

Exploring WAP Technologies: Mediating E-Discussions in Learning Communities

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Introduction

The use of computer-mediated communication is proving to be a powerful medium for both online and conventional classroom-based courses. Research studies have shown that the use of communication tools such as the e-mail, bulletin board, and chat line promote student-centered learning (Harasim, 1990; Zhu, 1998; Cecez-Kecmanovic & Webb, 2000). New technologies such as Wireless Application Protocol (WAP), General Packet Radio Service (GPRS) and 3G (3rd Generation) technologies offer education institutions additional tools that allow students and instructors access to the Internet, anywhere and anytime, via the micro browser equipped mobile phone.

The main objective of the study is to explore the opportunities and limitations of WAP technology that mediate e-discussions in learning communities. Adopting an exploratory approach, a case study of a class of 20 students in an Instructional Technology module was carried out from July to October 2001. Both qualitative and quantitative methods were used. These include interviews and a questionnaire survey to find out the participants' perceptions of using WAP as a communication tool, as well as how the new technology has facilitated or impeded their learning process, both technically and cognitively. A discourse analysis was applied to the postings where the types of discussions were coded. Comparison was also made between the new technology and computers uses in terms of the frequency of messages, and length and quality of messages.

Context of Study

'Instructional Technology' (PED 503/513) is one of the core modules in the Postgraduate Diploma in Education (PGDE) programme at the National Institute of Education, Singapore (NIE). In this module, students learn how to integrate Information Technology effectively into their classroom practices. There are eight face-to-face tutorial lessons and three online discussions. NIE has adopted Blackboard, an online learning delivering and management system that allows students to learn independently and instructors to customize the e-learning packages according to their students' need.

To explore the implications of emerging technologies for learning, the first author led an investigation team in early 2001 to investigate the opportunities and limitations of WAP technologies in mediating e-discussions. While the rest of the students participated in the online discussion forum through Blackboard (Figure 1) using computers, a class of 20 students used WAP-enabled mobile phones to participate in the discussion forum. Using the WAP-enabled mobile handsets, Siemens 3808I (figure 2), provided by Mobile (One) Asia, students in the study were able to access the threaded e-discussion forum (Figure 3) anytime, anywhere, and at their own pace.

Figure 1: Blackboard E-Discussion Forum

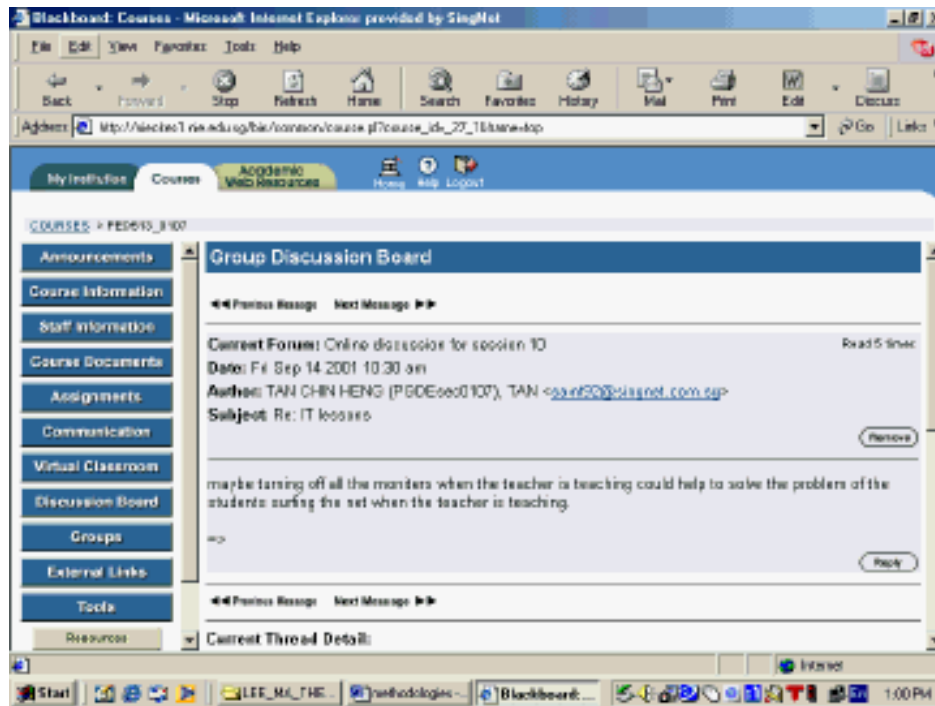


Figure 2: WAP-enabled Mobile Phone (Siemens 3808I)



Figure 3: WAP-based E-Discussion Forum



The research team identified the need to design and develop an application for e-discussion between the tutor and students by using the WAP-enabled mobile phones. In this application, the tutor is able to do the administrative function. He has the autonomy to manage the forums and his group, or to terminate the group and forum through the application and discuss with the students through WAP devices, such as creating new thread, deleting thread, replying to the messages and deleting messages. Students are able to log on to the e-discussion via the WAP-enabled phones to discuss with other classmates and tutor. They are empowered to create new threads, view threads and reply to the messages.

During the pilot test, some problems were encountered. Measures were then taken to refine the application. It was observed that students found it difficult to use the WAP-enabled mobile phones as a result of slow transmission speed, small screen, navigational problems and short life span of the battery. A WEB-based forum was created at the end of Forum 2, and implemented midway through Forum 3, to allow participants the flexibility to access either the WAP-based forum or the WEB-based forum (Figure 4). Participants were then able to locate the exact forum or thread or message using their personal computers.

Figure 4: WEB-based Discussion Forum



Design and Methods

To gain a full and elaborated picture of the study, multiple methods were adopted. With multiple methods, the biases and weaknesses of a single method could be overcome (Denzin 1988). In the initial stage of the study, findings and implications were drawn from the pilot test to add value to the formulation of this research study. The actual study included a face-to-face interview with the online forum tutor and a focus group interview with the students. A survey for all the students who were involved in the WAP-based discussion forum was also conducted. There were six forums in total. Two were brainstorming discussions and two were case study discussions. Forum 1 was the pilot study and Forum 5 was an informal web-information sharing forum. The postings for the four forums were coded and categorized qualitatively and quantitatively.

Major Findings

Findings drawn from the focus group interview, the face-to-face interview, the survey and the postings from WAP-based and WED-based forums were first studied independently and were later compared and matched to obtain a more holistic and reliable conclusion. There were six discussion forums in all. The first and the fifth forum, which formed the pilot study, and the informal web information-sharing forum were not part of the main study. Forum 2 and 6 were brainstorming discussions, whereas Forum 3 and 4 were case study discussions. Four key findings have been identified in this study:

1. There are technical and physical constraints of WAP technology that may be addressed by its complementary use with WEB technology and the role adopted by the instructor.
2. WAP technology complements WEB technology to mediate e-discussion in a learning community.
3. Pivotal role taken by the instructor to facilitate e-discussion.
4. The language used in WAP-based forum is unique. It is not a feature in formal writing nor does it resemble the messages found in the WEB-based forum.

Technical and Physical Constraints of WAP technology

The level of participation was rather encouraging for Forum 1 (pilot study). This might be due to the initial curiosity and excitement towards the new technology. However, the participation rate fell from 90.5% in

Forum 1 to a mere 57% in Forum 2, and the number of messages also experienced a sharp fall from 127 messages in Forum 1 to 25 messages in Forum 2. According to the students, the fall in participation was largely due to technical difficulties and the physical constraints of the WAP-enabled mobile phones that they have encountered when using them. Some of the technical difficulties they faced were short life span of phone battery, resending of messages, difficulty of logging into the forum, and navigational problems.

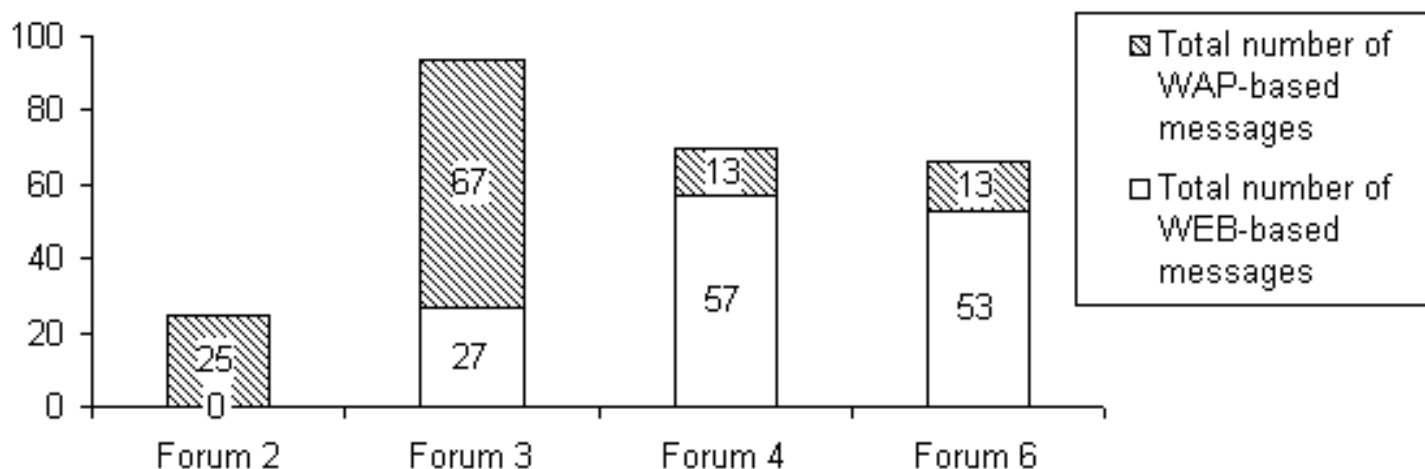
The students' questionnaire survey conducted at the end of the module clearly showed that the students were rather unhappy with these difficulties. All students either strongly agreed or agreed that it was difficult to read the messages from the small screen. 65% of the students responded that they faced technical problems when accessing the WAP-based forum. 85% of them felt that it was difficult to key in messages using the WAP-enabled phone and all students experienced difficulty in browsing the messages. Although technical constraints might be the main factor for the sharp fall in participation and contributions, this phenomenon might also be due to the discussion questions. The sharing of Microlessons ideas in Forum 2 might have caused the fall in participation and contributions as the students were more concerned with putting up their ideas rather than spending time commenting on others' ideas.

However, all these technical and physical concerns had urged the research team to create a WEB-based discussion forum that allowed the students the flexibility of either using the WAP-enabled mobile phones or computers to log into the discussion forum. According to the instructor, technical problems were not the most crucial but the first hurdle that had to be crossed. The next 2 findings show that the physical and technical constraints of WAP technology may be addressed by its complementary use with WEB technology and the pivotal role adopted by the instructor.

WAP Technology Complements WEB Technology to Mediate E-discussion

After the introduction of the WEB-based discussion forum, the level of participation and the number of contributions were more or less stabilized. Figure 5 shows the total number of WAP-based and WEB-based messages. In Forum 3, there were 67 WAP-based messages and 27 WEB-based messages. Forum 4 and 6 each yielded 13 WAP-based messages.

Figure 5: Total Number Of WAP-Based And WEB-Based Messages



The total number of WAP-based messages was high for Forum 3, this was because WEB-based forum was only introduced in the midst of this forum, and the students were still visiting the WAP-based forum. After the introduction of Web-based forum, the total number of messages in Forum 4 and 6 were the same at 13. This suggests that not all students have totally given up using the WAP-enabled mobile phones despite the introduction of the WEB-based forum. According to the data, there were 6 students who had never contributed to the WAP-based forum. But with the introduction of the WEB-based forum, all 6 contributed.

According to the analysis of individual students' contributions, it was recorded that there were 5 students who visited the WAP-based forum and the WEB-based forum at the same time. Among them, 2 students were actively using the WAP-based forum even after the introduction of WEB-based forum. In one student's contribution, out of her 16 messages posted after the introduction of WEB-based forum, 31% were WAP-based messages. Another student had posted 15 messages after the introduction of the WEB-based forums, and 73% of these were WAP-based ones. A student in the focus group interview felt that the major role of the WAP-enabled mobile phone was to complement the personal computer. It allowed her to check her unread messages anytime anywhere and reply if necessary. This point was elaborated by another student who believed that the WAP-enabled mobile phone should be used together with the personal computer to tap on the advantages of both tools. The rest of the 4 students in the focus group showed their approval by nodding their heads.

From the data, it was clear that the introduction of the WEB-based forum had encouraged online participation. However, the introduction of the WEB-based forum did not negate WAP-based postings. The students used WAP-enabled mobile phones or computers to participate in the WAP-based or WEB-based forums respectively. This suggests that the WAP-based forum complements the WEB-based forum. In this case, the advantages of both tools optimize and enhance the e-discussions. In other words, WAP technology provides another alternative to the e-discussion, allowing opportunities for collaboration and social interaction.

Pivotal Role Taken by the Instructor to Facilitate E-discussion

The class instructor played a crucial role in the discussions. He guided the students in the forums and facilitated the discussions by using different tactics. In some cases, he asked questions to probe the students to think deeper when the discussion lacked depth. For instance, in one of his messages, he wrote: "What kind of support should we give for independent learning?" The purpose of this question was to encourage the students to focus on the subject and also to think of the issue from different perspectives. The instructor also provided students with sufficient guidance and clarified their concepts whenever necessary. For example, when the students were confused with the concepts, he would either give hints to remind them, or to correct their misconception right away. These were done either via the discussion forums or personal e-mails. During the focus group interview, the majority of the students agreed that their instructor had fulfilled his job as mentor, guidance and listener. The role of the instructor in facilitating the e-discussions, mediated by WAP and WEB technologies, may have addressed some of the physical and technical constraints of WAP technology.

The Language Used in WAP-based Forum is Unique

From the messages that were analyzed, one common feature that was found in all the WAP-based messages was the use of their own version of short forms. Students tend to use "stu" for "students", "cher" for "teacher", "n" for "and", "chem." for "chemistry" and "2" for "to" etc. The average number of such short forms that appeared in WAP-based messages was 1.6 per message and 0.8 per message in WEB-based messages. According to the students in the focus group interview, they used more short forms in

WAP-based messages to save time and effort.

Others features found in WAP-based messages were the omission of subjects, for example, the omission of "I", and the improper use of grammar, punctuation and tenses. For example, a student wrote: "he need to find out what q his stud cant ans n are those q too diff 4 them". In this message, there was a high frequency of short forms and punctuation was absent. The capital letter was not in place, and the grammar used was not correct either. The language that was used in the WAP-based forum discussion is indeed a unique one. It is not a feature in formal writing nor does it resemble the messages found in the WEB-based forum. Although there were short forms and improper use of the language in the WEB-based forum, the messages were generally more organized and structured. Table 1 compares messages from the WAP-based and WEB-based forums posted under the same thread. We can clearly see that in the WAP-based message, there were less words than in the WEB-based message. In the WAP-based message, the number of short forms used was more and perspective taking was not obvious.

Table 1: A Comparison of WAP and WEB Messages

WAP messages	WEB messages
"how abt ask stud 2 present wat hav ben learnt in gps,b4 test.stud learn thru interactn,1 mtd of social constru?"	"Perhaps what he can do is to tell them to focus on certain parts of the website, give them the SIOs.. so that they know they have achieved something! And then make them do discussion on the topic in groups, come back to school and do the experiments so that they can digest the information better! and then he can test them. Not possible to just make them study a totally new topic without proper guidance. students will be students."

The average number of words in one WAP-based message was 16, whereas the number was 50 for a WEB-based message. WEB-based messages were lengthier than WAP-based ones in general. This may be due to the tendency to spend a longer time working on the computer than on the WAP-enabled mobile phone. It may also due to the physical and technical constraints of WAP technology. During the focus group interview, one student stated that, when he participated in the WAP-based discussion, he just wanted to go straight to the point and get his message across.

In the survey that was conducted at the end of the course, 65% of the students agreed that WAP technology has helped to build a learning community. They believed that the WAP-based forum has formed a closely-knit group, and everyone was able to participate and learn from each other. Even though the language used in WAP-based forum was different from the language used in the WEB-based forums, the students were able to understand it. This newly-emerged conversational style of writing suggests that the writer may be more concerned with conveying his/her thoughts and ideas than proper spelling, phrasing, grammar or punctuation.

During the interview, when the students were asked how they comprehended this form of language, they said that they had learnt it from one another through SMS (Short Message Service). And since most of them were very familiar with SMS, they actually transferred this "knowledge" into WAP-based discussions. Before the module, they were using their SMS skills mainly for social purposes, but now they were able to apply the same set of skills to engage in constructive sharing of ideas and knowledge through the WAP-based forum.

Conclusion

Wireless devices are expected to become pervasive learning tools in the immediate future. Emerging technologies such as WAP, GPRS and 3G have to be explored to reap their opportunities for learning. Research on the application of such technologies in education is slowly emerging. This study has reported on the pioneering efforts of using WAP technology in e-discussions to build a learning community. More studies have to be conducted to explore the possible ways to make WAP technology a successful social and intellectual tool for facilitating individual learning and enhancing the social construction of knowledge. The technical aspects of the WAP-enabled mobile phones should be considered seriously in the future development of WAP technology with respect to e-discussions or learning. Further comparisons may be made between WAP-based discussions and WEB-based discussions to tap the advantages of each technology to provide a more effective interaction mode.

To harness the potential of emerging technologies, we must continuously refine our research plans and methods. One way to improve it is to learn from previous studies and face future challenges. This exploratory study has discovered some of the limitations of WAP-based discussions. However, it has also revealed the potential of WAP as an online communicating tool. WAP technology may be an ideal instructional approach for building a learning community within technological enhanced educational settings in the near future. But the technical nature of this technology must be refined, modified and enhanced first. Additional qualitative and quantitative studies are also needed to substantiate the usefulness of WAP technology and to establish guidelines for integrating such tool into our learning.

The public access to the WAP sites is via <http://eduweb.nie.edu.sg/projects/WAP>.'

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