colleges and public and private universities in 13 states is among the first of its kind. The study found that liberal arts graduates

excelled on measures of personal growth and responsible citizenship but did not demonstrate superior critical thinking skills compared to graduates from private and public universities (Pascarella, Wolniak, Seifert, Cruce, & Blaich, 2005).

Data from comprehensive institutions are often difficult to interpret as the following example illustrates. In preparation for an accreditation visit, a mid-size comprehensive public university in the USA began measuring both critical thinking skills and dispositions, using the CCTDI and WGCTA (Walsh & Seldomridge, 2006). Data on critical thinking dispositions collected from 1997 to 2002 showed no consistency of pattern. While some cohorts saw gains, others saw losses, and several years had essentially no change. Throughout this period, the usual academic indicators (e.g., SAT/ACT data, cumulative grade point average, science grades) remained the same. The data on critical thinking skills were likewise inconclusive and difficult to explain (*ibid.*).

In Western countries medical and allied health care education has been at the forefront of standardized testing of critical thinking skills and dispositions. In clinical settings critical thinking can literally mean the difference between life and death, and health educators are particularly concerned with devising and testing curricula that require the practice of critical thinking. In the USA problem-based learning has been fundamental to this approach since the 1960s, when medical schools abandoned traditional lecture-based education in favor of active learning (Kowalczyk & Leggett, 2005). Allied health education in the USA followed suit in the 1980s (*ibid.*). Of all fields in allied health education, nursing education has been among the most active in testing critical thinking. One of the main objectives of nursing education is to produce nurses with the ability to think critically and thus be able to provide safe nursing care (Suliman, 2006). The philosophy of this approach is to encourage student self-directed learning and take a problem-solving approach (McAllister, 2001). Similar to critical thinking assessment in liberal arts and comprehensive universities, nursing education has primarily relied on standardized testing.

Walsh and Seldomridge (2006) reviewed the extensive literature on standardized tests of critical thinking in nursing education and concluded that “years of measuring critical thinking using standardized instruments and evaluating the effectiveness of various interventions to enhance critical thinking have yielded results that do not inform pedagogical practice.” Walsh and Seldomridge suggest that in nursing education the use of standardized instruments to measure critical thinking is not particularly useful because such tools assess the skills of classical logic, as opposed to the critical thinking skills of clinical practice.

Comparative data obtained in various countries provide some insight into cultural factors associated with the cultivation and assessment of critical thinking in nursing education. Some of these comparative data were obtained with local translations of English-language instruments, while other data were collected with the English language originals. One study compared nursing students from universities in Hong Kong and Australia on the CCTDI. In contrast to the Australian students, the Chinese nursing students failed to show a positive disposition toward critical thinking on the CCTDI total mean score (Tiwari, Avery, & Lai, 2003). In an earlier study Chinese nursing students at a Hong Kong university were also shown to have a negative disposition toward critical thinking in the majority of CCTDI sub-scales. Similar as in Western studies, the students in this study scored lowest on the truth-seeking sub-scale and highest on inquisitiveness (Ip et al., 2000).

The development of critical thinking skills is a current focus in nursing education and care in Japan. However, the Japanese Nursing Association does not require students to be assessed on critical thinking as a curriculum outcome (Kawashima & Petrini, 2004). A recent study based on a Japanese translation of the CCTDI compared freshmen and junior nursing students and transfer students with registered nurses on their dispositions to critical thinking (Kawashima & Petrini, 2004). The students who transferred to the nursing program showed an overall positive disposition toward critical thinking as measured by the CCTDI total mean score.

The data for the regular students and registered nurses suggested an overall ambivalence toward critical thinking. All three groups scored in the positive range on three sub-scales: open-mindedness, inquisitiveness and maturity. When compared to aggregate findings from Western studies of nursing students (Facione, 1997), the Japanese nursing students and registered nurses scored lower on both total score and all sub-scale scores.

In discussing these results Kawashima and Petrini comment that the traditional Japanese education system continues to hinder the development of nursing students. Learning skills that require students to formulate their own questions or interests in academia or social events are not encouraged, and neither are autonomy and independent learning, all of which have been associated with the cultivation of critical thinking skills and dispositions (Ibid; cf. Facione, 1990).

Kawashima and Petrini's findings and comments about the effect of traditional education on Japanese nursing students resonate with similar observations of Japanese medical education. In a rather frank invited assessment of medical education at a major Japanese medical school, R. Harsha Rao, an accomplished US-based teacher-practitioner laments: "It constantly drove me crazy to see these incredibly brilliant and knowledgeable young minds go into limbo because they were taught not to ask any questions. I came to realize that it was the Japanese way when I was told by them, in fact, that to ask a question was a sign of disrespect for their teacher! So much so that a couple of students even implied that they were afraid to ask because they would be ridiculed for being too dumb to figure it out for themselves!" (Rao, 2006a). Rao (2006b) comments that only if teachers are willing to be challenged will students feel free to challenge them. The primary onus is thus on teachers to foster a climate of active learning.

None of the studies discussed so far directly tested the link between students' learning style and their dispositions to use critical thinking. A study on Saudi Arabian students used the CCTDI and the Learning-style Inventory (LSI; Kolb, 1985) to investigate this link. The LSI measures the participants' relative emphasis on four learning abilities: concrete experiencing (CE); reflective observation (RO); abstract conceptualization (AC); and active experimentation (AE). All students took the tests in English and two groups were compared. The first group consisted of students enrolled in a 4-year BS program in Nursing. The second group consisted of university graduates with a degree in physics, chemistry, mathematics or biology, enrolled in a 2-year accelerated program in nursing.

Overall, the students in the second group were significantly more disposed to critical thinking, inquisitive and self-confident. Across both groups, inquisitiveness was positively correlated with active experimentation (AE) and negatively with concrete experience (CE). Abstract conceptualization (AC) was positively related to truth seeking, analyticity, systematicity, self-confidence, and maturity. Finally, reflective observation (RO) was negatively correlated with truth seeking and systematicity (Suliman, 2006).

## Testing: Quo Vadis?

Based on this limited review of the first decades of research on critical thinking outcomes in higher education it seems reasonable to suggest that both skill and disposition are difficult to capture with standardized tests. Standardized testing of critical thinking may face similar constraints and shortcomings as standardized testing of intelligence (Cernovsky, 2002). Walsh and Seldomridge (2006) explain that the inconsistent findings and limitations of available standardized instruments have led programs to consider qualitative measurements of critical thinking, such as portfolios, narratives, and reflective assignments. However, issues of interrater reliability, validity, and inability to compare findings across programs, have limited the usefulness of such approaches. For example, faculty who identified themselves as more abstract thinkers rated students' reflective writing higher on critical thinking than faculty who described themselves as concrete thinkers (*ibid.*).

Members of the APA panel on critical thinking commented that it was easier for them to reach consensus on the definition of critical thinking than on recommendations for the most effective ways of testing it. The panel did suggest that assessment should occur frequently and should be used diagnostically as well as summatively (Fancione, 1990). The panel also recommended that different instruments should be used, depending on which aspect of critical thinking is targeted and where students are in their learning—the introductory stage, the practice stage, the integration stage or the generalized stage. Finally, and importantly in view of some of the cross-cultural findings discussed earlier, the panel emphasized that critical thinking instruction should not be deferred until college, “since it is not likely to be effective if it were” (*ibid.*).

## Cognitive Development and Critical Thinking

Traditional students at colleges and universities are in the late adolescence and early adulthood stages of psychological development. According to Swiss psychologist Jean Piaget’s influential developmental theory, around this age young people enter the formal operations stage of cognitive development. This final stage in Piaget’s theory is characterized by the ability to systematically think about all the logical relations in a problem. Keating (1980) reviewed research on adolescent thought and elaborated on Piaget’s ideas by proposing five specific characteristics that distinguish adolescent thinking processes from those associated with middle childhood: (1) thinking about possibilities, (2) thinking ahead, (3) thinking through hypotheses, (4) thinking about thought, and (5) thinking beyond conventional limits.

We can map these five characteristics of adolescent thought onto the skills and sub-skills of critical thinking identified by the APA panel of experts (Table 2). For example, the ability to think about possibilities (1), to think ahead (2), and to think beyond conventional limits (5) map onto *inference*, while the ability to think through hypotheses (3) maps onto *evaluation*. Finally, second-order cognition, that is, the ability to think about one’s own thoughts (4) maps onto *explanation*, *self-regulation*, *interpretation* as well as *analysis*. In sum, theory and research in developmental psychology suggest that the average adolescent mind is developmentally ready to be “poked into critical thinking action,” considering that it is capable of performing the mental operations associated with critical thinking skills.

## Cultivating Critical Thinking

How can college and university teachers poke the minds of students into critical thinking action? Most experts agree that lecture-based, teacher-centered classroom activities are least likely to cultivate critical thinking in students, especially when combined with multiple-choice examinations and similar tests that reward recognition and recall rather than encourage critical thinking (Walsh & Seldomridge, 2006). Providing meaningful active learning opportunities, especially in the form of problem-based or integrated learning activities, is the pedagogy of choice for cultivating critical thinking skills and for nurturing critical thinking dispositions. Much can be done to scaffold active learning without having the teacher take center stage. For example, targeted and timely questioning can help move students into a higher level of functioning. Research reviewed by Walsh and Seldomridge (2006) showed that teacher questions at a higher level (i.e., application, analysis, evaluation, synthesis) yield more sophisticated student responses. Research has also shown that faculty questions are commonly at a low level (i.e., information, knowledge, comprehension), so work in this area remains to be done.

In the following section I briefly describe a recent project on critical thinking in one of my upper-level psychology courses. Our work on critical thinking in the course stretched over several class sessions and included in-class readings and discussions, problem-based homework assignments, and in-class presentation of these assignments, and it culminated in a reflective writing assignment. We started with defining critical thinking and a discussion of

hindrances to critical thinking. For this purpose the students were given a set of tables listing hindrances to critical thinking due to use of language, faulty logic or perception, or psychological and sociological pitfalls (Carroll, 2000; 2003). We worked with these tables in class and tried to come up with everyday examples of hindrances to critical thinking. Next, we read (in class and as homework) a critical piece on the use and misuse of intelligence testing in psychology. After reading and discussing the main content we tried to determine whether or not the critical message of this piece was constrained due to use of language or faulty logic. This exercise was difficult for the students considering that language use hindrances to critical thinking, such as the use of jargon or doublespeak, are difficult to spot in a language other than one's own. The students most often commented on the emotive content of the piece and how in their view it distracted from the main message. Finally, the students wrote a reflective paper offering their opinion on how critical thinking applies to the study of psychology. One student wrote: "Thinking critically is that we can understand what truth is," while another commented that: "I felt that critical thinking is very related to morals and ethics." Yet another student cited some of the specific examples of hindrances to critical thinking discussed in class and wrote: "... communal reinforcement,<sup>1</sup> ad hominem fallacy, and poisoning the well are psychological and sociological pitfalls that the Japanese tend to fall in. It might happen because of cultural background. Japanese are not individualists and tend to follow authority and numbers." Several students mentioned in their papers that they were well familiar with critical thinking because it had been emphasized in their classes since their freshman year. The insights the students demonstrated through their reflective writing can thus be seen as a cumulative function of the consistent emphasis on critical thinking throughout their liberal arts college career.

It is unlikely that the kind of insights these students showed can be adequately captured through standardized testing. Teachers as well as researchers should think creatively and critically about how to design and implement multiple methods of measuring critical skills and dispositions throughout the entire 4-year curriculum. As teachers we should also critically reflect on *how* content could be taught to foster critical thinking and not only on *what* should be taught. Finally, and perhaps most importantly, if we approach critical thinking as a simple set of teachable skills our efforts are likely to fail (Keating, 1996). Rather, as cogently stated by Keating (1996), educators should strive to enhance students' critical thinking by considering it part of "a coherent way of engaging the world that requires such skills, plus content knowledge, personal dispositions, emotional commitments, and productive patterns of social interaction." Perhaps, then, this is what a liberal arts education, with its clear focus on developing students ability to "shed details in favor of principles" (Whitehead, 1929) and proven track record of fostering personal growth (Pascarella et al., 2005), is particularly well positioned to accomplish.

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<sup>1</sup> In the case of communal reinforcement a claim whether valid or invalid becomes a widespread belief through repeated assertion by community members. The ad hominem fallacy involves criticizing the person not the argument that s/he makes. Poisoning the well involves reinforcing prejudice about the opposition, making it difficult for opponents to be viewed fairly.

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