Use of asynchronous online discussion in a hypermedia design class: Pre-service teachers' perceptions

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Abstract

The main objective of this study was to investigate how a group of pre-service teachers perceived the opportunities and limitations of using an asynchronous online discussion forum to learn hypermedia design concepts. To achieve this, a case study of two classes was carried out. Data was collected through student interviews, examination of students' reflection logs, online discussion transcripts, and a questionnaire survey to compare students' opinions of learning and thinking via asynchronous online discussions with other common modes of learning. Findings revealed three major advantages and four factors that discouraged pre-service teachers from participating in asynchronous online discussion. No statistical significance was found in the pre-service teachers' responses to whether they perceive themselves learning more about hypermedia design concepts in the asynchronous online discussion as compared to other modes of learning. However, they perceived themselves to have thought more in the asynchronous online discussion environment rather than in the web-based resource environment ($p<0.01$*), and from printed materials (*$p<0.05$*).*

Introduction

In the last few years, there has been a proliferation of computer-mediated communication (CMC) tools, which have opened up the possibilities for learners to exchange ideas for the purpose of discussing a topic of mutual interest. Feenberg (1987), for example, noted that since 1982, CMC has been used for higher education instruction on a small but growing scale. One such CMC tool is the asynchronous online discussion forum. Asynchronous online discussion forums, which are also sometimes known as computer conferencing, can refer to a variety of systems that allow participants to communicate with one another without being online at the same time (Romiszowski & Mason, 1996).

The main objective of this study was to investigate how a group of pre-service teachers perceived the opportunities and limitations of using an asynchronous online discussion forum to learn hypermedia design concepts. To achieve this, a case study of two classes was carried out. Data was collected through student interviews, examination of students' reflection logs, online discussion transcripts, and a questionnaire survey to compare students' opinions of learning and thinking via asynchronous online discussions with other common modes of learning. Findings from this study will be useful to inform instructors on how to adapt asynchronous online discussions to best help their students learn.

Asynchronous online discussion

Asynchronous online discussion enables individuals to be a part of a virtual community in which they perform a common task of learning cooperatively (Bourne, 2000). The following section will examine some of the benefits and limitations of using asynchronous online discussion in teaching and learning.

Benefits of asynchronous online discussion

Asynchronous online discussion allows individuals to have learning experiences beyond traditional classroom settings (Gilbert & Dabbagh, 2005; Cheung & Hew, 2004). Individuals can participate in the asynchronous online discussion any time and any place (Hew & Cheung, 2003), giving them more time to think about the issues and/or problems before responding to them.

Asynchronous online discussion environment also allows individuals to express their thoughts and ideas with more freedom and ease, and also increase their own reflection and interactions with others (Hew & Cheung, 2003). Some studies (McReary, 1989; Newman, Johnson, Webb, & Cochrane, 1997; Henri, 1992) indicated that individuals' reasoning skills could be improved by using asynchronous online discussion. Through collaboration and social negotiation in an asynchronous online environment, individuals are able to construct knowledge and relate what they learn to their prior knowledge (Gilbert & Dabbagh, 2005).

An asynchronous discussion environment is able to capture the written thoughts of the individuals in the form of discussion transcripts. The transcripts allow the students to exchange in-depth feedback. Moreover, the process of writing encourages reflection which helps promote higher level learning such as analysis, synthesis, evaluation as well as clear and precise thinking (Garrison, 1993). In terms of the learning benefit, the value of being able to allow everyone to read and follow the thinking process of others in the class made an impact on all participants. For example, the online discussion may provide the participants with a new perspective, a way to imagine another point of view, or a deeper understanding of the material (Ruberg, Moore & Taylor, 1996).

Limitations of asynchronous online discussion

Despite the aforementioned benefits of using asynchronous online discussion, there exist some limitations that would hinder its effective use. Tutors or moderators, too, often find that the online discussion turns out to be surprisingly inactive in practice (Groeling, 1999). Online discussion often translates into little to no discussion. From literature, the various reasons for this are identified. Some of the main reasons are described in the following section.

Technological difficulties faced by individuals in the asynchronous online discussion forum are commonly cited as an obstacle in the use of this tool (Pérez Cereijo, Young, & Wilhelm, 2001; Lewis, Whitaker, & Julian, 1995). Slow Internet access or connection problems can also accentuate the problem of logging on to the discussion forum. Students may thus become disenchanted with the technology and are negative about the use of asynchronous online discussion.

For some students, the delay in receiving feedback or responses to their messages is perceived to be a major problem (Hew & Cheung, 2003). The lack of visual and auditory cues in an asynchronous online discussion forum can put off contribution (Hammond, 2000; Bullen, 1998). As a result, problems such as procrastination or failure to respond at all may occur (Romiszowski & Mason, 1996). The low levels of visual and auditory cues can also lead to more uninhibited behaviour on the part of the participants (Berge, 1997; Berge & Collins, 1995). This may cause some participants to become antagonistic, negative or critical toward others (Pena-Shaff, Martin, & Gay, 2001). Insults may therefore be traded in the midst of the online discussion.

Most of the asynchronous online discussion environments are threaded environments. Some individuals become disoriented in such an environment (Hew & Cheung, 2003). For example, some may post their ideas that do not belong in a particular thread. As a result, others may find it difficult to follow the discussion. Despite its limitations, an asynchronous online discussion provides participants an alternative way to interact with one another. Although the lack of social presence in asynchronous communication can result in less personal and socio-emotional interactions, an asynchronous communication environment frequently supports more task-oriented exchanges in comparison to face-to-face communication (Walther, 1992). An important question then, is how asynchronous online discussion can affect the pre-service teachers' learning experiences while involved in the design of hypermedia projects.

Research questions

Four main research questions guided this study:

i. What advantages do the pre-service teachers perceive by participating in an asynchronous online discussion?

ii. What are the factors that discourage the pre-service teachers from participating in the asynchronous online discussion?

iii. Do the pre-service teachers see themselves learning more about hypermedia design concepts in the asynchronous online discussion as compared to other modes of learning (such as lecture, face-to-face discussion with project partner, face-to-face discussion with classmates, face-to-face discussion with tutor, printed materials, and Web-based resources)?

iv. Do the pre-service teachers see themselves thinking more about hypermedia design concepts in the asynchronous online discussion compared to other modes of learning?

Method

Subjects

The subjects for this research were forty-seven pre-service teachers enrolled in a diploma in education program. There were seventeen (36%) male students and thirty (64%) female students. Two of the forty-seven students (4.3%) reported that they seldom participate in asynchronous online discussions prior to this study, while nineteen (40.4%) and twenty (42.6%) of them participated "sometimes" and "often" respectively. The remaining six subjects (12.8%) had been involved in several asynchronous online discussions.

Data collection and analysis procedures

The core basis for this research study was a course entitled, "Instructional Message Design". In this particular module, students learned important hypermedia design concepts such as learner control and the use of media. Students also designed and developed hypermedia projects that served as instructional materials to be used in actual classroom settings. Besides the usual face-to-face tutorial sessions, asynchronous online discussions were also held. These asynchronous online discussions (which lasted two weeks) were facilitated by discussion forums available in BlackBoard: web-based course management software adopted by the National Institute of Education, Singapore (NIE). All the students who participated in this study had computers and Internet access at home.

Prior to the start of the first online discussion session, the forty-seven students were first briefed, in a face-to-face tutorial session, on the objective of the discussion. Students were told to give their comments about previous hypermedia projects done by other students in terms of the use of media and learner control. Altogether, eleven hypermedia projects were posted onto the web. These previous projects served as vehicles to stimulate student thinking, questioning, and idea sharing. The students were required to justify all the statements they made in the online discussion. The rationale for the exercise was to provide each student the opportunity to:

i. Consolidate their previous learning from face-to-face tutorial and reading materials.
ii. Apply their previous learning in evaluating others' projects. Students did not know the owners of those projects, so that they may be more willing to share their comments.
iii. Help the students to become better acquainted with one another.

The asynchronous online discussion forum used by the researchers had the capability of saving a transcript of the students' discussion. Therefore, the entire two-week online discussion was saved and downloaded for analysis.

Next, as a class assignment, all students were also asked to maintain a reflective log by describing what they had learnt in the discussion. This was to enable each student to:

i. Reflect on what they had learnt from the online discussion.
ii. Think about the advantages of using the online discussion.
iii. Indicate and identify some of the important hypermedia concepts and ideas in their minds.

These reflective logs also provided the researchers insights into students' thoughts and reactions during the online discussion.

At the conclusion of the entire course, the students were asked to complete a paper-based questionnaire survey. All forty-seven students returned the survey. The aim of this survey was to compare students' opinion of learning and thinking via asynchronous online discussion with other common modes of learning (e.g. lecture and tutorial modes). Face-to-face interviews with selected students were also held upon completion of the course.

Results

Findings of the face-to-face student interviews, students' reflection logs, online discussion transcripts and questionnaire survey were first studied independently by the researchers and were later compared to obtain a more reliable conclusion. The key findings are addressed after each of the research questions.

What advantages do the pre-service teachers perceive by participating in an asynchronous online discussion?

The main advantage of participating in an asynchronous online discussion was the convenience associated with the flexibility of time. A majority of the pre-service teachers (45.7%) indicated that they liked the convenience associated with asynchronicity. As one subject wrote, "I can post my discussions anytime within the discussion period and I find it is more convenient this way". Another pre-service teacher exemplified the appreciation of this advantage in a log entry:

> The online discussion permits us to review the files [i.e. the hypermedia projects done by previous students] any time along the given period [i.e. the duration of the entire discussion], which I feel is a better way of learning. You will engage in the learning out of your own interest without feeling threatened like "you have to learn it now in [these] two periods". I personally feel that given our own time management in [this] study, it is [a] more conducive and productive way of learning.

The second main advantage of participating in an asynchronous online discussion as perceived by the pre-service teachers was that people seemed to be more open and expressed their ideas more freely. 37% of the pre-service teachers felt that their classmates were more outspoken during the online discussion than in normal classroom situations. One of them stated: "Valuable feedback could be obtained from classmates who might not feel comfortable commenting in person". Another commented: "I am able to express my views better during online discussion and am more comfortable that way".

The third main advantage of using asynchronous online discussion was the ease by which ideas could be exchanged and shared among the participants. A handful of students (17.1%) indicated that they were able to get feedback or suggestions from more of their classmates rather than just one or two. The value of being able to read what others commented had an effect on some pre-service teachers, as indicated by a log entry:

> The existence of the online discussion was very beneficial … One of the ways is by learning from other classmates' comments. By analyzing other [people's] point of views and opinions about a certain project, it creates room for me to do some critical thinking and considerations on applying certain functions or background on my project's template.

What are the factors that discourage the pre-service teachers from participating in the asynchronous online discussion?

There are four main factors that discouraged the pre-service teachers from participating in the online discussion. Interestingly, the most common factor, as indicated by 19.4% of the students, was the limited amount of time they had in using the asynchronous online discussion. Even though the discussion forum was available 24 hours a day and 7 days a week for the entirety of two weeks, some pre-service teachers still complained about the time constraint. Therefore, it appears that some inconsistency exists between the main advantage of asynchronous online discussion as perceived by the pre-service teachers and the main factor that discouraged them from participating. Although they generally felt that the asynchronicity of the discussion gave them the opportunity to log in and post comments at any time they like, they still considered time constraint as a major factor that inhibited their participation. This apparent contradiction will be discussed in the final section of this paper.

The frustration felt by the pre-service teachers when they received slow feedback or response to their queries or messages was the second main factor which discouraged participation. Almost fourteen per cent of the pre-service teachers complained about having to wait for responses on some ideas that they wished to clarify urgently. One pre-service teacher, in comparison with the discussion in a normal tutorial session, wrote: "We have to wait for responses unlike in face-to-face discussion where you can have it impromptu."

The third main factor that discouraged participation was slow Internet access, as indicated by 11.1% of the students. The general consensus among these students was that "it was rather time consuming and slow Internet access took up a lot of [our] time".

The fourth main factor that discouraged the pre-service teachers' from participating in the asynchronous online discussion was due to server problems. 11% of them expressed the obstacles they encountered while attempting to access the discussion forum.

Do the pre-service teachers see themselves learning more about hypermedia design concepts in the asynchronous online discussion as compared to other modes of learning (such as lecture, face-to-face discussion with project partner, face-to-face discussion with classmates, face-to-face discussion with tutor, printed materials, and web-based resources)?

No statistical significance was found (see Table 1) in the pre-service teachers' responses to the question as to whether they perceived themselves learning more about hypermedia design concepts in the asynchronous online discussion as compared to other modes of learning. However, quantitatively, a marginal majority of the students indicated that they learned more about hypermedia design concepts in the asynchronous online discussion compared to lecture, face-to-face discussions with their partners and printed materials (e.g. books, papers). Moreover, close to two-thirds of them felt that they learned more in the online discussion than in face-to-face discussions with their classmates and from web-based resources. However, only 40.4% of them agreed that they learned more in the online discussion compared to interacting with the tutor. Table 1 shows the actual percentage of their responses and Chi-square test results.

Table 1: Pre-service teachers' perception about their learning in asynchronous online discussion and other modes of learning

Comparison	% of students who learn more in the online environment	Chi-square test Asymp. significance (2-sided)
Online vs Lecture	51.1%	X^2 = 0.021, df = 1, *p=0.884*
Online vs F2f (partner)	51.1%	X^2 = 0.021, df = 1, *p=0.884*
Online vs F2f (classmates)	61.7%	X^2 = 2.574, df = 1, *p=0.109*
Online vs F2f (tutor)	40.4%	X^2 = 1.723, df = 1, *p=0.189*
Online vs Printed materials	55.3%	X^2 = 0.532, df = 1, *p=0.466*
Online vs Web-based Resources	63.8%	X^2 = 3.596, df = 1, *p=0.058*

N=47

Do the pre-service teachers perceive themselves thinking more about hypermedia design concepts in the asynchronous online discussion as compared to other modes of learning?

Generally, most pre-service teachers felt that participating in the asynchronous online discussion allowed them to think more about hypermedia design concepts in comparison to other modes of learning. They indicated that they significantly thought more in the online discussion when compared to accessing other Web-based resources ($p< 0.01$). Moreover, they also significantly thought more in the online discussion when compared to printed materials ($p<0.05$). However, as in the case of learning hypermedia concepts, only 40.4% of the students felt that they thought more in the online discussion compared to interacting with the tutor. In other words, the tutor was able to stimulate the students' thinking more effectively in a face-to-face discussion mode. Table 2 shows the actual percentage of their responses and Chi-square results.

Table 2. Pre-service teachers' perception about their thinking in asynchronous online discussion and other modes of learning

Comparison	% of students who think more in the online environment	Chi-square test Asymp. significance (2-sided)
Online vs Lecture	55.3%	X^2 = 0.532, df = 1, p=0.466
Online vs F2f (partner)	57.1%	X^2 = 1.043, df = 1, p=0.307
Online vs F2f (classmates)	61.7%	X^2 = 2.574, df = 1, p=0.109
Online vs F2f (tutor)	40.4%	X^2 = 1.723, df = 1, p=0.189
Online vs Printed materials	66.0%	X^2 = 4.787, df = 1, p=0.029*
Online vs Web-based Resources	72.3%	X^2 = 9.383, df = 1, p=0.002**

N=47, * p < 0.05, ** p < 0.01

Discussion and conclusion

In this study, the three main advantages that pre-service teachers perceived by participating in the asynchronous online discussion environment were the convenience of participating at anytime in the discussion, the openness in exchanging ideas, and the ease of receiving feedback from others. The pre-service teachers also identified four major factors that discouraged them from participating in the asynchronous online discussion: a limited amount of time for discussion, the slow rate at which one received feedback from others, slow internet access and server problems. As mentioned earlier, one of the interesting findings in this study is the contradiction between the main advantage and the main factor that discouraged participation, as perceived by the pre-service teachers in the use of an asynchronous online discussion. Some pre-service teachers commented that they had little time for the discussion. There are several reasons for this reaction:

i. Technical demands associated with getting the asynchronous online discussion forum set up and running (Drew, 2000) could hinder one's participation in such a discussion. It requires the use of some computer equipment, software, and Internet connections. Some of them may not have these resources at home so participating in the online discussion becomes a hassle for them. They may need to go to their classmates' homes or even back to the campus to post their messages to the discussion.

ii. Another reason might be an overloaded online system where it becomes difficult to make connections to the BlackBoard software at NIE because the lines were busy. The analysis of the timestamps of the message postings in this study revealed that almost half of all the messages were posted between 1200 and 1500 hours. This was the period where the pre-service teachers had difficulty logging in to the discussion forum, prompting one student to comment "slow Internet access time makes online discussion very frustrating." However, it is not easy to avoid the network gridlock because there are many courses in NIE that required students to use the Blackboard software. As a result, it is difficult to ensure that the network traffic is not overloaded.

iii. The pre-service teachers were also very busy with other course modules. One of them gave the reason that "time allocated for the online discussion clashes with the deadlines of other course modules, thus [the] lack of time to participate". Along the same lines, one remarked, "We need to access the Net quite often and it may be difficult as time is also occupied with doing other work".

It was also found that the pre-service teachers did *not* significantly perceive themselves to have learned more about hypermedia design in the asynchronous online discussion when compared to lecture, face-to-face discussion with partners, classmates, or tutor, printed materials, and web-based resources. However, students indicated that they significantly felt themselves *thinking* more about hypermedia design concepts in the online discussion environment in comparison to accessing other *web-based resources* and *printed materials*. These results showed that an asynchronous online discussion environment is comparable to other modes of instruction such as lecture, and face-to-face discussion with partners, classmates, and tutor as far as students' learning and thinking about hypermedia design concepts are concerned. Educators should realize the advantages and limitations of using asynchronous online discussion. Asynchronous online discussion is one of the e-learning strategies to help students to learn. With the appropriate use of facilitation skills, online discussions protocols, and evaluation criteria (Gilbert & Dabbagh, 2005), some of the obstacles of employing an asynchronous online discussion environment can be alleviated, and the benefits of such discussion environments can be reaped.

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