

Promoting Tertiary Level Students' Critical Thinking through the Use of Socratic Questioning on the Blog

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ABSTRACT

Over the past decade, much has been done to improve students' critical thinking in education. This study investigates if applying Socratic questioning on the blog can promote students' critical thinking. It applies a generic model, which associates with three fundamental components. Participants were an intact class of tertiary level students enrolled in an obligatory course. Students practiced Socratic questioning during face-to-face and online sessions. To serve this goal, they were asked to be attentive and share their ideas or questions with other students on the blog. Students' critical thinking ability was assessed using the Cornell Critical Thinking Test before and after they were trained in Socratic questioning. The results showed that the Socratic questioning training had a significant positive change on students' critical thinking ability. If students master the art of Socratic questioning, they can bring it into various courses they take. They can also use it in different discussions they engage in, and apply it not only in raising and asking questions about what is taught, but also in making questions concerning the issues in their daily life in a meaningful way.

Keywords: Blog, critical thinking, Cornell Critical Thinking Test, Socratic questioning

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INTRODUCTION

Over the past decades, much has been done to improve students' critical thinking (CT) by the Ministry of Education in Malaysia. It is believed that "all which the school can or need do for pupils, as far as their minds are concerned, is to develop their

ability to think” (Sharifah Nor Puteh *et al.*, 2010, p. 87). In the same line, Mahathir Mohamad, the fourth Prime Minister of Malaysia, said that Malaysian education should focus more on developing critical and creative thinking minds rather than acquiring knowledge that is fleeting in nature. In fact, to optimize students’ CT, they need training in particular skills “to make predictions, propose solutions, create, judge ideas, express opinions, make choices and decisions, and solve everyday life-like problems” (Maria, 2010, p. 111).

In 1979, the Cabinet reviewed different aspects of Malaysian educational system. The report emphasized on the Ministry of Education’s responsibility to review the education curricula for both primary and second schools to develop students’ CT. In this perspective, the Ministry of Education designed two new curriculums called “the Integrated Primary School Curriculum for School Curriculum (KBSR)” and “the Integrated Curriculum for Secondary Schools (ICSS)” in 1982 and 1988, respectively (Curriculum Development Center, 1989, p. 1).

Later, in 1989, the need for developing college students’ CT was discussed in the ICSS (Rosanani & Moomala, 2007), while official attempts started in 1994 by the Ministry of Education to introduce CT into the educational curriculum in colleges (Rajendran, 2010). After 1998, local universities such as Universiti Putra Malaysia, University Malaya, Universiti Utara Malaysia, and more recently, Universiti Pendidikan Sultan Idris have begun offering

courses on CT at the undergraduate level. They conducted different courses and workshops on training CT skills (Rajendran, 2008); however, the question on how CT should be applied has yet to be investigated (Dhanapal, 2008).

Research shows that using critical questions plays an important role in stimulating students’ cognitive processes such as “self-reflection, revision, social negotiation, and conceptual change of student misconceptions” (Yang *et al.*, 2005, p. 164). To this end, Paul and Elder (2007) refer to Socratic questioning (SQ) as one of the most effective techniques that instructors can apply to guide students in asking thoughtful questions, thus promoting their CT. Although some research studies have investigated the effect of SQ on students’ CT (e.g., Yang *et al.*, 2005; Chin, 2006), there is a lack of research on using SQ on blogs. Therefore, this study aims to investigate if applying SQ on the blog can promote students’ CT. Following this introduction, the paper presents a literature review which includes the role of CT, SQ, and blogs in education. It discusses the framework of study that underlines the research. This is followed by an elaboration on the methodology of the study. It then presents the results and related implications. Finally, limitations of the study and suggestions for future research, as well as conclusions, are presented.

Definitions of CT

A number of definitions of CT emerge from the literature. Cheong and Cheung

(2008) claim that individuals who think critically can ask questions, collect relevant information, search through the information in an efficient and creative way, reason logically from gathered information, and arrive at a valid and truthful conclusion that enables her/him to live and act successfully in the world. In fact, CT refers to examining a statement by considering its assumptions, supportive evidence accuracy, and logical reasoning to come to a reliable conclusion (Paul, 2003). In the context of this study, we focused on the pedagogical aspect of CT, in which it is applied to analyze information, identify reasons, and judge the quality of an argument to draw logical conclusions by students (Woo & Wang, 2009).

SQ and CT

King (1995) believes that SQ is the heart of CT because "the level of thinking that occurs is influenced by the level of questions we ask" (p. 13). Through SQ, students can really think and learn (Paul & Elder, 2007), as their levels of thinking are reflected by the type and level of questions they ask or answer (Teo, 2009). This idea implies that CT and SQ have a unique common end which may lead to demonstration of self-disciplined thinking. It means that the CT perspective offers a considerable, accurate, and deep understanding of SQ. On the one hand, CT offers the conceptual tools to show how an individual mind functions in terms of meaning and truth. On the other hand, SQ applies those conceptual tools in framing vital questions to pursue the functions of the mind (Teo, 2009). This claim enhances

the understanding that central to CT are thoughtful questions that invoke individuals' higher level of thinking (Yang *et al.*, 2005). Therefore, instigating critical questions from students tends to be more important in stimulating their minds than suggesting provocative questions to them (Seiferth, 1997; Yang *et al.*, 2005; Cheong & Cheung, 2008; Teo, 2009).

Research has supported that using SQ can foster students' CT (e.g., Yang *et al.*, 2005; Teo, 2009;), but to practice SQ in face-to-face classrooms, instructors often face difficulties, which include large class size and limited contact time with students (Mandernach, 2006). To overcome these barriers, advanced technology has produced a wide range of online tools such as blogs to help instructors promote students' CT (Tan & Shahsavari, 2011).

Blogs

Research shows that blogs have been used in various ways in a learning environment. For example, they allow students to interact with each other (Tu *et al.*, 2007), to share information and to collaborate with one another anywhere and anytime (Johnson, 2004). Blogs not only induce students to think critically (Wang & Woo, 2010) but also provide a good chance for instructors to apply different strategies and techniques in their instruction. From this perspective, blogging as an act of bloggers' communication on blogs has been used to facilitate students' collaboration and expand their learning beyond the classroom environment (Blackstone *et al.*, 2007).

Wong *et al.* (2009) argue that blogging can assist students in enhancing their written communication skills, self-reflection, sharing and transferring knowledge and experience, encouraging personal reflections, and evaluating their performance. All the above advantages suggest that blogs have many positive features that can be applied as educational tools to facilitate students' learning particularly in promoting their CT (e.g., Oravec, 2002; Davi *et al.*, 2007; Woo & Wang, 2009; Shahsavari & Tan, 2010).

In spite of the benefits of using blogs in education, some difficulties which may hinder the development of CT among students are found in using blogs in classrooms. For instance, due to the asynchronous feature of blogs, *sometimes gap* exists between blogging activities such as posting and receiving comments. Another concern is that other Web pages may distract students' attention away from their blogging (Online Education Blog, 2011). Considering all these factors, this study aims to investigate if applying SQ on the blog can promote students' CT.

FRAMEWORK OF THE STUDY

This study is based on constructivist and connectivist learning theories, and the generic PST (pedagogy, social interaction, and technology) model developed by Wang (2008). In the following sections, the learning theories and the description of the PST model are elaborated.

Learning Theories

Constructivists believe that learners gain knowledge by directing their own learning (Mergel, 1998). In this theory, learners are not empty vessels to be filled with knowledge. They are active learners who are trying to create meaning. One of the most considerable instructional principles driven from this theory is designing a learning environment to support and challenge learners' thinking (Savery & Duffy, 1996). The foregoing principles generally support the design of this study.

However, like behaviorism and cognitivism, constructivism learning theory only addresses learning that occurs inside individuals and it does not address learning that happens outside of individuals like storing and manipulating learning by technology such as blogs. As a result, in this study, sticking to constructivist learning theory alone does not seem sufficient to distinguish the effects of SQ on the blog. There is a need for another theory such as connectivism learning theory to give insight into learning skills and tasks required for learners in order to excel in a digital age (Siemens, 2012).

According to Siemens (2012), connectivists believe that information and knowledge exist not only in human brains, but also in electronic networks that are persistently moving and being organized. As a result, networking is essential for learners to expand, grow, react, and adapt their personal learning through technology, as well as their individual learning.

The PST Model

As noted earlier, in addition to the constructivist and connectivist learning theories, this study was guided by the PST model developed by Wang (2008). This model is based on the theory of affordance in education, which was first introduced by James Gibson (1977). According to Gibson, affordance shows the interaction between the learner and the technology (Gibson, 1977), which provides an opportunity for action based on a perception of all ways that a technology can be used (Norman, 1988). In fact, affordance makes a connection between knowing technology and using technology (Wallace, 2004).

The PST model is designed to determine if learning occurs effectively in the design of a learning environment (Bower, 2008). According to Wang (2009) content, pedagogy, social interaction, and technology are four elements associated with the model. Following the PST model, all elements except the content are explicitly presented in the framework (see Fig.1).

Content refers to any “subject topics, concepts, theories, ideas, or organizational frameworks” used to support students’ learning (Wang, 2009, p. 5). The pedagogical affordances show how a particular learning activity could probably be enacted in a given educational context (Wang, 2009; Wang & Woo, 2008). The social affordances refer to learners’ interactions and perception of a learning environment in applying any ICT tools (Kreijns *et al.*, 2002). The technological affordances show an ICT tool’s usability. It indicates if any technological tool allows for the accomplishment of a set of tasks efficiently and effectively to satisfy users in a learning environment. Within this model, pedagogical and social affordances are the main factors that influence learning effectively, while technological affordances show the extent of pedagogical and social affordances in using any ICT tool (Wang, 2009). Therefore, without technological affordances, any ICT tools would be at risk of being useless (Wang & Woo, 2008).

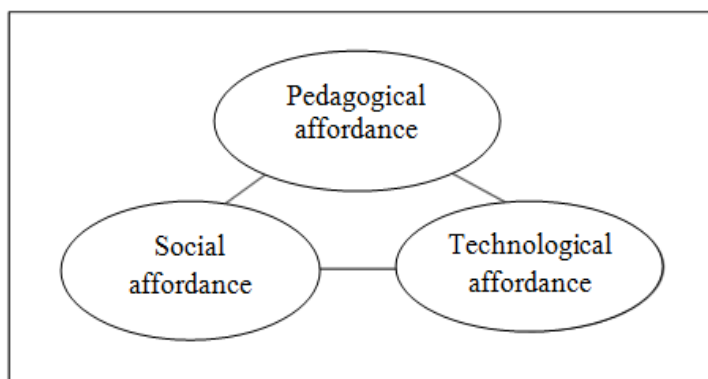


Fig.1: The PST model (extracted from Wang, 2009, p. 16)

Conceptual Framework of the Study

Fig.2 presents the conceptual framework applied in the study. Content refers to constructivist and connectivist learning theories, and Socratic discussions that support students’ learning. Pedagogy affordance shows how the SQ training is applied in the study. In this perspective, students are expected to apply SQ in their blog comments. Social affordance reveals the reciprocal relationship among students and students and an instructor. Technology affordance reveals students’ blog activities based on their own interpretations of the blog. In this perspective, the blog would be considered as a useful Web 2.0 tool if students could promote their CT skills after they had been trained in SQ; otherwise, the instructor should consider adopting another Web 2.0 tool.

METHOD

Participants

Participants were an intact class of tertiary level students enrolled for an obligatory

course of an undergraduate programme. In this study, the course name is not revealed to protect the identity of the participants. They were 40 tertiary level students aged between 20 and 25. One of the students was absent from the SQ training. The students were from three ethnic origins, namely, Malay, Chinese, and Indian. All had English as their second language. Ninety two percent had personal computers and 50% had home or student’s dorm Internet access. Most students were familiar with blogs. Students’ display names on the blog were changed to allow them to communicate freely in blog activities and protect their identities.

Procedure

The course ran for 14 weeks and was conducted twice a week. The blog was set up by the instructor at www.blogger.com. Students practiced SQ during face-to-face and online sessions.

All the face-to-face sessions were conducted in a computer lab. Each session lasted for 60 minutes. During the first face-to-face session, after registration on

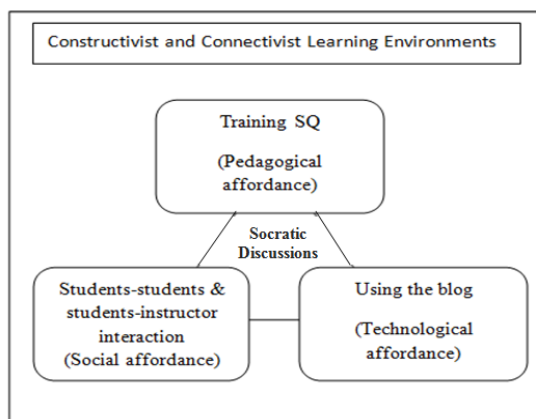


Fig.2: The conceptual framework of the study

the blog, all bloggers were given hands-on practice on basic blogging skills such as posting or giving comments to each other's posts.

Before the SQ training, various types of Socratic questions were distributed to students (see Appendix). To overcome the problems of large class size and also to encourage effective interaction among students in face-to-face sessions, they were divided into three or five members in groups of their own choosing. To take part attentively in each SQ discussion on the blog, the students were allowed to *consult* various types of Socratic questions with other group members. They were also asked to be attentive, think well, and share their ideas with their group mates before responding to group members' ideas or questions. In each group, one of the students was to post the blog comments.

To train SQ method, the instructor started the discussion by posting a statement on the blog. Following the SQ method, the instructor's statement was replied by students' blog comments through asking series of questions and pursuing answers.

The same procedure was carried out in online sessions, except that in these sessions, students took part in each discussion

individually and independently outside the computer lab. Fig.3 shows a sample of students' Socratic discussion on the blog.

During Socratic discussions, the instructor played the role of a facilitator to lead students' questions and answers to a reasonable conclusion. All discussion topics were selected from Paul and Elder (2007) (e.g., Thinking through the Concept of Friend). Topics gave students experience in clarifying, sorting, analyzing, and evaluating their thoughts to distinguish known from unknown (Paul & Elder, 2007).

Instrument

In this study, the Cornell Critical Thinking Test (CCTT) Level X developed by Ennis and Millman (2005) was applied to detect students' CT ability before and after training in SQ. It contains 76 questions in which five questions are sample questions and the rest are test questions. In this study, 50 sets of the CCTT were purchased from the CT Website (www.criticalthinking.com/series/055/index_c.jsp) at a cost of US\$ 150 which was paid by a research grant. Forty sets were used in this study. The test items are not appended because of copyright reasons. According to Ennis *et al.* (2004), students' CT scores can be measured in two

I: How do you know someone is your real friend?
S1: Someone who stands by you when you really need him/her... when you face with problems.
S2: What do you mean by problems?
S3: To me it is not that important to have a real friend.
S2: @ S3, why isn't it important to have a friend? Can you give us any reasons?
S4: @ S3, I think we can't live without our friends. We need their support.
S5: @ S4 Agree! True friends are always support us through the bad times as well as the good.

Note. I=instructor, S=student

Fig.3: An example of practicing students' Socratic discussion on the blog

ways: using the total right scores, where only the correct answers are counted, or using the formula total right scores minus one-half of the wrong scores. In order to avoid students' making wild guesses, the second method was applied in this study.

RESULTS AND DISCUSSION

To investigate if applying SQ on the blog can enhance students' CT ability, we examined students' pre-test and post-test scores in the CCTT-X test before and after the SQ training, respectively. To do so, we run a paired sample *t*-test by using *SPSS*. A paired sample *t*-test succeeded to reveal a statistically reliable difference between the mean score of the pre-test ($M = 19.83$; $SD = 9.66$) and the post-test ($M = 27.26$; $SD = 14.02$), where the students had $t(38) = -4.83$, $p(\text{sig}) = .00$, $\alpha = 0.05$. The result also showed that using SQ caused the a significant increase in the students' CT ability.

An implication of this finding is that deep questions such as Socratic questions help students become independent and reach CT in their destination as good thinkers (Paul & Elder, 2007). The result seems to be consistent with other studies which found that using SQ can promote students' CT and also produce high level of thinking among students (Chua, 2004; Chin, 2006; Teo, 2009).

Besides, assessing students' CT ability before and after training, SQ also indicates that practicing SQ on blogs allows all students equal chance and enough time to think. Blogs help students not only to

come up with provocative questions and answers by surfing on the Net but also to find reasonable answers and novel materials to justify their answers. This view is supported by the notion that using blogs can foster students' CT (Wang & Woo, 2010) and give all students an equal chance to ask deep questions (Tan & Shahsavari, 2011).

The finding supports Huit's idea (1998) that since CT is a complicated activity, it does not seem logical to expect that any CT skill training is sufficient to ensure students' CT. Hence, teachers must have the competency in selecting different CT skills. In this study, a highly significant increase in the students' CT after they have practiced SQ may imply that firstly, applying SQ have the potential to promote students' CT by giving students more time to think and reflect on their own learning (Paul & Elder, 2007). Secondly, Web 2.0 tools can be used to practice SQ and promote students' CT (Yang *et al.*, 2005). Thirdly, to maximize the effectiveness of SQ training, students must participate in pre-planned discussions guided by a teacher (Paul & Elder, 2007). Therefore, to expand students' understanding through SQ, a systematic step-by-step process is required to improve and guide students' thinking to ask thoughtful questions (Chin, 2006).

Moreover, the application of the PST model can support three fundamental aspects of acquiring CT skills. The pedagogical affordance supports the effectiveness of practicing SQ in promoting students' CT. The social affordance supports the efficacy of the course in promoting students' social interaction. In addition, a technological

affordance supports the effectiveness of using blogs in promoting students' CT in a learning environment. Obviously, without using blogs, the two other affordances, the training SQ and students' interaction were meaningless.

LIMITATIONS

This study was conducted with tertiary level students; a similar study could be carried out with students at other learning levels. In addition to using SQ, some other factors such as student's personality, cognitive style, age, and gender may affect students' CT. Moreover, this study did not investigate if the SQ training had any significant effect on asking thoughtful questions in students' blog comments. This research is currently underway and the preliminary results are satisfactory.

CONCLUSION

The current study shows that applying SQ on the blog can promote tertiary level students' CT. If teachers feed students by asking questions, it would, metaphorically, be like jumping continually on the brakes in a car which is already switched off. Students require the skill of asking critical questions, which turns their intellectual engines on and reaches CT in their destination. In fact, if students master the art of SQ, they can bring it into various courses they take. They can also use it in different discussions they engage in and apply it not only in raising and asking questions about what is taught, but also in making questions concerning the issues in their daily life in a meaningful way.

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APPENDIX

Taxonomy of Socratic questions

#	Question Category	Examples
1	Questions that seek clarification	
	<i>Explaining</i>	Can you explain that...?
	<i>Defining</i>	What do you mean by...?
	<i>Giving Examples</i>	Can you give me an example of...?
	<i>Supporting</i>	How does that help...?
2	Questions that probe reasons and evidence.	
	<i>Forming argument</i>	Why do you think that...?
	<i>Assumptions</i>	How do we know that...?
	<i>Reason</i>	What are your reasons...?
	<i>Evidence</i>	Do you have evidence...?
3	Questions that explore alternative views.	
	<i>Re-stating a view</i>	Can you put it another way...?
	<i>Speculation</i>	Is there another point of view...?
	<i>Alternative views</i>	What if someone were to suggest that...?
	<i>Counter argument</i>	What would someone who disagreed with you say...?
4	Questions that test implications and consequences.	
	<i>Implications</i>	What follows from what you say...?
	<i>Consistency</i>	Does that fit with what we said earlier...?
	<i>Consequences</i>	What would be the consequences of that...?
	<i>Generalising rules</i>	Is there a general rule for that...?
5	Questions about the question/discussion.	
	<i>Questioning</i>	How could you test to see if it were true...?
	<i>Analysing</i>	Do you have a question about that...?
	<i>Connecting</i>	What kind of question is it...?
	<i>Summarising</i>	How what does was said help us...?
	<i>Coming to conclusions</i>	Who can summarize so far...? Are we any closer to answering the question...?

Fisher's (1998)

APPENDIX (continue)

Rhodes' questions	1	Informational questions	How does it work?
	2	Interpretive questions	What do you mean by that?
	3	Explanatory questions	What is the reason for that?
	4	Procedural questions	How is that done?
	5	Relational questions	How do these compare or contrast?
	6	Verificational questions	What are the facts to support it?
	7	Heuristic questions	What could we find out?
	8	Evaluational questions	What difference does it make?
Chin's Taxonomy	1	Pumping	"Right", "Uh-huh", and "Ok"
	2	Reflective toss	S1, "I think ..." T, "Any suggestions to her answer?" S2, "Yes, ..."
	3	Constructive challenge	How to find the density of one's body?
Elements of Thoughts	1	Questioning goals and purposes	What was your purpose when you made that comment?
	2	Questioning questions	What question you are raising. Could you explain it?
	3	Questions information, data, and experience	On what information are you basing that comment?
	4	Questioning inferences and conclusions	How did you reach that conclusion?
	5	Questioning concepts and ideas	Are we using the appropriate concepts?
	6	Questioning assumptions	What exactly are you taking for granted here?
	7	Questioning implications and consequences	Are you implying that...?
	8	Questioning viewpoints and perspectives.	From what point of view are you looking at this?
Universal intellectual standards	1	Clarity	Could you elaborate further on that point?
	2	Accuracy	How could we find out if that is true?
	3	Precision	Could you be more specific?
	4	Relevance	How is that connected to the question?
	5	Depth	What are some of the complexities of this question?
	6	Breadth	Do we need to consider another point of view?
	7	Logic	Does all this make sense together?
	8	Significant	Is this the central idea to focus on?
	9	Fairness	Do I have any vested interest in this issue?

Sources: Fisher (1998, pp. 7-10); Wenning and Holbrook (2006, p. 11); Chin (2007, pp. 824-825); Paul and Elder (2007, p. 5 & 9)

