

Ready for m-learning? Access to mobile devices by tertiary students studying Japanese

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This paper reports on the ownership and use of computer hardware, including smart phones and tablet computers, among the students learning second year level Japanese at a university in Australia. The survey of 160 students shows that these mobile devices are taken up rapidly by current students, and are gaining popularity as a method of accessing study-related materials. Owners of a tablet computer seem more likely to use it for their education purpose. Yet, the significant majority of students still seem to prefer using desktop computer at home to access the university's Learning Management System, indicating that students are selective about their use of technologies for different purposes. The foundation for implementing m-learning at tertiary level seems to be almost set from the hardware point of view, but the students' pattern of using the hardware must also be taken into account when developing m-learning contents. (145 words)

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In the last 5 years, two products, iPhone and iPad, have given us alternative ways to interact with the world, organise our lives and obtain information. Both items have enabled us mobile access to the internet, and invited other companies to introduce similar products, thus created two new categories of technology that were not readily available to general population previously. Devices in both categories have penetrated the market rapidly. Telstra, an Australian telecommunication provider, claims that in 2011, 46% of mobile phone owners in Australia own a smart phone and this will continue to increase in the future (Telstra, 2011). Tertiary students are no exception to this trend. The learning in the future will most definitely utilise these technologies. Various mobile learning (m-learning) contents have been developed and delivered, capitalising on this trend (e.g., Cochrane & Bateman, 2010; Kinash, Brand, & Mathew, 2012).

However, despite being referred to as 'Digital Natives' who grew up surrounded by digital technologies and who are always ready to learn and processing information (Prensky, 2001a), not all digital natives who are now entering tertiary education are equally capable of using the latest mobile devices nor adept at learning at any time (Kennedy, Judd, Churchward, Gray, & Krause, 2008). In order for m-learning to be effective, students' access to, their level of familiarity with, and their preference and patterns of using different technology that they have must be considered (Kennedy *et al.*, 2008).

The data analysed in this paper was collected as a preparation for upcoming development and implementation of m-learning program to enhance the learning of Japanese language. Through analysis, this paper intends to find out what array of technologies the students in 2012 own, how the available technologies are used by them, and whether there is a space for educational contents to enter into students' time and lifestyle via these technologies. It will also draw comparisons from the similar survey conducted at the same university in 2006 (Kennedy *et al.*, 2008) to see how the introduction of the two categories of technologies, i.e. smart phones and tablet computers, have affected the students' use patterns of other technologies.

Background

Although smart phone ownership is spreading rapidly among students, there does not seem to be a clear definition of a smart phone. However, modern smart phones seem to share the following common features in addition to being able to make a phone call: data communication capability through applications such as a web browser, an email client and a calendar, an ability to compose and view documents, an ability to view and play photos, music and video clips, a camera to take photos and videos, and a LCD touch screen which doubles as touch keyboard (Incept Inc., 2011). Further, a user can add extra functions to their smart phones by downloading applications, or 'apps', such as foreign language dictionaries and games. A tablet computer can be described as a larger version of a smart phone without the ability to make phone calls (Incept Inc., 2012). With a larger screen, a tablet computer can be used as a substitute for a larger desktop or laptop computers (Telstra, 2011). In addition, the touch screen on tablet computers and smart phones can record where on the screen was touched, and when recorded continuously it can act as a digital notepad. With fingers and/or stylus pen, a user can create a note and send a digital copy to other users via the internet.

With the development of data communication infrastructure, users of smart phones and tablet computers are able to access the internet anywhere in the world where there is a mobile phone coverage or a WiFi access point. This capability can make smart phones and tablet computers ideal tools to not only deliver m-learning contents, but to ask students to interact with their teachers and peers. Especially for learning a language, where an extended amount of exposure to the target language is necessary for memorising and constructing another system of language, m-learning or Mobile Assisted Language Learning (MALL) is an attractive option for both students and teachers to increase contact hours. However, development and implementation of MALL activities will be limited by the students' access to mobile devices and use patterns. Surveying potential clients seemed appropriate to determine how students use different types of technologies for their study and other needs.

There are three studies that surveyed students' ownership and use of various technologies including mobile devices in Australian higher education context. Oliver and Goerke (2007) surveyed 413 students in 2005 and 290 students in 2007. In both survey they asked students about ownership of four mobile devices: laptop computers, handheld computers (PDA), mobile phones and portable MP3 players (e.g., iPod). It was found that in both survey just less than half of the respondent owned a laptop computer, less than 10% owned a handheld computer, while more than 96% owned mobile phones. They also found that majority of students (93.4 in 2005, 86.6% in 2007) use the online resources for study purposes. Although it is not stated how these students access the internet resources, one would imagine it was done from a desktop computer, given that mobile internet was not widely available in those days.

A larger scale study was conducted by Kennedy et al. (2008). They surveyed 2120 first-year students in 2006 at the University of Melbourne about their access to various technology hardware, including mobile phones and desktop computers, and use of them to access the internet resources. They found that 96.4% of students had unrestricted access to a mobile phone, 89.5% to a desktop computer, 63.2% to a laptop computer, and 10.8% to a PDA. Over 90% of students responded that they use the internet for study purpose, and most of them do so on daily or weekly basis. However, when asked about accessing the internet from their mobile phones, either for study purpose or otherwise, only 32.2% responded affirmatively.

Both studies mentioned above occurred before the introduction of the smart phone and the tablet computer. Fujimoto and Stockwell's study in 2010 surveyed 180 students studying various languages (Fujimoto & Stockwell, 2012). Their study also showed that more than 96% of students own mobile phones and more than half of them readily use them to access information on the internet. What was interesting was that almost 4% of students being surveyed do not use their mobile phones to make phone calls, meaning their use is limited to sending and receiving text messages and accessing the internet. However, the distinction between smart phones and ordinary mobile phones were not made in their questions. The ownership of tablet computer was not questioned either.

Aiming at using a smart phone to implement MALL activities in the near future, the students' ownership of smart phones will be surveyed in this study. Further, the students' use of various mobile and other technologies to access internet resources for study purpose will be included in the survey questions. Finally, students' willingness to use their smart phones and mobile phones for learning Japanese will be asked.

Methodology

Participants

Data used for this analysis was collected from students undertaking second-year-level Japanese subject at the University of Melbourne in May, 2012. Out of 190 enrolled students, 160 students participated to the survey. All participants were aged between 17 and 22 at the time of survey, thus belonging to 'digital native' generation.

At the University of Melbourne, students can take Japanese language subjects as their major or minor study area or as breadth subjects. All students at the university are encouraged to take 4 subjects from outside their home faculties, and this is how the majority of the students access Japanese subjects. Out of 160 participants, 131 (81.9%) indicated they are in this category, outnumbering both students studying Japanese as their major (21, 13.1%) or minor (7, 4.4%) area of their study. Among the teaching team, students in this category is said to spend less effort and time on their Japanese study because it is not their major study area. The male/female ratio was close to even, with 70 male participants (43.75%) against 90 female (56.25%), while the number of international students was not as high as expected (59 participants, or 36.9%).

Procedure

A 1-page questionnaire, containing questions about students' access to, frequency and location of using various technologies and their likeliness to use their mobile devices in the m-learning or MALL activities being developed in the near future, was used. The format of the questions and the technologies included in the questions were selected following Kennedy *et al.*'s study (2008) in order to draw direct comparisons from their survey in 2006 to see the changing landscape of technology use over the 6 years at the same university. However, some items of technologies were substituted to reflect the technological development over the 5 years. For example, PDA which attracted the least proportion of affirmative answer in 2008 was dropped in favour of the two pieces of new technology, i.e., smart phones and tablet computers. The range of activities students conduct on-line was reduced to what can be done on mobile devices and substituted to reflect the possible use of the devices for a language learning purpose.

The anonymous questionnaire was distributed during a tutorial in May, 2012. There were 9 tutorial groups this year, each containing 16 to 22 students. The tutors in each tutorial group distributed the survey and were asked not to give specific instructions on answering the questions, other than to make general comments such as "students in this course seem to use their smart phones a lot during the tutorials." The students then had about 5 to 10 minutes to complete the questionnaire during the tutorial, before returning it to their tutors. The main researcher was not present during this time.

Results

Students' access to technology

Students were asked about their ownership and the access to a range of technology hardware. Three choices, unlimited access, limited access and no access, were given to each of the following devices: smart phone (e.g., iPhone and Android phone), ordinary mobile phone, tablet computer (e.g., iPad, Galaxy Tablet), laptop computer, desktop computer, and MP3 player (e.g., iPod). Smart phone and mobile phone are asked as separate items in order to see the penetration of the smart phones to this group of students independently from the older-generation mobile phones, although the distinction between them were not made explicit other than the examples given before. Students were advised to select 'Unrestricted access' if they own the device, and 'Limited access' if they use a shared facility.

Table 1: The percentage of students who owns or have access to mobile devices.

	2012			2006*		
	Unrestricted access	Limited access	No access	Unrestricted access	Limited access	No access
Smart phone	76.3	7.5	16.3			
Mobile phone	55.6	5.0	36.9	96.4	0.9	1.5
Tablet computer	22.5	10.6	66.9			
Laptop computer	84.4	8.8	6.9	63.2	10.0	24.0
Desktop computer	46.9	19.4	33.8	89.5	4.9	3.7
MP3 player	72.5	6.3	21.3	68.9	5.7	23.3

* The data from 2006 adopted from Kennedy *et al.* (2008)

Table 1 shows that majority of students have unrestricted access to the devices asked about, other than tablet computers. More than one in four students now owns a smart phone, while the ownership of ordinary mobile phone has dropped to 55.6%. Further analysis shows that 39.4% of students own both a smart phone and a normal mobile phone, while 0.6%, or 1 student, indicated that he/she does not have an access to either. The percentage of students who answered they only have access to a mobile phone, but not a smart phone or a tablet computer, was 10%.

Within 2 years of being on the market, tablet computer has penetrated a third of student population; 33.1% answered they either own or have access to a shared tablet computer. None of them answered that they have an unlimited access to a tablet computer on its own; of 36 students who answered they have an unlimited access, 35 (97.2%) indicated they also have an unlimited or limited access to a laptop computer and 27 (75.0%) indicated

they also have an unlimited or limited access to a desktop computer. Twenty-six, or 72.2% of students indicated they have an access to all three types of computers.

When compared with the data from 2006, the access to a desktop computer has significantly dropped, with 33.8% claiming they do not have access to a desktop computer. In comparison, the access to a laptop computer has increased by around 20%. No student indicated that they do not have access to either a desktop or a laptop computer.

The proportion of students who have access to a MP3 player did not change significantly. Although a slight increase in ownership percentage is observed, it can be attributed to the difference in the size of participants between the two studies.

Frequency of use

Table 2 shows what proportion of students use their mobile devices for different activities. The question did not specify which device is used for a particular activity, but asked the students' general tendency to do the various activities from their mobile devices. Although some students indicated which device they use for each activity, they are not reflected to Table 2.

Table 2: Percentages showing how often students use mobile devices for different activities.

	2012				2006*			
	Daily	Weekly	Monthly	Not used	Daily	Weekly	Monthly + over monthly	Not Used
Make phone calls	75.6	18.1	4.4	0.6	76.2	16.1	4.3	3.4
Send/receive SMS	91.9	6.3	1.3	0.0	79.5	13.2	3.1	4.1
Send/receive email	58.8	23.1	3.8	13.8	7.4	5.9	10.9	75.8
Take digital photo/movies	36.3	31.9	20.6	10.6	32.2	25.0	12.6	30.1
View Learning Management System	46.3	31.9	1.3	20				
Access website for study purpose	43.8	32.5	6.3	16.9	8.1	9.5	14.5	67.8
Access website for other purposes	73.8	15.6	1.3	9.4				
As a dictionary	45.0	30.6	2.5	21.9				
As a personal organiser	36.9	24.4	9.4	29.4	29.8	21.6	12.2	36.5
Take notes for study purposes	18.8	25.0	4.4	51.3				
Listen to music/podcast	70.0	5.6	2.5	21.9				

* The data from 2006 adopted from Kennedy *et al.* (2008)

The use of mobile devices to make phone calls, regardless of the type of phones, did not change greatly from 2006 data. However, the uses of mobile devices for other activities have increased since 6 years ago. The uses of mobile devices to send/receive emails have increased dramatically, from 7.4% in 2006 to 58.8% in 2012. Furthermore, mobile devices are used much more frequently to view websites, both for study and private purposes. While the data in 2006 only surveyed students for their experiences in using information from the web, the students in 2012 appear to use the web to gain information for their study as well. Unfortunately the data does not show the quality of students' experiences viewing various websites.

Students in 2012 seem more open to using their mobile devices for their study purposes. It is significant to see almost half of students have used their mobile devices to take notes for study purposes, and 43.8% on more than weekly basis. In language courses, almost 4 in 5 students have used their mobile devices as a dictionary, and 45% of them on daily basis.

These increases could be the result of enhanced capability of new mobile devices, especially smart phones and tablet computers, to readily access the internet and handle larger amount of texts on their larger screen. To check this, the data gathered from the owners of tablet computers and smart phones are contrasted with the students who do not have access to these devices. Tables 3 to 6 shows the percentage of students accessing email, accessing websites for both study and other purposes, and taking notes for study purposes according to their access to a tablet computer, smart phone and ordinary mobile phone.

Table 3: Percentages of students accessing email according to their access to mobile devices.

		n	Daily	Weekly	Monthly	Not Used
Access to a tablet computer	unlimited	35	65.7	28.6	0.0	5.7
	limited	17	70.6	17.6	0.0	11.8
Access to a smart phone	unlimited	121	66.1	23.1	3.3	7.4
	limited	12	50.0	25.0	0.0	25.0
Access to a mobile phone only		16	25.0	12.5	12.5	50.0

Students who have access to a tablet computer and a smart phone appear to send and receive emails from their mobile devices more often than students who only have access to an ordinary mobile phone. However, more students from the mobile phone only group are accessing the email from their mobile phones compared to students in 2006, as shown in Table 2.

Table 4: Percentages of students accessing websites for study purposes according to their access to mobile devices

		n	Daily	Weekly	Monthly	Not Used
Owens a tablet computer	unlimited	35	62.9	28.6	2.9	5.7
	limited	17	29.4	47.1	5.9	17.7
Owens a smart phone	unlimited	121	47.9	36.4	5.0	10.7
	limited	12	41.7	25.0	16.7	16.7
Owens a mobile phone only		16	18.8	18.8	6.3	50.0

Table 5: Percentages of students accessing websites for other purposes according to their access to mobile devices

		n	Daily	Weekly	Monthly	Not Used
Owens a tablet computer	unlimited	36	88.9	8.3	0.0	2.8
	limited	17	76.5	17.6	0.0	5.9
Owens a smart phone	unlimited	122	83.6	12.3	1.6	2.5
	limited	12	50.0	33.3	0.0	16.7
Owens a mobile phone only		16	25.0	25.0	0.0	50.0

A significant majority of students with accesses to a tablet computer and a smart phone indicated they view websites both for study and private purposes in daily or weekly basis. However, students with an access to a tablet computer appear slightly more willing to use it for study purpose than students with an access to a smart phone on more frequent basis. For example, 92.3% of students with a tablet computer use it for study purpose on daily basis, as opposed to 89.6% of students with a smart phone. In comparison, only half of the owners of a normal mobile phone have used it to view websites for both study and private purposes.

Table 6: Percentages of students taking notes with their mobile devices for study purpose according to their access to mobile devices

		n	Daily	Weekly	Monthly	Not Used
Owns a tablet computer	unlimited	35	40.0	25.7	0.0	34.3
	limited	17	17.6	23.5	11.8	47.1
Owns a smart phone	unlimited	120	19.2	30.0	5.0	45.8
	limited	12	16.7	8.3	8.3	66.3
Owns a mobile phone only		16	12.5	6.3	0.0	81.3

Although there are still a portion of students who do not use their tablet computers and smart phones for a note-taking purpose, students with a tablet computer are twice more likely to use it on a daily basis than owners of a smart phone and a mobile phone. Ordinary mobile phones are not used for note taking, although there seem to be some dedicated users of their mobile phones.

Learning on mobile devices

The next section asked a series of questions to determine whether mobile devices can be a tool for delivering mobile learning, and students' willingness to use them to learn Japanese on the move. As shown in Table 7, when asked directly, 83.1% of students answered they would like to use their mobile devices to receive m-learning or MALL activities.

Table 7: Percentages of students willing to receive m-learning instructions on their mobile devices.

Yes	83.1
No	10.0
Maybe/No Answer	6.9

However, when asked where students use their mobile devices, and where they access the university's Learning Management System (LMS), a different picture emerges. Table 8 shows the percentages of students using their mobile devices in different situations, and Table 9 shows the percentage of students accessing the LMS from different locations. Multiple answers were allowed for these questions.

Table 8: Percentages of students using their mobile devices in different situations (multiple responses).

At home	49.4
On the way to/from uni	66.9
At uni during classes	14.4
At uni between classes	43.1
Weekend	25.0

Table 9: percentage of students viewing LMS from different locations (multiple responses).

At home from a desktop computer	96.9
From university computer lab	21.9
On the move from a mobile device	27.5

Approximately two out of three of students (66.9%) indicated they use their mobile devices on the way to and from the university, while 43.1% indicated they use mobile devices between classes on campus. Mobile devices are also used by 14.4% of students during classes, presumably for note-taking purposes. Almost half (49.4%) responded that they use their mobile devices at home. Interestingly, only 25.0% of students use them on weekends.

Table 9 shows that the vast majority of students access the LMS at home from desktop computers rather than from mobile devices, while 27.5% indicated they access LMS on the move from their mobile devices. The

choice “at home from mobile devices” was not included in the survey. University computer lab is used by 21.9%.

Discussion

The findings confirm that ‘digital native’ students are not homogenous group (Kennedy et al., 2008). When a new piece of technology becomes available, it does not always completely replace the old ones, but leaves behind some who are comfortable with not using the new technology (Kennedy, 2011). For example, although tablet computers have been used by one in three students, their use patterns are widely varied. Some have embraced the technology in various aspects of their life, including study purpose; others seem to prefer the old methods of studying. The number of students with an access to smart phones has now overtaken the number of students with an access to ordinary mobile phones with limited functions. When providing m-learning activities for the current students, alternative accesses to the same materials must be made available, not just from equity point of view to those without an access to a smart phone, but to fulfil the different choices that students make.

The selective nature of ‘Digital Native’ students, in terms of what technology to use for their learning, is noted by other authors too. For example, Stockwell (2010) reports that when given a choice to work on the same task between a mobile phone and a desktop computer, students who initially chose to work on their mobile phone have changed to work on desktop computers during the project. He also reports that the students who worked on desktop computers showed a higher level of achievement than those who worked on mobile phones (Stockwell, 2010).

From the findings of this study, too, it is unknown whether students who participated to this study will use their mobile devices to engage in the proposed m-learning or MALL activities, despite their overwhelming enthusiasm to attempt such a mode of learning. Despite a wider ownership of smart phones and an increased access to the internet from the mobile devices, it has not translated to accessing study-related website, in particular, the university LMS. Although it can be accessed from smart phones, this author’s own experiences with viewing the LMS on smart phones show that the pages are difficult to navigate from the smaller sized touch screens on these devices. The issue of screen size is widely acknowledged by practitioners of MALL (e.g., Stockwell, 2010). Perhaps the current generation interface design of the LMS is not suited to the use from smart phones. The issue of user interface still remains despite smart phones having larger screens and more intuitional interfaces than the older generation mobile phones.

However, it is notable to see 45% of students use their mobile devices as a dictionary. This may include both accessing the dictionary website via the web browser and using dedicated language dictionary apps. From this author’s personal observation in tutorials, the latter is the case for majority of students, giving them an alternative to buying a dedicated electronic dictionary that was once popular among language learners and international travellers. The dictionary data used in these apps can be stored in the smart phone or accessed via the internet connection. There are pros and cons for both types of dictionary apps, but ability to connect to the internet is exclusive to dictionary apps installed on smart phones. Furthermore, students seem to like using these dictionary apps in classes. It can be suggested that developing a dedicated app to access LMS, such as Blackboard Mobile Learn (Kinash et al., 2012) may invite more access to information on LMS from smart phones.

Access issues aside, it is also notable to see that mobile devices are used at home by most students, and that preparation for university studies seems to take place the most often at home. The similar findings were reported when a wider population of Australians were surveyed (Telstra, 2011). It seems that despite ‘Digital Natives’ are always ready to integrate new knowledge (Prensky, 2001b), in order to learn systematically, as required by the current tertiary education system, they still need a place to spend time on the contents to be learnt in peace. It appears their mobile devices are used to access information that they need instantly when they need it, in addition to using their less mobile devices, such as desktop and laptop computers. This may also shed light on the fact that students who have unrestricted access to a tablet computer also have regular access to desktop and laptop computers. Using mobile devices ‘at home’ does not necessarily mean they are used ‘at a desk’; it can be used in bed or in toilet (Telstra, 2011). Students are selective about which technology to use for different purposes.

Finally, one question that is yet to be answered is how tablet computers will be taken up by ‘Digital Native’ students in the near future. The cost of tablet computers may be preventing some students from owning one, in

comparison to smart phones which can be owned with small or no initial outlay.¹ While it seems clear that it will not replace desktop or laptop computers in the next couple of years, it is also evident that the students with access to a tablet computer are more likely to use it to access websites for study purpose, including the LMS, and even during the classes to take notes. This seems to be the technology that can be transferred to learning purposes easily. Follow up surveys in the future may find a different picture.

Conclusion

For now, this author is satisfied to see that the students are willing to use their mobile devices to receive m-learning instructions. However, the challenges ahead are to design m-learning and MALL tasks that are unique to smart phones and can be used from a simple interface, as seen in various dictionary apps. It may be the case that the learning of the future is something that is downloadable as an 'app' to the students' mobile devices.

At the same time, in order to sustain the current mode of tertiary learning, which demands students to synthesise and create new knowledge, learning contents to encourage quiet thinking and learning time is also necessary. Strategies to use mobile devices for such purposes should also be considered.

The future surveys will need to incorporate questions specific to user interface as this appears to affect students' willingness and frequency to access information on smart phones. To see the changing landscape of technology use by students, a continued study of similar kind is ideal in order to determine how best to incorporate technology in the teaching at higher education level.

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¹ At the time of writing, iPad WiFi only model with 16GB memory is sold for A\$539, and WiFi + 3G model is sold for A\$679. Smart phones in Australia can be purchased from under \$50 plus appropriate network usage fee for calls and data communication.

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