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Critical Thinking

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What is critical thinking?

Generally speaking, critical thinking refers to high-level mental activities entailed in everyday life. In fact, we perform critical thinking frequently as we must decide how we will react to what we hear, see and experience. If we react passively, we make the opinions of others our own (i.e. unquestioned acceptance of the ideas of others). If we react actively, we ask questions to reach our own conclusions and thus acquire knowledge. Indeed, human culture essentially constitutes criticism of existing phenomena that have survived and been passed on through socio-cultural evolution. In other words, human civilization, advancement and modernization are products of our abilities to judge, to identify needs, to search for and create favourable living conditions, and to discover new strategies for solving problems.

Specifically, in the realm of psychological research, the working definition of the National Council for Excellence in Critical Thinking and Instruction is "the intellectually disciplined process of actively and skilfully conceptualizing, applying, analyzing, synthesizing or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning or communication as a guide to belief and action" (Binker 1992, p.84). As a topic alternately coming in and out of the focus of the mainstream psychology, 'critical thinking' has been defined variously differently by various researchers and practitioners. Of these, four deserve attention:

- Reasonable, reflective thinking that is focused on deciding what to think or do (Ennis 1987).
- The skill and propensity to engage in an activity with reflective skepticism (McPeck 1981).
- Essentially dialogical disciplined, self-directed thinking which exemplifies the perfection of thinking appropriate to a particular mode or domain of thinking (Paul 1989).
- Skilful, responsible thinking that facilitates good judgement because it relies upon criteria, is self-correcting, and is sensitive to context (Lipman 1988).

What are schemes of critical thinking?

Critical thinking consists of a set of dispositions and abilities. Whereas dispositions (or attitudes) are the more affective aspect of critical thinking, abilities (or skills) are the more cognitive aspect. Examples of critical thinking dispositions are being open-minded and considerate of other people, being impartial, suspending judgement and taking a stance when warranted, questioning one's views, and using one's critical thinking skills. Critical thinking abilities comprise clarity (elementary and advanced clarifying abilities), basis (evaluating sources of information), inference (drawing implications and conclusions) and interaction (action-oriented). Examples of critical thinking abilities are identifying assumptions, both stated and unstated, both one's own and others; clarifying, focusing and staying relevant to the topic; and judging the reliability and credibility of sources (see Ennis 1987, pp. 12-15).

TEACHING CRITICAL THINKING

Goals

Cultivating critical thinking means helping students to process information in meaningful ways and to become independent and self-regulated learners. Students construct meaning from text, solve problems, select and develop effective thinking strategies, take responsibility for their own learning, and transfer skills and concepts to new situations. Students learn how to learn. In a critical thinking classroom, the teachers encourage students to question what they hear and examine their own thinking for logical inconsistencies or fallacies. Criticism should be constructive, and made with the intention of helping someone or improving some situation.

Teacher roles

In teaching critical thinking, educators assume that critical thinking is transferable and trainable. The major issue of teaching critical thinking includes searching suitable ways and environments that can uncover the thinking potentials of individuals and can help them perform critical judgements and decisions. When teaching critical thinking, the teacher uses strategic teaching. He/she plays the role of a 'strategist'. Strategic teachers are 'mediators'. The strategist teacher mediates the student's experiences by interpreting and organizing external stimuli and by guiding the thinking of the student to appropriate learning goals, always aiming toward independent learning. Specifically, mediated

learning experiences might include helping students observe, select contents that are important, represent information, select and plan specific cognitive and meta-cognitive strategies, compare and contrast, monitor understanding, and assess the use of a strategy.

Strategic teachers are also 'models'. Modelling is defined in terms of thinking aloud to express the thoughts, feelings and attitudes of teachers as they figure something out – with all the stops and starts, puzzlements, revisions and on-line processing of thinking as it occurs in reality. Modelling by thinking aloud is particularly important in teaching students how to construct meaning (especially given the non-linear aspect characteristic of thinking), how to monitor one's own thinking, and how to answer a question through reasoning.

Problems

We elicit six common problems related to teaching critical thinking. The first problem addresses the issue of the authenticity of training tasks. Students often fail to transfer the skills acquired in school context to real-life contexts. School tasks are often 'decontextualized', and devoid of the complexity and dynamics of real-life tasks. Hence, it is suggested that classroom work should include the addressing of real-world problems, as opposed to focusing solely on artificial exercises.

Second, it is difficult to demonstrate a transfer of critical thinking skills, whether they taught in a general or specific mode. There are three camps of researchers on the issue of domain-specific versus general thinking skills. The first group of researchers adopts the subject-specificity view. They argue that domain-specific critical skills exist, but generalizable general thinking skills do not. The second group of researchers subscribes to the generalizability view. They believes that general principles of critical thinking exist, and that critical thinking should be taught separately from the standard subject area (e.g. informal logic course in philosophy). The third group of researchers shares the integrative view. They perceive critical thinking as a combination of a set of general dispositions and abilities, along with specific experience and knowledge within a particular subject-matter area. Hence, they feel, educators should teach general critical thinking principles both as separate and infused courses into the existing subject-matter instruction, where general dispositions and abilities would be applied. Indeed, the issue of generality-versus-specificity is persistent in the history of educational psychological research. Nonetheless, we espouse a synthetic 'both-and' approach advocated by the third camp, but not the dogmatic 'either-or' approach

embraced by the first and second camps, given as that the former approach is adaptive whereas the latter is inflexible. In conclusion, in sharing the stance taken by Sternberg (1987), we recommend that educators should adopt a mixed model – teaching general cognitive strategies and appying them in specific contexts.

Third, it is a challenging task to estimate students' developmental readiness. Students' abilities to understand and master critical thinking vary with age. It is not clear what developmental constraints exist for different groups of students, and in what ways teaching critical thinking can attend to these constraints. Nonetheless, given that critical thinking is a kind of propensity, infusing critical thinking should begin as early as possible in the educational and developmental process and should continue throughout an individual's school and adult life.

Fourth, it is essential to understand students' prior knowledge. It is generally agreed that an individual's familiarity with the subject matter plays an important part in the person's performance on thinking tasks in that area. Knowledge and thinking skills are interdependent. In particular, the problem of 'inert knowledge' (Scardamalia & Bereiter, 1985), which is knowledge that students possess but cannot access or apply, can be attributed to a lack of critical thinking.

Fifth, educators should have a profile of student characteristics when teaching critical thinking. Intellectual ability, gender, cultural and socio-economic background are factors that have been investigated in relation to the degree to which different groups of students exhibit facility or difficulty in mastering critical thinking. In teaching critical thinking to students of various abilities, the greatest gains were made by the low-ability students. On the other hand, given that the empirical data have been inconsistent, the question of whether critical thinking dispositions are gender-typed traits (e.g. males are supposed to be better in logical reasoning and females in making judgements) is controversial. In addition, cultural and socio-economic factors, possibly mediated by prior knowledge, are supposed to have an impact on the acquisition critical thinking abilities. Nevertheless, empirical findings about the effect of various student characteristics on the acquisition of critical thinking skills are limited.

Sixth, there is a general agreement that teachers need to be trained in critical thinking dispositions and skills in order to be able to teach thinking effectively (Lipman 1988; Nickerson 1987). Specifically, it is very challenging for teachers to assume multiple roles, including that

of decision-maker, thinker, coach, mediator, model and learner. Indeed, under the influence of Schön's (1987) notion of 'reflective practitioner,' the traditional model of teacher education has been revised. In particular, the conventional clear-out separation of the professional school, where student-teachers are taught theoretical knowledge, and the practical setting where they are supposed to implement the abstract theories they have learnt, is refuted. Instead, close cooperation and efficient communication among between university lecturers, supervising teachers at school and the student -teachers themselves is advocated. Clearly, this reform necessitates the support of educational institutions involved.

CLASSROOM TECHNIQUES

A critical thinking classroom encourages the acceptance of divergent perspectives and free discussion. It emphasizes giving reasons for opinions rather than only giving correct answers. Group work, cooperation and teacher questioning are important components of teaching critical thinking. We cite five methods that can help promote critical thinking in the classroom:

- the classroom assessment method;
- the problem method;
- the conference-negotiation method;
- the case study and inquiry method; and
- the technology-as-support method (see Tan & Zhang 1998).

Classroom assessment method

Students participate actively in assessing learning instructions and outcomes. They write brief and anonymous responses to simple questions and prompts, and teachers collect their answers and respond to the most commonly raised questions. It is believed that by taking part in assessing classroom learning with the use of the writing technique, students can learn to appreciate different viewpoints and engage themselves in reflecting their own thoughts as well as those of their peers. Besides, they are much more motivated to participate in classroom activities because they are empowered to express opinions and are ascribed a clear role in the setting.

Problem method

This method comprises three stages — assignment of tasks or problems, use of course or other materials to solve problems, and discussion of solutions in class. Students learn to set criteria to select valid resources. They learn how to generate an argument and collect supporting evidence for their argument. They also learn how to generate more than one possible solution to a situation.

Conference-negotiation method

In this method, small groups of students meet with the teacher to freely discuss, challenge and defend their interpretations of the learning material. Teachers assign students challenging readings serve as resources and facilitators when students raise issues and address ask questions. Students adopt the cooperative learning strategy. Heterogeneous teams of students work on a common problem that demands highly important, complex and reasonable learning goals as well as shared efforts. Students also learn ways to manage conflicts, treat all parties in conflict with respect and at the same time identify common interests.

Case study and inquiry method

It This method allows students to analyze the case by identifying key characters, determining central issues, as well as assessing internal and external climates and forces. The teacher prepares an outline of questions to facilitate the discussion. He/she then leads students through the thought process of analysis and application. The inquiry technique allows students to ask and answer thoughtful questions. It generates a meta-cognitive self-testing experience.

Technology-as-support method

When students attend to technology as a support technique, they learn how to use technology as an information source, a generative tool (e.g. to release complex processing) and a communicative support system (e.g. collaborative activity). They use the computer to create homespun hypertext and link information. Riddles, interactive computer games and situated simulation are employed to encourage cognitive flexibility.

IMPLICATIONS FOR EDUCATORS

Teachers are in a unique position to learn about the long-term effects of instruction, in contrast to short-term effects of experimental training.

Thinking skills require continual attention and monitoring. To conduct an evaluation, it is necessary to develop a set of evaluative criteria which can specify the discernible behaviours and dispositions (or attitudes) that accompany effective thinking. Teachers can develop these criteria ideally with students. The primary source of the students' criteria for effective thinking is their own experience. Therefore, a very fruitful activity can be the generation of evaluative criteria that will allow each student to compare his/her own conception of effective thinking with the conceptions of other students and the teacher. Once the tentative criteria are established, each member of the class should test them against real-world life situations, for instance, do people whom they consider to be good thinkers display those skills?

It is important to use at least two types of lens to evaluate thinking skills and disposition. A wide-angle lens will allow the teacher to look at the entire class. This might be particularly useful on occasions when the whole class is engaged in a discussion of an issue on which opinions differ. However, to avoid getting an impressionistic evaluation, the second tele-photo lens should be used with which the teacher can look at the behaviour of individual students.

In documenting samples of the group's behaviour over time, videotapes and audio tapes of classroom discussions are useful. In addition, it is also useful to keep anecdotal notes made by teachers and students while they are discussing or silently reflecting on specific issues. At the individual level, the teacher can use students' portfolios of writing and artworks (e.g. journal writing in the form of a diary), or the students can be required to fill in short questionnaires on a regular basis. The more varied the tasks and situations used to apply the criteria of good thinking skills and strategies, the more likely the students will internalize and transfer their use. Teachers can videotape discussions at regular intervals and analyze them together with students. For instance, students can be asked open-ended questions about what they like or dislike about the discussions. Moreover, students can fill in a checklist that evaluates both the discussions and their participation with particular reference to whether students feel that they have backed up their opinions, striven for understanding, listening carefully, spoken up freely, and been courteous.

There are many ways of evaluating critical thinking. As a sustained activity, writing has the potential to develop many of the dispositions associated with the development of thinking skills, for instance, judging credibility and relevance. Certainly it can foster persistence and precision in both thought and the use of language. There are many thinking skills that are amenable to multiple-choice testing (e.g.

deductive reasoning). Multiple-choice tests, though time consuming to construct, are very efficient to administer and score, thus necessitating a relatively short processing time. In contrast, essay tests are more time-consuming and expensive to score. Besides, they create logistical problems such as difficulty in establishing inter-rater reliability and subjectivity in scoring.

It is desirable that teachers use other performance tasks to evaluate thinking. Teachers employ rich, naturalistic, sustained and somewhat novel tasks, having the evaluation activity serve as a motivator. Only when the evaluation tools are impoverished substitutes for the desired behaviours should the value of requiring students to prepare for such a test be questioned. For instance, in science class, students might be asked to design an experiment that can be evaluated in terms of the reliability of the findings. In art, they could be asked to design a building or an object according to certain specifications.

Teachers can also use unobtrusive measures that make use of already existing data. By unobtrusive, we mean that these measures should not interfere with students' performance and do not require additional instructional time. They involve some creative ways of using physical traces, archival data and observations, many of which can be adapted to the classroom. Moreover, it is intriguing to use goal-free evaluation in which the evaluator does not have access to the objectives of the programme and can thus be open to seeing changes of all types — even those not explicitly addressed by the programme. For instance, if an evaluator is informed that the goal of an empirical study is to examine students' conceptual changes in a collaborative learning activity he/she may only focus on certain cognitive variables, but ignore the affective elements of the group interaction, which would play a significant role in determining the effect of collaboration. In contrast, an evaluator who is not informed about this goal may attend to both the cognitive and affective elements of the interaction.

Further, teachers and students should look for examples of introspection (i.e. deliberation about current state of mind and actions), retrospection (i.e. deliberation about past experiences and actions), and 'futurespection' (i.e. deliberation about future actions). The evaluation should document examples of students' knowledge representations and meta-cognitive strategies, which can be tapped by the thinking-aloud method. In sum, a combination of quantitative and qualitative evaluations instead of monolithic ones should be adopted to assess thinking skills. Specifically, dispositions that accompany good thinking,

such as open-mindedness, are relatively difficult to evaluate. As engaging in critical thinking is a voluntary propensity, participant observations in a typical situation (i.e. a real-life setting) and semi-structured observations in an optimal situation (i.e. an experimental setting) are required. Besides, standardized or experimenter-developed attitude tests, questionnaires, and interviews can be employed to assess dispositions. Nonetheless, it is of utmost importance to define a well-articulated research goal which determines the selection of appropriate assessment tools.

Conclusion

This article provides a perspective of critical thinking in education. As a unique human faculty, critical thinking contributes substantially to our cultural development. Despite its ubiquitous role in our everyday life, our understanding of critical thinking is inadequate, especially in the area of training this skill. In the literature, various definitions of critical thinking can be located. The lack of a unitary definition makes academic discourse about on this concept, and the design of an effective teaching programme difficult. Specifically, critical thinking is understood as a composite construct comprising a host of sub-skills (e.g. Ennis 1987), and it is impossible to include all of them in a teaching programme, given our limited resources in terms of time and manpower. Hence, it is essential to set a clear goal for teaching critical thinking and to specify the role of teachers in this challenging task. Indeed, a number of theoretical issues (e.g. generalizability of thinking skill) are still to be resolved.

From a practical point of view, various classroom techniques (e.g. the problem method) for teaching critical thinking are enumerated. The deployment of a specific technique hinges crucially on the goal of the training and the characteristics of the target group. The common thread linking these methods is that students should be encouraged to learn actively and engage in collaborative discourse. Furthermore, of particular concern is the choice of assessment method which can document the effectiveness of individual programs. It is advisable to employ an eclectic approach which can reveal the multifaceted nature of critical thinking. Clearly, the points discussed in this article are not exhaustive, given critical thinking is an encompassing concept. Assuming that thinking critically is essential for acquiring knowledge, expertise and skills in every domain, we recommend educators to invest much more research effort in establishing robust theoretical and

methodological approaches to critical thinking. Hence, effective programs for training this higher-order cognitive skill can be devised. Last but not the least, all of us, irrespective which role we assume, be it a learner or a teacher, should strive to develop critical thinking which is our life-long challenge.

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