

Investigating learner preparedness for and usage patterns of mobile learning

GLENN STOCKWELL

*Waseda University, 1-6-1 Nishi-waseda Shinjuku-ku, Tokyo, Japan
(email: gstock@waseda.jp)*

Abstract

While the use of mobile devices for language learning has sparked the interest of an increasing number of researchers in recent years (e.g., Aizawa & Kiernan, 2003; Thornton & Houser, 2005), our knowledge of learners' preferences for the mobile platform and their usage patterns remains limited. Are learners prepared to use mobile phones for performing language learning activities, or is there still a preference for desktop computer environments? Do learners make attempts to use mobile phones and then opt for a desktop computer instead? When and where do those learners who choose to use mobile phones use them, and why do they choose them? The current study investigated 75 learners of English at a Japanese university who were assigned vocabulary learning activities which they could choose to complete on either a mobile phone or desktop computer. It sought to determine their intentions to use mobile phones for language learning if other options were available, to compare this with their actual usage patterns, and to determine when and why learners used mobile phones. Learner attitudes and preferences were elicited through a post-survey, and usage patterns were determined through analysis of detailed server logs. The results are discussed in terms of the readiness of learners to undertake mobile-based language learning activities, and the issues having an effect on the establishment of the mobile phone as a language learning tool.

Keywords: mobile learning, learner perceptions, intelligent systems

1 Introduction

Although mobile phones have started to appear more regularly in the literature on second language learning over the past few years, at this point they could not be termed as being a mainstream platform. Having said this, there is indeed great enthusiasm about the potential that mobile devices bring to language learning environments, and the prospect of having technology-enhanced materials carried around by learners to be

completed in their own time in a place of their choosing is one that has been predicted for some time now (e.g., Bax, 2003).

Research has certainly become more varied, with the focus of studies using mobile phones incorporating more of the functionalities that modern handsets now possess, such as email (Kiernan & Aizawa, 2004), Short Messaging System (SMS) (Levy & Kennedy, 2005), and Internet browsers (Taylor & Gitsaki, 2003). Responses from students regarding mobile learning have for the most part been positive, as indicated by the results of surveys such as Thornton and Houser (2002) and others, but considering learners were required to use the mobile phone as part of their language learning activities in these studies, is this really an accurate indication of how learners perceive mobile phones when they have a choice to use them or not? A study by Stockwell (2007) demonstrated that learners who could complete vocabulary learning activities on either a mobile phone or a desktop computer opted for the desktop computer in the vast majority of cases, with only 6.3% of all activities being completed on the mobile phone. Of these learners, more than half made no attempt at all to use the mobile phone for completing the activities. The reasons for the low usage of the mobile platform may not necessarily be as obvious as they might seem. Earlier studies such as those by Thornton and Houser (2001) cited the small screen and keypad as being troublesome, and this may well have been a cause of the lack of mobile phone use in the Stockwell study, but would this prevent students from even attempting to use the mobile platform? Some students in the Stockwell study did indicate that the costs of using their mobile phone for educational purposes were too high so they decided to use the desktop computer instead, but if costs are indeed high enough to dissuade learners from using their mobile phone, the implications for the widespread use of this platform for language learning are obviously significant.

2 Expectations for and barriers to mobile phone learning

Research into mobile phone learning at this point appears to present somewhat of a paradox. On the one hand, there are teachers and researchers who are enthusiastic about using mobile technologies, believing that providing means for learners to study “anytime, anywhere” will encourage more frequent and integral use of learning technologies as opposed to the more occasional use generally associated with computer laboratories (Roschelle, 2003). Many see mobile learning as the next generation of learning, one that is to be readily embraced by the learners using technologies that most already possess (see Australian Flexible Learning Framework, 2007; The MoLeNET Project, 2007). Others do take a more tempered approach, such as Levy and Kennedy (2005), who argue that the widespread acceptance of communication technologies in non-learning contexts does not necessarily mean that they will be effective or valued in educational contexts. Despite this, these teachers and researchers take an optimistic viewpoint towards the use of mobile phones for language learning, as attested to by the steadily growing body of research. Investigation of these studies does, for the most part, show that the vast majority expect learners to use their mobile phones, often simply on the premise that they own one, and learners are rarely given a choice to opt out of taking part in such a study.

On the other hand, in contrast to this, there are those who hold to a more pessimistic approach, pointing out the many factors that impede their introduction into language learning environments. Wang and Higgins (2006), for example, give a detailed overview

of the psychological, pedagogical, and technical barriers to using mobile phones in the classroom. They argue, quite rightly, that acceptance of new technologies takes time, and all learners cannot be expected to feel comfortable with using new technologies at the same rate. It is also possible, as Dias (2002) points out, that learners may see mobile learning as an intrusion into their own personal space, and this would also limit the degree to which they would accept mobile phones. Pedagogically, as Kukulska-Hulme and Shield (2007) argue, activities that capitalise on mobility and portability – the very rationale for using mobile technologies – are not as commonplace as one might hope, and although the “anywhere” factor is often not an issue, the “anytime” part is, where learners are sent messages by email or SMS at either fixed times, or times that suit the teacher, a tendency which seems to defeat the purpose of using mobile technologies at all. The technical limitations have been widely cited, and include the size of the screen and the difficulties of inputting text, particularly English (e.g., Thornton & Houser, 2002).

Unlike when computers first started to be used for language learning purposes, the mobile phone is already an established technology among much of the language learning population. This brings with it expectations on the part of teachers, but these expectations may not be equally reflected in learner attitudes. It appears that many learners seem reluctant to use the mobile phone for their language learning (e.g., Stockwell, 2007), but this is unlikely to be a reflection of a lack of confidence or competence with the mobile phone, rather, more an indication of learners’ unwillingness to use mobile phones for educational purposes as opposed to private ones. This leads us to ask whether we should force learners to use mobiles because teachers feel it is convenient for them in terms of mobility and portability. It is important to know how learners themselves perceive the mobile phones if they are to gain a wider acceptance amongst language learners. Exactly what, then, is the stance of the learners in this paradox? How prepared are our learners to engage in using mobile phones for language learning? Studies into learner preparedness into CALL in general do exist, such as Barrette’s (2001) work, but preparedness in this context is defined in terms of the skills the learners possessed and how comfortable they felt with using computers rather than their willingness to use them. Simple ownership of a technology and having the skills to use it does not necessarily relate to whether or not learners will actually use it. To that end, our knowledge of how willing learners are to use mobile technologies really cannot be determined just because they own mobile phones.

The purpose of the current study was to determine if and how learners who had the option of using either mobile phones or desktop computers (PCs) for language learning tasks would use the mobile phones. It differed from the earlier study (Stockwell, 2007) in that it also sought to examine learners’ preparedness for using the mobile phone through identifying their pre-use intentions to use this technology, and whether this intention was translated into actual mobile phone use. The study aimed to address the following research questions:

1. How do learners’ pre-use intentions regarding using mobile phones for language learning compare with actual usage?
2. When and where do learners undertake activities on the mobile phone outside of class time?

3. What are learners' specific usage patterns of mobile phones in terms of isolated usage, block usage, or continuous usage?
4. How do learners view mobile phones for use in the future, and is this view affected by their learning experiences on the mobile phone?

The method used in the study is described below.

3 Method

3.1 Participants and procedure

The participants in the current study were 75 first-year students spread across three classes all taught by the author at Waseda University. The course is compulsory for all students in the faculty, and is intended to assist learners with their English listening skills and vocabulary, focusing on a range of topics including new technologies, leisure activities, and various social problems. The classes were not streamed, and although learners were generally at a pre-intermediate level of proficiency, there were some learners who had experience living in an English-speaking country. Learners in the faculty are for the most part conscious of their Grade Point Average (GPA) and thus keen to score well in the subject.

Vocabulary activities based on the textbook materials were made available on both PC and mobile phone. As classes were held only once a week, learners were expected to complete the vocabulary activities outside of class time, although an orientation was held in the first class to show students how to log in and configure personal preferences such as the number of items per task and the frequency of vocabulary reminders. Time was also spent on ensuring that learners understood how to complete the actual activities themselves, and learners were given an opportunity to ask questions about how to use the system on either the PC or the mobile. The learners were required to complete the activities by the end of the semester (13 weeks). The activities were included in the grades for the subject, and learners were given a score of 10 if all of the 10 lessons were completed. This score was reduced by 1 mark for each lesson that was not finished, so the completion rates were very high, with 92% of learners completing all of the vocabulary tasks. In addition, as there was a weekly quiz in class based on the vocabulary activities from the third week, learners were encouraged to complete the activities consistently throughout the semester to help them prepare for the quizzes.

The focus of this study was specifically on desktop computers rather than including laptop computers, due to the fact that it was assumed that the desktop is still overwhelmingly the major computer technology possessed by students, with the exception of the mobile phone. Similarly, while other mobile devices are used by learners, there is very much a merging of mobile technologies where mobile phones include not only communication functionalities, but can also be used for data manipulation and for listening to MP3 files. To determine the accuracy of this assumption, an informal questionnaire was given at the start of the semester, where students were asked how many carried laptop computers, and how many used other mobile devices. Only one learner indicated that they carried a laptop computer, and while several also had iPods and other MP3 devices, almost half indicated that they used

their mobile phone for this function. No students owned a PDA, and none of the learners had ever used a mobile phone or other mobile device for learning purposes previously.

Learners were able to access the PC version of the materials from any location, including the university computer laboratories, their homes, or wherever they had access to the Internet. The mobile version was also accessible from anywhere learners were able to get a signal on their phones provided that they had Internet access. Learners were asked orally in the first class whether they had a mobile phone with Internet capabilities, and all 75 learners across the three classes indicated that they did. It was emphasised from the first class that they were free to use either the PC or the mobile, and it was up to themselves to decide which platform was most comfortable, with no pressure on them one way or the other. They were also told that they could switch between platforms as they saw fit, and that they could, if they desired, commence a lesson on one platform and complete it on the other with no disadvantage whatsoever. Learners were told in advance of the study that data would be collected and used for research and further development, but that records included learner information only as numbers in order to protect their privacy. Only records of completed lessons were linked to real names so that grades could be assigned at the end of the semester.

3.2 System Description

The technology that was used in the current project was the same as that used in the Stockwell (2007) study, so only a brief overview has been provided here. The system was written in PHP and MySQL, with a different interface for the PC and mobile platforms. As learners were able to listen to the audio passages covered in class at home through Moodle, the PC version of the system was integrated into and accessed through Moodle. The mobile system, in contrast, was accessible through a separate address on the same server designed especially for the mobile phone, using a simplified interface. Both the PC and mobile systems accessed the same databases, and any activities completed on one or the other were reflected in the results in the same way.

The system included a variety of vocabulary activities ranging from more passive tasks that simply required the learner to select the correct word from a list of alternatives, through to more productive tasks where learners were required to write the appropriate word in the correct tense. The system included six different task types, including choosing the appropriate word for an English sentence, choosing the appropriate English word for an English definition, choosing the appropriate English word for a Japanese meaning, matching a list of English words with their English definitions, writing a word in English for an English definition, and writing the appropriate English word for an English sentence. In both the PC and mobile systems, writing consisted of no more than a single word per question, with the aim of maintaining a simpler interface for the mobile, and keeping as much consistency as possible between the mobile and PC platforms.

In order to make the activities more meaningful, the system employed an intelligent engine that adapted to the learners depending on what they scored correctly and incorrectly. Items for each lesson were presented in random order, and then assigned a competency score depending on learner responses. Items with a lower competency score were presented to the learners with more frequency than those with a higher competency

score, and learners needed to attain a certain level of competence with all items in a given lesson before they were able to go on to the next lesson. This meant that learners who scored correct answers more frequently were able to progress through the lessons more quickly than those who made errors. If the learner answered correctly the first time an item appeared, the item was assigned an initial competency score of 6, whereas if they scored incorrectly, the item was assigned an initial competency score of 3. For each correct response, the competency score for each item increased by 1, and decreased by 1 for each incorrect response. An item was considered as “known” by the system if it reached a competency score of 8. These numbers were selected to ensure that even if the learner got an item correct the first time, it would need to be correct a further two times in a row before considered as “known,” and that the learner would need to get the item correct a further five times in a row for it to be correct if they got it wrong the first time it appeared. Even if an item was considered as “known”, it was still included in the activities sporadically to ensure that the learner was still able to answer correctly. Each lesson included 13-17 vocabulary items selected from the commercially produced textbook, which was considerably fewer than in the earlier study. This was due to the fact that it was a compulsory first year course rather than an advanced elective one, and it was thought that it was better to not overload the learners too much.

The mobile version of the system was tested on each of the major mobile phone providers’ Internet-capable handsets in Japan (KDDI AU, Softbank, and NTT DoCoMo) to ensure that it would work during the pilot phase of the study. Apart from a few minor bugs (mainly formatting), the system itself was essentially unchanged from the previous study. Further details about the system, including other features and screen shots of the PC and mobile platforms may be seen in the earlier study (see Stockwell, 2007).

3.3 Data Collection

The data were collected through a combination of detailed server logs automatically kept by the system, and a survey administered at the end of the semester. No vocabulary pre- or post-test was undertaken as the objective of the study was not to investigate learner development with the vocabulary activities but rather to identify how and why learners did or did not use mobile phones for language learning when they had alternative methods of completing the activities. The server logs kept records of, among other things, the platform the learners used to complete a task, the lesson number, the type of task, the time a task was started and completed, and the score attained for the task. Other information including the number of attempts on each item, along with the overall accuracy measures of the vocabulary items, were also recorded in each learner’s profile, but these were not used in the current study.

The survey was administered anonymously in the final class of the semester, and asked learners about their intentions to use the mobile phone before they started the activities and their reasons why they thought that they would or would not use the mobile phone. While advantages such as mobility and convenience and disadvantages such as cost, the screen size and the keypad were anticipated, the question regarding the reasons was intentionally kept as an open question to allow learners to freely respond with what they thought rather than prompting possible responses. Even if an “other” option were included in a multiple choice question format, it was the view of the author

from past experience that learners were more likely to just choose from the existing options rather than volunteering extra information unless absolutely necessary. The reason why this question was asked at the end of the semester rather than at the beginning was so that correlations between pre-use ideas and self-reported use could be seen for each learner.

The survey continued by asking learners to provide information about how much they used the mobile platform on a Likert scale ranging from “Not at all” through to “For all tasks”, followed by another open question asking them their reasons for their usage. If learners indicated that they used the mobile phone, they were asked to give details of when and where they used the mobile phone for the vocabulary activities. This was followed by a question regarding whether or not they felt any differences between the mobile and the PC platforms, and if so to describe what they were. Finally, learners were asked about whether they wanted to use mobile phones for language learning in the future, and to provide details explaining their answer. The results of the surveys and log data are presented forthwith.

4 Results

4.1 Survey results

The survey data were analysed first. One student from each of the three classes was absent for the last class, so the total number of surveys received was 72 out of a possible 75 students. As Figure 1 shows, 36.1% (26) of the learners indicated that they intended to use the mobile phone for completing the activities, with the remaining 63.9% (46) responding that they did not. The students were asked their reasons as to why they gave this answer, and the responses were varied, but were for the most part not unexpected, given the previous literature into mobile learning. By far the most commonly cited reason for wanting to use the mobile (17 of the 26 learners who indicated that they intended to use the mobile phone) was that they could complete the activities anywhere, such as on the train, between classes, or as one learner wrote, in other classes (see Table 1). A further five learners indicated that they could use the mobile phone in their free time, three mentioned that it was quicker to use the mobile because there was no boot-up time, and two simply suggested that the mobile meant that there was no need for a PC. Only one learner indicated that they had no PC at home.

At the top of the list of reasons for not wanting to use the mobile phone was the cost, which was cited by 19 of the 46 learners who responded negatively. This was followed by difficulties associated with the small screen size (7 learners) and that the PC was



Fig. 1 Student survey responses regarding intentions to use the mobile phone for the vocabulary activities before the study (n=72)

sufficient for doing the activities (7 learners). The problem of the keypad was cited by five of the learners, and a further three indicated that they wanted to study in a quiet environment which was more achievable with a PC. A practical reason given by one learner was that using the mobile for the activities would use up the battery too quickly, while more psychologically motivated responses included that learning on a mobile phone didn't "feel like studying", that the "mobile phone is not a tool for studying", and that if they studied using the mobile, they were more likely to leave the activities until the last minute. These results are summarised in Table 1.

The second question on the survey asked the learners about how much they had used the mobile phone for their activities, as shown in Figure 2, ranging from 0% to 100%. The results indicate that, according to the learners, 48 did not use the mobile phone at all (66.7%), while a further fourteen learners (19.4%) used it for less than a quarter of the vocabulary activities. Only a relatively small proportion of learners indicated that they used the mobile for more than half of the activities, coming to a total of ten learners (13.9%). There was a slight discrepancy between the survey results and the actual log data but the differences were not considered significant.

The reasons given by those learners who indicated in advance that they did not intend to use the mobile phone, and claimed that they did not use it, were similar to the results of the earlier question, with a focus on the costs, the screen, the study environment and the keypad, but a notable addition was that three of the learners felt unsure how to do the activities on the mobile phone, while another replied that they just never felt like using the mobile for the activities. An important consideration was those learners who indicated that they intended to use the mobile for doing the tasks, and ultimately did not. Of the seven learners that fit into this category, three pointed out that they found that they ended up doing the activities on the PC when they were doing other things, a further three wrote that they felt that they couldn't concentrate when they started to use the mobile (including one learner who wrote that they "couldn't get into study mode with the mobile"), and one learner indicated that they could not access the site from their mobile when they tried.

In contrast to this, there were five learners who indicated that they did not intend to use the mobile but did. For the most part, these learners (4 out of 5) ended up identifying themselves as being in the lowest category of usage (1-24%), but there was one learner who claimed that they used the mobile for 50-74% of the activities. Reasons given by

Table 1 *Reasons given by learners for not intending to use mobile phones for language learning (n=72)*

Intend to use (n=26)			Not intend to use (n=46)		
Reason	Number		Reason	Number	
Use anywhere	17	(65.4%)	High cost	19	(41.3%)
Free time	5	(19.2%)	Small screen size	7	(15.2%)
No boot-up time	3	(11.6%)	PC sufficient	7	(15.2%)
No need for PC	2	(7.7%)	Keypad	5	(10.9%)
No PC at home	1	(3.8%)	Study environment	3	(6.5%)
Other	2	(7.7%)	Other	3	(6.5%)

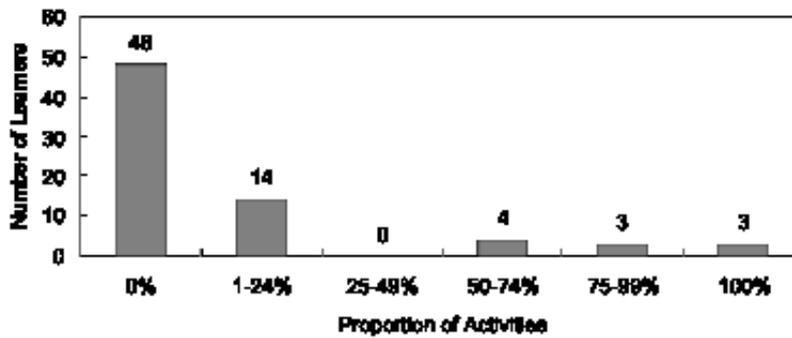


Fig. 2 Student survey responses regarding the proportion of activities completed on the mobile phone (n=72)

the lower use learners included that they didn't have access to a PC when they wanted to (2 learners), and that they tried the mobile but found it too difficult (2 learners). The higher use learner noted that they found the mobile convenient for doing the activities on the way home after class.

The nine learners who wrote that they intended to use the mobile and indicated that they had used it extensively provided similar responses for why they used it compared to their pre-use views, pointing out the convenience of the mobility and the ability to use it easily in their free time without needing to go to where a computer was located. There were ten learners who had indicated that they intended to use the mobile but then claimed to use it very little, explaining that it was due to the difficulty of using the keypad, the small size of the screen, and that it took longer to load the pages than the PC. One interesting and pertinent response was that because the class quizzes were completed on PC, it was better for them to get used to the PC interface to help them with the test.

The learners who indicated that they did do activities on the mobile phone (24 learners – 33.3%) were asked to provide information about the locations where they did them. The answers varied here again, and many learners provided multiple answers, although the proportions were not given. The vast majority of learners indicated that they used the mobile phone during commuting (19 learners), while seven learners wrote that they did the activities on the mobile phone at university, although the exact location was not made clear by all but three learners who wrote “in the corridors,” “in the study room,” and “in the cafeteria” respectively. A further five learners wrote “at home”, but one of these responded to the previous question that they had “used it once but found it difficult,” so no doubt this was a test to determine whether they wanted to use the mobile platform further. One of the learners who wrote that they used it at university responded to the previous question that they couldn't use a PC at that time, so it is likely that either the computer labs were full, or that they were in a location on campus that did not allow them to get access to a computer. A small number of learners also responded that they did the mobile activities while waiting for friends, before tests and during breaks. A summary of the locations is provided in Table 2.

The learners who had indicated that they had used both the mobile and PC platforms were asked if they felt any differences between the two, the results of which are shown

Table 2 *When and where learners used mobile phones for doing the vocabulary activities (n=24)*

Location	Number of Learners
While commuting	19 (79.1%)
At university	7 (29.2%)
At home	5 (20.8%)
While waiting for friends	3 (12.5%)
Before tests	2 (8.3%)
During breaks	1 (4.2%)

in Figure 3. In all, there were 21 learners who fit into this category, eight of whom (38.1%) answered that they did feel a difference, while the remaining 13 learners (61.9%) answered that they did not. Only those who wrote that they did feel a difference were required to provide further information, and five learners wrote that they found the keypad more difficult on the mobile than the PC, one replied that the PC was “slightly easier” but with no further explanation, one learner wrote that they had never used a PC for learning before (although what was meant by this was not clear), and one learner noted that they felt that the mobile was easier.

The survey continued by asking learners whether or not they would like to use mobile phones in the future for language learning, as shown in Figure 4. Almost two-thirds of the learners (44 out of 72) indicated that they did want to use the mobile for language learning, which was a marked increase compared with the 26 learners who responded that they had used the mobile during the semester.

There was a very large correlation between the answers provided for those learners who gave the same response to both the pre-usage question and their future plans to use the mobile phone for learning, but there were a number of learners who did indeed provide differing responses. There were seven learners who indicated that they intended to use the mobile phone initially, but then that they did not want to use it in the future. Of these, three learners also responded that they had not used the mobile platform, a further three responded that they had used it a small amount, and the last learner that they had used it extensively. The reasons given by the self-proclaimed non-users were that PCs were sufficient and that learning in small bursts was not their learning style, while the light users responded that their eyes got tired and that PCs are faster and easier to use. The heavier user simply responded that PCs were more convenient, in spite of predominantly using the mobile phone to complete the activities.

In contrast to these were the learners who indicated initially that they did not intend to



Fig. 3 Student survey responses regarding whether they felt a difference between the mobile and the PC platforms (n=21)



Fig. 4 Student survey responses regarding desire to use mobile phones for language learning in the future (n=72).

use the mobile for the current activities, but they did wish to use the mobile in the future for language learning. There were 25 learners (34.7% of the total number of learners) who fit into this category, 22 of whom responded that they did not use the mobile platform during the semester. From these non-users, 14 learners cited portability as a reason why they would like to use the mobile in the future, while another three learners imposed a few conditions on their future use, these being that costs would need to decrease, that the input system would need to be changed to make typing English easier, and finally if it were “convenient.” The remaining three learners of the 25 in this category consisted of two light users, and one heavier user. One of the light users remarked that the mobiles were easy to use, while the other responded that they were convenient provided the keypad was improved. The heavier user reported that the mobile system was easy to use.

4.2 Log data results

Along with the survey data, the logs recorded on the system were also analysed. Firstly, the learners’ volume of usage was measured and, apart from a few minor exaggerations on the part of a few learners (i.e., only one learner used the mobile 100% of the time), the log data provided very similar results to the learners’ responses in the survey, so have not been included here.

A more detailed breakdown of the learners who attempted the activities on their mobile phone is shown in Figure 5, and it shows that the largest number was those who

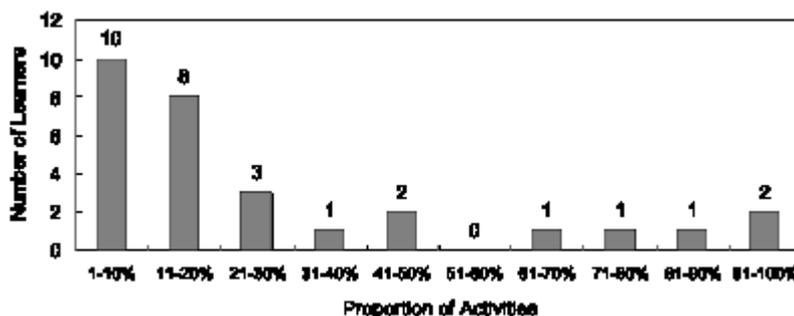


Fig. 5 Proportion of activities completed on mobile phone (only learners that used the mobile phone) (n=29)

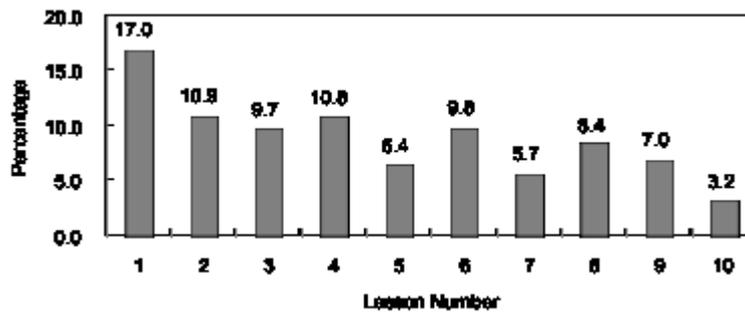


Fig. 6 Percentage of each lesson completed on the mobile phone (n=75)

used the mobile for up to 10% of the activities at 13.3% (10 learners). This was followed by 8 (10.7%) learners who used it for 11-20% and a further 3 (4.0%) who used it for 21-30% of the activities. The learners were fairly evenly distributed across the remainder of the categories although, of course, the number was very low.

The consistency of use of the mobile platform across the semester is outlined in Figure 6, measured by analysing how much learners used the mobile phone in completing each of the lessons. While this method of investigation assumes a fairly consistent completion of the activities across the semester to some degree (as opposed to a rush of activity in a small number of blocks), at the very least it provides some baseline data to determine how the learners completed the lessons with regard to platform longitudinally. The figure shows a clear novelty effect in the first lesson, with a drop to the second lesson which is maintained to fourth lesson. This drops down suddenly at the fifth lesson, followed by a sudden increase again in the sixth, another drop in the seventh, an increase in the eighth lesson, after which the proportion of activities on the mobile wanes away until the last lesson. The larger drop in the fifth and tenth lessons may be due to the fact that tests were held after these two lessons, and learners may have used the computer during these times to either study in more concentrated blocks, or to get used to doing activities on PC, as one learner indicated on the survey. A more detailed analysis of how each of the learners used the mobile phone with regard to the groupings of mobile vs. PC usage is described in the Discussion section.

It is interesting to note that the results did not demonstrate the tendency seen in the earlier study (Stockwell, 2007) for learners who favoured the mobile to fail to complete the lessons compared with the learners who predominantly (or exclusively) used the PC. Of the 75 learners, only six failed to complete all of the lessons, with four of these only using the PC, one using the mobile for just over 10% of the activities, and the final learner using the mobile for just under half of the activities completed.

5 Discussion

5.1 Usage patterns of MALL

Unlike the majority of previous research, the current study examines how learners utilise the mobile phone for language learning activities when there are other means of

completing the same content. Through examining learners' free choices with the technology, it is possible to determine how prepared learners are to undertake mobile learning of their own volition, as opposed to when it is forced upon them. Asking learners to make decisions at the outset of a study may not be an accurate indication, as shown in the current study, where learners changed their minds about the mobile platform both favourably and negatively during the research period.

The results of the access logs demonstrated that the majority of learners (61.3%) did not make any attempt to use the mobile phone for language learning activities and, for the most part, the majority of learners who actually undertook the vocabulary learning activities on the mobile phone appeared to be testing the platform out. From analysis of their usage patterns, the learners may be categorised into groups according to their preparedness to use mobile technologies for language learning. Of course it is difficult to say with certainty which group the learners fit into based on the log data alone, but for those teachers introducing mobile learning into their environments, having a broad idea of how learners respond to using mobile technologies may allow them to take measures to encourage their learners to use the mobile phone more actively for learning activities. The categories are outlined below:

Non-users: These were the learners who did not use the mobile platform for any of the activities at all, instead doing everything on the PC. Making up 46 of the 75 learners (61.3%), it was by far the biggest category.

Try-and-quit users: This was the largest group of learners who actually used the technology, consisting of 17 of the 29 learners (58.6% of learners who used mobile phones, and 22.7% of the total number of learners) who used their mobile phone for the learning activities. They were identified as fitting one of three criteria: learners who tried the mobile learning activities only once, either as a single attempt (4 learners) or a very short block of attempts (4 learners); learners who tried the mobile learning activities for a couple of short isolated sessions separated by use on the PC (5 learners); and learners who tried the mobile activities for one or two longer sessions, again, separated by work on the PC (4 learners). In all cases, learners reverted back to using only the PC after the trials on the mobile platform.

Sporadic users: This group consisted of four of the learners (13.8% of those who used mobile phones, and 5.3% of the total number of learners), and can be distinguished from the learners in the above group in that they completed two or three shorter sessions of activities on the mobile phone mixed in with activities on the PC. Unlike the try-and-quit users, these learners used the mobile even towards the end of the period investigated.

Balanced users: While they may have favoured one slightly over the other, these learners (4 learners) maintained a fairly even balance between the PC and mobile platforms. Their usage was characterized by short bursts intermittently between the mobile phone and the PC, or by alternate continuous periods on one or the other platform.

Heavy users: The learners in this group (4 learners) chose to complete all or the vast majority of activities on the mobile phone. Activities completed on the PC may be isolated attempts, or alternatively they may be in small blocks.

It should be noted that not all non-users are necessarily negative to the technology. As shown in the current study, a number of learners did not wish to use the mobile for the activities at this time, yet were still open to using them in the future. If the seven learners who changed their minds about the mobile technology after they used it were added to the 44 who indicated that they wanted to use mobile technologies in the future, then it might be concluded that 51 learners (70.8%) expressed a positive attitude towards mobile learning.

Many of the learners in the current study who tried the mobile activities and quit described the mobile interface as slow with regard to page loading times and inputting through the keypad. Despite efforts being made at the design stage to counter these problems, identifying new ways of dealing with these difficulties could go a long way towards ensuring a more widespread use of mobile phones within a language learning environment. Once learners start to use the mobile technology, then their usage will be very much dependent on their personal preferences, be they sporadic users, balanced users or heavy users, but unless learners are motivated to try and continue to use the technology in the first place, it is not possible to capitalise upon it.

4.2 *Dealing with barriers*

There is no doubt that there are still a number of barriers that limit the use of mobile phones for language learning. As Wang and Higgins (2006) pointed out, some of these are technological, some are pedagogical, and others are psychological. The concerns that were raised by learners in the current study, while loosely fitting into these categories, are described in Table 3, divided up into those barriers that are easier to overcome, and those that are more difficult to overcome. The elements are not necessarily discrete, and some overlap will naturally occur between the more specific factors such as the keypad and the more wide-reaching ones such as psychological and environmental factors.

Design will always be paramount in any environment where technology plays a role, and carefully thought-out design has the capacity to overcome a number of the barriers that have been identified surrounding the use of mobile phones. This design may include design of the interface or the activity type itself, which would help to alleviate the keypad and screen factors, or it could be design of the actual pedagogy such that the mobile phone finds an integral and integrated role in the curriculum rather than the more peripheral role that it is often placed in now. This must of course take into consideration how the mobile phone links with other elements of the course, and the other technologies. What are the learners trying to achieve through the mobile phone? Are the skills the learners are acquiring through this platform transferable to any other part of

Table 3 *Barriers to the use of mobile phones for language learning*

Easier Barriers	More Difficult Barriers
Keypad factors	Psychological factors
Screen factors	Environmental factors
Pedagogical factors	Cost factors

the language learning environment? If so, are these links made clear to the learner? Dealing with these elements is fundamental not only in making learning through mobile phones an easier and more rewarding experience for learners, but also in overcoming the more difficult factors as well. The way in which learners view the mobile phone for language learning from a psychological perspective may also be shaped by design, but perhaps over a longer time frame. Learners who feel that the mobile phone is, as one learner put it, “not a tool for studying” may be encouraged if some language learning activities can be presented with a less “studious” image.

Whereas users of PCs may be used to the role of the computer for role-playing games for entertainment purposes, they may feel less comfortable in engaging in Internet chat for learning a language. To these learners, introducing environments such as graphic MOOs such as that described by Svensson (2003) may help bridge the gap between computer as gaming tool and computer as learning tool, in that it contains elements of both. To do this in a mobile learning context would require an understanding of what learners use the mobile phone for in their everyday life, and then design language learning activities that help to bridge the gap. Once the learners start to change their own perceptions of what mobile phones are used for, then the potential to introduce a wider range of activities through the mobile becomes evident. Design of the curriculum is also essential in this point as well, in that incorporating sufficient training may help to ease the doubts that learners may have in advance of using newer technologies (see Hubbard, 2004). Just because learners are familiar with mobile phones, it does not provide any accurate indication that they will know how to use them for language learning purposes, as comments by a few learners in the current study demonstrated.

Environmental factors are also a difficult issue to overcome, but again, considered design can play an important role. If learners feel that using the mobile phone for learning requires a longer attention span that is more suited to PCs, then it is possible to leave longer tasks to the PC and design shorter, less demanding tasks for mobiles that can be completed without requiring a heavy cognitive load. The final issue of cost is one that deserves a good deal of attention, as there is evidence that learners are often not prepared to pay at all for using mobile phones for non-recreational purposes (see Lee, 2006), making this a hurdle that may not be easy to clear. In saying this, it is not completely without possibilities. Obviously designing lighter interfaces that use a minimum amount of bandwidth and hence attract a lower cost to load onto the phone is one way of doing this, such as using Flash-based activities (e.g., Houser & Thornton, 2004), but some costs would of course still be incurred by the learners. Alternative methods would be possible through developing tasks that can be downloaded to mobile phones without the need to use the Internet at all, either through plugging the phone into a computer, or through evolving technologies such as micro SD cards or infrared, which are becoming more commonly available on handsets. There are of course logistical issues such as handset compatibility, but it is certainly a possibility for the future that may help to ease the issue of costs that nearly half the learners in the current study indicated was of concern to them. Design, then, has the potential to counter many of the problems that learners are citing as inhibiting their use of mobile devices for language learning, but each factor must be considered while bearing in mind the importance of the balance with the others.

4.3 *New technologies, new concerns*

The relationship between what learners are required to do with mobile phones and other language learning activities in a given environment is indeed an important one. The point raised by the learner who indicated that they used the PC to accustom themselves to the PC interface used in the test is certainly worthy of consideration. In the same way that early CALL activities often occurred in isolation from assessment (i.e., drills and activities were done on computer but the tests were paper-based), when having learners undertake mobile-based activities we must also consider if this is to be related to assessment. Certainly at this point security is an issue in assessment on mobiles, as learners have the ability to quickly flick between applications such as email, other websites and memos with little chance of being noticed by the teacher, compared with PCs, where the screen can be monitored either by language laboratory systems or by the teacher walking around the classroom. When screens on mobiles are by default small and intended only for personal use, monitoring by teachers for cheating becomes difficult indeed. Assessment would need to be designed so that cheating is either not an issue, or alternatively, measures need to be put in place at a software design level that makes it difficult.

The idea of assessment for mobile learning brings with it other issues as well. For instance, if assessment on mobile phones becomes enforced, then the concerns such as individual student cost become pertinent. Even though in a Japanese university environment virtually all students may have mobile phones, once ownership becomes a requirement in order to be assessed, the dangers of introducing gaps between the haves and have nots on a personal level rather than an institutional one (which has often been the area of contention in CALL) are immediately obvious. CALL labs may be made available to learners who do not have computers at home, but making mobile phones available to learners who do not have one, though certainly not impossible, entails a large number of logistical difficulties, compounded when considering the inherently personal nature of a mobile phone as a communication tool.

It should be noted that the current study is not without limitations. Despite the relatively large pool of learners who had the potential to use the mobile phone ($n=75$), the actual number of students who did was quite small. This means that generalisability of results becomes difficult, and as such conclusions made here must be considered in the context of the study. Similarly, as mentioned above, although care was taken to design interfaces and activities that were appropriate for use with the mobile phone, a different type of activity might have brought a different result. Having said this, activity type would probably not have had much of an effect on the percentage of learners who decided not to use the mobile phone (since they did not use it), which was 6 out of 11 learners (55%) in the pilot study (Stockwell, 2007) and 46 out of 75 learners (61%) in the current study. Another point is that the distinction made here is between mobile phones and desktop computers, which were the mainstream in the given environment. Settings where wireless laptop computers are more common, or where other types of mobile devices such as PDAs are more widely used may also have had an effect on the outcomes of the study.

5 Conclusion

Learners are very much aware of the practical limitations of the mobile phone for language learning, but the general attitudes of the learners in the current study, at the very least, were not negative. Although the overall use of the mobile phone for the vocabulary learning tasks was low, the survey data indicated that learners approached the technology with a degree of expectation, with over two-thirds of the learners expressing an interest in using mobile phones for language learning in either the short or long term.

As with any new technology, learner acceptance progresses at different rates. Some learners will be immediately enthusiastic about using a new technology while others will be less eager to embrace the technology. There will also be learners who will approach the technology with higher expectations or requirements which may be difficult to meet. Ensuring that a solid design framework has been put in place with regard to the technology in terms of the relationship with the pedagogical goals, the interface, and the language learning environment – founded on a knowledge of the learners' concerns and expectations – will go a long way to ensuring that learners are satisfied with their learning experience through the mobile phone. However, there will always be an element that is very reluctant to use new technologies, and these learners may require time before they feel ready to engage in mobile learning activities. Other learners will see merits with the mobile technology, but feel that they want to maintain a balance between different platforms.

Providing a range of options for learners takes time to prepare and to maintain for teachers and materials designers, but through provision of such options, learners who may not initially wish to use new technologies may find that over time they are able to see their benefits through observation of other learners, or out of their own curiosity, when they feel ready. At this still very early stage of development into mobile learning, perhaps the most important quality that is needed is patience on the part of the teacher, so that they may look objectively from the perspective of the learner, and allow the learner to explore, test out, and grow familiar with mobile technologies. There is also a parallel need for learners to exercise the same patience towards teachers who wish to explore the potential of mobile technologies for language learning.

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