

Critical Thinking in Asynchronous Online Discussion: An Investigation of Student Facilitation Techniques

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Abstract

Background: In the last decade, asynchronous online discussion forums have become a primary focus of many educational researchers. Some advocates believed that the process of typing out messages in itself can promote in-depth critical thinking skills. Nevertheless, empirical research has not provided much support for this claim in natural settings. In fact, many previous studies have found that students do not necessarily exhibit in-depth critical thinking in online discussions.

Aims: To investigate the types of facilitation techniques exhibited by student facilitators, and how these techniques might influence in-depth levels of critical thinking in asynchronous online discussion forums.

Sample: Participants of the study were ten education major students at an Asia-Pacific university.

Method: An exploratory qualitative case study methodology was employed. Data were collected from the students' online discussion postings and interviews. The top 30% of discussion forums in terms of the most number of in-depth critical thinking incidences were first identified. Next, the bottom 30% forums were identified as the lower-level critical thinking group.

Results: In the case of the top 30% forums, showing appreciation, questioning, expressing agreements, and providing opinions or explanations were among the most prevalent facilitation techniques used, while in the case of the bottom 30% forums, the most common facilitation techniques merely included showing acknowledgement or appreciation and inviting feedback or comments.

Conclusion: The findings suggest that student facilitators should perhaps focus on three facilitation techniques, specifically questioning, expressing agreements, and providing opinions or explanations to foster in-depth level of critical thinking. The findings also suggest that it may serve student facilitators well to employ a variety of facilitation techniques rather than just utilise a few preferred ones in order to achieve higher levels of critical thinking.

Keywords: asynchronous online discussion, critical thinking, facilitation techniques

非同步網上討論中的批判性思維：學生的協調技巧調查

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摘要

背景：在近十年裏，非同步網上論壇成為了許多教育研究員的焦點。有些提倡者相信鍵入消息的過程可能本身促進批判性思維的技能。然而，在自然設置中，實證研究未提供任何佐證。實際上，許多早先研究發現學生在網上討論中並不一定會展示批判性思維。

目的：調查學生協調員所展示的協調技術種類，及這些技巧如何影響在非同步網上論壇中的批判性思維能力。

對象：參加研究的是來自一所亞太大學的十名教育系學生。

方法：使用的是試探性定性專題研究方法。資料來自學生的網上討論和採訪。首30%最高層的批判性思維的論壇首先被辨認。其次，再辨認底下30%的低層批判性思維。

結果：名列首30%的論壇中，顯示欣賞、發問、表達協議和提供觀點或解釋是最常用的協調技巧，而在底下30%的論壇中，最常用的協調技巧僅有認同或表示欣賞和邀請回饋或者評論。

結論：研究結果建議或許學生協調員應該集中於三種協調技巧：發問、具體地表達協議和提供觀點或解釋以促進高層次的批判性思維。研究結果也建議學生協調員使用多樣化的協調技巧而不是只運用幾個個人較偏愛的技巧以達到更高層次的批判性思維能力。

關鍵詞：非同步網上討論、批判性思維、協調技巧

Introduction

According to Swartz and Parks (1994), critical thinking is the ability to evaluate the reasonableness of ideas. Critical thinking skills are considered crucial to students because it allows them “to deal effectively with social, scientific and practical problems” (Shakirova, 2007, p.42). Learners who possess the ability to think critically will be able to solve problems in an effective manner.

Henri (1992) argued that critical thinking may be categorized according to a dichotomy of surface or shallow versus in-depth level of information processing. Surface level critical thinking, for example, is indicated by the mere repetition of ideas and the absence of explanation and justification, while in-depth level is indicated by messages that reflect critical evaluation of information through clarification and value judgment.

According to Cheong & Cheung (2008), one of the challenges faced by students in a face-to-face classroom environment is the limited amount of time for critical thinking, and consequently discussions in class tend to be shallow. Although it is possible for the students to continue their discussion after class, it is difficult if not impossible to get everyone to stay back after school on a regular basis. Consequently, some researchers have suggested the use of asynchronous online discussion forums because such forums can be deployed to extend student discussion beyond the traditional classroom environment (Hew & Cheung, 2003), and to help students solve ill-structured problems (Hew & Knapczyk, 2007).

In the last decade, asynchronous online discussion forums have become a primary focus of educational researchers and theorists. Some advocates believed that the process of typing out messages in itself can promote in-depth critical thinking skills

(Newman, Webb & Cochrane, 1997). Thomas (2002) claimed that asynchronous online discussions can facilitate the development of in-depth critical thinking because it provides the platform for students to think and organize their ideas before responding to questions or comments in the discussion forum.

However, empirical research has not provided much support for this claim in natural settings. Many previous studies have found that students do not necessarily exhibit in-depth critical thinking in online discussions (Burt, Grady, & McMann, 1994; Bullen, 1998; Hew & Cheung, 2003; Khine, Yeap, & Tan, 2003; Landsman & Gorski, 2007). For example, Burt et al. (1994) examined the level of information processing in critical thinking among graduate students in inter-university computer-mediated conferences. The researchers found very few instances of in-depth level of information processing in critical thinking. Bullen (1998) examined the quality of critical thinking skills in a university-level computer conference. Bullen found that although all students demonstrated critical thinking at some level, none was doing so at the in-depth level on a consistent basis. He pointed out that the relatively passive role of the facilitator might have contributed to the surface level of critical thinking. Students seldom acquire in-depth critical thinking skills independently (Landsman & Gorski, 2007). Hew and Cheung (2003) found that most of the surface level thinking was due to students making conclusions or judgments without offering any justification; proposing solutions with little details or explanations; and stating that one shares the conclusions or judgments made by others without taking these further.

Typically in an asynchronous online discussion forum, there is a facilitator (such as an instructor or a student) who manages the discussion. Paulsen (1995)

originally classified the role of facilitation into three different types: organizational, social and intellectual. Based on Paulsen's framework (1995), Cheung and Hew (2005) further analysed and summarized the role

of facilitation from other researchers (Berge, 1995; Paulsen, 1995; Klemm, 1998; Winiecki & Chyung, 1998; Salter, 2000; Goodyear et al., 2001; O'Grady, 2001) into Table 1.

Table 1

Description of Activity Related to The Organizational, Social and Intellectual Facilitation Types

Facilitation type	Description of activity	Source
Organizational	Spur participation when it is lagging. For example, request direct comments and responses to the issues discussed.	Paulsen (1995)
	Require regular participation. For example, exhorting students to post at least two messages per week.	Paulsen (1995); Klemm (1998)
	Prompt frequently. Use private messages to urge participants to take part in the discussion, to initiate debates, and to solicit suggestions	Paulsen (1995)
	Encourage participants to respond to each other as well as to the tutor.	Salter (2000)
	Keep discussion on track	Winiecki & Chyung (1998)
Social	Be responsive. For example, respond quickly to every contribution either by posting a personal message to the contributor or by referring to the author's comment in the discussion.	Paulsen (1995)
	Reinforce good discussant behaviours. For example, praise students who respond effectively online.	
Intellectual	Ask questions to help participants understand.	O'Grady (2001)
	Challenge ideas or opinions. Draw attention to opposing perspectives, different directions or conflicting opinions.	Berge (1995); Paulsen (1995); Goodyear <i>et al.</i> (2001)
	Make appropriate contributions.	Goodyear et al. (2001)
	Insist that opinions posted by participants are supported with data and rational reasoning.	Klemm (1998)

Extracted from Cheung & Hew (2005), pp. 59-60

Past efforts to enhance students' critical thinking in online discussions have largely focused on the facilitation techniques used by the instructors because instructors are instrumental in shaping or influencing the discourse (Bullen, 1998; Yang, Newby & Bill, 2005; Yang, Newby, & Bill, 2008). For example, Yang, Newby and Bill (2005) investigated the effects of using questioning techniques on students' critical

thinking skills in asynchronous discussion forums in university-level distance courses. The empirical results of Yang et al.'s (2005) study indicated that instructor teaching and modeling of questions helped the students to cultivate and maintain a higher level of critical thinking skills in the online discussion forums. In addition, Yang, Newby, and Bill (2008) found that having the instructor to facilitate the

discussions at the beginning of the online discussions rather than later, helped students maintained their critical thinking thereafter.

It is important to note, however, that not all researchers believe that an instructor such as a faculty member, teacher, graduate assistant is the best person to be involved or facilitate a student online discussion forum. Fauske and Wade (2003-04), for example, found that the presence of the instructor can oppress certain students and their ideas. According to Hew, Cheung, and Ng (2009), instructor-facilitation is typically seen as a hierarchical relationship such as an expert-novice relationship. Due to this hierarchical relationship, an instructor's presence can prevent students from posting messages because students tend to think that the instructor's note must be the final authoritative one (Zhao & McDougall, 2005). Furthermore, Mazzolini and Maddison (2003) noted that instructor questioning, may be seen by some students as an assessment tool; hence, students may cease participating in the discussion altogether. Due to these reasons, some researchers (Poole, 2000) have suggested the possibility that students should facilitate their own discussions.

There is comparatively little research done that directly addresses student or peer facilitation compared to instructor facilitation (Ikpeze, 2007; Hew, Cheung, & Ng, 2009). The extant research on student facilitation is also limited in two ways. First, the specific facilitation techniques might not be clearly delineated (Hew & Cheung, 2008). For example, in the study by Cifuentes, Murphy, Segur, and Kodali (1997), students facilitated online discussions by employing intellectual, social, and organizational roles or techniques; however these roles were not clearly described. Second, although some researchers examined student facilitation

techniques in online discussions, their investigation was limited to thread development; for example the depth of discussion threads (Hew & Cheung, 2008), or thread termination (Chan, Hew, & Cheung, 2009). The possible influence of student facilitation techniques (if any) upon critical thinking in online discussions was not explored.

Research Questions

The following research questions were the focus of the study:

- (a) What is the quality of thinking, in terms of critical thinking, demonstrated by the participants in the online discussion?
- (b) What are the facilitation techniques used by the student facilitators in the online discussion?
- (c) Are there any differences between discussion forums that have achieved higher levels of critical thinking and those that do not in terms of the types of student facilitators' techniques used?

Method

To address these questions, we report an exploratory case study that utilized student as facilitators in the following section. The key purpose of this study is to help us gain an in-depth understanding of a situation (Merriam, 2001), rather than to generate grand predictions. The participants for this study were ten students who were enrolled in a graduate level course entitled "Multimedia Design" at a major Asia-Pacific university. In this course, students learned major multimedia design concepts including learner control, navigation, metaphor, and use of media. There were six male students and four female students. During the course of the semester, two asynchronous online discussion sessions were

held, each of them lasted a week with a week's break in between.

The asynchronous online discussions were entirely facilitated by the students without the intervention of the instructor, using the Blackboard web-based course management software. All the students had access to the Internet at home and they were familiar with the features of the Blackboard. Each of the ten students owned their individual discussion forums. Each student was required to design and develop an instructional multimedia software. After the students had drafted their projects, they uploaded the materials into their individual discussion forums. Each student then became the facilitator of his or her own forum to discuss ideas with one another to critique and improve their multimedia software. How the discussion began and evolved in each forum depended on the individual student facilitator. Students had the freedom to choose to participate in whichever discussion forum they wanted.

Data Collection and Analysis

This study relied mainly on two sources of data - online postings, and student interviews. To address the first research question, "What is the quality of thinking, in terms of critical thinking, demonstrated by the participants in the online discussion?" we used the content analysis method on all the online discussion postings (Hew, Liu, Martinez, Bonk, & Lee, 2004). The unit of analysis for the coding of critical thinking skills was the individual message or note posted in the discussion forum. All discussions postings were coded using the framework for evaluating thinking skills and levels of information processing (Cheung & Hew, 2006). Cheung and Hew (2006) created a framework (see Table 2) to assess

the quality of thinking skills in terms of the level of information processing by leveraging and synthesizing on the best features of work related to critical thinking done by Henri (1992), Swartz and Parks (1994) and Newman et al. (1997). We utilized the aforesaid framework to assess the quality of critical thinking exhibited by students in a peer-facilitated environment because it was congruent with the aims of this study and it is a robust framework, drawing perspectives from several authorities in thinking.

Surface level critical thinking includes: 1) making conclusions or judgments without offering justification (Henri, 1992), 2) sticking to prejudices or assumptions (such as forming an irrational attitude of dislike against an individual, a group, or their ideas) (Newman et al., 1997), 3) stating that one shares the conclusions or judgments made by others without taking these further (Henri, 1992), and 4) failure to state the advantages or disadvantages of a suggestion, conclusion, or judgment (Henri, 1992). In-depth level critical thinking, on the other hand, involves: 1) making conclusions or judgments supported by justification (Henri, 1992), 2) setting out the advantages or disadvantages of a suggestion, conclusion, or judgment (Henri, 1992), 3) stating that one shares the conclusions or judgments made by others and supporting them with relevant facts, proof, experience, or examples (Henri, 1992; Newman et al., 1997), and 4) making valid assumptions based on the available indicators (Henri, 1992; Swartz & Parks, 1994).

The first author independently coded all the postings using the aforementioned thinking framework. In order to estimate the consistency of the analysis, we had an independent observer code 50% of the message postings (randomly selected). The percentage of agreement of the coding was 88%.

Table 2

Framework for Evaluating Critical Thinking and Levels of Information Processing in Online Discussions

Surface level critical thinking	In-depth level critical thinking
Does not justify conclusions or judgments made (Henri, 1992)	Justifies conclusions or judgments made (Henri, 1992)
Stating that one shares the conclusions or judgments made by others without taking these further (Henri, 1992)	Stating that one shares the conclusions or judgments made by others and supporting them with relevant facts, experience or personal comments (Henri, 1992)
Does not spell out the advantages or disadvantages of a suggestion, conclusion or judgment (Henri, 1992)	Identifying the advantages or disadvantages of a suggestion, conclusion or judgment (Henri, 1992; Newman et al., 1997)
Sticking to prejudices or assumptions (Newman et al., 1997)	Making valid assumptions based on the available indicators (Henri, 1992; Swartz & Parks, 1994)

Extracted from Cheung & Hew (2006)

To address the second research question, “What are the facilitation techniques used by the student facilitators in the online discussion?” the first author independently coded all the facilitators’ postings in the ten forums using the constant-comparative approach (Lincoln & Guba, 1985). The coding scheme or framework was not predetermined but emerged inductively from the data. Specifically, the facilitators’ postings were examined to build emergent categories of the types of facilitation. A facilitator’s posting might contain evidence of one or more facilitation techniques employed and all these were counted and recorded. Analysis of the facilitators’ postings continued until each emergent category was saturated - meaning until new data began to confirm instead of shedding new light on the types of facilitation technique categories.

At the end of the analysis, nine types of facilitation techniques were found by the first author (see Table 4). In order to establish the reliability of the coding, another observer coded 50% of the message postings (randomly selected) using the indicators described in Table 4. The percentage of agreement of the coding was 95%.

The address the third question, “Are there any differences between discussion forums that have achieved higher levels of critical thinking and those that do not in terms of the types of student facilitators’ techniques?” we first ranked and identified the top 30% of forums (n=3) in terms of the most number of in-depth critical thinking incidences found. We referred these as the higher-level critical thinking group. The bottom 30% forums (n=3) were identified as the lower-level critical thinking group. We then examined if there were any differences in the facilitation techniques displayed by the student facilitators in groups that demonstrated higher versus lower levels of critical thinking.

Convenience sampling was used to obtain participants for the interviews. Four participants volunteered to be interviewed. The interviews were conducted in order to clarify the reasons why some of the facilitation techniques were used and how they contributed towards critical thinking. Telephone interviews with the participants were conducted and further supported by email interviews as follow up. According to Meho (2006), email interviewing can be a viable alternative to face-to-face interviews, particularly in cases where

time or geographical boundaries are barriers to an investigation. Extracts of interviewees' comments were compiled and send back to the participants via email to validate and confirm the information collected. This served to provide descriptive validity, ensuring that the participants agreed that the interview data accurately capture their opinions (Johnson, 1997).

Result

Research Question 1: What is the quality of thinking, in terms of critical thinking, demonstrated by the participants in the online discussion?

Table 3 provides the details of the levels of critical thinking exhibited by participants in the ten discussion forums. Altogether, 20.7% of all message postings in the online discussion were of surface critical thinking level. The rest (79.3%) were of in-depth level. The top 30% of forums in terms of the most number of in-depth critical thinking incidences found were facilitated by CLP, ELSL and KLET. The bottom 30% forums were facilitated by MH, PL and SK.

Research Question 2: What are the facilitation techniques used by the student facilitators in the online discussion?

Nine facilitation techniques were uncovered in the discussion forums: (a) inviting feedback/comments, (b) expressing agreements, (c) acknowledgement/showing appreciation, (d) challenge other' viewpoints, (e) questioning, (f) summarize salient points, (g) make connections with supporting research, (h) providing opinions or explanations, and (i) establish new threads/directions. The facilitation techniques are summarized in Table 4 with their definitions and examples for illustration. These techniques are explained in the subsequent paragraphs.

Acknowledgement or showing appreciation.

Acknowledgement or showing appreciation (40.8%) formed the bulk of the facilitation techniques employed by the student facilitators. Offering acknowledgement or appreciation may seem too trivial to trigger critical thinking; however one of the interviewees (HH) in this study commented

Table 3

Quality of Thinking Exhibited in the Ten Online Discussion Forums

Facilitator	Surface	Critical Thinking In-depth	Total critical thinking	Ranking (in terms of in- depth critical thinking)
CLP	2	18	20	1
ELSL	4	16	20	2
KLET	0	16	16	3
CLL	2	11	13	4
RR	1	9	10	5
CWC	4	8	12	6
HH	6	6	12	7
PL	1	4	5	8
MH	3	3	6	9
SK	1	1	2	10

Table 4

Facilitation Techniques

Facilitation Technique	Definition	%	Examples
Invite feedback or comments	Encourage participants to post online	8.4	Please feel free to give me lots of comments and feedback to enhance it.
Expressing agreements	Express agreement to valid points made by other participants	12.8	You are right! When I design that main menu slide, my idea was to accentuate the color wheel.
Acknowledgement or showing appreciation	Offers words of appreciation or acknowledgment of postings	41.3	Thank you for the suggestion.
Challenge -others' viewpoints	Pose a challenge to a participant or participants	0.5	We shall do an experiment on this and test it out to see who's right!
Questioning -Clarifications -Probe viewpoints	Ask questions to either clarify or elaborate ; probe viewpoints or opinions	6.5	Clarification: Why do you say that? Do you have the same problem too? Viewpoints: How do you find the level of interactivity? What do you think of the color used for the tabs?
Summarize Salient Points	Provide a short summary of discussion points	0.5	I have consolidated and summarized my learning points from this afternoon session.
Make Connections -with Supporting -Research	Made reference to existing literature	2.0	I did a little research on colors and found some really useful info on the net: (URL provided).
Providing opinions/ explanation	Offers own opinion / explanation to describe rationale of action	25.6	Personally, I found the article more suited for colors for classroom environment instead because...
Establish New Threads / Directions	Direct participants to new threads or direction in thinking	2.4	I have started the following thread. It is open for debate and discussion.

that although showing appreciation might not necessary result in critical thinking, it was essential and necessary as an online discussion environment is "a social platform where learners and facilitators collaborate and it is crucial in sustaining the discussion and participation, without which critical thinking may not follow or materialise". It is possible that this technique plays a supporting role in promoting in-depth critical thinking levels because it helps to ease the participants into the online discussion and establish a safe, non-confrontational

learning environment where there is mutual respect for each other.

Questioning.

Questioning constituted 6.5% of the total counts of facilitation techniques. Although it was relatively low in overall utilization in the discussion forums, it was the second top facilitation technique utilised by the top two facilitators, in terms of in-depth levels of critical thinking achieved in the facilitators' forums. Two types of questioning were

predominant in the online discussion: questions of clarifications, and questions that probe viewpoints. Student facilitators used questions of clarification in order to ask participants to provide more elaboration or information about their ideas expressed online.

Expressing Agreements.

This refers to the student facilitators expressing agreement with valid points made by the participants in the online discussion and it constituted 12.8% of the total counts of facilitation techniques. According to one of the interviewees (KLET), she commented that “agreement is important to keep the discussion focused on the subject topic and it also achieves a common understanding of viewpoints and assumptions so that they can use this common ground to launch into more in-depth discussions and also easier for students to move into areas to explore their differences”. This is in line with researchers like Collision et al. (2000) who suggested that online facilitators should look at facilitation in two stages: the first stage is to achieve common understanding and consensus on certain issues and the second stage is to proceed to explore their differences and engage in more-in-depth conversations, leveraging on their common ground found earlier.

Providing Opinions or Explanations.

This technique constituted 25.6 % of the total counts of facilitation techniques. This refers to the student facilitators providing own opinions on a particular topic of discussion, or detailed explanations as to why certain approaches or solutions are adopted or implemented. According to one of the interviewees (ELSL), the main reason why she provided opinions, personal experience, or suggestions was to help the participants better

appreciate the issues on hand. In this manner, besides helping the participants see things in a clearer way through her own experiences, it also allowed the participants to clarify the assumptions she made and examine if their experiences also tally with hers, or identify if there were any similarities or differences involved. Another interviewee (KLET) opined that this in turn helped participants to evaluate or clarify their own opinions to see if it was valid and to assess the accuracy of their thinking too, thereby promoting critical thinking.

Challenging Others’ Viewpoints.

Analysis shows that only one of the peer facilitators employed this technique in the facilitation of the discussion forums. The student facilitator (CLP) challenged another participant (HH) to conduct an experiment and she actually crafted the experiment and attached it in the Blackboard as a file and sent it to him. However, it drew no response from the other participant (HH). Intuitively, challenging or aggressive questioning should yield more critical response from the online participants. However, such cases are rare in this AOD forum discussion and the challenge from the student facilitator drew a blank response. A thirty-minute phone interview with HH was conducted in order to find out the reasons why he did not respond to that challenge by CLP. The interview revealed that the participant felt offended and from his point of view, the challenge seemed to carry a certain degree of sarcasm in it and hence he deemed it meaningless to continue with the online discussion. In fact, from the analysis of the online transcripts, he chose to be silent and totally withdrew from the online discussion after that challenge was issued. This point will be further explored in the discussion section of the paper.

Other Facilitation Techniques.

There were four other online facilitation techniques uncovered which were less utilised by the peer facilitators: summarize salient points (0.5%), invite feedback or comments (8.4%), establish new threads or direction in thinking (2.4%), and make connections with supporting research (2.0%). Summarizing salient points refers to the student facilitators making a posting that consolidates the main points of the issues or topics that have been discussed so far in the online forums. According to Hew et al. (2009), posting a summary can help prevent or minimize information overload on the part of the participants because they could quickly get an idea of what the discussion is all about by reading the summary without having to read through every posting made. However, in-depth discussion may or may not ensue. Inviting feedback or comments could potentially increase or sustain participation and lure out the online “lurkers” which may help to contribute to more postings and avoid the situation where the more vocal ones may dominate the online discussion. However, in-depth discussion may or may not ensue or be forthcoming. Establish new threads or direction in thinking may motivate participants to look at other potential areas for discussion and this may achieve the same effects as the technique on providing own opinions or explanations in that it will open up new horizons and reflections in these new areas might ensue. In addition, the technique on making connections with supporting research may potentially support critical thinking in online discussions as it lends itself to justifications of arguments using research and literature as the basis to support their discussion points rather than based on their conjecture. According to one of the interviewees (HH), he said that it will “allow you to probe for

evidence to justify your stand too”. Therefore, it has the potential to increase the quotient of critical thinking in online discussion forums.

Research Question 3: Are there any differences between discussion forums that have achieved higher levels of critical thinking and those that do not in terms of the types of student facilitators’ techniques?

In the case of the top-three forums, showing appreciation, questioning, expressing agreements, and providing opinions or explanations were among the most prevalent techniques used. In the case of the bottom-three discussion forums, they mainly exercised the techniques of showing acknowledgement or appreciation and inviting feedback or comments. In fact, these two techniques constitute more than 66.7% to 85.7% of the total facilitation techniques exercised by the student facilitators during the online discussion.

In terms of total counts of facilitation techniques exercised during the online discussion, it has been found that on average there are 34 counts of facilitation techniques exercised during the online discussion. As for the bottom-three forums, on average only eight counts of facilitation techniques have been exercised. This suggests that there is a greater intensity of facilitation interventions in forums that achieved higher levels of critical thinking.

Discussion and Conclusion

Based on content analysis of the online transcripts, we uncovered nine different types of facilitation techniques present in the online discussion forums. The analysis of results highlighted certain facilitation techniques found in forums (top-30%) with higher critical thinking levels, such as: showing acknowledgement or appreciation,

questioning, expressing agreements, providing opinions or explanations. In contrast, for forums (bottom-30%) that scored low in critical thinking levels, the predominant facilitation techniques were merely showing acknowledgement or appreciation and inviting feedback or comments. In other words, facilitators in forums with higher critical thinking levels tended to exhibit social and intellectual types of facilitation technique (refer to Table 1) while facilitators in forums with low critical thinking levels showed only social and organizational types of facilitation. This suggests that student facilitators should perhaps pay attention or focus more on intellectual types of facilitation technique, specifically questioning, expressing agreements, and providing opinions or explanations to foster higher levels of critical thinking.

Of particular interest is the facilitation technique on challenging others' viewpoints found in one of the ten student facilitators under study. Intuitively, challenging or aggressive questioning by participants should draw more critical response from the online participants. In fact, Walker (2004) found that online behaviours such as probing and challenging could be the best way to promote clarification of the student's ideas, arguments and critical thinking. However, in this case, it did not draw a response at all. As previously mentioned, the respondent being targeted (HH) completely withdrew from the online discussion altogether after the challenge was posed to him.

There could be a few reasons to account for this particular incident. First, the participants might not have enough time to warm up and know each other well before they embarked on online discussion activities. The second reason could be attributed to the Asian culture and society that promotes social harmony and avoidance of conflict in a learning environment (Chang,

2000). Challenging or probing in an online environment may not work well in the context of Asian culture. This interesting incident may underscore the fact that it is not the norm for students to engage in such behaviour in the Asian context, especially if the participants do not know each other well. The student (HH) chose to remain silent and leave the online discussion altogether to avoid confrontation or conflict. However, this facilitation technique of challenging others' viewpoints could work in the western culture where there could be greater tolerance for probing in the classroom and online learning environment. More research needs to be undertaken on culture as an intervening factor in critical thinking in a peer-facilitated AOD.

The implication for student facilitators is that they need to be aware and take into consideration factors such as culture and social norms when adopting more aggressive facilitation techniques in an AOD environment where there are significant numbers of Asian students or participants. Student facilitators should also have the mindset that participants in an online environment have a "collective obligation to behave within the socially accepted ways" (Watkins and Biggs, 2001, p.282). One of the interviewees (HH) also expressed the need for peer facilitators to establish ground rules such as encouraging participants to suspend judgement, be open-minded, seek clarifications whenever possible, probe assumptions and offer constructive feedback. These guidelines will guide and remind participants to avoid holding on to prejudices and avail themselves of every opportunity to clarify assumptions wherever possible to avoid surface-level thinking and achieve a higher level of critical thinking and learning (Newman et al., 1997; Cheung & Hew, 2005).

As for questioning techniques, numerous studies have been conducted on the employment

of questioning as a pedagogical approach to foster critical thinking skills in students (King & Rosenshine, 1993; Ge, 2001). Although there are numerous types of questioning method such as inquiry, rhetorical divergent, to name a few, Socratic questioning is often suggested as the most meaningful (Painter, 1996). According to Paul (1990), Socratic questions include: (a) questions of clarification, (b) questions that probe assumptions, (c) questions that probe reasons and evidence, (d) questions about viewpoints, and (e) questions that probe implications and consequences.

Based on the Taxonomy of Socratic Questions by Paul (1990), two categories of questions have been prevalent in forums that achieved higher levels of critical thinking: questions of clarification and questions that probe viewpoints. The results implied that using these two types of Socratic questioning techniques might help raise the level of critical thinking in a peer-facilitated AOD. Future research could examine student facilitators' use of other Socratic questions to see if and how these questions may influence the attainment of critical thinking.

Based on the results of the interviews, it has also been found that participants may be more comfortable with finding common ground first before moving on to other areas of differences and disagreement. However, from the analysis of the online transcripts, most participants stopped at achieving consensus and did not move on further to explore their differences. One possible reason for this is that the participants may agree with each other too early at a stage in the online discussion and this consequently stifles in-depth discussion among participants. This might also encourage a "herd mentality" or groupthink, a term coined by psychologist Irving Janis (1972) and it happens when a group conforms automatically and

uncritically to a group judgment, as a result of group pressures of conformity that lead to a degeneration or deterioration of "mental efficiency, reality testing, and moral judgment" (p.9) among participants. Moreover, given that the participants were not very familiar with one another, they might be less motivated to appraise the other participants' views. Agreement is useful in circumstances where it is clear that the underlying basis or assumptions for reaching the conclusion is sound; otherwise it may not be of benefit to the students in the online discussion. The implication for the student facilitator is that this technique should be used with caution. The student facilitator should capitalise on the moment when the participants are ready to explore their differences, once they have gained enough common ground, to further motivate them to continue with the online discussion, using other techniques such as Socratic questioning before groupthink settles in and consequently stifles in-depth discussion.

There is also the issue of time in an asynchronous online discussion environment that needs to be addressed. A case in point for discussion was the lowest-ranked discussion forum managed by the facilitator (SK). Apart from the fact that he did not use a variety of facilitation techniques and stick to mainly showing appreciation and inviting feedback or comments, it has been observed that his late posting of the design project in the second week of the online discussion (he miss the opportunity to post it during the first week of online discussion) could also account for the lower number and quality of responses from the participants.

Limitations and Future Research

Like any other research, there are a number of limitations in this research. This study concentrated on examining the possible influence of online student

facilitation on critical thinking levels in online discussion forums. The results of the current study might not be generalizable as it was confined to a small sample size within a specific type of discipline or course programme. Furthermore, we cannot, through the current study, determine *causal effects* of student facilitators' facilitation techniques on critical thinking levels because we did not employ any control treatment. In the present study, we could only suggest that student facilitators should perhaps focus on three facilitation techniques: questioning, expressing agreements, and providing opinions or explanations to foster in-depth level of critical thinking. To determine actual causal effects of these techniques, an experimental research design may be used. Future research can perhaps involve two groups of student facilitators - one group who is trained in and utilizes the three facilitation techniques, while the other does not. Future research could expand the definition of thinking to other areas such as creative thinking and other important outcomes of online discourse such as levels of student's learning achieved should be examined in the future.

It is to be noted that the framework for evaluating critical thinking (Table 2) was not communicated to the students before or during the entire online discussion. If the framework for evaluating critical thinking had been made known to the students or if there were consultations with the student on the evaluation criteria of the online discussion, particularly on the requirements of critical thinking on the part of the students, it might have an influence on the level of critical thinking achieved in the online discussions. Future studies may analyse the impact of using Table 2 on the quality of critical thinking achieved in a student-facilitated environment and how it may influence the use of facilitation strategies or techniques.

Online facilitation is not an intuitive undertaking for many students and hence instructors should prepare them for the challenges of facilitating in an online discussion platform. Through this study, we hope that educators have a greater understanding of the challenges involved in online facilitation and better appreciate the types of peer facilitation techniques that could promote higher levels of critical thinking in a peer-facilitated online discussion environment.

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