Critical Thinking: A Concept Paper

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No one disputes the importance of critical thinking as a goal of education. It is what we expect students to practice, engage with, and advance in during their years in school, leading to their full participation as informed members of our communities. What is in question, however, is how the school system should respond to this imperative. How should we design curriculum and assessment to improve the likelihood that students actually become critical thinkers?

In an attempt to answer this question, this paper explores the concept of critical thinking as presented in recent literature on the topic. It examines the following questions: What is critical thinking? How does it develop over time? and What conclusions can we draw about how critical thinking should be addressed in curriculum and assessment?

What is Critical Thinking?

In spite of widespread acknowledgement that critical thinking is an important outcome if not the very purpose of education, agreement on how to define critical thinking has been notoriously difficult to achieve. Definitions abound in the literature, but many are too vague or general to be of use or are so comprehensive that they fail to serve as definitions. This problem is frequently noted in the literature, often in a lengthy discussion at the beginning of a study (see, for example, Kuhn 1999, Van Gelder 2005, Angelli & Valanides 2008, Lai 2011).

If considered on a spectrum, at one end are the narrowest definitions of critical thinking as viewed by cognitive psychologists, which generally equate critical thinking with higher-order thinking skills, usually including analysis, evaluation, synthesis, and problem-solving. The focus of this type of definition is on the observable products or behaviours associated with critical thinking, not with the ideal qualities of the critical thinker his or herself. Typical of this approach is the following definition of critical thinking:

> The mental processes, strategies, and representations people use to solve problems, make decisions, and learn new concepts (Sternberg, 1986, p. 3).

At the other end of the spectrum are pedagogical approaches, which tend to view the cognitive psychology approach as reductionist, simplifying to a few skills or procedures a much more complex development. This view, popularized by Roland Case and the Critical Thinking Consortium, rejects the view of critical thinking as product, process, or procedure, seeing it instead as an all-encompassing goal of education. Typical of this view is the following definition:

> Critical thinking involves thinking through problematic situations about what to believe or how to act where the thinker makes reasoned judgments that embody the qualities of a competent thinker. A person is attempting to think critically when she thoughtfully seeks to assess what would be sensible or reasonable to believe or do in a given situation (Case & Daniels, n.d., p. 5).

Somewhere between these two positions are the definitions of educational philosophers, which tend to encompass thinking skills within a view of the ideal thinker. Typical of these definitions is the following:

> Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness (Paul & Scriven, 1987).

What Are the Key Components of Critical Thinking?

As discussed above, definitions of critical thinking tend either to reduce the complexity of the undertaking or to expand it to incorporate all aspects of education, in both cases leaving much room for disagreement. Another way of looking at critical thinking is to describe it in terms of its components, that is, the outcomes we expect students to demonstrate as critical thinkers. The following paragraphs describe aspects of critical thinking that are accepted by most or at least some critical thinking researchers.

Skills
Almost all critical thinking advocates and researchers agree that critical thinking includes the cognitive skills associated with higher-order thinking. These include analyzing arguments, assertions, or evidence; making inferences using inductive or deductive reasoning; judging or evaluating; and making decisions or solving problems. Other abilities include asking questions, interpreting or explaining, and being able to see both sides of an issue.

Dispositions
Most researchers agree that in addition to cognitive skills, critical thinking requires certain dispositions, also referred to as attitudes or habits of mind, including some or all of the following: open-mindedness, fair-mindedness, inquisitiveness, the desire to be well-informed, flexibility, and respect for other points of view. However, some researchers dispute the inclusion of dispositions within a definition of critical thinking, seeing dispositions simply as desirable qualities to inculcate in students but not essential to critical thinking itself.

Knowledge
Most researchers agree that background knowledge is essential to critical thinking, giving as it does something for students to think critically about. In fact, one of the reasons posited for children's lack of critical thinking skills is their relative lack of knowledge. While generic critical thinking skills may be introduced to students in isolation from domain-specific knowledge, most researchers agree that the actual practice of critical thinking requires domain-specific background knowledge. At the same time, research has shown that some critical thinking skills are general in nature and thus transferable to new contexts.

The use of criteria or standards
Educational philosophers, including those associated with the Critical Thinking Consortium and the Foundation for Critical Thinking, view the use of criteria or standards to make judgments or decisions as a crucial component of critical thinking. In this view, critical thinking is differentiated from other forms of thinking by the qualities it meets as defined by explicit criteria or more generally by norms, ideals, standards of various kinds, and laws. Cognitive psychologists, on the other hand, view criteria as outside the definition of critical thinking itself, since they are not behaviours or skills.

Motivation
Some researchers see critical thinking as including the motivation to think critically. Internal motivation, including the willingness to tackle difficult and ill-defined problems and to persist, is essential to success as a critical thinker. Without motivation, the argument goes, students will not demonstrate the hard work required to engage with problems until they find a solution. Disagreement over the role of motivation in critical thinking is similar to that for other dispositions, that motivation is a supporting condition but not a critical thinking skill itself.

Metacognition
Many critical thinking definitions include reference to the skills commonly associated with metacognition. Paul's 1990 definition, for example, refers to critical thinking as "thinking about thinking." Kuhn (1999) in particular has argued that critical thinking is a form of metacognition. Others have argued that metacognition is a form of critical thinking, pointing out that the use of strategies, often considered a metacognitive skills, is really part of critical thinking.Whether metacognition is a component of critical thinking or a complement to it, it is so closely associated with critical thinking that, like motivation, it is unlikely that one exists without the other.

Creative thinking
While creative thinking has traditionally been seen as a separate development from critical thinking, some researchers argue that creative and critical thinking are inseparable, with creative thinking being the product of critical thinking. Bloom's revised taxonomy (Anderson & Krathwohl, 2001) includes "creating" among the higher-order skills, along with analyzing and evaluating, suggesting that they are all cognitive skills. Paul and Elder (2012), in particular, argue that "good thinking" requires both critical and creative thinking: "When we understand critical and creative thought truly and deeply, we reconize them as inseparable, integrated, and unitary (n.p.)."

Ethical reasoning
The relationship between critical thinking and ethical thinking is disputed in the literature, with many researchers treating the two as separate concerns, pointing out that people can think critically without being ethical. However, Paul and Elder (2009) argue that "skilled ethical reasoning presupposes the same range of intellectual skills and traits required in other domains. One must be skilled in breaking reasoning down into its component parts. One must be proficient in assessing reasoning for its clarity, accuracy, relevance, depth, breadth, and logicalness (p. 36)."

How Does Critical Thinking Develop?

Clearly, critical thinking develops over time. Children are not capable of the reasoning we expect of secondary students, nor are secondary students capable of the reasoning we expect of university graduates. What is not as clear is how this development takes place, what sequence it follows, or how it corresponds to children's developmental stages. The following section discusses traditional views of the developmental stages of critical thinking and more recent views.

Conventional views of cognitive development have been influenced by two important twentieth-century theories: those of Jean Piaget and Harold Bloom. In Piaget's theory, not until adolescence were children capable of formal operations, including abstract reasoning. Although often simplistically interpreted, Piaget's developmental theory was taken by many curriculum designers to mean that children could not truly engage in critical thinking because of its reliance on abstract reasoning. Simlarly, Bloom's 1956 taxonomy of cognitive processes, which ordered cognitive skills from lowest order to highest order, viewed critical thinking as a "cumulative hierarchical framework; achievement of the next more complex skill or ability required achievement of the prior one" (Krathwohl, 2002, p. 218). The equation of the higher-order skills of analysis, synthesis, and evaluation with critical thinking skills meant that curriculum developers often assumed that students in lower grades needed only be concerned with mastering lower-level skills (Case, 2005, p. 2).

More recently, a number of researchers have concluded that the development of critical thinking begins much earlier than previously thought and that the dispositions toward critical thinking in particular can be fostered from a very early age. A revised version of Bloom's taxonomy (which replaces *knowledge, comprehension, application, analysis, synthesis, and evaluation* with *remembering, understanding, applying, analyzing, evaluating, and creating*), for example, allows that cognitive processes do not develop in rigid sequence, although the complexity of the skills used is assumed to depend on a student's level (Anderson & Krathwohl, 2001).

Bailin et al (1999) posit that while critical thinking develops over time, the process begins in the early grades: "Primary students can begin to learn important commitments and habits of mind, such as thinking reasons and truth are important, respecting others in discussion, being open-minded, and being willing to look at issues from others' points of view (p. 298)." Case (2005) argues similarly that any task at any level in school can be an opportunity for critical thinking "provided the thinker attempts to judge what would be reasonable or sensible to believe or do (p. 4)."

Paul and Elder (2010) offer a model of the development stages that any person, child or adult, must progress through to become a fully competent critical thinker. Their model assumes that the stages are predictable, that they are achieved in sequence, that progress from stage to stage is not automatic but requires commitment on the part of the learner to advance to the next stage, and that success is "deeply connected to the intellectual quality of student learning." In their model, thinkers move through the following stages:

- Stage 1: The Unreflective Thinker (unaware of the role of thinking in their lives)

- Stage 2: The Challenged Thinker (develop initial awareness of the role of thinking in their lives)
- Stage 3: The Beginning Thinker (begin actively to take command of their thinking)
- Stage 4: The Practicing Thinker (become aware of the thinking habits they need to develop)
- Stage 5: The Advanced Thinker (have established good habits of thought and experienced the benefits)
- Stage 6: The Master Thinker (continually monitor, revise, and rethink strategies for continual improvement)

Finally, Kuhn (1999) offers a different view of the development of critical thinking, one that relies on metacognitive developments that begin in early childhood. She identifies three forms of "meta-knowing" skills that she argues are essential to the development of critical thinking: metacognitive, metastrategic, and epistemological ways of knowing in young children. As she explains, "These basic forms of second-order cognition—knowing what one knows and how one knows it and effectively managing and deploying one's cognitive resources—are the foundation of the critical thinking skills that we hope to impart to students during the remainder of their school years (p. 21).

What Conclusions Can We Draw For Curriculum and Assessment?
The research on critical thinking reviewed above leads to a number of conclusions of pertinence to the design and development of curriculum and assessment, including the following:
- Critical thinking develops throughout the K-12 years, and thus critical thinking skills and dispositions should be fostered throughout the K-12 curriculum, with the complexity of the tasks involved increasing commensurate with grade level.
- Activities that incorporate critical thinking skills and dispositions should include explicit standards or criteria against which students' achievement can be assessed, by students themselves and by their teachers.
- Critical thinking should be integrated within subject areas and, as necessary, taught as generic skills.
- Opportunities for metacognitive development should be incorporated into all learning activities.
- The development of critical thinking should be considered as overlapping and interacting with the other competencies of communication, personal responsibility, social responsibility, creative thinking and innovation.
- The abundant resources provided by the Critical Thinking Consortium and the Foundation for Critical Thinking should inform the development of critical thinking curriculum and assessment materials.

As a closing thought, the following conclusion from a study of critical thinking in university students sums up much of the wisdom found in recent literature on the topic and points to a number of essential conditions in which critical thinking in its fullest sense can flourish, whether in kindergarten or university:

>   Students' critical thinking seems to improve most in teaching
>   environments where learning is mediated by someone who confronts

students' beliefs and alternative conceptions, encourages students to reflect on their own thinking, creates cognitive dissonance or puzzlement, and challenges and guides students' thinking when they are actively involved in problem solving. These tactics seem to increase students' metacognitive awareness enabling them to think and talk about their own thinking processes. Rogoff (1990) termed this type of social interaction guided participation. By guided participation, she means active involvement by learners in structured activities with the guidance, support, and challenge of companions. Accordingly, asking students to constantly draw distinctions not in the abstract but concretely, allowing them to doubt things as well as to be engaged in debates, and making them aware of the fact that there are multiple ways of carving up the same domain are key strategies for the teaching of critical thinking. (Angelli & Valanides, 2008, p. 332)

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Key Resources

Critical Thinking Organizations
The following organizations offer extensive readings and curriculum support materials for K-12. More information is available at their websites:

The Critical Thinking Consortium (Vancouver)
www.tc2.ca

The Foundation for Critical Thinking (Berkeley, CA)
http://www.criticalthinking.org/

The Critical Thinking Company (Seaside, CA)
http://www.criticalthinking.com/company/articles/critical-thinking-definition.jsp

Useful Websites
The following website offer various critical thinking resources of interest:

Bloom's Digital Taxonomy
http://edorigami.wikispaces.com/Bloom%27s+Digital+Taxonomy

Creative Think, Roger von Oech
http://www.creativethink.com/

Critical Thinking in Education and Life
http://www.asa3.org/ASA/education/think/critical.htm#ethics

Critical Thinking Web
http://philosophy.hku.hk/think/

Destination Imagination BC
http://www.destinationimagination.ca/

Edward de Bono
http://www.debonoconsulting.com/about_debonoconsulting.asp

Professional Development Module on Critical Thinking Skills
Texas Collaborative for Teaching Excellence
http://www.texascollaborative.org/criticalthinking.htm

Critical Thinking Expertise in British Columbia
Garnet Ayres,
Deputy Superintendent Delta School District

Jocelyn Beaton,
BC Social Studies Teachers Association   Department Head, Moscrop Secondary
(Burnaby)

Robin Gregory, Decision Research
http://www.decisionresearch.org/

Ray Myrtle,
Classroom Teacher, School District No. 41 (Burnaby) President, BC Provincial
Intermediate Teachers Association

Valerie Overgaard,
Vice Chair of the Board of Directors
Associate Superintendent, Vancouver School District No. 39

B.C.-based facilitators, Critical Thinking Consortium
For information, see http://www.tc2.ca/wp/pro-d/facilitators/
Mary Abbott, Vancouver Island BC
Phil Balcaen, Kelowna BC
Roland Case, Vancouver BC
Lindsay Gibson, Kelowna BC
Armelle Moran, Kelowna BC (French)
Cynthia Nicolson, Bowen Island BC
Stefan Stipp, New Westminster BC