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# Technology in Language Teaching & Learning

ISSN 2652-1687

<https://journals.castledown-publishers.com/tltl/>

*Technology in Language Teaching & Learning*, 1 (1), 33-51 (2019)  
<https://dx.doi.org/10.29140/tltl.v1n1.152>

## Insights from Replication on the Factors Affecting Task Engagement in Mobile-based Learning Activities



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### Abstract

Despite the large amount of research that has taken place with mobile devices for language learning over the years, there are still limited conclusions that can be reached as to what contributes to sustained task engagement. A common problem that has long been seen in the CALL literature is that many tasks and activities that are reported are small scale studies taking place in a single environment with a limited number of subjects, often as a result of teachers investigating the outcomes of their own teaching (see Warschauer, 1997; Hubbard, 2005). Given the nature of the environments in which many teachers find themselves, it is in some way inevitable that studies tend to be of a smaller scale and often undertaken within a single class. It is possible to gain deeper insights into the tasks used through replication studies (Porte, 2012). This paper discusses the potential insights gained from replicating approximately the same basic language learning tasks in varied contexts. Research on vocabulary and listening tasks was carried out in Japan over an 8-year period from 2010 through 2017 for Japanese learners of English. In addition, the same tasks were adapted for Australian learners of Japanese in 2012 and Taiwanese learners of English in 2013, with a total of 420 participants. Data were collected through post-treatment surveys, semi-structured interviews and server logs recording the times spent on the tasks, the scores achieved, and the devices used to engage in the tasks. The same methods of data collection were used in each of the studies, using primarily the same tasks apart from adaptations made for developments in technology and for the different language learning contexts. Carrying out the same tasks in subsequent years with increasingly newer technologies and with teachers and learners from different cultural backgrounds provided insights into the effect of the context, the technology, and role of both teachers and learners in successfully implementing the tasks.

**Keywords:** mobile learning, replication studies, learner training, impact of technology

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**Data Availability Statement:** All relevant data are within this paper.

## Introduction

The hopes held by many for mobile technologies in second language teaching and learning have remained consistent over the past two decades, as mobile phones and other portable devices have become increasingly available to teachers and learners alike. There has been a growing body of research that examines the various ways in which mobile technologies have been used in language learning environments (see Burston, 2012; Duman, Orhon, & Gedik, 2015), revealing a range of novel and innovative methods that are able to capitalize upon the affordances of mobile technologies. Results in general have been rather positive in terms of learner engagement and general attitudes according to survey data, but questions remain as to whether this positivity is an actual reflection of how mobile technologies are used and viewed by learners in the real world.

In some ways, expectations by teachers and researchers have been overly optimistic and as such have not been an accurate reflection of the realities associated with learning through mobile devices (see Stockwell & Reinders, 2019, for a discussion). The reasons for this lack of enthusiasm are varied, but revolve primarily around a lack of knowledge of how to use the tools (Stockwell, 2008), the learning environment (Wang & Higgins, 2006), and a lack of general training in the technology for learning purposes (Stockwell & Hubbard, 2013). These results have been widely supported by a number of studies over the years, suggesting that while technologies have great potential, there still remain issues that need dealing with before greater acceptance is possible on a greater scale.

Understanding the factors that lay behind learners' willingness to use their mobile devices for learning purposes has been proven to be more difficult than it appears on face value. Physical problems of mobile devices have been frequently cited as a problem (see Wang & Higgins, 2006; Stockwell, 2008), but does this mean that as mobile devices increase in screen size, storage, and battery life that learners will be more willing to use them proactively for their learning? Furthermore, what role does the teacher play? Can the teacher encourage learners to see the value of mobile-based tasks in a way that would impact their actual usage? What are the features of the learning environment itself that can contribute to a shift in learner attitudes towards that will make them more likely to engage in language learning tasks on mobile devices, and are there inhibiting factors that reduce the willingness of learners to use their mobile devices for learning? These are just some of the questions that have plagued research into mobile learning with regards to the gap between elicited attitudes towards mobile learning and empirical evidence into their usage. These have also served to demonstrate that learning through mobile devices requires a realistic perspective, where the myth of technology ownership as a predictor of engagement just simply does not seem to hold true (see Healey, 1999, for a discussion).

## Realities of Mobile Learning

There has already been a growing body of research that has investigated the use of mobile devices in language teaching and learning, and these have started to reveal that simply making teaching and learning tools available on mobile devices such as mobile phones is unlikely to have a direct influence on whether learners will actually use them. The physical characteristics of mobile phones have often been cited as being a limiting factor with regards to their uptake for learning purposes (e.g., Koole, 2009) where key factors such as screen size, inputting, battery life and storage are thought to have a negative influence on use of mobile devices for educational purposes. While screens have increased in size over the decade since the emergence of the smart phone on the market, issues of battery life and storage are still very relevant, in many cases with battery life being cited as being even more of an issue than it was in the past (Klímová, 2018). These physical characteristics of mobile devices also often results in many of the resources that are available on mobile devices being "stripped down" versions of PC-based resources (Squire, 2009, p. 71), meaning that they may be limited in their

educational value.

Another key issue regarding learner use of mobile (and other) technologies for language learning has been the fact that most learners simply do not possess the skills that they require to use them effectively for learning. Researchers and teachers are starting to see the need for training that goes beyond just the technical aspects but also actively strives to provide learners with strategies using the technology for learning particular (cf., Romeo & Hubbard, 2010; Stockwell & Hubbard, 2014). Although it is easy to make assumptions about learners being more capable users of technology than their teachers, this viewpoint is quickly losing ground (e.g., Lai & Hong, 2014), and assumptions that learners can use mobile devices for private uses should not be applied automatically to learning uses (Stockwell, forthcoming). Kim *et al.* (2012), for example, found that learners in a graduate school TESOL class failed to engage in activities as much as was expected, the primary reason being a lack of experience and skills with using the mobile apps for the learning purposes required of them. The tools themselves were YouTube and VoiceThread, which in themselves are relatively widely used for private purposes, but the skills that these learners had from their private experiences did not equip them sufficiently to use them effectively for learning. Thus, engagement in language learning tasks through mobile devices is dependent upon factors that relate directly to knowing how to use them to learn, but as is alluded to in the previous section, in order to understand how to get learners to actively undertake language learning tasks, we need to explore what task engagement is, and examine some evidence that might provide some preliminary responses to the question of how to sustain it.

### **Complexities of Task Engagement**

What the term engagement actually refers to has been a topic of some interest over the past several years, in part prompted by discussion in the seminal work by Philp and Duchesne (2016), building on ideas proposed by Christenson, Reschly, and Wylie (2012). While most teachers would have a general view of engagement as the way that learners undertake particular tasks and activities, most widely seen in terms of the amount of time spent on them. This in itself is not problematic, but as Philp and Duchesne (2016), point out, engagement can be seen in far more complex terms than this. Broadly, they define engagement in terms of four main interrelated and interdependent areas: behavioural, cognitive, emotional, and social. Behavioural refers to making undertaking the task a part of a routine and includes the amount of time spent on the task itself. It does not infer a deeper interaction with the materials, but rather just the intent to complete them. Cognitive engagement includes the idea of learners seeking to learn as a result of the tasks, that is, that learners require some degree of mental effort where they sustain their focus on the given tasks in order to achieve this. Emotional engagement entails feelings and is directly related to the affective aspect of learning, such as enthusiasm, interest and enjoyment (Skinner, Kinderman, & Furrer, 2009). The last type of engagement, social engagement, refers to how learners interact with one another and the teacher as a part of undertaking the task.

Consideration of each of these different types of engagement can shed some light on the ways in which learners undertake tasks on mobile devices. Typically time on task (largely behavioural engagement) has been the most widely viewed element of examining how learners engage in language learning tasks, but going one step further to consider the reasons behind them from other perspectives such as cognitive, emotional, and social can enable researchers to prepare the conditions required for more active and meaningful use of materials that learners have access to.

### **Task Replication**

While research into the use of technology in language teaching and learning has come a long way in the past two decades, it has been pointed out by several researchers over the years that there are still

limitations. An often-cited problem with conducting research in language learning—and it seems to be particularly pertinent with regards to learning with technology—is the lack of subjects that are available, often resulting in small-scale studies becoming the mainstream (Hubbard, 2005). This results in teachers investigating the outcomes of their own teaching (Warschauer, 1997), typically with limited numbers of subjects in fixed contexts. The longevity of studies is often related to the duration of relevant funding (Stockwell, 2012), meaning that once the funding is exhausted, further relevant research also seems to stop. Felix (2005) has also lamented the fact that we see calls for follow-up research that don't eventuate, meaning that data remains relatively limited and the depth of research required to get a better understanding of what is happening while undertaking learning tasks and activities fails to appear.

This is, to a certain degree, unavoidable. In most cases, researchers (particularly those who are researching their own teaching and learning contexts) are limited by the number of students that they have access to, and it just simply is not viable to have larger groups for logistical reasons such as maximum class sizes or the number of classes that they are able to teach. In order to offset this difficult, an area attracting more attention in recent years has been replication of research (see Porte, 2012). Replication research can take various forms, starting from *exact replications* where all conditions are kept the same, *approximate replications* where some conditions are altered such as the subjects or the context, or *conceptual replications*, where one variable or one measurement is altered to assess generalisability. In the social sciences, exact replications are extremely difficult to achieve (Chun, 2012), with conditions natural changing over time. This is even more pertinent when technology is involved, because technological developments happen at such a fast pace that even several months between one study and another is likely to see some kind of change, particularly when learners are using their own technologies. Approximate and conceptual replications can, however, enable researchers to get access to a larger set of data that can enable them to build upon theories or hypotheses that have been formulated from earlier research, and these replications have formed the foundation of the current study as described below.

### The Current Study

The purpose of the current study was to examine studies carried out using a comparable intelligent online tutor system to determine what factors may have played a role in enhancing learner engagement in learning activities that could be carried out using mobile phones. Data were collected over eight years in different contexts, as can be seen in Table 1. Seven of the studies were carried out in Japan, with one in Taiwan and one in Australia. All studies apart from the one in Australia used the same basic materials with supplementary materials in either Japanese (Japan) or Chinese (Taiwan).

**Table 1** List of all studies covered in the current analysis

Study No.	Year	Location	Language	%age SP	Subjects
1	2010	Japan	English	25.7%	39
2	2011	Japan	English	40.0%	45
3	2012	Japan	English	61.4%	57
4	2012	Australia	Japanese	66.7%	21
5	2013	Japan	English	90.2%	49
6	2013	Taiwan	English	87.8%	123
7	2014	Japan	English	100.0%	41
8	2017a	Japan	English	100.0%	18
9	2017b	Japan	English	100.0%	27
				<b>TOTAL</b>	<b>420</b>

Specifically, the factors that were under examination were the technological differences, teaching differences, and the environmental differences. Technological differences were selected because of the change over time in smart phone technology, which increased from one quarter of students in 2010 through to all students in 2013 and 2017. It should be noted that the reason for the break in 2015 and 2016 from the project was that the researcher was on sabbatical and not teaching the classes during those two years. Teaching differences were focused on because of differences that became apparent in the way that the researcher conducted his own classes as well as the variation in the way that the teachers in Taiwan and Australia conducted their classes with regards to technology usage. Environmental differences focused specifically on the differences that were seen in the three different countries in which the studies were carried out, as well as the gradual changes in environment that were observed by the researcher in Japan.

Specifically, the research questions addressed in the study are as follows:

1. What is the effect of technological developments on task engagement using mobile devices?
2. What is the effect of teaching differences on task engagement using mobile devices?
3. What is the effect of the greater environment on task engagement using mobile devices?

In all cases, it should be pointed out that it was realised that the scope of the study was limited in that technological developments referred mainly to the spread of smart phones and other related changes (i.e., the cost of Internet access, etc.), and that teaching differences was the result of individual differences between the three teachers who used the system and the changes in teaching method by the primary researcher. The environment looks at the system used in Tokyo (a large metropolitan region in Japan), Tainan (a small city in Taiwan), and Melbourne (a mid-sized metropolitan region in Australia), which limit generalisability but do provide potential insights into the problems that might be faced in varying contexts. The methodology is described in the following section.

## **Methodology**

As described above, the current analysis examines the longitudinal use of an online intelligent vocabulary that was initially created by the researcher in 2007 and gradually updated as mobile technologies evolved. The basic technology used for the project was essentially the same, created using PHP and MySQL that could be accessed either from mobile devices (i.e., mobile phones or tablets) or computers (desktop or laptop). As smart phones became more widespread, this system was also made available as a web app, where learners could access the system with a single click on an icon on their smart phones. Encoded information about the users was stored on the server, meaning that learners can switch between mobile devices and computers seamlessly, where the system would know exactly how far they had advanced through a particular lesson and they could pick up on one device where they had left off on another. The study was carried out with students predominately in Japan with Japanese learners of English in courses taught by the researcher, however there one course carried out in Australia and another carried out in Taiwan using the same system, but adapted for the learners in those particular environments (i.e., learners of Japanese in Australia and learners of English in Taiwan).

The system itself has been described elsewhere (e.g., Stockwell, 2010; Stockwell & Liu, 2015), so only those points most relevant to the current study will be mentioned here. The content of the vocabulary system was used as a supplement to video and listening materials covered in the classes in Japan. The same materials that were used in Japan were also used in Taiwan, however the Japanese explanations were translated into Chinese. A different set of materials was used in Australia for the learners of Japanese, but the same fundamental idea of the vocabulary being a supplement to listening

was maintained. This system was intelligent in that it adapted to each individual learner depending on how they performed in the ongoing activities. The activities included multiple choice to select the best word to fit a sentence, definition matching, and writing out the full word to fill in gaps in sentences. Passive tasks (that is, where learners simply selected words) appeared first, followed by more active tasks, where the learner was required to write out full words rather than simply recognizing them. In the earlier versions of the system (until 2013), the system required learners to complete one unit before they were able to go on to the next, but this was removed from 2014 based on learner requests.

## **Subjects**

As described above in Table 1, subjects were a total of 419 students at universities in Japan (n=275), Taiwan (n=123), and Australia (n=21). Learners in both Japan and Taiwan were studying English as a non-major, with the English course they were enrolled in being a compulsory subject to complete their degree. The emphasis of the courses in Japan was listening and speaking, while the class in Taiwan was a multi-skill general English class. The students in Japan had an average TOEIC score of around 400 to 450 (pre-intermediate), while the learners in Taiwan had an average of around 300-400 (post-beginner). Students in Australia were in a post-beginner Japanese course which they were taking as an elective (i.e., non-compulsory) course. Learners in all the courses were told that they could use the system as a support for their in-class study, and the choice to use the online was left up to the students. It was later found that the teacher in Taiwan had required the learners to engage in the online materials, with a grade being awarded for each unit completed. In all cases, the learners were given the option to use either PC or mobile devices depending on their own individual preferences. The learners in Taiwan were also able to complete the activities on either platform with no difference in the grade awarded. The completion rates for the units were near 100% for all cohorts, despite the fact that they were not required in Japan or Australia but were recommended to complete them in order to help them with their week-by-week assessment in class.

## **Data collection**

Despite the fact that there were multiple studies carried out over an eight-year period, the data collections methods were kept as consistent as possible to allow for some comparison across the different years and contexts. As described above, however, it is understood that these are approximate replications, and that there were differences that appeared as a result of the varying contexts in which the studies were carried out. Data were collected through server logs that recorded user activity as the learners engaged in the activities through either their mobile devices or computers, including the device that was used, the time that the learners spent engaged in each individual task, the scores for each task, and the actual responses to each question posed by the system, allowing the researcher to see each individual learner's strengths and weaknesses in the vocabulary. Because the listening was done through the class Moodle, it was possible to see when the learners accessed the listening passages there, but since many of the learners downloaded the listening to their individual devices, it was not possible to track how often they continued to listen to the activities once downloaded. As a result, listening data were excluded from the current study. In addition, pre-surveys and post-surveys were conducted with each cohort of students to obtain basic demographic information about the learners and to find out about their experiences in using technology (including mobile devices) for language learning and their expectations for using their mobile devices—specifically mobile phones—for learning during the course. All classes were observed by the individual teachers as well, who kept records of how the learners used and interacted with the technology in class and questions and other concerns that learners raised with regards to carrying out the tasks outside of class. Interviews were conducted at the end of each course with volunteers to get more detailed information regarding learner attitudes towards the use of mobile devices for language learning and suggestions for improvement for later courses.

## Data analysis

The results for each course were calculated individually, and it wasn't until completion of the course in 2017 that the results of each semester were collated. Demographic information allowed comparisons with regards to the technologies that were owned by the participants in each course, and this also allowed for identification of the categories that formed the centre of the current study, differences in technology, teaching, and the environment. Given the approximate nature of the replications of the different courses, statistical comparisons were just not considered as having sufficient reliability, so they have not been included in the current study. The results of the various comparisons are provided forthwith, along with the relevant discussions. It should be noted that not exactly the same data have been provided here for each of the comparisons due to space limitations, so only the data that were considered to be most relevant to that particular comparison have been included.

## Results & Discussion

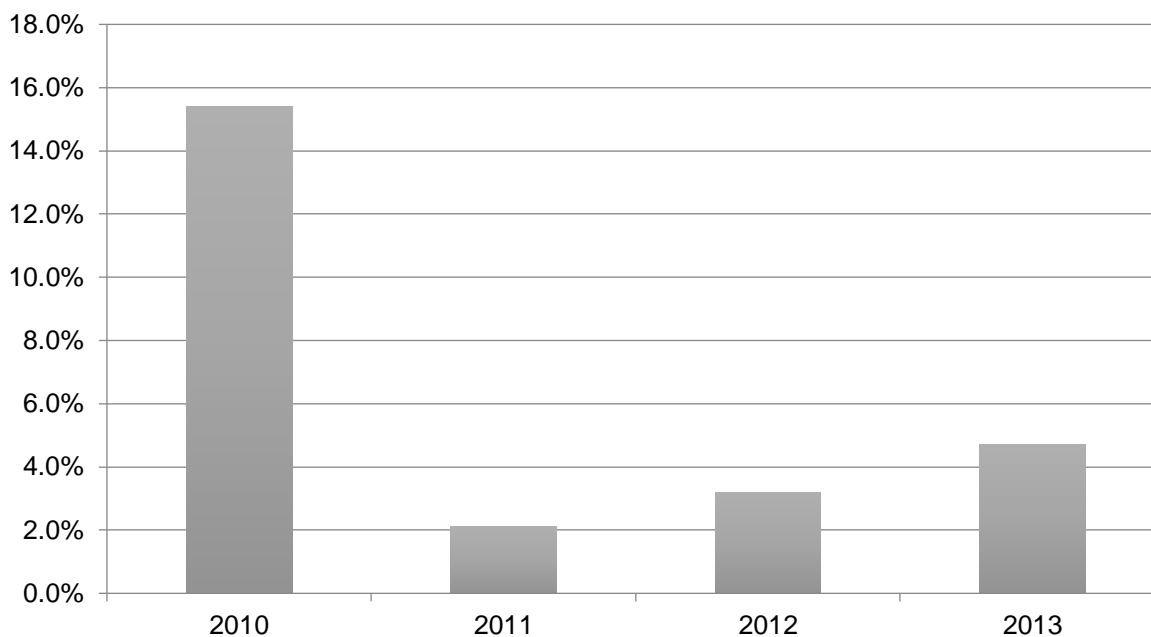
### Technology differences

Four studies from Japan were selected as they were held under moderately consistent conditions, with the primary difference being the advancements in technology that occurred over the years. The research follows on from results presented by Stockwell (2010) that shows data from 2007 through to 2009, which was before smart phones started to be widely used by university students. The four studies in the current study (see Figure 2) were chosen as they demonstrated a steady increase in smart phone ownership from 2010 (25.6%) to 2013 (90.2%). Data from 2014 and 2017 were not included, as a different teaching approach was introduced that was thought to have had a major impact on the ways that the learners engaged in the learning activities. These are covered in the following point on differences in teaching.

**Table 2** *List of studies compared for technology differences*

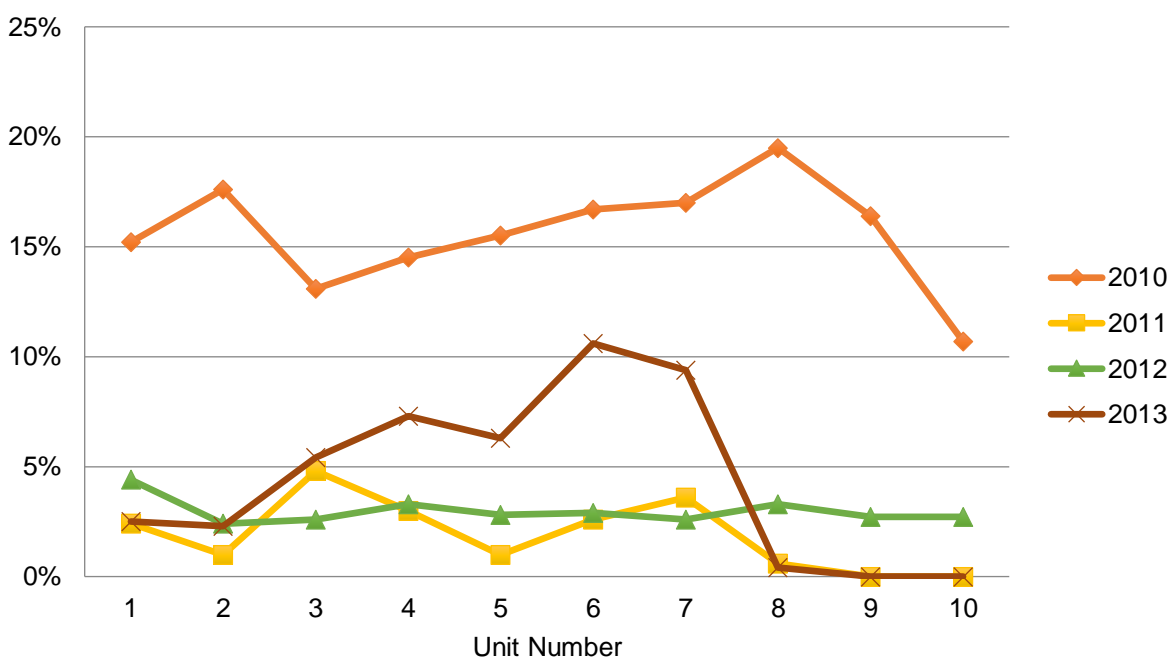
Study No.	Year	Location	Language	%age SP	Subjects
1	2010	Japan	English	25.7%	39
2	2011	Japan	English	40.0%	45
3	2012	Japan	English	61.4%	57
5	2013	Japan	English	90.2%	49
				<b>TOTAL</b>	<b>190</b>

An initial measure was made to determine the number of activities that were carried on mobile phones. As was the case with all of the cohorts in the studies listed in Table 1, learners had the option to use either their mobile devices or their computers in order to carry out the activities. It should also be pointed out again that learners were not forced to engage in any of the online activities at all if they so desired.



**Figure 1** Percentage of activities carried out on mobile devices (technology differences)

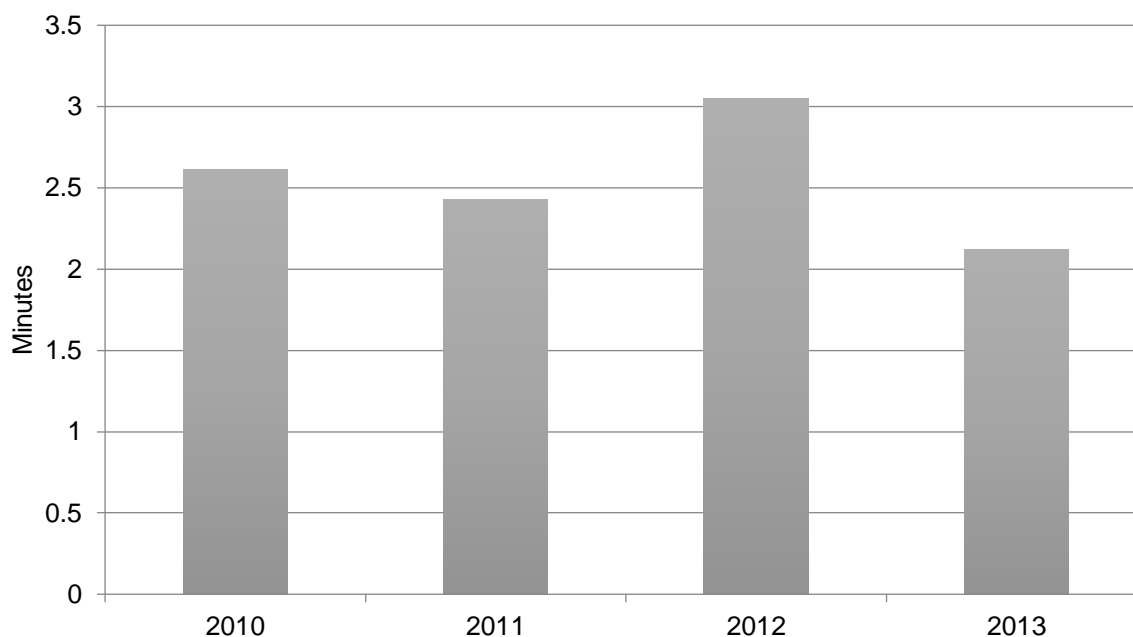
The most surprising point with the current study was the remarkably high proportion of activities that were carried out on mobile devices with the 2010 cohort, reaching as high as 15.4%. The figures from 2011 through to 2013 were far more indicative of the percentages shown in previous years (see Stockwell, 2010), so this figure was completely unexpected. One observation that could be made from this year was that the group in general was an exceptionally high-performing group who excelled in other subjects as well as English, so they may have just been a more “motivated” group than other years. Generally, there appeared to be little effect from the increase in smart phones over the four years, with just a very slight increase but still under 5% smart phone use with the exception of 2010.



**Figure 2** Percentage of units completed on mobile devices (technology differences)



Despite the differences in the amount of activities carried out on mobile devices, there were some similarities that were evident as well (see Figure 2). Namely, there tended to be a drop off in mobile device usage towards the end of the semester, as seen from Units 9 and 10. The 2012 cohort was the only exception to this that remained relatively consistent throughout the semester, whereas the drop was seen to reach almost zero in 2011 and 2013, and a marked reduction even in the 2010 group to levels far below those seen in the earlier units. When asked about this in the post-treatment interviews, a number of the students indicated that they were using their computers for other subjects at the end of the semester, so since they already had their computers switched on, they just felt it made more sense to do the vocabulary activities on the larger screens of the computers rather than the mobile phones.



**Figure 3** Average time spent per activity on mobile devices (mins) (technology differences)

Regarding the amount of time that the learners spent engaged in the activities, the results showed that there were not great differences, particularly as a result of the technology. Learners spent more time per activity on average in 2012 than the other years, despite the fact that smart phone ownership was at just over 60% compared to 40% in 2011 and 90% in 2013. Should smart phones be easier for learners to engage in the activities (as a result of the touch screens instead of scrolling with a small “joystick” which was a feature of GSM phones in Japan at the time), it might be expected that there would be a steady decrease from 2010 through to 2013. Comparisons of the learners using smart phones compared with those using GSM phones revealed remarkably similar patterns for the years studied, meaning that there appeared to be little effect of the use of smart phones on the amount of time that learners spent engaged in the tasks on their mobile phones. It is possible, however, that there are other unseen factors at work as well, where learners in different years simply exhibited different study habits that resulted in variations in the different years. The students in 2010 certainly were more “chatty” with one another and the teacher than had been evident in other years, which may have led them to use the tasks more actively than other cohorts.

### Reflections on technology

The results revealed that there did not appear to be any great impact as a result of the emergence of

smart phones, at least in terms of learner preferences to use their mobile phones in preference to their computers to complete activities and the amount of time spent completing the activities. There were variations over the years, but given the relatively random nature of these differences, it is highly unlikely that they could be attributed to the increasing ownership of smart phones. It should be pointed out, however, that the technology that was used from 2010 through to 2013 was a web-based interface created using PHP and MySQL, but from 2013 a web app was added so that learners with smart phones could use this rather than the existing web-based interface. As the results demonstrated, however, it did not appear to make any great difference to the engagement in the activities.

When asked about their perceptions of the activities, a large proportion of the learners indicated that they felt that the mobile phone was really no more than an “emergency” tool for studying when the PC was not available. This in itself is not a negative outcome, as it does indicate that the learners are making conscious decisions about when to use or not use mobile technologies, but the small amount of mobile phone usage would seem to indicate that there were other times that learners could be engaging in the activities when PCs were not available that they were not capitalising upon. This being the case, it might be thought that emotional engagement with the technology in mobile phones may be rather low, and learners felt that there was a greater amount of cognitive engagement in doing the activities on PC compared to mobile phones. In saying this, the 2010 group’s exceptional time spent on the mobile tasks may show that there was some kind of underlying factor that contributed to learners exhibiting other forms of engagement that were difficult to determine, such as emotional engagement as they found the tasks to be particular interesting, or social engagement such as wanting to please the teacher.

The differences in engagement, then, are most likely due to other factors such as the motivation of the learners with regards to their English language studies in that particular year, or possibly even due to differences in the way that the teacher presented the activities to the learners and encouraged them to use them throughout the semester. Even though there were no conscious differences between the years, it is likely that there was some variation in the explanations or methods used by the teacher that had an unforeseen impact on engagement.

### **Teaching differences**

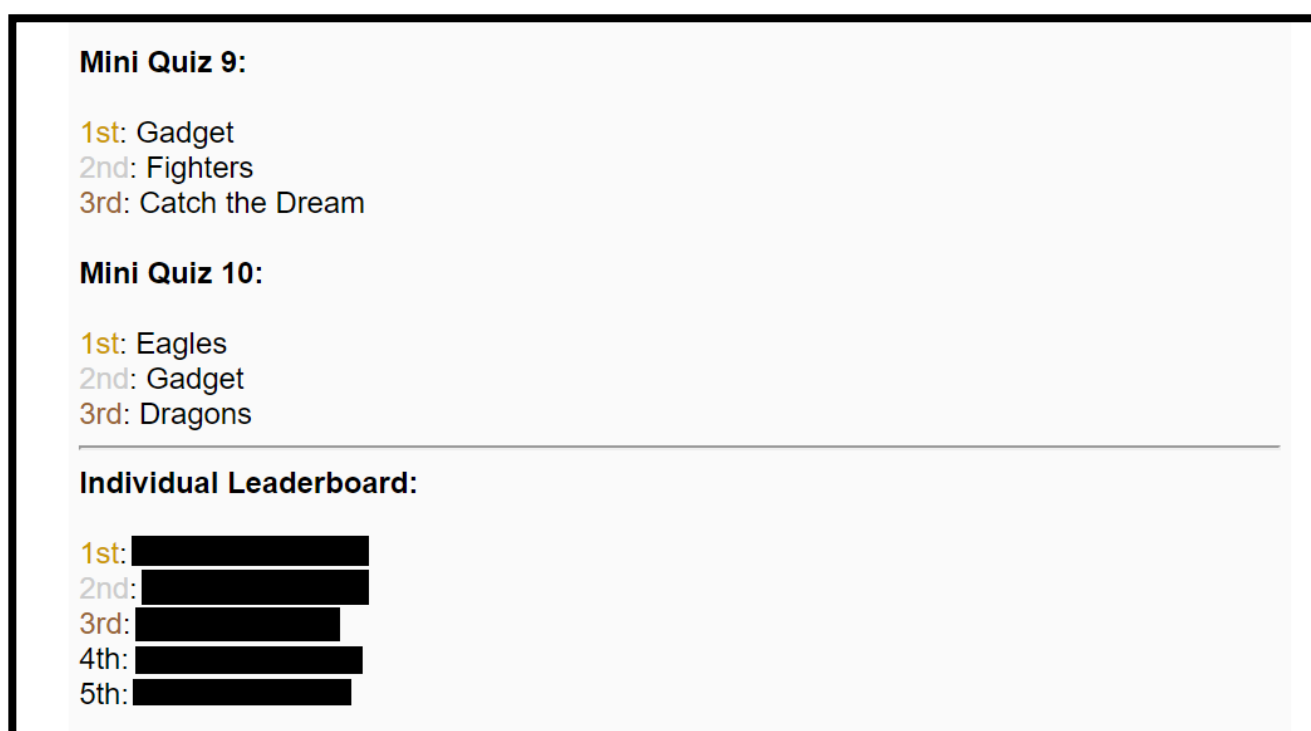
As with technology differences, the four studies were all selected from Japan as the environment itself was largely the same, with the primary variation being in the teaching methods (see Table 3). The data from 2013 were included as a baseline comparison, as it included the teaching approach that had been used primarily from 2010 onwards, but from 2014 active training was introduced that built upon the work of Romeo and Hubbard (2010) that included technical, strategic, and pedagogical training. A more detailed description of these types of training can be seen in Hubbard and Romeo (2012), but briefly, technical training describes how to use the technology, strategic includes the specific strategies for using the technology to develop particular language skills and areas, and pedagogical training requires learners to reflect upon and evaluate their strategies and teach these to others. Technical training had always been a central part of using the technologies from the outset, even predating the current study, but a more integrated style of training that required learners to learn new strategies and see how to apply them to their own learning became the feature of all studies after 2013.

In the 2014 and 2017a studies, the same basic teaching approach was used that was built upon the training model, but a competitive component was added in 2017b, where learners competed with one another at an individual and group level. The competitive component meant that learners’ scores in the weekly quizzes that was based on the vocabulary and listening from the previous week. Learners were asked in advance if they agreed to participate in the competition at the beginning of the semester, and

all learners were happy to take part.

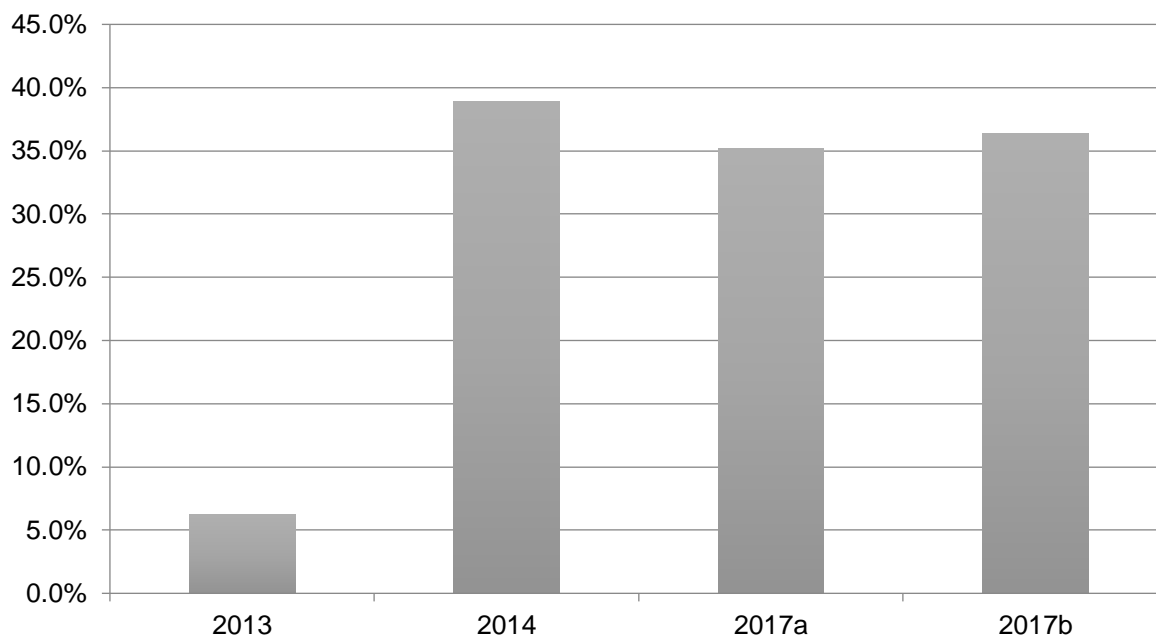
**Table 3** *List of studies compared for teaching differences*

Study No.	Year	Location	Language	%age SP	Subjects
5	2013	Japan	English	90.2%	49
7	2014	Japan	English	100.0%	41
8	2017a	Japan	English	100.0%	18
9	2017b	Japan	English	100.0%	27
				<b>TOTAL</b>	<b>135</b>



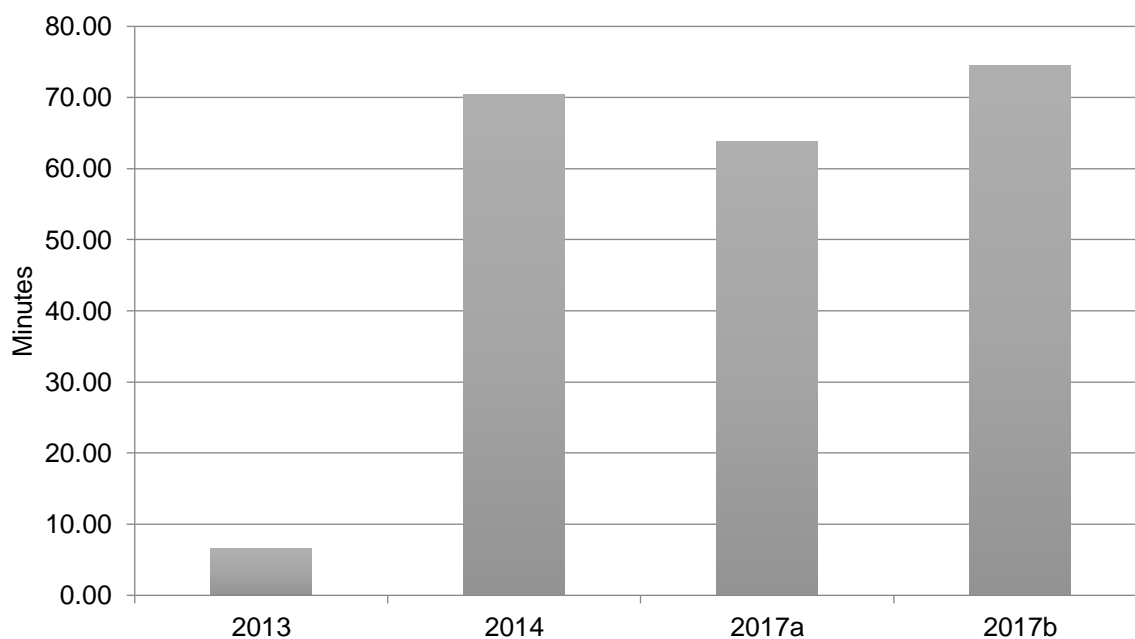
**Figure 4** *Example of the group (top) and individual (bottom) leader boards for 2017b*

The competition had two parts; firstly, the learners' scores for each weekly quiz were calculated, and the learners with the top five cumulative scores were listed on the course page of Moodle. The results were not visible outside of the class page, and only the top five students were listed, with the order changing slightly each week depending on the scores achieved in the weekly quizzes. The groups were assigned with three or four learners per group and named Group A through to Group G, and learners could assign any name they liked based on this letter. Unlike the individual competition, this was done week-by-week, so that the leader boards showed the three top-scoring groups for each week, as can be seen in Figure 4.



**Figure 5** *Percentage of activities carried out on mobile devices (teaching differences)*

As with the technology comparisons, mobile phone usage was calculated for each cohort, with the results presented in Figure 5. The results showed that there was an enormous impact as a result of the training (2014, 2017a, and 2017b) compared with 2013 despite the similar proportion of smart phones. One initial assumption was that as learners became more used to using their smart phones as a part of their daily lives, usage would increase (i.e., 2017 compared with 2014), but this did not seem to be the case. In fact, the figures were slightly lower in 2017 compared with 2014, indicating again that using mobile phones for private purposes is not a strong predictor that learners will engage in them for learning purposes. The competition element (2017b) seemed to provide a slight increase in the proportion of activities compared to the training only group (2017a), but the difference was negligible and as such difficult to state categorically that there was any real impact.



**Figure 6** *Total minutes spent on activities on mobile devices (teaching differences)*

As with the actual amount of time spent on the activities, the total amount of time also revealed a massive increase from just over six and a half minutes on mobile devices to more than an hour in 2014 and in both classes in 2017. Stockwell and Hubbard's (2014) study that compared the same 2013 and 2014 data presented here revealed that not only did the learners spend more time on mobile devices, but also that the 2014 cohort spent nearly three times the amount of time on the activities in general (i.e., including on PCs) when compared to the pre-training cohort in 2013. Similar results were also evident in the 2017 cohorts as well, with comparable amounts of time spent on the activities by the learners in both the training only group and the training and competition group. The competition group did in fact appear to spend more time on the activities on average than the training only, spending in all an extra ten minutes on the activities on average compared to the training-only group in the same year, which would indicate that there may have been some impact as a result of introducing this extra component. With the limited data available in the current study, however, any type of definitive outcome would be difficult.

### **Reflections on teaching**

While there are likely to be unseen aspects of teaching that also were present in the current study, it was clearly obvious from the current result that the impact of learner training on the learners' decision to engage in mobile activities was enormous, with a ten-fold increase in the amount of time that learners spent on engaging in the tasks on their mobile devices. Although technical training had been a key part of the teaching over the previous years, the addition of the strategic and pedagogical training changed not only how the learners used mobile devices, but how they engaged in the activities in general. The 2014 and 2017 classes saw the learners engaging in active dialogue about their own learning with other students, something that they indicated that they had had only very limited—if any—experience with in the past, and this also had the effect of changing the entire dynamics of the teacher-student- and student-student interaction. Learners were more willing to ask the teacher or each other about how to use the technology and even asked for extra strategies and even resources so that they could engage in activities after the course had completed.

This discussion also led to other less expected outcomes, although these were also considered as positive. Firstly, the learners had rarely given much feedback to the researcher about the system in terms of what they saw needed improving, but in 2014 (and again in 2017) there were several learners who clearly articulated what they saw as making the system easier for them to use. Where possible, these changes were made for learners, and included being able to do the units in any order (previously they needed to be done consecutively), and to increase or decrease the number of questions that appear on a single screen. It is of course conceivable that this had an impact on improving learner engagement after the changes were made, but a look at the data did not reveal any particular increase after being changed.

Finally, the competitive element may have some impact on total time engaged in activities, and learners did seem to be more concerned about their scores than in previous cohorts. For example, learners indicated that they were happy to see their group listed in the leader board, and if one learner in the group scored badly in a particular week, they apologised to the other learners in the group as they brought down the group average. This did take place in a rather light-hearted manner, but it still revealed a desire to score well as a part of a team. It was positive to note that every group came out in first place at least once during the semester, sometimes to the surprise of the members themselves. In the individual leader board, learners who were top placed showed disappointment when they dropped from top to second place, or if their names disappeared from the list completely. Thus, competition did seem to have a positive impact overall on learner attitudes towards task engagement, and this was

reflected in increased use of their mobile devices as well.

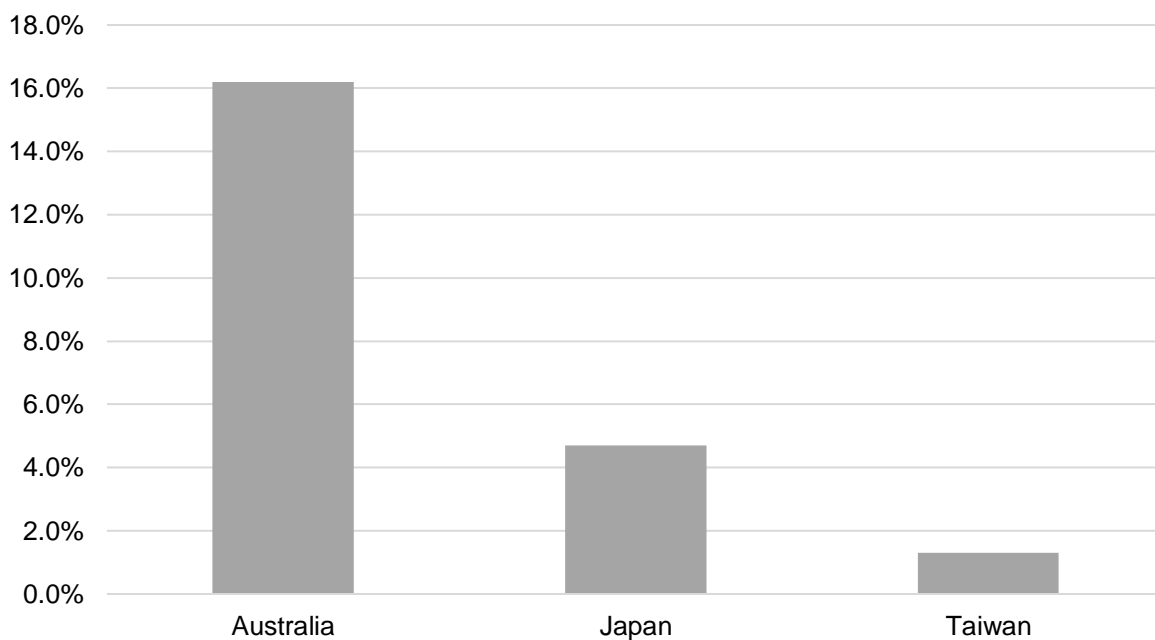
### Environmental differences

The three studies that were selected to examine the environmental differences were chosen on the basis of the fact that they were held in the same year but in different countries. As with the previous comparisons, the same basic system was used, but the primary difference was with the Australian system that used a different vocabulary and listening set from study in Japan and in Taiwan.

**Table 4** *List of studies compared for environmental differences*

Study No.	Year	Location	Language	%age SP	Subjects
4	2013	Australia	Japanese	66.7%	21
5	2013	Japan	English	90.2%	49
6	2013	Taiwan	English	87.8%	123
				<b>TOTAL</b>	<b>193</b>

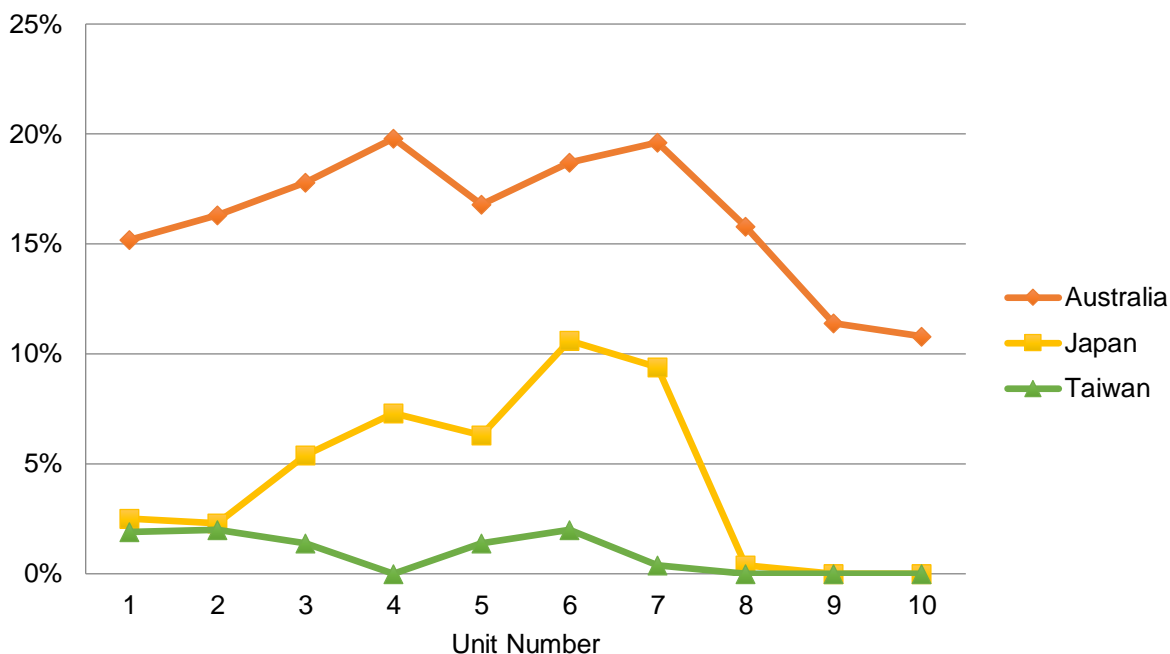
As can be seen in Table 4, there was a smaller percentage of smart phone ownership for the Australian students compared with the Japanese and Taiwanese students, but several students who did not have smart phones did report having tablets. The large difference in the number of subjects in each study did make comparisons difficult in some regards, but the comparison did provide some evidence of the effects of the environment in each of these contexts.



**Figure 7** *Percentage of activities carried out on mobile devices (environmental differences)*

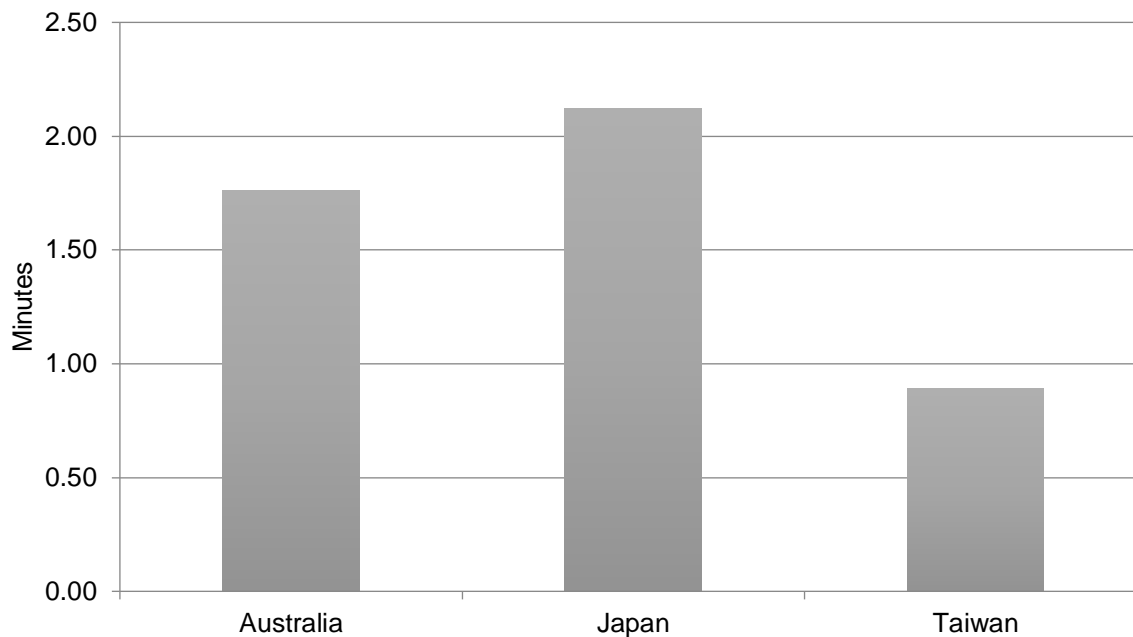
With the slightly higher percentage of smart phones owned in Taiwan, it was initially expected that the usage of mobile phones would be at least equivalent to, if not higher than, the figure from Japan, and Australia being somewhat lower. The outcome turned out to be rather surprising, with just 1.3% of activities carried out on mobile phones in Taiwan—less than one third of Japan—and over 16% in Australia, which was near four times the figure in Japan. Further checking of access showed that a large proportion of this was through tablets, but there was still consistent engagement in the tasks through smart phones and GSM phones as well. One factor that may have contributed to the much

higher engagement in the activities on mobile devices by the learners in Australia may have been the fact that Japanese was an elective subject for the participants, whereas English was a compulsory subject for students both in Japan and Taiwan. This fact in itself may have had an impact on the emotional engagement in the tasks, as learners in Australia felt that the activities may have been more relevant to them in terms of their desire to actually learn Japanese for future communication and/or work-related purposes.



**Figure 8** *Percentage of units completed on mobile devices (environmental differences)*

When viewed across the semester (see Figure 8), the drop off in usage at the end of the semester was consistent across all three environments, and the reasons cited by learners were largely the same, that is, that they were busy with other subjects which required them to use their computers, so it made more sense for them to use the computer because of the larger screen and ease of inputting. The extremely low engagement in the tasks in Taiwan was somewhat unexpected, so it was necessary to investigate the features of the environment that caused this. Survey results are documented in more depth in Stockwell and Liu (2015), but one difficulty that learners in Taiwan faced was that they predominantly commuted by scooter, and as such they were not able to use their mobile devices as they commuted in the same way as the learners in Japan did. Another interesting factor that became apparent that was not known at the outset of the study was that in order to maximise learner engagement, the teacher in Taiwan made the activities a requirement for the learners in her class. This turned out to be a significant change, because the different framing of the activities may well have resulted in different attitudes towards them on the part of the learners. Whereas in Japan, the activities were framed as being a support for learning, making the activities compulsory meant that the ultimate goal of the learners was simply to complete them. This factor also seemed to be reflected in the amount of time that the learners were prepared to spend on the activities, as seen in Figure 9.



**Figure 9** Average time spent per activity on mobile devices (mins) (environmental differences)

The learners in Taiwan spent by far the least amount of time per activity when compared with the learners in Australia and in Japan, spending on average just 53 seconds to complete them. Learners in Japan took the most amount of time at over two minutes per activity on average and the Australian learners spent around one minute and 45 seconds. A look at when the learners actually engaged in the activities showed that the Japanese and Australian learners were relatively consistent throughout the semester, largely using the activities to help them prepare for the weekly quizzes, whereas the learners in Taiwan had minimal access from after the first few weeks of the semester, and then worked on the activities intensively in the last week in order to receive the grade for completing them.

### Reflections on the environment

While the environment was ultimately affected by teaching to a certain degree, there were other factors that also had an impact on how the learners engaged in the activities. One of the most obvious of these was the use of public transportation, which impacted both the learners in Japan and in Australia. Commuting by train is considered as quite common in Tokyo and Melbourne, and learners took advantage of this commuting time by engaging in the mobile-based tasks. This would be expected to be the “ideal” use of mobile devices where learners can indeed make the most of small gaps in time to for learning, but it should be noted that these times are not universally available, and sometimes mobile devices might not be the most suitable available technology when learners do have time (i.e., if they are at home where they can access their PC).

The way in which the tasks were framed most certainly seemed to have an impact on the way in which learners engaged in them. If they were shown to be a part of an integrated whole, that is, as a support for learning materials covered in the class, it seems that learners were more willing to spend more time on them, including through their mobile devices. As a tack-on activity that was independently worth a grade seemed to cause learners to finish them very superficially, and indeed the completion rates for the learners in Taiwan were the lowest of all of the studies examined in this paper. Ensuring that learners can see why they are completing tasks could be thought as having a major impact on how they viewed and engaged in them. In terms of the engagement of the learners in Taiwan, it would appear



that they engaged in the tasks at a behavioural level, where completion was the predominant outcome rather than considering how they may relate to their own learning. This comparison also served to further confirm the comparative insignificance of smart phone ownership on task engagement through mobile devices, with the Australian learners being the most prolific mobile users of the three cohorts despite having the lowest ownership of smart phones. While of course this was made up for to a certain degree by tablets, the results do add weight to the argument that simply owning a technology is a poor indicator of how it will be used for learning.

The competition element also appeared to impact on the nature of the engagement. Whereas the training added a cognitive aspect to learner engagement in the tasks, competition seemed to add both emotional and social aspects, where the learners interacted with one another before and after (and sometimes during) task engagement, and felt part of a team attempting to achieve higher grades to appear on the class leader board. This would lead us to assume, then, that although there might not have been an enormous time difference with regards to the addition of competition to training, there was likely a difference in the type of engagement, with their being not only cognitive engagement but also social and emotional. This change would be thought to impact upon not only the time spent on tasks (to a certain degree) but also to the sustainability of task engagement.

### **Conclusion**

The current study looked at the use of mobile devices in comparable settings to try to shed light on the factors that lead to engagement in learning tasks through these mobile devices. The results of comparisons of the impact of technology, teaching and the environment itself do allow for some tentative conclusions. First and foremost, developments in mobile technologies appear to have only a very limited impact on learner engagement through mobile devices. As the study in 2010 in Japan and in 2013 in Australia showed, even those learners using less sophisticated mobile technologies exhibited comparatively high rates of mobile phone usage. Higher access to smart phones, as may be seen in Taiwan and Japan in 2013 still did not automatically lead to greater use of these mobile devices for learning purposes, making it possible to conclude that there must be other factors at play that have a greater impact.

The environment certainly does seem to have had some influence on task engagement through mobile devices, most obviously in terms of whether the learners were able to use their mobile devices during their commuting time. In large cities like Tokyo or Melbourne where there is solid public transportation infrastructure in place, task engagement through mobile devices appears to be more feasible. In contrast, where learners need to take their own transportation using scooters or cars, this time is just not available to learners in the same way, meaning that other gaps in time need to be found where learners have access to their mobile devices, and that these devices are the logical choice for that given context. This does lead us to very important questions about the nature of learning through mobile devices. Regardless of the design of the tasks themselves, if learners do not find that they have the physical space or time in order to use their mobile devices, it is difficult to expect that their mobile device will be a viable option for learning, particularly if other devices are available.

In the current study, at the very least, it appears that the role of the teacher is the greatest with regards to encouraging learners to use their mobile devices to engage in language learning tasks. Of these providing learner training where learners can reflect on their own strategies using their mobile devices seems to directly influence how willing learners are to use them actively. Once learners understand precisely *how* to use their mobile devices to learn, they are far more likely to spend time engaging in meaningful learning tasks and activities with them. Teachers need to provide ongoing training to facilitate this in class time, but this use of class time might be considered as a wise investment of

available time and resources to lead learners to spending time outside of class more effectively. The role of the teacher can be extended to include how the teachers frame the tasks, that is, whether they show them as integral or supplementary, and the addition of other elements such as competition can also help to “kickstart” learners into engage in the activities. Competition—at least in the current comparisons—did not seem to have an enormous influence, but learners did seem to want to take more responsibility for their study so that they did not let down their classmates.

The overall picture of factors leading to task engagement through mobile devices remains unclear in many regards, and the current study is only able to shed some light on the potential factors within the relatively limited contexts described here. The results do, however, provide positive evidence that the teacher’s role is likely the most important factor contributing to how learners view and engage in mobile learning, and at the same time show us the dangers in placing too much emphasis on technological advances. The main conclusion that can be drawn from this study is that teachers need to be very much aware of what their learners can and cannot do with technology, and be willing to provide them with sufficient training to achieve the learning goals that they have in mind, while at the same time being aware that the given context in which they find themselves will have consequences on when and where learners can practically use their mobile devices as a part of their ongoing language learning.

## References

- Burston, J. (2013). Mobile-assisted language learning: A selected annotated bibliography of implementation studies 1994–2012. *Language Learning & Technology*, 17 (3), 157–225.
- Christenson, S., Reschly, A., & Wylie, C. (Eds.). (2012). *Handbook of research on student engagement*. New York: Springer.
- Chun, D. (2012). Review article: Replication studies in CALL research. *CALICO Journal*, 29 (4), 591–600.
- Duman, G., Orhon, G., & Gedik, N. (2015). Research trends in mobile assisted language learning from 2000 to 2012. *ReCALL*, 27 (2), 197–216.
- Felix, U. (2005). Analysing recent CALL effectiveness research—towards a common agenda. *Computer Assisted Language Learning*, 18 (1-2), 1–32.
- Healey, D. (1999). Classroom practice: Communicative skill-building tasks in CALL environments. In J. Egbert & E. Hanson-Smith (Eds.), *CALL environments: Research, practice and critical issues* (pp. 116–136). Alexandria, VA: TESOL.
- Hubbard, P. (2005). A review of subject characteristics in CALL research. *Computer Assisted Language Learning*, 18 (5), 351–368.
- Kim, D., Rueckert, D., Kim, D.-J., & Seo, D. (2013). Students’ perceptions and experiences of mobile learning. *Language Learning & Technology*, 17 (3), 52–73.
- Klímová, B. (2018). Mobile phones and/or smartphones and their apps for teaching English as a foreign language. *Education & Information Technologies*, 23 (3), 1091–1099.
- Koole, M. (2009). A model for framing mobile learning. In M. Ally (Ed.), *Mobile learning: Transforming the delivery of education & training* (pp. 25–47). Athabasca: AU Press.
- Lai, K.-W., & Hong, K.-S. (2014). Technology use and learning characteristics of students in higher education: Do generational differences exist? *British Journal of Educational Technology*, 46 (4), 725–738.
- Philp, J., & Duchesne, S. (2016). Exploring engagement in tasks in the language classroom. *Annual Review of Applied Linguistics*, 36, 50–72.
- Porte, G. (Ed.). (2012). *Replication research in applied linguistics*. Cambridge: Cambridge University Press.
- Romeo, K., & Hubbard, P. (2010). Pervasive CALL learner training for improving listening proficiency.

- In M. Levy, F. Blin, C. Siskin & O. Takeuchi (Eds.), *WorldCALL: International perspectives on computer-assisted language learning* (pp. 215-229). New York: Routledge.
- Skinner, E. A., Kindermann, T. A., & Furrer, C. (2009). A motivational perspective on engagement and disaffection: Conceptualization and assessment of children's behavioral and emotional participation in academic activities in the classroom. *Educational and Psychological Measurement, 69*, 493–525.
- Squire, K. (2009). Mobile media learning: Multiplicities of place. *On the Horizon, 17* (1), 70-80.
- Stockwell, G. (2008). Investigating learner preparedness for and usage patterns of mobile learning. *ReCALL, 20*(3), 253-270.
- Stockwell, G. (2010). Using mobile phones for vocabulary activities: Examining the effect of the platform. *Language Learning & Technology, 14* (2), 95-110.
- Stockwell, G. (forthcoming). *Mobile assisted language learning: Concepts, contexts, and challenges*. Cambridge: Cambridge University Press.
- Stockwell, G., & Hubbard, P. (2014). Learner training in mobile language learning. In J. Colpaert, A. Aerts, & M. Oberhofer (Eds.), *Proceedings of the 2014 CALL Research Conference* (pp. 320–322). Antwerp: University of Antwerp.
- Stockwell, G., & Liu, Y.C. (2015). Engaging in mobile phone-based activities for learning vocabulary: An investigation in Japan and Taiwan. *CALICO Journal, 32* (2), 299-322.
- Stockwell, G., & Reinders, H. (2019, forthcoming). Technology, motivation and autonomy, and teacher psychology in language learning: Exploring the myths and possibilities. *Annual Review of Applied Linguistics, 39*.
- Stockwell, G. (2012). Mobile-assisted language learning. In M. Thomas, H. Reinders & M. Warschauer (Eds.), *Contemporary computer-assisted language learning* (pp. 201-216). London & New York: Continuum Books.
- Wang, S., & Higgins, S. (2006). Limitations of mobile phone learning. *The JALT CALL Journal, 2* (1), 3-14.
- Warschauer, M. (1997). Computer-mediated collaborative learning: Theory and practice. *The Modern Language Learning, 81* (4), 470-481.

## Acknowledgements

This work was supported by a JSPS KAKENHI Grant Number JP18K00798 (2018-2020).

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