Title: A survey of attitudes towards critical thinking among Hong Kong secondary school teachers: Implications for policy change.

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Abstract

"Critical thinking" (CT) is frequently found in educational policy documents in sections outlining curriculum goals. Despite this frequency, however, precise understansdings among teachers of what it really means are lacking. In this study, 72 high school teachers in Hong Kong were surveyed and interviewed on their beliefs about the meaning of CT. Results indicated that while the teachers had some conception of the term, it tended to be narrow. Further, they expressed strong support for the inclusion of CT in the curriculum, while conveying a desire for training in how to teach it. The findings suggest more precise definitions of CT are needed in educational documents.

Keywords: critical thinking; secondary school curriculum; educational goals; thinking skills

1. Introduction

“Critical thinking” (CT) has become one of the buzzwords of our times. The ancient Greeks notwithstanding, its modern origins can be traced back at least as far as educator John Dewey who introduced the notion of reflective thinking in the early 20th century. In the present era, CT’s heights may have been reached in the 1980s and 1990s when numerous scholars made attempts to define the term. While definitions of CT continue to be discussed and debated, the term “critical thinking” still resonates both within the academic world and with the public at large.

One of the more common contexts in which the term “CT” arises is in discussions about the education system, especially the curriculum. Often, the stated concern is that CT is absent among the youth of a given population and the fault is schooling. Typically, schools and curriculums, especially in East Asia, are blamed for focusing excessively on memorizing for exams or stuffing knowledge into students without developing the cognitive abilities to critically evaluate arguments (Egege, S. & Kutieleh, 2004; Zhang, 1999). A recent editorial in the Japan Times (Editorial Jan. 25,

2009, ¶ 5) captures this sentiment;

> Instead of letting the same old testing pressures continue to drive the educational system, changes are needed… De-emphasizing entrance exams will allow education at all levels to refocus on more substantial and active learning. Reconsidering the very basis of all education can help develop … critical thinking and creative potential"

Interestingly, the concern about deficient CT skills is not confined to any one country or region, but appears to span educations systems around the world. The Association of American Colleges and Universities (2005), for example, noted that test results among college seniors show that only 6 percent of students scored "proficient" in critical thinking.

Similarly, when a CT test was administered to college entrants in Scotland and Australia, scores revealed no significant difference between degree- and non-degree holding students indicating a lack of CT skill development even in tertiary institutions in the two countries (Pithers and Soden, 1999). In the United States, Willingham (2008) concludes that despite educational changes and efforts since the publication in 1983 of *A Nation at Risk*, which detailed the lack of higher order thinking skills among the youth of America, little improvement has taken place.

The pervasive concern over the lack of CT notwithstanding, documents outlining the educational aims in schools from several countries mention CT as one of their goals. For example, Singapore's vision statement from the Ministry of Education states, "[w]e should help the students to ask more searching questions, encourage curiosity and critical thinking, and not only to follow prescribed answers" (Ministry of Education, 2009). In the UK National Curriculum, under a section entitled "Values, Aims and Purposes," (National Curriculum, 1999) it states, "[b]y providing rich and varied contexts for pupils to acquire, develop and apply a broad range of knowledge, understanding and skills, the curriculum should enable pupils to think creatively and critically, to solve problems and to make a difference for the better." Finally, in Hong Kong, which is the context for the present study, the term "critical thinking" is mentioned in multiple reports under sections entitled "Learning goals," "Facilitating Effective Learning" and the like (see Education Bureau, 2007) and has been introduced as a key feature in a new subject called "Liberal Studies.".

While the need to engender CT in students may appear self-evident, the actual

understanding of the term, as well as the steps required to achieve the objective remain unclear. In other words, while CT is a widely used term in educational policy documents, clearly stated criteria seldom accompany the term nor are there concrete learning benchmarks to illustrate progress in CT. This actually comes as little surprise given the controversies over how to define the term (see Griggs, Jackson, Marek, & Christopher, 1998; Halpern, 2001).

2. Defining CT

In raising and defining the notion of reflective thinking as "the kind of thinking that consists in turning a subject over in the mind and giving it serious consecutive consideration" (1933, p.3), John Dewey helped focus attention on ways of thinking as an educational matter. In a return to this concern about thinking, the term "critical thinking," and how to define it has received much discussion and debate in recent years. At one level, most definitions contain a thread of commonality. For example, the following are just a few definitions taken from the literature.

- "reasonable and reflective thinking that is focused upon deciding what to believe and do" Norris and Ennis (1989) (p.3)
- "When we think critically, we are evaluating the outcomes of our thought processes—how good a decision is or how well a problem is solved" (Halpern, 1999, p.70).
- healthy skepticism (Lipman, 1991)
- the art of thinking about your thinking (Paul, 1990, p.32)

Other issues within the realm of CT have also emerged as part of the effort to define CT. Forefront among these is whether cognitive skills or procedures, such as those outlined in the definitions above, are sufficient in themselves. Specifically, whether an individual has the motivation to apply these cognitive procedures has also become a subject of interest. So-called "habits of mind" which include qualities such as openmindedness, cognitive maturity and inquisitiveness, or what has been termed a "critical thinking disposition" have also been claimed to play a key role in CT (Facione et al., 1995; Halpern, 1998; Perkins & Ritchhart, 2004; Siegel, 1997).

With this in mind, efforts have been made to compile the multiple dimensions of CT in order to provide a concise overarching definition. Two landmark studies have made efforts to precisely encapsulate a definition of CT. The oft-cited work by Facione (1990), commissioned by the American Philosophical Association, represents a consensus definition of CT derived from an international panel of expert scholars and

theoreticians. In this study, the contributors' consensual statement focused on both cognitive skills as well as the dispositional dimension of CT in recognition of its dual nature. Similarly, a study by Griggs et al. (1998) summarized 25 definitions of CT abilities in the literature as "…a process of evaluating evidence for certain claims, determining whether presented conclusions logically follow from the evidence, and considering alternative explanations. Critical thinkers exhibit open-mindedness; tolerance of ambiguity; and a skeptical, questioning attitude" (pp. 256). Again the skill and dispositional components of CT are evident in the former and later parts of this quote respectively.

The dual dimensionality of CT, i.e., skill- and disposition-based is underscored by controversy over the nature of widely used tests of CT. For example, Ku (2009) notes that three widely used tests for measuring CT the Watson-Glaser Critical Thinking Appraisal (WGCTA) (Watson & Glaser, 1980) the Cornell Critical Thinking Test (CCTT; Ennis, Millman, & Tomko, 1985), and the California Critical Thinking Skills Test (CCTST; Facione, 1990b) capture only the cognitive elements of CT such as the ability to make inferences, recognizing assumptions, deductions, and evaluating arguments while largely leaving dispositional elements unexplored. In response, the California Critical Thinking Disposition Inventory (CCTDI; Facione & Facione, 1992) was developed in order to assess this other crucial dimension of CT. While the findings from studies that have used these tests are not significant for the purposes of the present study, the tests' focuses on either cognitive (or skill-based) or disposition-based notions underscore the dual nature of CT. It is this twofold aspect of CT which will be explored more deeply in this study

As it happens, the latter test (CCTDI) has been used in the Hong Kong context, the location of the present study. In their study comparing the CT disposition of Hong Kong and Australian nurses, Tiwari, Avery and Lai (2003) found that there were both similarities and differences between the two groups of nurses with regard to CT disposition. Notably, where there were differences in Openmindedness and Maturity, the researchers suggested that culture may have played a role, noting that in Chinese culture, opportunities to practice tolerance of conflicting views are lacking.

For the purposes of this study, no concrete definition of CT will be used. Instead, subsumed in the study that follows is the understanding that any conception of CT must include its dual dimensionality, i.e., skills and disposition, and that in order to effectively fulfil pedagogical goals aiming to produce CT in students, both dimensions need to be recognized. The actual skills and dispositions under discussion here have been laid out in detail in the Facione's consensus definitional study (1990). The cognitive skills list includes: interpretation, analysis, evaluation, inference, explanation and self-regulation, along with sub-skills under each of these headings.

The disposition list includes two categories with a list of dispositions under each. The first category is "approaches to life and living in general" (p. 25) which includes various traits such as openmindedness, inquisitiveness, flexibility in considering alternatives, fair-mindedness, self-confidence in one's own ability to reason and willingness to reconsider; the other category, "approaches to specific issues, questions and problems" (p. 25), includes characteristics such as clarity, reasonableness, persistence and orderliness.

The distinctions between the two aspects of CT are important because one of the main aims of this study is to determine the depth of teachers' understanding of the term "critical thinking." In other words, do teachers have both dimensions of CT in their understanding of the term.

While there is some disagreement on how exactly to define CT, or to what degree it is a set of skills or a disposition, and whether it is subject-specific or not, there is a broad consensus about it being a desirable trait that should be engendered by education systems. Indeed, the use of the term is widespread and its meaning is seldom questioned when packaged as one of a set of goals within an educational system. Indeed, educators appear to often appear to take the concept on faith, perhaps as a sort of self-evident foundation of Western thought such as freedom of speech" (Atkinson, 1997, p. 74). Given the extent to which CT is promulgated as a fundamental objective in education systems, some tacit understanding or at least an agreement about what the term means should be shared by teachers in order to carry out the goal.

Hypotheses

These comments and findings are particularly significant for the present study which endeavors to explore the understanding of the term "CT" held by educators in an attempt to draw out more specific conceptions with an eventual goal of formalizing criteria that will encompass the term. In this case, the educators were a group of Hong Kong high school teachers who instruct classes under the guidelines mentioned above in which "critical thinking" is mentioned numerous times in educational policy documents (Curriculum Development Council, 2009). Given the prevailing perceptions about CT as described here, the present study hypothesizes that:

1. educators strongly believe CT should be part of the curriculum;
2. educators have only vague/generalized notions of what the term means and how it can be taught in the classroom;

3. educators desire more training in how CT can be implemented in the classroom.

4. Method

4.1. Participants

Seventy-two in-service Hong Kong high school teachers who taught a variety of subjects (Table 1) completed a questionnaire while taking a professional development course unrelated to the theme of this paper. The questionnaire was written in English, the second language of the teachers; however, all participants had to declare a high level of English proficiency in order to enroll in the course. The mean length of service was 16 years ranging from two to 32.

Table 1 goes here

4.2. Instruments

The survey instrument consisted of an eight-item Likert questionnaire which explored 1) the participants' attitudes on the meaning of CT, 2) CT's role in their job and subject area, and 3) the perceived need for training to enhance teaching techniques in CT. The questionnaire also included one open-ended question seeking a definition of a good critical thinker. This approach to defining CT was taken rather than requesting a definition because it was believed to be easier to personalize the topic rather than asking for a dictionary-like definition.

The open-ended item required a coding exercise in which entries were read through several times in an initial coding exercise (Richards, 2003). Categories were established based on the classification of lexical items with similar meanings. For example, the terms "different," "multiple," "a variety of," "from both sides," etc. appeared frequently immediately before (or after) words such as "perspective," "viewpoints," and "opinions." Occurrences of these words were first isolated and then

counted allowing for no more than one instance from each teacher and classified into a category called “Having diverse perspectives.” Other categories emerged in a similar fashion.

While the main instrument in this study was the questionnaire, semi-structured interviews were conducted with five participants who taught a variety of subjects for the purposes of attaining more in-depth insight into teachers’ beliefs about CT. Detailed notes were taken and confirmed with participants. Interview responses were coded and categorized in a similar fashion to the open-ended question. Table 2 shows the characteristics of these participants and Appendix 1 the interview questions.

Table 2 goes here

5. Results

5.1. Likert-style questions

Table 3 shows the means and standard deviations for the eight numerically oriented items in the questionnaire. Cronbach alpha performed on the results (X=.703) revealed good reliability.

Items that produced mean scores most distant from the mid-point, 3, indicate the strongest viewpoints while those closest to 3 exhibit the weakest. Using this as a measure, item 8 (M=1.93) generated the strongest sentiments with participants expressing a firm collective agreement that a need exists for more training about how to teach CT skills. Two other items produced relatively forceful responses, this time disagreeing with the notions that it is neither necessary to increase CT in the curriculum (M=3.93), nor is it the teacher’s job to teach it (M=3.92). Participants displayed a reasonably strong collective agreement that teaching CT skills is part of their job (M=2.36) and that they have a clear idea of what CT means (M=2.43). There was considerable agreement (M=2.56) that CT is important in the subjects they taught,

although this item produced the highest standard deviation (.99). On the other hand, they tended to disagree that Hong Kong students are good at CT (M=3.59). Finally, there was only a slight tendency to agree that they build CT into their lessons (M= 2.93). In sum, it can be said that the participants felt they understood what CT is, that it is important and should be taught by the teacher, perhaps because they believed Hong Kong students were weak in this area. However, they had a strong desire for more training on how to teach CT.

Table 3 goes here

5.2. Open-ended question

The final item in the questionnaire asked participants to complete the following sentence: "A good critical thinker is a person who…" Among the 72 responses, 69 responded. These responses were classified according to their meaning with several broad themes emerging (Table 4).

The most common theme accounting for fully half of the responses (n=37) can be summarized by the term "having diverse perspectives." Variations on this term included "think …

from different/multiple/various viewpoints;

on both positive and negative sides of the issue;

from different angles."

The second most common theme to emerge was "including reasonable and logical support" with 26 participants choosing this definition. Key terms associated with this meaning included:

"having logical analysis;

thinking based on reasonable grounds;

analyze the issue and come up with a conclusion with evidence."

Tied for the second most common theme was "appropriate decision-making (n=26)." Participants used terms such as,

"interpret whether it is right or wrong;"

“make informed choices;”

“come up with a conclusion.”

The fourth most common theme was “having one’s own point of view” accounting for (n=21) of opinions. Typical responses included:

“develop unique ideas or comments

think independently;

express ideas personally.”

No other themes were identified; however, single instances all related to dispositional aspects were found (n=8) e.g.,

“make a fair judgment;”

“monitor one’s own thinking process;”

“seeking future information;”

“try to obtain the truth behind.”

Finally, three respondents provided definitions which were unclassifiable, e.g., “think deeply.”

The numbers above add up to more than one per respondent because some participants included more than one definition. Figure 4 shows the breakdown.

Each of the above four themes were then categorized as either cognitive skill or dispositional. The most common definition, “having diverse perspectives,” appears most closely related to openmindedness or flexibility in considering alternatives, and thus is dispositional. The second, “including reasonable and logical support,” is clearly a cognitive skill. The third theme, “appropriate decision-making,” because it relies on argumentation is also cognitive. However, the fourth most common theme, “having one’s own point of view,” although not fitting neatly into the consensus definitions (Facione, 1990), appears to be dispositional as it is most closely associated with “self-confidence in one’s own ability to reason.”

Summing up the results of the open-ended question, 27 respondents included both cognitive and dispositional elements in their definitions while 22 included only dispositional ones and 16 only cognitive ones.

Table 4 goes here

Figure 1 goes here

5.3 Interviews

A sample of five participants (Table 2) was interviewed for their views on CT. In the section below, their comments are summarized.

5.3.1. Participant A ("Alfred")

Subject: Chemistry

Experience: 10 years

School Band: 2 (among three bands where Band 1 schools have the academically strongest students)

Alfred believed that CT consists of two main aspects: scientific reasoning and multiple viewpoints. As a chemistry teacher, he believed that CT is intrinsically included in his subject as part of scientific reasoning; however, in science he claimed there is no leeway for diverse perspectives. Therefore, he felt that at least part of his teaching included some aspects of CT, although one aspect was missing. His beliefs about the need to include multiple perspectives as an integral part of CT came from professional development sessions he had attended, but he thought that this aspect of CT applied only to "liberal studies" (humanities).

> "Exams seldom test CT in terms of multiple perspectives which apparently is an important element of CT as I have leaned in teaching development workshops but as far as chemistry is concerned, it is scientific reasoning that is important and I think this is part of CT."

Alfred claimed that the types of questions asked on Hong Kong examinations over the past decade had changed significantly. Rather than evaluating the students' ability to memorize as they did in the past, questions now ask students to apply their new knowledge to novel situations. As an indicator, the periodic table is now routinely included in chemistry exams leaving more time for higher-order thinking questions.

Alfred claimed that in the classroom, students working on projects in teams also encouraged CT, although stronger group members tended to do all of the work. He also mentioned newer teaching methods which now demand role-playing by students further encouraged CT.

5.32. Participant B ("Betty")

Subject: Biology

Experience: 9 years

School Band: 2 (among three bands where Band 1 schools have the academically strongest students)

Betty, like Alfred, believed that being a good critical thinker meant having one's own independent viewpoint. Therefore, she claimed, in teaching biology, which has "definite answers," there is little room for CT.

> "In science it is hard to have one's own view because there is just one answer. Most science teachers think that science is about facts so it is hard to include CT."

However, she claimed that occasionally, when the social implications of biological issues arise, e.g., questions about adoption or choosing the gender of a child, CT becomes necessary in her classes.

Betty claimed to be uncertain about what CT really meant with a belief that CT only encompassed dispositional elements such as having an independent viewpoint . Upon being informed by the interviewer that CT could encompass the ability to evaluate novel scenarios using reasoning and analysis, she claimed that her students do need to apply their newly learned scientific knowledge and reasoning to solve fresh problems. Under this new realization about CT, Betty said this is actually a common type of questioning in her class and subject.

5.3.3. Participant C ("Charles")

Subject: Liberal Studies

Experience: 22 years

School Band: 1 (among three bands where Band 1 schools have the academically strongest students)

Unlike Alfred and Betty, Charles felt that CT was at the core of his subject, Liberal Studies. To Charles, CT meant being able to "come across something and analyze it and decide whether it is good or bad and decide how much you agree or disagree." For this, students required "independent thinking." Charles definition, like Alfred but unlike Betty, included both cognitive skill and dispositional dimensions of CT. Charles believed his subject contained a lot of practice in CT while mentioning that the type of examination questions now do indeed require CT. For example, one question he recalled asked students to discuss the implications on society of a world where robots do most of the work. Here, unsurprisingly, Charles said that good answers needed to be supported with strong reasons and logic. However, he felt the students in general were quite poor at CT saying that some students simply lacked the "character to argue."

5.3.4. Participant D ("*Daniel")*

Subject: Mathematics

Experience: 10 years

School Band 3 (among three bands where Band 1 schools have the academically strongest students)

As a mathematics teacher, Daniel claimed that there was very little CT in his subject because most of his teaching was the application of formulas. The only instances where he could envision CT occurring were during questions involving statistics. Here, he outlined an example where the y-axis of a scale is altered in order to make sales growth of a company's product over a competitor appear more impressive than it really was. Such an example is clearly associated with the cognitive side of CT. Daniel said that occasionally, questions such as these are included in tests. When asked for his understanding of CT's meaning, however, he was hard pressed to define it. Clearly, Daniel had not thought about CT and how it applied to his subject.

5.3.4. Participant D ("*Ellen")*

Subject: Geography

Experience: 10 years

School Band 2 (among three bands where Band 1 schools have the academically strongest students)

Despite claiming to know little about CT, Ellen had quite strong and distinctive feelings about it. She believed that the most important aspect of CT was to have "an independent and individual point of view." in other words, the dispositional dimension. However, she felt that CT skills were lacking in Hong Kong students, who she claimed simply wanted to memorize answers from the textbooks. She asserted that although she made great efforts to encourage critical thought in her students, most teachers do not do likewise. Instead, they follow the old practice of rote memorization.

Ellen stated that examinations questions are now much better at promoting CT. She gave the example of a question on this year's certificate exam in geography which asked students whether the Three Gorges Dam on the Yangtze River could have solved the problem of flooding after the Szechuan earthquake the year before. By mentioning such a cognitively oriented question in reference to CT, Ellen revealed that her conception of CT contained both skill and dispositional elements. She claimed that such a question taking a contemporary problem and requiring critical thought was much different than the exam questions she remembers during her school days. At that time, she claimed, the questions simply tested how well students memorized various geographical features and processes without applying them to novel scenarios.

6. Discussion

Returning to the three hypotheses that this study proposed, the results appear to support two of them while returning an unclear message on the third. The teachers as a whole indicated that CT should be part of the curriculum (Hypothesis 1) and they also collectively expressed the belief that more training in how to teach CT was needed (Hypothesis 3). However, it appears too strong a statement to say that teachers had only vague and generalized notions about the meaning of CT (Hypothesis 2). Rather, they appeared to have quite specific, but often narrow conceptions of the meaning. These issues and related questions are discussed below.

Strong responses to three questionnaire items in particular, i.e., disagreement towards two notions, that it is "not necessary to teach CT" (#5) and it is "not the job of the teacher to teach CT," (#6) as well as agreement with the idea that "teachers need more training about how to teach CT skills" (#8), all suggest that teachers are firm believers in CT as a pedagogical goal. This is further underscored by the collective tendency to

agree that Hong Kong students lacking in CT ability (#4). Thus the teachers' four responses where the strongest views were held can be voiced succinctly:

> *CT is important and needs to be taught because Hong Kong students are deficient in this area, but we need more training on how to teach it.*

Further supporting such a statement are the moderately strong results in items 1 and 2, which can be voiced as follows:

> *Teaching CT is part of my job but I am not completely sure what CT means.*

The multivariate responses in the interviews and the open-ended item in the questionnaire (see Table 3) which asked participants to define the nature of a good critical thinker are both an encouraging and challenging result. The participants as a whole presented a narrow understanding of CT that only in very limited ways dovetailed with definitions found in the literature. That most of their responses could be broadly categorized under either "CT as a set of skills" or "CT as a disposition" supports this notion. In terms of more specific associations,

On the other hand, such a multifaceted response suggests that CT means different things to different teachers. In effect, there may be teachers who stimulate CT in their students by strictly focusing on CT skills, such as supplying good reasons and evidence, while paying little heed to encouraging openmindedness. Conversely, it is also possible that other teachers encourage a "diversity of perspectives," which was the most common response, without advancing the evaluation of arguments on reasonable grounds. Significantly, it is this ability to evaluate that appears at the core of CT; however, most respondents did not include any notions related to the evaluation of ideas. As for the actual evaluation of students' CT ability, Lu (2008) claims that any assessment of CT must attempt to measure both dispositional qualities and cognitive skill aspects. In effect, without an understanding of CT which is more fleshed out, teachers may not fully capture the essence of CT in their classrooms.

In general, both the responses to the questionnaire items and comments in the interviews indicated that while most of the participants did have clear ideas about the meaning of CT, their conceptions were incomplete and in many cases disturbingly narrow. This was particularly the case among the science and math teachers, some of whom believed their subject entailed little critical thought. The confusion displayed by Betty is a case in point. Her assumption that CT simply meant having multiple viewpoints was underscored by the most common definition given to the open-ended

question in the survey. The conception that CT means "having diverse viewpoints" appears to be widely held. Betty's initial comment that biology doesn't require CT highlights a commonly held misconception, perhaps the most common one among the group of participants and may suggest that this is widely held in the community of teachers. Upon realizing that the term "CT" includes the notion of reasoning and analysis, Betty felt that CT was a central component of her subject. This confusion over the meaning of CT suggests that educational authorities need to clarify what they mean by CT. In the case of Betty and many of the participant teachers, such a clarification would help teachers realize that their present practice in science classes already entails CT to a certain degree.

According to interviewed teachers, CT is already underlying the types of questions now asked in examinations; e.g., see examples from Charles and Ellen above, which most interviewees claimed did not exist when they were students in school. This being the case, CT may need to be more explicitly brought to the fore as part of the curriculum, especially in science and mathematics classes, rather than having it buried in processes and formulas unawares to the teacher and student. Similarly, Daniel's claim that CT does not occur in mathematics, again uncovers the need for a clearer definition of CT. In the process of working through mathematical problems, reasoning and analysis based on supporting evidence, i.e., central components of CT, are all at play. For example, in examining the congruency of triangles in a geometry class, students need to apply rules or even derive them based on logical reasoning.

Despite the rather mixed understanding of what CT really means, the participants collectively expressed almost unequivocal support for CT pedagogy by disagreeing with notions that ran counter to the inclusion of CT in the curriculum and the classroom (items 5 and 6 respectively). This strong support coupled with the collectively expressed desire for more training in how to enhance CT pedagogy (item 8) suggests that the participants need little persuasion about the importance of making CT an integral part of their classroom experience. However, this study's findings which show some confusion about CT's actual meaning, coupled with the fervently felt need for help in teaching CT indicate clearer direction is needed than the simple listing of the term "CT" under broadly based headings, such as "Generic skills" or "Learning goals" found in official Hong Kong educational policy documents (see Curriculum Development Council, 2009) while assuming that the meaning is clear to all. In contrast, this same curriculum guide fully explains key terms, such as "learning for assessment" or "whole person development" replete with practical examples of their meaning, while the term "critical thinking," which is mentioned numerous times, stands alone without any follow-up.

If "CT" in schools (and not only in Hong Kong) is to be given prominence commensurate with the frequency to which it appears in policy documents, one step forward would be to revise curriculums so that they clearly illustrate the types of instruction and questions that support CT. Curriculums should also encourage teachers to mindfully highlight the quality of reasoning and evidence in answers to problems. This raising of CT awareness has clear associations with meta-thinking, or developing habits of mind that are self-critical (Paul & Elder, 2001). By giving CT more of a central role, curriculum designers would be taking steps towards implementing concrete measures rather than simply and vaguely stating CT as a generic goal.

Liberal studies

http://www.edb.gov.hk/FileManager/EN/Content_4036/liberal.pdf

7. Conclusion

The present study which sampled the opinions of a very small percentage of teachers in Hong Kong cannot be generalized to the larger local context, or any similar context outside of Hong Kong. However, the findings can be taken as indicators that a great deal more illumination about the meaning of CT and how it is taught are both needed and desired. This is not only underscored by the teachers' collective beliefs about themselves and their classes (items 2, 5, 6, 7 and 8), but also in their beliefs about their students' general (lack of) ability to think critically (item 4).

The good news coming out of this study is that clear movements appear to have been made towards introducing some elements of critical thinking both into the classroom and examinations in Hong Kong. This movement is apparent in the types of pedagogical tools employed by teachers who now have enlightened practices such as project work, web-based collaboration, and novel scenario-based exam questions to augment more traditional forms of teaching and assessment. On the downside, CT has many meanings to many teachers, which, although understandable, calls for some standardization. This can be accomplished by producing curriculum documents that:

- unpack the multifaceted nature of CT into clearly defined components;
- make that meaning clear in policy documents;
- provide training in how to give CT a more prominent role in individual subjects as the need is perceived[1];

[1] The nature of CT varies greatly from subject to subject. For example, the type of CT needed for arguing against the construction of a nuclear power plant in geography class is much different than

- set out learning benchmarks specifically focused on both CT skills and disposition.

While this study has focused on teachers and policy in Hong Kong, it may have wider implications where the term "critical thinking" is used in relation to educational goals both casually as well as in government policy documents. The use of the term without fully unpacking its components assumes that all understand how to proceed, which this study has demonstrated is not the case. For example, engendering a disposition is unmistakably different from teaching a set of skills and the associated pedagogical needs of each should be dealt with accordingly.

Future studies may explore teachers' understanding of, and reaction to CT instruction in other locales for comparison with the present study. Similar studies using a larger sample of teachers may be able to better understand differences in beliefs among subject teachers as well as teachers with different amounts of experience. There is also a need to isolate the effective practices of teachers who already implement CT in their classes in order to shed light on the types of topics and methods that elicit the kind of thinking encompassed by CT across the curriculum.

In conclusion, given the firm support CT instruction has from educational authorities, not to mention the broad-based backing it received from the teachers in this study, it is surprising that more elucidation on how to implement this kind of instruction has not appeared. Contrary to the common assumption that CT is a self-evident quality, more fleshing out of CT's pedagogical constituents is required. With concrete definitions in place, distinct goals can be established and effective practices launched. In essence, like any other key component of pedagogy, CT cannot be assumed. It must be clearly defined, comprehensively taught and carefully assessed.

Word count: 5,236

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the type of CT needed for solving a geometric problem in mathematics class (see McPeck, 1990). Even physical education class could include facets of CT – say in football, the reasons for choosing a certain student player to serve in a particular position.

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Appendix 1

Interview questions

1. What does the term “critical thinking” mean to you?
2. Do you think HK students in general are good critical thinkers? (Likert)
3. If so, can you give an example that supports why you think they are good at critical thinking?
4. If not, can you give an example that supports why you think they are not good at critical thinking?
5. Do you encourage critical thinking as a teacher in your classroom?
6. If so, how do you encourage it?
7. If not, why do you not encourage it?
8. Do you think critical thinking should play a stronger role in the curriculum?
9. In what way do you think critical thinking could be given a higher priority in the curriculum a) for your subject; b) in general?
10. What impediments are there to teaching CT?
11. Do exams include CT questions?

Table 1

Subject Taught (n=72[i])

Subject	No. of participants
Science and Mathematics	47
Humanities (Geography History Art Music)	12
Business	7
IT	5
Physical Education	5
Other	11

i Numbers do not add up to 72 because some teachers taught more than one subject.

Table 2

Participant interviewee profile

Participant	Years teaching	Subject taught
Alfred	10	Chemistry
Betty	9	Biology
Charles	22	Liberal Studies
Daniel	10	Mathematics
Ellen	10	Geography

Table 3

Mean scores and standard deviations of closed-ended questionnaire items[i]

Item	Mean	SD
1. I have a clear idea of what the term "critical thinking" means.	2.43	.85
2. Teaching critical thinking skills is an important part of my job as a teacher.	2.36	.81
3. I build critical thinking explanations and exercises into most of my lessons.	2.93	.76
4. Hong Kong students in general are good at critical thinking.	3.59	.71
5. It is not necessary to increase the role of critical thinking into the curriculum.	3.93	.68
6. It is not the job of the teacher to teach critical thinking in the classroom.	3.92	.69
7. Critical thinking is especially important in the subject that I teach.	2.56	.99
8. Teachers need more training about how to teach critical thinking skills.	1.93	.72

i 1=Strongly agree; 5=Strongly disagree

Table 4

Responses to "A good critical thinker is someone who…" (n=69)

Rank	Definition	Response	Percentage[i]
1	has diverse perspectives	37	31
2	provides reasonable and logical support	26	22
3	appropriate decision-making	26	22
4	has one's own point of view	21	18
6	other dispositional aspects	8	7
7	other	2	2

i oPercentages do not add up to 100 because some respondents gave more than one definition.

Reviewers' comments:

Reviewer #1: MS: TATE-D-09-00357
This survey study of a convenience sample 72 high school teachers in Hong Kong sought to illuminate attitudes toward critical thinking as an educational outcome at the secondary level. There are a few interesting findings stemming from this paper but there are several substantial issues with this manuscript that make it necessary to decline acceptance. Problems stem from the overall organization and thesis of the paper, including the literature that was reviewed, as well as from the methodological decisions used for sample selection and the reporting of results.

Literature Review and Thesis Statement

First, the literature review presents various distinguishable, yet highly compatible, operational definitions for critical thinking (CT) that one finds in this scholarly domain. The author(s) literature review does little more than present

the work of selected prominent critical thinking theorists and scholars. This simple review contributes nothing original to the literature in this thematic area and is incomplete. Notably missing from this review were two published works that offer consensus definitions (Facione 1990; Jones, Corrallo, Facione, & Ratcliff, 1994). Facione's work in 1990 was commissioned by the American Philosophical Association and represents a consensus definition of CT derived from an international panel of expert scholars and theoreticians. Jones and colleagues pursued a similar endeavor with employers. Also missing is a reflection of how critical thinking is being represented in the research coming out of Hong Kong. It is suggested that the authors
consult the work of Agnes Tiwari and her colleagues who has been researching CT among health professionals in Hong Kong [e.g., Facione, P.A., Facione N.C., Tiwari, A, & Yuen, F. (2009) Critical thinking disposition assessment in China The Journal of Peking University, 46(1), 55-62].

Methodology Problems

The thesis being developed in this paper is that the teachers of Hong Kong (as represented by this study sample) know that critical thinking is important and should be in the school curriculum, the teachers understand CT in a sophisticated but narrow way, and therefore critical thinking should be more precisely defined in the educational (i.e., governmental) documents.

The author(s) did find from their closed-ended survey results that teachers in this sample tended to agree that critical thinking was an important element of the curriculum and desired additional training in the area of teaching critical thinking. These were interesting and solid findings. This could have served as the foundation for a discussion of the current state of teacher training and ongoing professional development in Hong Kong and determining the degree to which programs develop teacher's understanding of critical thinking as an educational outcome. However this was not the primary direction chosen by the authors.

It was the open ended question on the survey and the five interviews that posed the most challenge to the author(s). The author(s) appear to have gotten lost in their efforts to make sense of the various ways their participants responded to the open ended question regarding the characteristics of a good critical thinker. Perhaps the author(s) should have considered adopting one of

the richer definitions from the literature and used that as the basis for their classifications. Since the author(s) themselves never offered an operational definition of CT for their paper it is difficult to determine how the author(s) conclude the responses of the participants to be "sophisticated" or "narrow" or any of the other descriptors that are offered. Against what benchmark, other than the author(s)' own understanding of CT, are these evaluations being made?

What follows below is a list of additional concerns that need to be addressed before this paper can be reconsidered for publication.

* Differences were found based on years of experience, yet only subjects with 9 or 10 plus years of experience were selected for interview.
* No statistical tests are reported to support the claims being made about group differences in the Likert-style questions.
* Bar charts of responses for the eight Likert-style questions would have been more informative that means and standard deviations (though both would have been best).
* Requesting a description of the "ideal critical thinker" is not the same as requesting a "definition of critical thinking"
* No sample sizes were provided for number of older teachers versus younger, or for the number of teachers of older students versus number of teachers of younger students.
* No discussion of the use a recognized qualitative data analysis technique for open-ended questions
* No explanation f how the five individuals were selected for interviews.
* No acknowledgment of the disciplinary skew of the sample of 72 teachers for the survey and no attempt to fix the skew for the interviews.
* The attempt to make comparisons across disciplines is fatally flawed by lack of sample size in most categories - conclusions on p.8 are unwarranted.
* Attempts to classify the responses in terms of various themes mentioned in the literature review appears without any interpretation or conclusions (p.8)
* No discussion of how the five interviewees responded to the Likert-style questions (this would have assisted in the understanding of their responses).
* The interviewees were really poor examples of the supposedly sophisticated understanding that these teachers were supposed to have had

about critical thinking - therefore it is unclear what the purpose of the five interview examples was supposed to be doing to further understanding in this domain. Why did the five interviewees not force the author(s)' to call into question the conclusions they were making about these teachers' understanding or the validity of their self-reported level of confidence in their understanding?

One cannot help but reflect on the numerous terms used in education (e.g., intelligence, motivation, cultures, character education, service learning) that have complex and varying operational definitions, and wonder why the author(s) chose to argue that the lack of definition in the educational field is a primary reason these teachers have a weak understanding of CT. The hypothesis that a clear definition of CT in the educational policy documents - and the top-down policy mandates for curricular change that would supposed ensue - will clear up teachers' misunderstandings of this construct is an interesting assertion. One could examine the likeliness of this claim by replicating this current study with one of the educational terms that the author(s)' state are defined in the educational documents ("learning for assessment", "whole person development" p. 13). Do teachers give consistent and comprehensive definitions of these terms? Even if the results were overwhelmingly
consistent, broad and sophisticated, one could not conclusively determine that it was the inclusion of a definition in the educational documents that contributed to this understanding. It would be absolutely necessary to examine the curriculum and pedagogies in the teacher preparation programs and professional development courses to see the extent to which critical thinking based curriculum and pedagogies are introduced, practiced and mastered.

The attention that is paid to the concept of critical thinking in training and professional development programs should have been a central focus of the author(s)' commentary, not buried as a recommendation in the conclusion. A significant contribution to the field could have been made if the author(s) offered recommendations regarding the position of critical thinking in teacher training.

Reviewer #2: Research on teacher's beliefs on critical thinking in non-Western country is timely. Conceptualization of critical thinking and its implantation in curriculums and classrooms are non separable matters. Thus, the research question does warrant attention. Yet the paper needs a much stronger and updated literature review. The method of the research is rather straight forward. Qualitative analysis on the open-ended response is incomprehensive and is merely descriptive - a couple themes underlying participants' responses are teased out but not thoroughly examined and analyzed. Merely pointing out the need to examine critical thinking and that teachers lack a consistent and coherent understanding of critical thinking is not enough. Overall, the study makes very limited contribution to the field.

Page 1. "While these definitions continue to be discussed and debated..." It's not clear what "these definitions" refer to.

Still on Page 1. "Typically, schools and curriculums, especially in East Asia, are blamed for focusing excessively on memorizing for exams or stuffing knowledge into students without developing the cognitive abilities to critically evaluate arguments. A recent editorial in the Japan Times (Editorial Jan. 25, 2009, 5) captures this sentiment..." Please cite relevant works to support these statements. In particular, please note the difference between students not forming a habit to evaluate arguments critically VS students not capable (lacking abilities) to do so, i.e. existing conceptualizations are inadequately discussed; relevant research on how teachers define critical thinking is not cited at all.

Page 3. "Despite this seeming agreement, doubts about defining CT remain." It's not clear what the "agreement" is. It would be good to, in a few sentences, summarize and list out the core components/skills of critical thinking commonly suggested by different scholars.

Page 4. "While there is some disagreement on how exactly to define CT, i.e., whether or not it is a set of skills or a disposition, and whether it is

subject-specific or not..." In fact, it is commonly suggested that there are two components of critical thinking - skill and disposition (See work of Halpern, Norris, Taube, Stanovich etc.).

Method. It is ambiguous whether the authors see the questions of Table 3 as a scale. A clearer description (what does this scale aim to measure?) and the development of the scale (factor? any pilot data?) should be reported.

Page 8. The term "questioning disposition" is misleading, do the authors mean a disposition to question?

"Likewise, the self-monitoring of one's thinking, i.e., metacognition, is a disposition rather than a set of skills." This claim is not well supported. On the contrary, metacognition has mostly been regarded as self-regulatory strategy as opposed to a disposition.

Page 12. "Lu (2008)" Please check this citation against the reference list.

Discussion

It's not clear how the current findings add to existing literature on critical thinking or policies regarding how critical thinking teaching should be implemented in classrooms (It seems the main conclusion of the paper is merely that teachers' understanding of critical thinking differs). A number of scholars discussed the tided nature of the two components (skill and disposition) of critical thinking. However the inter-dependent relationships between the two components are not well addressed in the paper. The study also failed to address what contributes to the differences in understanding of critical thinking, and how such differences reflect the conceptualization / myths (?) of what constitutes critical thinking?

Reviewer #3: This is an interesting topic of study in which the author considers the lack of clarity surrounding the use of the term 'Critical Thinking' (CT) in educational contexts. The introductory sections are sufficiently broad to set a

useful context although it is questionable whether the references to CT in Higher Education are really necessary, given that the study focuses on the views of secondary school teachers. In particular the mention of Fox (1994) in the final paragraph of section 2 does not seem to fit with what precedes it. Instead it would be more important to develop the point made by Atkinson (1997) that CT is often taken 'on faith' in Western societies (not least to question the notion of 'Western' in this quotation!).

A more fundamental problem emerges throughout the article. The author sets out in sections 1 and 2 the case that there is no agreed definition or understanding of CT. If this is the case, then it makes it impossible to argue that any of the teachers have 'misconceptions' or 'confusions' since that assumes that there is an agreed definition somewhere, from which they have strayed and to which the author has subscribed. It can only be said that the teachers have differing views rather than 'right 'or 'wrong' views of the concept. The results of the study also seem to prove hypothesis 2 (that educators have only vague notions of what the term means etc) rather than disprove it, as the author contends. Further, the claim made in the abstract that teachers have a 'sophisticated' understanding of the term is hard to justify (it seems far from sophisticated in most cases!), as is the judgement that their understanding is 'narrow', again given that there is no agreed definition of what CT actually is. The core outcome of the study is however highlighted towards the end where the author correctly notes that there is a need for standardisation and examples to help teachers move forward, but it should also be noted by the author that this consensus would be simply an artificial agreement on what CT is within one education system, where no absolute definition can a priori be assumed. Standardisation would make teachers' jobs easier, certainly if they are being asked to assess CT, but it must be recognised as a construct rather than something which exists independently of its measurement criteria or definition. More fundamental questions regarding how we can ever measure thinking are raised by this study.

Other more minor issues are as follows: the final paragraph on page 6 requires further detail (percentages, exact age groupings, measures of statistical significance) ; Figure 1 needs to include percentages beside each segment rather than being colour coded; the contention that metacognition is a disposition rather than a skill is contestable (page 8) and this again underlines the difficulty in defining CT at all; the interviews should be presented by theme explored and with quotations, rather than in succession and descriptively;

there are several examples of typographical errors.
Nonetheless a very interesting topic of study with clear implications for policy makers and curriculum developers.