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An experience of a three-year study on the development of critical thinking skills in flipped secondary classrooms with pedagogical and technological support



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ABSTRACT

The aim of this study was attempting to investigate the outcome of critical thinking achievement of learners when its development is infused into subject teaching with pedagogical and technological support. A total of 124 junior secondary students participated in the three-year trial teaching in Integrated Humanities subject. Flipped classroom strategy was implemented to engage learners in online pre-lesson learning preparation, in-class group discussion inside digital classroom and after-class extended learning using social learning platform. The critical thinking tests found that the students had good performance in the tasks on hypothesis identification, induction and deduction; and some achievements in the tasks on explanation and evaluation. It was found that students needed more time to develop capacities of deduction, explanation and evaluation. The semi-structured interviews found that the teachers and students valued the pedagogical way of providing guidance for students' group sharing for fostering critical thinking skills development. Three implications are discussed to shed light on the infusion of critical thinking skills development into the process of domain knowledge learning, the deployment of appropriate pedagogy to mobilize learners to engage in learning process, and the use of appropriate technology to facilitate learning process inside and outside of classroom.

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1. Introduction

The goal of school education in the twenty-first century is to prepare students for a deep understanding of domain knowledge, and at the same time a competent demonstration of the twenty-first century skills, such as critical thinking skills, to cope with the challenges in the ever-changing society (Chan, 2010; Kang, Heo, Jo, Shin, & Seo, 2010; Kong, 2014). This article shares experience of a three-year study which aimed to foster junior secondary students in Hong Kong to develop critical thinking skills when they learn domain knowledge in flipped classrooms. The domain curriculum targeted in this study was Integrated Humanities, of which the domain-specific learning tasks often require students to apply the twenty-first century skills.

2. Background of the study

There is an emerging trend toward the pedagogical integration of digital resources and communication tools into curriculum delivery in school education in the twenty-first century. With the access to multiple perspectives of information from

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massive digital sources, students should be able to judge the suitability and reliability of the retrieved information and to decide the ways to process the selected information (Kong, 2014; Padilla, 2010; Trilling & Fadel, 2009). It is one of the unifying goals in school education in the twenty-first century to empower students with critical thinking skills for effective learning (Ku, Ho, Hau, & Lai, 2014; Kwan & Wong, 2014).

2.1. Critical thinking skills

Critical thinking skills are the capabilities to think reflectively and judge skillfully, so as to decide what information is reliable and what actions should be taken during reasoning and problem-solving (Fung & Howe, 2014; Kwan & Wong, 2014; Kong, 2014). The study reported in this article, built on Kong (2014), to adopt the views of Hughes, Lavery, and Doran (2010) and Yeh (2009) that the capacities of critical thinking skills can be categorized into five major dimensions: (i) hypothesis identification – the capacity to recognize the underlying ideas or unstated assumptions of the problem to be addressed; (ii) induction – the capacity to reason the connection between a set of specific examples so as to derive a reliable generalization for the problem; (iii) deduction – the capacity to reason the connection between a set of general statements so as to reach a logically certain conclusion for the problem; (iv) explanation – the capacity to argue ideas through clarifying the causes, contexts, and consequences of the facts among different aspects of the problem; and (v) evaluation – the capacity to use a set of relevant criteria to determine the quality of the arguments and outcomes come up for the problem.

Students are advocated to develop critical thinking skills through the formulation of in-depth understanding of concepts and principles when learning complex subject matters (Deng, 2001, 2011). Empirical studies have been conducted in line with this advocacy. However, there are limited studies focusing on the secondary education sector, with examples including Cheong and Cheung (2008), Fung and Howe (2014), Huang, Hung, and Cheng (2012), Kwan and Wong (2014), McMahon (2009), Yang and Chung (2009) and Yang and Wu (2012). As reported in Kong (2014), these empirical studies suggest a number of critical thinking skill teaching strategies for teachers. For example, teachers should give students sufficient time to think about the problem-solving questions (Cheong & Cheung, 2008; Kwan & Wong, 2014; Yang & Wu, 2012). Teachers should also give sufficient time for students to discuss the problem-solving questions with group members (Cheong & Cheung, 2008; Fung & Howe, 2014; Huang et al., 2012; Kwan & Wong, 2014; McMahon, 2009; Yang & Chung, 2009). Moreover, teachers should guide different groups of students to make sharing with the whole class (Fung & Howe, 2014; Huang et al., 2012; McMahon, 2009; Yang & Chung, 2009). In addition, teachers should explain the answers for the problem-solving questions and then guide students to make reflection (Fung & Howe, 2014; Yang & Chung, 2009; Yang & Wu, 2012). The research by Cheong and Cheung (2008), Huang et al. (2012), Yang and Chung (2009) and Yang and Wu (2012) has empirically found that the above pedagogical ways can promote secondary students to be more aware that they need to develop critical thinking skills through a suitable learning process in class.

The researchers have also provided evidence on the strong and weak areas among secondary students in critical thinking skills development. According to Cheong and Cheung (2008), secondary students are weak in the dimensions of hypothesis identification and explanation. Yang and Chung (2009) have identified that the strong and weak areas among secondary students in critical thinking skills development are hypothesis identification and explanation, respectively. Huang et al. (2012) and Yang and Wu (2012) have the similar findings that secondary students perform well in tasks on hypothesis identification and deduction, but less satisfactorily in tasks on explanation and evaluation. These findings from the past research suggest that secondary students in general are relatively strong at identifying hypothesis and deductive thinking and relatively weak in explaining and evaluating conclusions.

2.2. Flipped classroom strategy

The flipped classroom strategy is considered potential to promote the comprehensive development of critical thinking skills among students under a learner-centered paradigm, as the learning tasks in flipped classrooms depend heavily on learner-driven preparation outside of formal class time. In flipped classrooms, learning tasks typically done as homework are undertaken in class with guidance from teachers, especially those collaborative learning tasks such as whole-class brainstorming, group-based hands-on assignments and peer reviews, feedback exchange and remedial help, etc. (Bergmann & Sams, 2012; Davies, Dean, & Ball, 2013; Kong, 2014). Teachers in flipped classrooms are enabled to free up class time to make meaningful contact with students for observing, guiding, commenting, and helping. Students in this regard can take more control of the pace, progress and responsibility in their own learning process according to individual needs (Flumerfelt & Green, 2013; Fulton, 2012).

In the digital age, the idea of flipped classrooms has gained prominence due to advancement in digital technology which enables students to ubiquitously access resources and connection with peers (Davies et al., 2013; Flumerfelt & Green, 2013). For flipped classrooms in the digital age—the digital classrooms, students use personal computing devices, especially mobile devices that are wirelessly interconnected, on their own or with a small group of peers for learning proposes (Chan, 2010; Wong & Looi, 2011). Such flipped classroom strategy moves passive learning tasks of knowledge delivery beyond formal class time; and uses classroom learning activities to prompt knowledge construction through the access to additional learning information from sources other than textbooks, and the extensive interactions with peers and teachers within formal class time (Bergmann & Sams, 2012; Missildine, Fountain, Summers, & Gosselin, 2013).

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