Comparing asynchronous online discussions and face-to-face discussions in a classroom setting

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Abstract

The purpose of this study is to investigate the perceived differences between asynchronous online discussions and face-to-face discussions in a classroom setting. The students' reflections were analysed by following a qualitative research approach. The results showed that atmosphere, response, efficiency, interactivity and communication were the top five themes that differ between asynchronous online and face-to-face discussions. Implications for designing asynchronous online and face-to-face discussions are discussed.

Introduction

Learning through discussions is an important strategy for students (Ellis & Calvo, 2004; Hung, Tan & Chen, 2005). Discussions may take place in different modes such as synchronous or asynchronous computer-network-based online discussions and face-to-face discussions. Many educators argue that online discussions are particularly practical for postbaccalaureate individuals who have to struggle with full-time work and further professional development (cf. Peterson & Bond, 2004). More importantly, online discussions offer great flexibility in terms of time and place (Hara, Bonk & Angeli, 2000). Online discussions are also known to have associated with distance education to support participants who may not have the opportunity to meet or interact with their learning counterparts (King, 2001). With the rapid development of computer-mediated communication (CMC), online discussions have become more involved in 'traditional' classroom settings to promote student critical thinking, knowledge construction and learning autonomy (Lim & Chai, 2004; Marra, Moore & Klimczak, 2004).

There have been a large number of research studies attempting to address the differences between in-class face-to-face discussions and off-class online discussions, but few have incorporated online discussions in a classroom setting for the comparison. This paper, therefore, is initiated to examine the perceived differences between in-class asyn-

chronous online discussions and in-class face-to-face discussions using a group of pre-service teachers. It also provides suggestions on how online and face-to-face discussions can be better designed.

Literature review

Reported differences between asynchronous online discussions and face-to-face discussions

Much research reports differences between asynchronous online discussions and face-to-face discussions. For instance, Tiene (2000) identified key differences in four areas as follows:

- Access. Online discussions are most likely to have more access problems than face-to-face discussions because it involves more technical components such as computers, discussion forums and Internet connections. Any faulty technical component can cause online discussions to cease to function properly. Nonetheless, with the development of CMC, the access problem may not remain as critical.
- Timing. Asynchronous online discussions usually require a longer time frame to process because participants need more time to read and reflect, prepare responses and type in the responses in written texts. Furthermore, participants may enter into the discussions at different times, which adds to the longer duration needed for the discussions (cf. Meyer, 2003).
- Mode of expression. Responses in online discussions are articulated in written rather than in spoken form. Understandably, this may not favour some who are more inclined to vocal expression. Moreover, text alone cannot 'communicate the nuances of the human voice, which can convey the tone of the conversation' (Tiene, 2000, p. 373).
- Visual cues. Visual cues are largely lost in online discussions. Although a number of emoticons like 😲😕👍👎 can be used to enhance body language, they are not equivalent to lifelike human gestures and are therefore insufficient to truly emulate human expressions. Despite this, online discussions are not totally inferior to the face-to-face counterpart. Studies have found that different tasks may prefer different types of discussion. For instance, a task that needs much coordination may not be suitable for a text-based online discussion where visual cues are primarily absent. However, problem-solving tasks may be more appropriate for a textual online discussion (cf. Berge, 1995; Hiltz, 1994; Moallem, 2003).

Other research focusing on the process of how people participate in discussions report additional differences. Walther (1996) found that online discussions were more task-oriented and focused compared with face-to-face discussions. Participants were more likely to focus on the topic rather than spend time on trivial issues. Nevertheless, it is harder for online discussions to reach a consensus (DeSanctis & Monge, 1998; Walther, 1996). This could be because the participants in an online discussion environment tend to be more critical and reflective, given the advantage of time and space convenience. Card and Horton (2000) observed that group members in a face-to-face discussion relied much on their own experiences to offer opinions while groups in an online discussion cited more literature and incorporated the author's beliefs with their own experiences in their discourse.

Research on the linguistic aspects of online and face-to-face discussions reveals other differences. For instance, Kern (1995) discovered that language output in online discussions contained more complicated sentences than those in oral discussions. Warschauer (1995) identified that 'students used language which is lexically and syntactically more formal and complex in electronic discussion than they did in face-to-face discussion' (p. 7). Sotillo (2000) reported that the complexity index was higher in asynchronous discussions than in synchronous discussions, as students had more time to write, edit and rewrite sentences in asynchronous discussions.

Pros and cons of asynchronous online discussions and face-to-face discussions
A commonly cited advantage of online discussions is the convenience and flexibility it offers in terms of time and place. This is because students are able to take part in online discussions at almost anytime and anywhere. Nonetheless, research indicates the medium of online discussion is not always a favourable choice among students. In a survey comparing online and face-to-face discussions, Tiene (2000) found that most students still preferred face-to-face discussions to online discussions even though they believed that online discussions could offer more convenience and flexibility. Other researches supporting this include Johnson, Sutton and Poon (2000) and Cooper (2001).

Some studies support that asynchronous online discussions can promote student critical thinking. For example, in a study analysing online messages in computer conferences by using the content analysis approach, Newman, Webb and Cochrane (1996) argued that online students were more likely to make important statements and link ideas together albeit the fewer number of novel ideas produced. In another online discussion study, Marra *et al* (2004) found evidence of student critical thinking in generating new ideas, clarifying information and linking ideas. In another study, Meyer (2003) compared the experiences of students in face-to-face discussions with threaded discussions, which revealed that students involved in online discussions exhibited more higher-order thinking by contributing more exploratory and integrative comments.

Asynchronous online discussions are more likely to benefit people in subordinated positions, such as those who are shy, introverted, reticent or having language difficulties (Belcher, 1999; Kern, 1995). CMC provides a freer and more comfortable environment in which participants have more equal opportunities to voice their opinions and are less influenced, controlled or dominated by others (Warschauer, 1995).

Online discussions have the potential to improve student relationship. In a qualitative study of a web-based graduate course, Powers and Mitchell (1997) found that online discussions enhanced the levels of rapport between the students because they had time to think about responses after reading the messages, and could remove those aggressive sentences to avoid unhappiness. However, in a study of the social and psychological impact of CMC on human-to-human communications, Kiesler, Siegel and McGuire (1984) reported an opposite result: people tended to be less inhibited but more aggressive in online discussions, even commenting more negative remarks.

In this study, the students participated in both in-class asynchronous online discussions and in-class face-to-face discussions during their tutorials. They also wrote reflection reports on their experiences using these two different modes of discussion. The reflection reports were further analysed by following a qualitative research approach to investigate their perceived differences between in-class asynchronous online and in-class face-to-face discussions. The main research questions of the study were:

1. How did the students participate in in-class online discussions and in-class face-to-face discussions?
2. What were the students' perceived differences between in-class online discussions and in-class face-to-face discussions?

Method

Course and participants

Data were collected during the January 2005 semester from the course entitled Constructive Learning with the Internet. This is an elective course which earns students two academic units towards graduation. The students in this study were doing a 1-year Post-Graduate Diploma in Education (PGDE) programme at the National Institute of Education (NIE) of Singapore. The course ran twice a week and lasted for 6 weeks. It involved three online and nine face-to-face sessions. In each online session, the students studied online lesson materials individually and participated in threaded online discussions. All the face-to-face sessions were conducted in a computer lab with sufficient desktops. The duration of each face-to-face session was 1 hour and 40 minutes.

Twenty-four PGDE students comprised of 18 females and 6 males participated in the study. All of them held a bachelor's degree before they enrolled into the programme. As this was an elective course, the participants majored in a range of subjects. Majority of the participants ($n = 20$) had their first degree in Chinese language teaching while two had theirs in chemistry, one in mathematics and one in music. The mean age of the students was about 25. They would be teaching at secondary schools after completing the PGDE programme.

Class activities

Three major activities were involved in each face-to-face session: tutor presentation, student discussion and student hands-on. The time allocated for these three activities were approximately 30, 40 and 30 minutes, respectively. Each face-to-face session focused on one topic.

In the first 30 minutes, the tutor gave a presentation on the topic. Occasionally the students were guided to explore some web-based materials. In the next 40 minutes, the students were divided into four groups with six members each. Each group, led by a leader, discussed the topic they learned in the previous face-to-face session. The role of the leader was to decide discussion questions, facilitate discussion and summarise discussion results. During the first face-to-face session, students chose a topic that they would like to lead; they then took on the role of the leader for their chosen topic in later

sessions. The performance of leaders was assessed based on the quality of the discussion (10%), the facilitation for the discussion process (10%) and the written summary of the discussion result (10%). The students were randomly assigned to discussion groups in each session.

Two asynchronous online discussion tools, Blackboard and Weblog (http://www.blogger.com), were introduced in the first face-to-face tutorial. The use of Blackboard in NIE has one constraint; it does not allow students to initiate a discussion forum within the Blackboard environment. If they need to do so, they would need help from their tutor. The Weblog, on the other hand, is a licence-free online tool that could be used for creating self-reported journals or diaries. The feature of allowing anyone to add comments makes Weblog a possible tool for supporting asynchronous online discussions. To use Weblog, the students need only to register for an account and they are on their way to use the facility.

The course culminated with a final project. In this project, the students were required to design a web-based constructivist learning environment. To do this, they must have basic skills for creating web pages. Many students were keen on using Dreamweaver, but not all were skilful enough to handle the tool by themselves. So the last 30-minute hands-on session was intended to train the students on how to use the tool.

Instruments
Two instruments were used for collecting the data in this study:

- Observational notes. During each class session, the tutor, who was one of the researchers, observed and took notes on the activities of the group leaders, the members, the number of groups taking part in the asynchronous online and face-to-face discussions and the progress of the discussion.
- Student reflections. At the end of the course, student wrote a reflection essay on their perceptions of the major differences between asynchronous online and face-to-face discussions. The reflection essay counted for 10% of their final marks. The reflections provided a platform for the students to express their views on their learning and a means to investigate their perceived differences between these two modes of discussion.

Data analysis
A qualitative research approach was adopted to analyse the data collected. To facilitate this process, all reflections were printed out into hardcopies. Coding of the textual data was first done by identifying key themes from the reflection discourse. A 17-key-theme system was used for this purpose. The key themes and their corresponding indicators are shown in Table 1.

Table 2 shows an example of how the coding system was applied to a passage of a reflection written by a student. In this example, the highlighted parts were considered as key themes and coded accordingly. Furthermore, each code was attached with either a positive or negative indicator. For instance, the first key theme in this passage was

Table 1: Coding system for the data analysis

Key theme	Indicators
1. Convenience (CON)	Any time Any where
2. Visual cues (CUE)	Facial expression Gesture Emoticon
3. Clarification (CLA)	Ease to clarify Ease to articulate
4. Communication (COM)	Written/spoken texts Ease to express thoughts Clear presentation
5. Time frame (TIM)	Long/short time needed Time extendable
6. Taking notes (NOT)	Ease to take minutes
7. Expression of questions (EXP)	Clear description for questions
8. Spontaneity (SPO)	Freedom to say Unplanned
9. Interactivity (INT)	More interaction Multi-way interaction
10. Focused (FOC)	Discuss the topic all the time Distraction Digress
11. Depth (DEP)	Chit-chat In-depth discussion Shallow discussion
12. Efficiency (EFF)	Repeated Time consuming Easy to draw conclusion
13. Preparation (PRE)	Well prepared Knowledgeable/professional
14. Responses (RES)	Immediate feedback Rapid response
15. View (VIE)	Able to refer to other materials Able to view discussion minutes before saying
16. Atmosphere (ATM)	Authenticity Comfort Aggression Equal access for shy participants Dominance
17. Technical problems (TEC)	Much technical support Easy access Difficulty

Table 2: A passage coded using the coding system

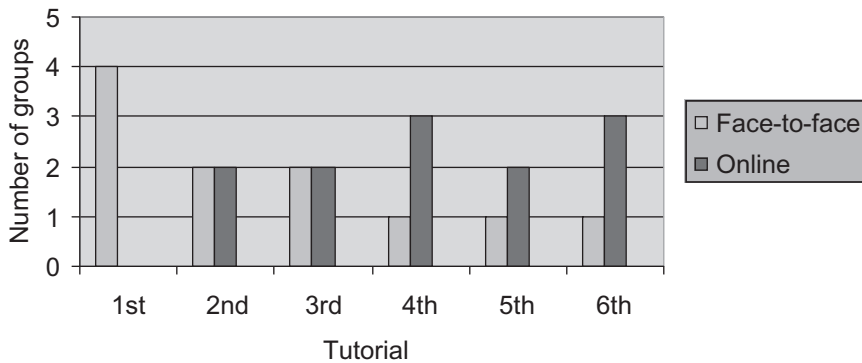|	
I feel that face-to-face sessions allow the group members to get responses at a faster rate because hearing is faster than reading. Also, f2f lets people see facial expressions	**RES (F+)**
and thus able to interpret the meaning behind the words spoken more accurately, as well as, it is easier to slip into using dialects/other languages (hard	**CUE (F+)**
to use typing to represent dialects) to find the more appropriate word to express their thoughts. But, disadvantages would be that since in a group, discussion may	**COM (F+)**
digress into gossiping/other non-constructive chit-chatting instead of discussing the topic at hand. Also, since responses are fast, it may be hard to hear and analyze	**FOC (F−)**
a lot of spoken sentences/meanings at the same time. Also, due to fast and continuous responses, it'll be hard to remember what was said/discussed unless	**COM (F−)**
someone was taking notes/minutes of the discussion (it may be difficult for the person to write down all the conversation that occur coz writing is slower than talking).	**NOT (F−)**

Figure 1: Number of online and face-to-face groups per tutorial session

related to 'response', therefore, it was coded as a RES. As the student thought this was a positive indicator to face-to-face discussions, the code RES was further refined as RES (F+).

Results

Preference for online and face-to-face discussions

Six tutorials contained in-class discussions. In each tutorial, the students were randomly grouped into four discussion groups consisting of six members each. This produced altogether 24 discussion groups over the entire period of the study. The leader of each group was allowed to decide on how to conduct the discussion: via online or face-to-face. The breakdown of online groups versus face-to-face groups is shown in Figure 1. In the first tutorial, discussions were all face-to-face. One leader even used an audio recorder to tape his group's conversation. The second and third tutorials involved two face-to-face and two online groups each. In the fourth tutorial, three groups went online and one group chose face-to-face. In the fifth tutorial, two groups opted online and one other face-to-face; the last group was discounted because the group members

did not have much discussion as expected. In the sixth tutorial, one group was face-to-face and the other three groups were online. Overall, the numbers of face-to-face and online discussion groups were about the same (11 face-to-face vs. 12 online). Note that more students opted for online discussions towards the last few tutorials because the group leaders believed that online discussions could allow discussion details to be recorded in texts and make their report writing easier. Additionally, all online discussion groups chose Weblog as their discussion platform probably because they found it less a hassle than using Blackboard.

What happened during the discussions?
The online discussions and the face-to-face discussions looked quite different from the surface. The online groups were silent. Every one sat behind a computer and was busy with typing. Comparatively, the face-to-face groups were more 'noisy' and interactive. The face-to-face groups were seen talking, discussing and even laughing.

Planning for an in-class online discussion may not seem always easy. Take the fourth tutorial (consisting of three online groups) as an example. There was some confusion at the beginning of the discussions while the tutor was trying to allocate the students into groups. A student who did not closely follow the tutor's instructions went to a wrong online discussion group. Consequently, it took much time to detect this mistake. Comparatively, because every action in a face-to-face activity is observable and identifiable, it suffers less miscommunication and misinterpretation.

Another phenomenon observed in the discussions was that in-class online discussions usually took a longer time to complete than face-to-face discussions. All discussions were expected to complete within a 40-minute time frame. When the discussion entered the last 5 minutes, the tutor would remind them to wind up their conversation. More often than not, the online groups would ask for extra time. They argued that they could not just leave their postings without a proper ending. In contrast, the face-to-face groups appeared to be more adaptive with their last bit of work; as a result, they were able to finish the discussions more punctually.

The leaders of online groups were seen more relaxed than their face-to-face counterparts. Very often, the leaders distributed the discussion forum uniform resource locators (URLs) written on paper to the members at the beginning of the online discussions. During the initial stage of the discussions, when few postings were received, the group leaders walked around, moderated and answered questions. Only when the discussions started to heat up would the group leaders have to moderate and mediate the discussions. In other words, the online discussion leaders were not entirely involved in the discussions right from the beginning. Face-to-face discussions entail their group leaders to be engaged throughout the whole discussion processes. They had to take notes, ask questions and provide directions to attain the discussion goals.

Another difference found in the summary reports of discussions submitted by the group leaders was that online group leaders often copied postings from the discussion forums

and pasted it to their summary reports. On the contrary, the face-to-face group leaders often had to paraphrase the members' ideas before using them in their own reports.

Perceived differences

Table 3 lists the numbers of positive and negative points towards online discussions, indexed by the difference value between the positive and negative points. Here the difference is defined as $\text{dif}(O) = (O+) - (O-)$, where $O+$ is the positive points and $O-$ is the negative points towards online discussions. A positive $\text{dif}(O)$ indicates that this theme favours online discussions, whereas a negative $\text{dif}(O)$ means that the theme prefers face-to-face discussions. Moreover, the absolute value of $\text{dif}(O)$ gives the extent of the perceived difference. For instance, the difference value of the atmosphere theme was 7 $(9 - 2)$, which implied the students tended to agree that online discussions could provide a better atmosphere than face-to-face discussions. The table also shows that atmospher and clarification were perceived to be the most favourable themes for online discussions, and efficiency and communication were the least favourable ones.

Table 4 shows the numbers of positive and negative points towards face-to-face discussions, also indexed by the difference value between the positive and negative points. The difference is similarly defined as $\text{dif}(F) = (F+) - (F-)$, where $F+$ are the positive points and $F-$ are the negative points towards face-to-face discussions. Responses and clarification were ranked as the most-favoured themes for face-to-face discussions, and atmosphere and preparation were the most unsuitable themes for face-to-face discussions.

Table 3: Positive and negative points towards online discussions

	Online		
	+	−	*dif(O)*
1. Atmosphere	9	2	7
2. Clarification	7	0	7
3. Efficiency	0	7	−7
4. Communication	0	6	−6
5. Focused	6	1	5
6. Expression of questions	0	5	−5
7. Time frame	2	7	−5
8. Interactivity	0	5	−5
9. Convenience	4	0	4
10. Ability to view	4	0	4
11. Depth	4	0	4
12. Technical problems	0	4	−4
13. Visual cues	0	4	−4
14. Taking notes	2	0	2
15. Responses	0	2	−2
16. Preparation	0	1	−1
17. Spontaneity	0	1	−1

Note. $\text{dif}(O) = (O+) - (O-)$

Table 4: Positive and negative points towards face-to-face discussions

	Face-to-face		
	+	−	*dif(F)*
1. Responses	13	0	13
2. Atmosphere	0	10	−10
3. Clarification	9	0	9
4. Preparation	0	8	−8
5. Efficiency	6	0	6
6. Interactivity	6	0	6
7. Visual cues	6	1	5
8. Communication	4	0	4
9. Spontaneity	4	0	4
10. Taking notes	0	4	−4
11. Time frame	0	3	−3
12. Focused	2	4	−2
13. Convenience	0	1	−1
14. Ability to view	0	1	−1
15. Depth	2	3	−1
16. Expression of questions	0	0	0
17. Technical problems	0	0	0

Note. $\text{dif}(F) = (F+) - (F-)$

Table 5 displays the perceived difference between the online and the face-to-face discussions, indexed by the value of the difference defined as $\text{dif} = \text{dif}(O) - \text{dif}(F)$. A positive difference means the theme favours online discussions over face-to-face discussions. The top five themes that were perceived to have major differences between face-to-face and asynchronous online discussions were atmosphere ($\text{dif} = 17$), responses ($\text{dif} = -15$), efficiency ($\text{dif} = -13$), interactivity ($\text{dif} = -11$) and communication ($\text{dif} = -10$). These themes will be further discussed in the following section.

Table 5 also shows that some themes were mentioned many times in the reflections but had no major perceived differences. This means the themes were perceived important for both online and face-to-face discussions but the difference of importance was insignificant. For instance, the theme of clarification received 7 dif(O) and 9 dif(F), but the difference is low ($\text{dif} = -2$). The students basically believed that both online and face-to-face discussions were helpful for clarification. In online discussions participants had more time to think, clarify and respond, while in face-to-face discussions participants could immediately raise questions and clarify.

Discussion
Atmosphere
Among the top five identified themes, only atmosphere scored a positive value towards online discussions. By atmosphere, it means authenticity, comfort, aggression, equal

Table 5: Perceived differences between online and face-to-face discussions

	dif
1. Atmosphere	17
2. Responses	−15
3. Efficiency	−13
4. Interactivity	−11
5. Communication	−10
6. Visual cues	−9
7. Focused	7
8. Preparation	7
9. Taking notes	6
10. Convenience	5
11. Ability to view	5
12. Depth	5
13. Expression of questions	−5
14. Spontaneity	−5
15. Technical problems	−4
16. Clarification	−2
17. Time frame	−2

Note. dif = dif(*O*) − dif(*F*)

access and dominance. In terms of authenticity, face-to-face discussions were more real and authentic than in-class online discussions because participants could talk to each other in real time, see their facial expressions and clarify matters immediately. In this aspect, face-to-face discussions were regarded as more superior to online discussions. But in other considerations, online discussions were more comfortable, less aggressive and offered more equal opportunities for group members to voice their opinions. Dominance by more vocal individuals was most likely to happen in an online discussion (King, 2001; Yu, 2002).

It seems that asynchronous online discussions are more appropriate for group characteristics that consist of a mix of introversion and extroversion, and submissiveness and dominance. In addition, online discussions would be more helpful if the discussions intend to create a more equal opportunity for all group members (cf. Warschauer, 1995) or to avoid aggression.

Responses

Responses in face-to-face discussions are more prompt than in online discussions. A commonly reported drawback of online discussions is that participants can hardly get immediate feedback from others because not all participate at the same time. This drawback may frustrate those participants who are impatient and in need of a response to act upon. This study indicated that the problem of delayed response was not spared when the online discussions were conducted in the classroom setting. Even within a

given time frame to do online discussions students still differed in the rate of thinking, typing, and sending their responses. As a result, some postings could hold back certain portions of discussion while others might lose their intended audience. This study suggests using face-to-face discussions in situations where prompt responses are the main concern of the activity.

Efficiency

Face-to-face discussions seem to be more efficient than online discussions in terms of time and ease to make conclusions. This study found that asynchronous online discussions needed a longer time frame to complete because participants in online discussions normally spend more time in articulating their ideas and writing in words. This result is consistent with findings of other studies such as Meyer (2003), Jonassen and Kwon (2001), and Olaniran, Savage and Sorenson (1996). This was probably because (1) the online participants spent too much time debating and negotiating, (2) the leaders did not mediate the online discussions to the same extent as their face-to-face counterparts, and (3) the lack of facilitating skills might prevent the groups from reaching agreements (Hiltz, Johnson & Turoff, 1986). This study thus suggests that face-to-face discussions be the first choice in situations where there is a limited time frame and conclusions must be reached urgently.

Interactivity

Face-to-face discussions are most likely to involve more interaction than online discussions, and the interaction is more multidirectional. In this study, it was found that when a student was expressing thoughts in a face-to-face discussion, the other members often were also making complementary remarks, comments or clarifications at the same time. The discussion process was more interactive and went in multiple ways. However, the online discussions were more restricted and tended to be more one-way. It might be because the online group members were already struggling to answer the discussion questions posted by the leaders within the time limit, leaving little time for further interactions. Maybe, more interaction would happen if the discussion period had been extended. This argument is consistent with the result of the study done by Card and Horton (2000) who claimed that 'computer technologies do not always foster a two-way interaction' (p. 243). Consequently, this study supports the notion that online discussions may not always foster two-way interaction, particularly when the time frame is short.

Communication

Communication in face-to-face discussions is easier and more natural than in online discussions. Johnson *et al* (2000) identified that face-to-face discussions allowed multiple channels of communication as it involved much nonverbal information such as tone of voice, gesture and facial expression. This study showed that the face-to-face students used a variety of languages they preferred in oral speaking such as English, Chinese or even dialects. In online discussions, however, participants could only use written texts in only one language, ie, English. Additionally, students commented that they felt easier to express thoughts in face-to-face discussions. They could speak out their ideas without

paying much attention to the structure of sentences and grammars. They could also receive information cues immediately when the audience was unclear.

In conclusion, these top five themes seem to be interconnected to each other. For instance, face-to-face discussions were perceived to be efficient, probably because it supported multichannel communications, provided more interaction and immediate responses, and allowed instant clarifications. In addition, these top five themes are not completely consistent with the four key differences (access, timing, mode of expression and visual cues) reported by Tiene (2000). It seems that access was not a problem for online discussions in this study, as the students did not encounter any technical problem. Timing was perceived to be negative for both online and face-to-face discussions. This is because online discussions need a longer time frame to carry out while face-to-face discussions require all participants to agree on a common time and place.

Implications
This study has implications for designing online and face-to-face discussions. Online discussions must have a longer time frame. Participants need time to view postings, reflect on it, type in texts and refine writing. After posting, they have to wait for responses. All these events take time. If the discussion period is short, an online discussion would most likely become a one-way communication. Face-to-face discussions may be more appropriate in this case. This study, however, did not suggest the optimal time frame for asynchronous online discussions. Group leaders would therefore need to include time frame as a major consideration when they choose a medium for the discussions.

Breaking down a complicated discussion question into smaller or more specific questions may help facilitate online discussions. A complex discussion topic usually requires a lengthy answer. If the time frame is short, participants probably will have no time to read others' postings and engage in further in-depth discussions. Comparatively, a more specific question will be relatively easier for them to answer quickly and hence, they will have more time to move on to further discussions.

Questions for online discussions must be clearly stated and understandable. Because of the delayed feature of asynchronous online discussion, participants are less likely to get prompt responses from others. If the questions are unclear and the participants cannot clarify immediately, the participant's progress will be impeded. However, in a face-to-face discussion setting, this is less of a problem because any clarification can be done immediately and collectively.

Participants need to be well prepared for face-to-face discussions. In an online discussion environment, participants have enough time to refer to other supporting references such as the Internet resources. However, participants in face-to-face discussions just cannot do that. Immediate responses are always expected. Although face-to-face discussions may offer a good opportunity for those who are less prepared to gain

knowledge from the group, it is difficult for them to make useful contributions. This is detrimental to the learning process and the learning community as a whole.

Limitations and future research

This study faced some limitations. First, it compared face-to-face discussions only with asynchronous online discussions, but not with synchronous online discussions. The differences between face-to-face discussions and in-class synchronous discussions can be further explored in future studies.

Second, the time frame for the asynchronous online discussion seemed to be too short. The discussion time of 40 minutes was very much limited by the fixed time slot for each class session. As observed, many students had only time to answer the group leader's questions, but not enough time for further clarification and interaction. That was why some students commented that the online discussions lacked interaction and involved only one-way communication. This finding suggests that further studies on asynchronous discussions be done in a longer time frame to verify whether more two-way interaction is promoted.

Third, the number of participants of the study was limited to the class size of 24. Additionally, the students were randomly grouped for discussions, not based on any criterion such as heterogeneous or homogeneous learning styles or friendship (cf. Vass, 2002). The results may not apply well to other dissimilar contexts. Allowing group leaders to freely choose face-to-face or asynchronous online discussions might also reduce the control of influence on their perceptions for the mode of discussion. The results suggest that future studies should involve a larger number of participants, have more heterogeneous discussion groups in terms of background or learning styles, and provide a more equal environment for both online and face-to-face discussions through the whole study period.

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